

**California Center for  
Sustainable Energy**

**Solar Water Heating  
Pilot Program:**

**Interim Evaluation Report**

***Appendices***

**FINAL**

Submitted to:

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# Appendix A

## Residential Survey—Participants

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**PARTICIPANT SURVEY  
ROUND 1  
CCSE SWH PILOT PROGRAM  
PROGRAM YEAR 2007**

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**INTRODUCTION AND FINDING CORRECT RESPONDENT**

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Hello, this is <INTERVIEWER NAME> calling from Itron on behalf of California Center for Sustainable Energy. This is not a sales call. May I please speak with &PROGRAM\_CONTACT? [IF NEEDED]: my understanding is that &PROGRAM\_CONTACT is responsible for making energy-related decisions at your home at &SERV\_ADDR – may I please speak with him/her?

**Q1**

<b>1</b>	No, this person no longer works/lives here	Q1B
<b>2</b>	No, this person is not available right now	Q1B
<b>4</b>	Yes	Q1C
<b>77</b>	No, Other reason (specify)	Q1B
<b>88</b>	Refused	Q1B
<b>99</b>	Don't know	Q1B

**Q1B**

[IF &PROGRAM\_CONTACT WILL NOT EVER BE AVAILABLE]  
May I please speak with the person most knowledgeable about the recent installation of a solar water heating system at this address? [IF NEEDED] We're calling to do a follow-up survey about your participation in the CCSE Solar Water Heating Pilot Program. The purpose of the survey is to assess how well the program met your needs and to make improvements to better meet those needs in the future.  
[IF NEEDED] This is a very important fact-finding survey among customers that have recently participated in the pilot program sponsored by the California Public Utilities Commission. CCSE is administering this pilot program to determine whether a statewide program would benefit California. We are NOT interested in selling anything, and responses will not be connected with you in any way. CCSE wants to understand how program participants think about and manage their energy needs.

77	There is no one here with information on that address/wrong address	T&T
1	Address correct/Continue Q1B until you find appropriate contact person	Q1C

**Q1C** [IF &PROGRAM\_CONTACT IS AVAILABLE]  
 Hello Mr/Mrs &PROGRAM\_CONTACT, this is <INTERVIEWER NAME> calling from Itron on behalf of the California Center for Sustainable Energy. Our records show that you participated in the CCSE Solar Water Heating Pilot Program, involving an installation of a solar water heater for &SERV\_ADDR on &INST\_DATE. Is this correct?  
 [IF NEEDED] We're calling to do a follow-up survey about your participation in the CCSE Solar Water Heating Pilot Program. The purpose of the survey is to assess how well the program met your needs and to make improvements to better meet those needs in the future.  
 [IF NEEDED] This is a very important fact-finding survey among customers that have recently participated in a pilot program sponsored by the California Public Utilities Commission. CCSE is administering this pilot program to determine whether a statewide program would benefit California. We are NOT interested in selling anything, and responses will not be connected with you in any way. CCSE wants to understand how program participants think about and manage their energy needs.

1	Yes, we participated in the program, and address is correct	Q2
2	There is no one here with information on that address/wrong address	T&T
3	Do not recall participating in the program	T&T

Before we get started, let me just ask you a few questions to see if you qualify for our survey:  
**Q2** Do you recall participating in the Solar Water Heating program from CCSE on or around &SURV\_DATE?

1	Yes	G1
2	No	Q2B
88	Refused	Q2B
99	Don't know	Q2B

**Q2B** It sounds like someone else at your location may be more familiar with your firm's participation in this energy management program? IF YES: Can you tell me who that person might be?

1	Yes, it was probably [NEW CONTACT NAME]	Q1B
77	No	T&T
88	Refused	T&T
99	Don't know	T&T

**GENERAL**

**G2** How long have you been at your current residence (where the SWH is installed)?

1	< 1 year	G3
2	1-2 years	G3
3	3-5 years	G3
4	6-10 years	G3
5	> 10 years	G3
88	Refused	G3
99	Don't know	G3

**G3** Do you own the system or is it a third-party-owned system?

1	Own	G5
2	Third-Party	G5
77	OTHER (Specify)	G5
88	Refused	T&T
99	Don't know	T&T

**G4** Did you have a SWH prior to this installation?

1	Yes	G4A
2	No	G5
88	Refused	G5
99	Don't know	G5

**G4A** If so, why are you replacing it?

1	Freeze damage	G5
2	Leaks	G5
3	Upgrading	G5
77	Other (Specify)	G5
88	Refused	G5
99	Don't know	G5

**G5** Have you applied for rebates through other CCSE or state energy efficiency programs?

1	Yes	G5A
2	No	G6
88	Refused	G6
99	Don't know	G6

**G5A** What type of equipment was that rebate for?

1	lighting	G6
2	appliances (specify type)	G6
3	heating/cooling	G6
77	OTHER (Specify)	G6
88	Refused	G6
99	Don't know	G6

**G6** How did you first hear about the Solar Water Heating Pilot program?

1	Chosen Solar Water Heating Company	G7
2	Different Solar Water Heating Company	G7
3	CCSE Print Advertisement (which one?)	G7
4	Television (CCSE SWH commercial, news stories, KPBS special, Rod Luck, Sustain San Diego special?)	G7
5	Newspaper Article (which one?)	G7
6	Radio (KPBS, Clear Channel, Sign on San Diego?)	G7
7	Internet (which website? KPBS, Sustain San Diego, CCSE, craigslist, San Miguel Fire District?)	G7
77	OTHER (Specify)	G7
88	Refused	G8
99	Don't know	G8

**G7** What type of marketing have you seen for the Solar Water Heating Pilot program? (select all applicable)

1	CCSE Print Advertisement (which one?)	G7A
2	Television (CCSE SWH commercial, news stories, KPBS special, Rod Luck, Sustain San Diego special?)	G7A
3	Newspaper Article (which one?)	G7A
4	Radio (KPBS, Clear Channel, Sign on San Diego?)	G7A
5	Internet (which website? KPBS, Sustain San Diego, CCSE, craigslist, San Miguel Fire District?)	G7A
66	NONE	G8
77	OTHER (Specify)	G7A
88	Refused	G8
99	Don't know	G8

**G7A** What did you think of the marketing materials?

1	liked them (specify any positive comments here)	G8
2	did not like them (specify any negative comments here)	G8
77	OTHER (Specify)	G8
88	Refused	G8
99	Don't know	G8

**G8** What made you decide to install a solar water heater? (circle all that apply)

1	Environmental concerns	G9
2	Energy savings	G9
3	Money - Payback Period	G9
4	Money - Internal Rate of Return (IRR)	G9
5	Money - Net Present Value (NPV)	G9
77	OTHER (Specify)	G9
88	Refused	G9
99	Don't know	G9

**G9** Has installing a SWH increased the value of your home?

1	Yes, by an amount equal to what was paid for the SWH	G10
2	Yes, by X percent <i>more</i> than what was paid for the SWH (Specify the percent)	G10
4	No	G10
88	Refused	G10
99	Don't know	G10

**G10** Had you been considering installing a SWH before you heard about the program?

1	Yes	G11
2	No	G12
88	Refused	G12
99	Don't know	G12

**G11** Had you researched the costs of a SWH before you knew about the program?

1	Yes	G11A
2	No	G12
88	Refused	G12
99	Don't know	G12

**G11A** Were the actual costs consistent with your researched costs?

1	Yes	G12
2	No	G12
88	Refused	G12
99	Don't know	G12

**G12** Without the program, how likely would you have been to install the SWH?

1	Not at all likely	G12A
2	Not very likely	G12A
3	Somewhat likely	G12A
4	Very likely	G13
88	Refused	G12A
99	Don't know	G12A

**G12A**            What concerns were causing you to hesitate in your decision to install a SWH?

<b>1</b>	Initial cost	G12B
<b>2</b>	Aesthetics	G12B
<b>3</b>	Lack of information	G12B
<b>4</b>	Reliability concerns	G12B
<b>5</b>	Contractor knowledge/experience	G12B
<b>77</b>	OTHER (Specify)	G12B
<b>88</b>	Refused	G13
<b>99</b>	Don't know	G13

**G12B**            How were your concerns addressed?

<b>1</b>	Received more information from the CCSE SWH program	G13
<b>2</b>	Received more information from a contractor	G13
<b>3</b>	Received more information from a different source (Specify)	G13
<b>77</b>	OTHER (Specify)	G13
<b>88</b>	Refused	G13
<b>99</b>	Don't know	G13

**G13**            Without a financial incentive from the Pilot Program, would you have installed the SWH at the same time?

<b>1</b>	Same time	F10
<b>2</b>	Later	G13A
<b>3</b>	Earlier	G13A
<b>88</b>	Refused	F10
<b>99</b>	Don't know	F10

**G13A**            How many months/years later (or earlier) and why?

<b>77</b>	OTHER (Specify)	F10
<b>88</b>	Refused	F10
<b>99</b>	Don't know	F10

**F10**            Did you receive financial assistance from a source other than CCSE?

<b>1</b>	Yes	F10A
<b>2</b>	No	F11
<b>88</b>	Refused	F11
<b>99</b>	Don't know	F11

**F10A**            From whom?

<b>77</b>	OTHER (Specify)	F10B
<b>88</b>	Refused	F10B
<b>99</b>	Don't know	F10B

**F10B** How much assistance?

<b>77</b>	OTHER (Specify)	F11
<b>88</b>	Refused	F11
<b>99</b>	Don't know	F11

**F11** How much has your electricity / natural gas / propane bill per month decreased since installing a SWH (as % of total bill)?

<b>1</b>	NONE	I12
<b>77</b>	OTHER (Specify)	I12
<b>88</b>	Refused	I12
<b>99</b>	Don't know	I12

**I12** Did you attend a CCSE SWH workshop?

<b>1</b>	Yes	I12B
<b>2</b>	No	C1
<b>88</b>	Refused	I12B
<b>99</b>	Don't know	I12B

**I12B** What was most helpful in the workshop?

<b>1</b>	information on rebates and other funding options	I12C
<b>2</b>	technical information	I12C
<b>3</b>	information on contractors/vendors	I12C
<b>4</b>	talking with other people interested in installing a SWH	I12C
<b>77</b>	OTHER (Specify)	I12C
<b>88</b>	Refused	I12C
<b>99</b>	Don't know	I12C

**I12C** Were there any topics you wish they had covered in more detail?

<b>77</b>	OTHER (Specify)	I13
<b>88</b>	Refused	I13
<b>99</b>	Don't know	I13

**I13** Where else did you look for information?

<b>77</b>	OTHER (Specify)	I14
<b>88</b>	Refused	I14
<b>99</b>	Don't know	I14

**I14** Was there anything you wish there had been more information about?

<b>77</b>	OTHER (Specify)	C1
<b>88</b>	Refused	C1
<b>99</b>	Don't know	C1

**CONTRACTOR CHARACTERISTICS**

**C1** Did the contractor seem knowledgeable about the SWHs?

1	Yes	C2
2	No	C2
88	Refused	C2
99	Don't know	C2

**C2** Did the contractor seem knowledgeable about the CCSE SWH program?

1	Yes	C3
2	No	C3
88	Refused	C3
99	Don't know	C3

**C3** Did the contractor encourage you to contact them when/if maintenance is needed?

1	Yes	C4
2	No	C4
88	Refused	C4
99	Don't know	C4

**C4** Have you contacted the contractor to come back to fix or check anything?

1	Yes	C5A
2	No	C6
88	Refused	C6
99	Don't know	C6

**C5A** What was the problem?

77	OTHER (Specify)	C5B
88	Refused	C6
99	Don't know	C6

**C5B** Did the contractor respond positively and in a timely fashion?

1	Yes	C6
2	No	C6
88	Refused	C6
99	Don't know	C6

**C6** On a scale of 1 to 5 with 5 being the most satisfied and 1 being the least, how satisfied were you with the contractor you hired?

1	Dissatisfied	C7
2	Moderately dissatisfied	C7
3	Neutral	C7
4	Moderately satisfied	C7
5	Very satisfied	C7
88	Refused	C7
99	Don't know	C7

**C7** What did you like/dislike about them?

77	OTHER (Specify)	B1
88	Refused	B1
99	Don't know	B1

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**BACKUP TANK CHARACTERISTICS**

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The next few questions are about your backup hot water tank system.

**B1** What type of backup hot water system do you have?

1	Tank (Not Energy Star)	B1A
2	Tank (Energy Star)	B1A
3	Tankless	B2
4	None	RW1
5	Other (Specify)	B2
88	Refused	B2
99	Don't know	B2

**B1A** What size is the backup tank? (in gallons)

77	OTHER (Specify)	B2
88	Refused	B2
99	Don't know	B2

**B2** What type of backup hot water system do you have?

1	Electric	B3
2	Natural Gas	B3
3	Propane	B3
4	Other (Specify)	B3
88	Refused	B3
99	Don't know	B3

**B3** What is the temperature setting on your backup hot water system?

1	Temperature (Specify - should be from 120 - 140 Fahrenheit)	RW1
2	Range (Specify - warm, very warm, hot)	RW1
88	Refused	RW1
99	Don't know	RW1

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**HOT WATER USAGE PROFILE**

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The next questions are about when and how hot water is used in your household.

**RW1** How many people are in your household?

77	OTHER (Specify)	RW2
88	Refused	RW2
99	Don't know	RW2

**RW2** What is the average number of showers/baths taken per day?

77	OTHER (Specify)	RW3
88	Refused	RW3
99	Don't know	RW3

**RW3** What is the average shower length (minutes)?

77	OTHER (Specify)	RW4
88	Refused	RW4
99	Don't know	RW4

**RW4** Do you have a low flow showerhead? (For more than one bathroom please record the number of low flow and non-low flow)

1	Yes (Specify number)	RW5
2	No (Specify number)	RW5
77	OTHER (Specify)	RW5
88	Refused	RW5
99	Don't know	RW5

**RW5** What are the typical times of day each shower is taken? (Count for each person)

1	morning (Specify number)	RW6
2	afternoon (Specify number)	RW6
3	evening (Specify number)	RW6
4	night (Specify number)	RW6
88	Refused	RW6
99	Don't know	RW6

<b>RW6</b>	What type of washing machine do you have (front or top loader?)		
	1	top loader (not EnergyStar)	RW7
	2	top loader (EnergyStar)	RW7
	3	front loader	RW7
	77	NONE	RW7
	88	Refused	RW7
	99	Don't know	RW7
<b>RW7</b>	How many loads of laundry are done per week?		
	1	OTHER (Specify)	RW8
	88	Refused	RW8
	99	Don't know	RW8
<b>RW8</b>	How many loads are done at each temperature?		
	1	Cold (Specify number)	RW9
	2	Warm (Specify number)	RW9
	3	Hot (Specify number)	RW9
	88	Refused	RW9
	99	Don't know	RW9
<b>RW9</b>	What typical day of the week do you do laundry?		
	1	weekday	RW10
	2	weekend	RW10
	88	Refused	RW10
	99	Don't know	RW10
<b>RW10</b>	What typical time of the day do you do laundry?		
	1	morning	RW11
	2	afternoon	RW11
	3	evening	RW11
	4	night	RW11
	88	Refused	RW11
	99	Don't know	RW11
<b>RW11</b>	Do you have a dishwasher?		
	1	Yes, EnergyStar	RW12
	2	Yes, not EnergyStar	RW12
	3	No	RW12
	77	NONE	RW12
	88	Refused	RW12
	99	Don't know	RW12

<b>RW12</b>	How many days a week do you wash dishes? (for those with a dishwasher fill in both responses 1 and 2)	
	<b>1</b>	By hand (Specify)
	<b>2</b>	In dishwasher (Specify)
	<b>88</b>	Refused
	<b>99</b>	Don't know

<b>RW13</b>	What time of day do you typically wash dishes?	
	<b>1</b>	morning
	<b>2</b>	afternoon
	<b>3</b>	evening
	<b>4</b>	night
	<b>88</b>	Refused
	<b>99</b>	Don't know

<b>RW14</b>	Has your water use pattern changed since installing a SWH?	
	<b>1</b>	Yes
	<b>2</b>	No
	<b>77</b>	NONE
	<b>88</b>	Refused
	<b>99</b>	Don't know

<b>RW14A</b>	How?	
	<b>1</b>	Other (Specify which activities used to be done differently)
	<b>77</b>	NONE
	<b>88</b>	Refused
	<b>99</b>	Don't know

**APPLICATION PROCESS**

<b>A1</b>	Were there any steps in the application process that took longer than expected?	
	<b>1</b>	Yes
	<b>2</b>	No
	<b>88</b>	Refused
	<b>99</b>	Don't know

<b>A1B</b>	What step was this?	
	<b>77</b>	OTHER (Specify)
	<b>88</b>	Refused
	<b>99</b>	Don't know

**A2** What were the biggest hurdles in installing your solar water heater and going through the rebate process?

1	NONE	A3
77	OTHER (Specify)	A3
88	Refused	A3
99	Don't know	A3

**A3** Do you have any other comments or recommendations on improving the program?

1	Yes (Specify)	P1
88	Refused	P1
99	Don't know	P1

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**SWH PERFORMANCE**

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The next questions are about the performance of your solar water heater.

**P1** Have there been any problems with the solar water heater after it was installed and operating?

1	Yes	P1B
2	No	P2
88	Refused	P2
99	Don't know	P2

**P1B** What were the problems?

77	OTHER (Specify)	P1C
88	Refused	P1C
99	Don't know	P1C

**P1C** How were they fixed?

77	OTHER (Specify)	P2
88	Refused	P2
99	Don't know	P2

**P2** Have there been any issues with the freeze protection design?

1	Yes	P2B
2	No	P3
88	Refused	P3
99	Don't know	P3

**P2B** What were the problems and how were they fixed?

77	OTHER (Specify)	P3
88	Refused	P3
99	Don't know	P3

**P3** Have there been any issues with the backup hot water system?

<b>1</b>	Yes (Specify)	P4
<b>2</b>	No	P4
<b>88</b>	Refused	P4
<b>99</b>	Don't know	P4

**P4** Is your system being metered and is the data being collected by CCSE, the installer, or someone else?

<b>1</b>	Yes (Specify)	P5
<b>2</b>	No	P6
<b>88</b>	Refused	P6
<b>99</b>	Don't know	P6

**P5** Were there any problems associated with the metering equipment?

<b>1</b>	Yes (Specify)	P6
<b>2</b>	No	P6
<b>88</b>	Refused	P6
<b>99</b>	Don't know	P6

**P6** What is the warranty on your system?

<b>77</b>	OTHER (Specify)	P7
<b>88</b>	Refused	P7
<b>99</b>	Don't know	P7

**P7** What do you do with the system while you are on vacation in order to prevent overheating?

<b>1</b>	Nothing	P8
<b>2</b>	Turn it off without draining	P8
<b>3</b>	Turn it off and drain	P8
<b>4</b>	Other (Specify)	P8
<b>88</b>	Refused	P8
<b>99</b>	Don't know	P8

**P8** On a scale of 1 to 5 with 5 being the most satisfied and 1 being the least, how satisfied are you with your solar water heating system?

<b>1</b>	Very dissatisfied	P9
<b>2</b>	Moderately dissatisfied	P9
<b>3</b>	Neutral	P9
<b>4</b>	Moderately satisfied	P9
<b>5</b>	Very satisfied	P9
<b>88</b>	Refused	P9
<b>99</b>	Don't know	P9

**P9** Why do you say that?

<b>77</b>	OTHER (Specify)	T&T
<b>88</b>	Refused	T&T
<b>99</b>	Don't know	T&T

**G1** What is your annual household income?

<b>1</b>	< \$50,000	G2
<b>2</b>	\$50,000 - \$75,000	G2
<b>3</b>	\$75,000 - \$100,000	G2
<b>4</b>	\$100,000 - \$150,000	G2
<b>5</b>	> \$150,000	G2
<b>88</b>	Refused	G2
<b>99</b>	Don't know	G2

On behalf of the California Public Utilities Commission, the California Solar Initiative, and the California Center for Sustainable Energy we thank you for your time and thoughtful input on this important effort.

**T&T** Have a nice day. Goodbye.

# Appendix B

## Residential Survey—SWH Owners Outside of SDG&E Territory

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HOMEOWNERS WITH A SWH OUTSIDE OF SDG&E TERRITORY  
SURVEY  
ROUND 1  
CCSE SWH PILOT PROGRAM

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**INTRODUCTION AND FINDING CORRECT RESPONDENT**

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Hello, this is <INTERVIEWER NAME> calling from the California Center for Sustainable Energy. This is not a sales call. May I please speak with &PROGRAM\_CONTACT? [IF NEEDED]: my understanding is that &PROGRAM\_CONTACT is responsible for making energy-related decisions at your home at &SERV\_ADDR – may I please speak with him/her?

Q1

1	No, you have the wrong number	T&T
2	No, this person is not available right now	Q1B
4	Yes	Q1C
77	No, Other reason (specify)	Q1B
88	Refused	Q1B
99	Don't know	Q1B

Q1B

[IF &PROGRAM\_CONTACT WILL NOT EVER BE AVAILABLE]  
May I please speak with the person most knowledgeable about the installation of a solar water heating system at this address?  
[IF NEEDED] We're calling to do a survey about your decision to install a solar water heating system. The purpose of the survey is to learn about the factors that influence the choice of installing a solar water heating system and may help to design a statewide incentive payment program for solar water heating system owners.  
[IF NEEDED] This is a very important fact-finding survey among individuals that have recently purchased a solar water heating system. CCSE is administering a pilot program in San Diego to determine whether a statewide program would benefit California. We are NOT interested in selling anything, and responses will not be connected with you in any way. CCSE wants to understand how program participants think about and manage their energy needs.

77	There is no one here with information on that address/wrong address	T&T
1	Address correct/Continue Q1B until you find appropriate contact person	Q1C

**Q1C** [IF &PROGRAM\_CONTACT IS AVAILABLE]  
 Hello Mr/Mrs &PROGRAM\_CONTACT, this is <INTERVIEWER NAME> calling from the California Center for Sustainable Energy. Our records show that you have purchased and installed a solar water heater for &SERV\_ADDR on &INST\_DATE. Is this correct?  
 [IF NEEDED] We're calling to do a survey about your decision to purchase a solar water heating system. The purpose of the survey is to learn about the factors that influence the choice of installing a solar water heating system and may help to design a statewide incentive payment program for solar water heating system owners.  
 [IF NEEDED] This is a very important fact-finding survey among individuals that have recently purchased a solar water heating system. CCSE is administering a pilot program in San Diego to determine whether a statewide program would benefit California. We are NOT interested in selling anything, and responses will not be connected with you in any way. CCSE wants to understand how homeowners think about and manage their energy needs.

1	Yes, we installed a solar water heating system, and address is correct	G2
2	There is no one here with information on that address/wrong address	T&T

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**GENERAL**

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**G2** How long have you been at your current residence (where the SWH is installed)?

1	< 1 year	G3
2	1-2 years	G3
3	3-5 years	G3
4	6-10 years	G3
5	> 10 years	G3
88	Refused	G3
99	Don't know	G3

**G3** How long ago was the SWH installed?

1	< 1 year ago	G4
2	1-2 years ago	G4
3	3-5 years ago	G4
4	6-10 years ago	G4
5	> 10 years ago	G4
77	OTHER (Specify)	G4
88	Refused	G4
99	Don't know	G4

**G4** Was the SWH installed at the same time as doing a home remodel or roofing?

1	Yes, remodel (specify type of remodel)	G5
2	Yes, roofing	G5
3	Yes, other (specify)	G5
4	No	G5
88	Refused	G5
99	Don't know	G5

**G5** What type of SWH system is it?

1	drainback	G6
2	ICS	G6
3	Thermosyphon	G6
4	closed-loop glycol	G6
5	Recirculation (Active, open-loop)	G6
77	OTHER (Specify)	G6
88	Refused	G6
99	Don't know	G6

**G6** Do you own the system or is it a third-party-owned system?

1	Own	G7
2	Third-Party	G7
77	OTHER (Specify)	G7
88	Refused	G7
99	Don't know	G7

**G7** Did you have a SWH prior to this installation?

1	Yes	G7A
2	No	G8
88	Refused	G8
99	Don't know	G8

**G7A** If so, why did you replace it?

1	Freeze damage	G8
2	Leaks	G8
3	Upgrading	G8
4	Moved - SWH was installed on a different house they previously owned	G8
77	Other (Specify)	G8
88	Refused	G8
99	Don't know	G8

**G8** How did you first learn about solar water heating systems?

1	from a friend or relative	G9
2	work in the industry	G9
3	school	G9
4	local rebate program (Specify)	G9
5	homeshow	G9
77	OTHER (Specify)	G9
88	Refused	G9
99	Don't know	G9

**G9** What made you decide to install a solar water heater? (circle all that apply)

1	Environmental concerns	G9A
2	Energy savings	G9A
3	Energy cost savings	G9A
4	Money - Payback Period	G9A
77	OTHER (Specify)	G9A
88	Refused	G9A
99	Don't know	G9A

**G9A** How much did you pay for your SWH system out-of-pocket (please exclude any rebates or tax incentives from this amount)?

77	Other (Specify)	G10
88	Refused	G10
99	Don't know	G10

**G10** Did you receive a rebate or tax incentive for the purchase and installation of this solar water heating system? (circle all that apply)

1	Yes, local rebate (Specify)	G10A
2	state tax incentive	G11
3	federal tax incentive	G11
4	No	G11
88	Refused	G11
99	Don't know	G11

**G10A** Without the local rebate, how likely would you have been to install the SWH?

1	Not at all likely	G11
2	Not very likely	G11
3	Somewhat likely	G11
4	Very likely	G11
88	Refused	G11
99	Don't know	G11

**G11** Had you researched the costs of a SWH before you contacted a contractor for a quote?

1	Yes	G11A
2	No	G12
88	Refused	G12
99	Don't know	G12

**G11A** Were the actual costs consistent with your researched costs?

1	Yes	G12
2	No	G12
88	Refused	G12
99	Don't know	G12

**G12** What concerns did you have when you were considering installing a SWH?

1	Initial cost	G12A
2	Aesthetics	G12A
3	Lack of information	G12A
4	Reliability concerns	G12A
5	Contractor knowledge/experience	G12A
6	Timing the SWH install along with a home remodel or roofing project	G12A
66	NONE	F1
77	OTHER (Specify)	G12A
88	Refused	F1
99	Don't know	F1

**G12A** How were your concerns addressed?

1	Received more information from a rebate program	F1
2	Received more information from a contractor	F1
3	Received more information from a different source (Specify)	F1
77	OTHER (Specify)	F1
88	Refused	F1
99	Don't know	F1

How much would you estimate your utility bill has decreased per month since installing a SWH? We would like an answer in percentage of bill. If you have an electric backup water heater, please respond in terms of your electricity bill. If you have a natural gas backup water heater, please respond in terms of your natural gas bill.

**F1**

77	Specify %	O1
2	It has remained the same	O1
3	It has increased (if so go to F1A)	F1A
88	Refused	O1
99	Don't know	O1

**F1A** Why do you think your bill has increased?

<b>77</b>	Specify	O1
<b>88</b>	Refused	O1
<b>99</b>	Don't know	O1

**O1** Have you installed other energy efficiency equipment?

<b>1</b>	lighting	O2
<b>2</b>	appliances (specify type)	O2
<b>3</b>	heating/cooling	O2
<b>4</b>	tankless water heater	O2
<b>77</b>	OTHER (Specify)	O2
<b>88</b>	Refused	O2
<b>99</b>	Don't know	O2

**O2** Have you also installed photovoltaic panels?

<b>1</b>	yes	C1
<b>2</b>	no, but have considered it	C1
<b>3</b>	no	C1
<b>77</b>	OTHER (Specify)	C1
<b>88</b>	Refused	C1
<b>99</b>	Don't know	C1

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**CONTRACTOR CHARACTERISTICS**

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**C1** Did the contractor seem knowledgeable about the SWH?

<b>1</b>	Yes	C2
<b>2</b>	No	C2
<b>88</b>	Refused	C2
<b>99</b>	Don't know	C2

**C2** Did the contractor obtain a building permit for the SWH?

<b>1</b>	Yes	C3
<b>2</b>	No	C3
<b>88</b>	Refused	C3
<b>99</b>	Don't know	C3

**C3** Did the contractor discuss general maintenance of the SWH system, such as avoiding freeze damage and stagnation issues? (circle all applicable responses)

<b>1</b>	freeze damage	C4
<b>2</b>	stagnation	C4
<b>3</b>	annual maintenance	C4
<b>77</b>	Other Maintenance (Specify)	C4
<b>4</b>	No	C4
<b>88</b>	Refused	C4
<b>99</b>	Don't know	C4

**C4** Did the contractor encourage you to contact them when/if maintenance is needed?

<b>1</b>	Yes	C5
<b>2</b>	No	C5
<b>88</b>	Refused	C5
<b>99</b>	Don't know	C5

**C5** Have you contacted the contractor to come back to fix or check anything?

<b>1</b>	Yes	C5A
<b>2</b>	No	C6
<b>88</b>	Refused	C6
<b>99</b>	Don't know	C6

**C5A** What was the problem?

<b>77</b>	OTHER (Specify)	C5B
<b>88</b>	Refused	C6
<b>99</b>	Don't know	C6

**C5B** Did the contractor respond positively and in a timely fashion?

<b>1</b>	Yes	C6
<b>2</b>	No	C6
<b>88</b>	Refused	C6
<b>99</b>	Don't know	C6

**C6** On a scale of 1 to 5 with 5 being the most satisfied and 1 being the least, how satisfied were you with the contractor you hired?

<b>1</b>	Dissatisfied	C6A
<b>2</b>	Moderately dissatisfied	C6A
<b>3</b>	Neutral	C6A
<b>4</b>	Moderately satisfied	C6A
<b>5</b>	Very satisfied	C6A
<b>88</b>	Refused	B1
<b>99</b>	Don't know	B1

**C6A** What did you like/dislike about them?

<b>77</b>	OTHER (Specify)	B1
<b>88</b>	Refused	B1
<b>99</b>	Don't know	B1

**BACKUP TANK CHARACTERISTICS**

The next few questions are about your backup hot water tank system.

**B1** What type of backup hot water system do you have?

<b>1</b>	Tank (Not Energy Star)	B1A
<b>2</b>	Tank (Energy Star)	B1A
<b>3</b>	Tankless	B2
<b>4</b>	None (Note: make sure they are not saying none because it is a 1-tank system and not a 2-tank system - still want to know the energy source and temp setting for a 1-tank system)	RW1
<b>77</b>	Other (Specify)	B2
<b>88</b>	Refused	B2
<b>99</b>	Don't know	B2

**B1A** What size is the backup tank? (in gallons)

<b>77</b>	OTHER (Specify)	B2
<b>88</b>	Refused	B2
<b>99</b>	Don't know	B2

**B2** What is the energy source for your backup hot water tank?

<b>1</b>	Electric	B3
<b>2</b>	Natural Gas	B3
<b>3</b>	Propane	B3
<b>77</b>	Other (Specify)	B3
<b>88</b>	Refused	B3
<b>99</b>	Don't know	B3

**B3** What is the temperature setting on your backup hot water system?

<b>1</b>	Temperature (Specify - should be from 120 - 140 Fahrenheit)	RW1
<b>2</b>	Range (Specify - warm, very warm, hot)	RW1
<b>88</b>	Refused	RW1
<b>99</b>	Don't know	RW1

**HOT WATER USAGE PROFILE**

The next questions are about when and how hot water is used in your household.

**RW1** How many people are in your household?

<b>1</b>	1	RW2
<b>2</b>	2	RW2
<b>3</b>	3	RW2
<b>4</b>	4	RW2
<b>5</b>	5	RW2
<b>6</b>	6	RW2
<b>77</b>	OTHER (Specify)	RW2
<b>88</b>	Refused	RW2
<b>99</b>	Don't know	RW2

**RW2** What is the average number of showers/baths taken per day?

<b>77</b>	OTHER (Specify)	RW3
<b>88</b>	Refused	RW3
<b>99</b>	Don't know	RW3

**RW3** What is the average shower length (minutes)?

<b>77</b>	OTHER (Specify)	RW4
<b>88</b>	Refused	RW4
<b>99</b>	Don't know	RW4

**RW4** Do you have a low flow showerhead? (For more than one bathroom please record the number of low flow and non-low flow)

<b>1</b>	Yes (Specify number)	RW5
<b>2</b>	No (Specify number)	RW5
<b>77</b>	OTHER (Specify)	RW5
<b>88</b>	Refused	RW5
<b>99</b>	Don't know	RW5

**RW5** What are the typical times of day each shower is taken? (Count for each person)

<b>1</b>	morning (Specify number)	RW6
<b>2</b>	afternoon (Specify number)	RW6
<b>3</b>	evening (Specify number)	RW6
<b>4</b>	night (Specify number)	RW6
<b>88</b>	Refused	RW6
<b>99</b>	Don't know	RW6

<b>RW6</b>	What type of washing machine do you have (front or top loader?)		
	1	top loader (not EnergyStar)	RW7
	2	top loader (EnergyStar)	RW7
	3	front loader	RW7
	66	NONE	RW7
	88	Refused	RW7
	99	Don't know	RW7
<b>RW7</b>	How many loads of laundry are done per week?		
	77	OTHER (Specify)	RW8
	88	Refused	RW8
	99	Don't know	RW8
<b>RW8</b>	How many loads are done at each temperature?		
	1	Cold (Specify number)	RW9
	2	Warm (Specify number)	RW9
	3	Hot (Specify number)	RW9
	88	Refused	RW9
	99	Don't know	RW9
<b>RW9</b>	What typical day of the week do you do laundry?		
	1	weekday	RW10
	2	weekend	RW10
	88	Refused	RW10
	99	Don't know	RW10
<b>RW10</b>	What typical time of the day do you do laundry?		
	1	morning	RW11
	2	afternoon	RW11
	3	evening	RW11
	4	night	RW11
	88	Refused	RW11
	99	Don't know	RW11
<b>RW11</b>	Do you have a dishwasher?		
	1	Yes, EnergyStar	RW12
	2	Yes, not EnergyStar	RW12
	3	No	RW12
	66	NONE	RW12
	88	Refused	RW12
	99	Don't know	RW12

<b>RW12</b>	How many days a week do you wash dishes? (for those with a dishwasher fill in both responses 1 and 2)		
	1	By hand (Specify)	RW13
	2	In dishwasher (Specify)	RW13
	88	Refused	RW13
	99	Don't know	RW13

<b>RW13</b>	What time of day do you typically wash dishes?		
	1	morning	RW14
	2	afternoon	RW14
	3	evening	RW14
	4	night	RW14
	88	Refused	RW14
	99	Don't know	RW14

<b>RW14</b>	Has your water use pattern changed since installing a SWH?		
	1	Yes	RW14A
	2	No	A1
	77	NONE	A1
	88	Refused	A1
	99	Don't know	A1

<b>RW14A</b>	How?		
	1	Other (Specify which activities used to be done differently)	A1
	77	NONE	A1
	88	Refused	A1
	99	Don't know	A1

**APPLICATION PROCESS (IF PARTICIPATED IN A REBATE PROGRAM)**

<b>A1</b>	Were there any steps in the application process that took longer than expected?		
	1	Yes	A1B
	2	No	A2
	88	Refused	A2
	99	Don't know	A2

<b>A1B</b>	What step was this?		
	77	OTHER (Specify)	A2
	88	Refused	A2
	99	Don't know	A2

**A2** What were the biggest hurdles in the rebate process?

1	NONE	A3
77	OTHER (Specify)	A3
88	Refused	A3
99	Don't know	A3

**A3** Do you have any other comments or recommendations on improving that particular rebate program?

1	Yes (Specify)	H1
88	Refused	H1
99	Don't know	H1

**SWH PERFORMANCE**

The next questions are about the performance of your solar water heater.

**H1** What were the biggest hurdles in installing your solar water heater system?

1	NONE	P1
2	Finding a contractor	P1
3	Obtaining a permit	P1
77	OTHER (Specify)	P1
88	Refused	P1
99	Don't know	P1

**P1** Have there been any problems with the solar water heater after it was installed and operating?

1	Yes	P1A
2	No	P2
88	Refused	P2
99	Don't know	P2

**P1A** What were the problems?

77	OTHER (Specify)	P1B
88	Refused	P1B
99	Don't know	P1B

**P1B** How were they fixed?

77	OTHER (Specify)	P2
88	Refused	P2
99	Don't know	P2

**P2** What is length of the warranty on your system and what does it cover?

77	OTHER (Specify)	P3
88	Refused	P3
99	Don't know	P3

**P3** On a scale of 1 to 5 with 5 being the most satisfied and 1 being the least, how satisfied are you with your solar water heating system?

<b>1</b>	Very dissatisfied	P4
<b>2</b>	Moderately dissatisfied	P4
<b>3</b>	Neutral	P4
<b>4</b>	Moderately satisfied	P4
<b>5</b>	Very satisfied	P4
<b>88</b>	Refused	P4
<b>99</b>	Don't know	P4

**P4** Why do you say that?

<b>77</b>	OTHER (Specify)	G1
<b>88</b>	Refused	G1
<b>99</b>	Don't know	G1

**G1** For statistical purposes only, can you tell me in which of the following best describes your household income before taxes?

<b>1</b>	< \$50,000	T&T
<b>2</b>	\$50,000 - \$75,000	T&T
<b>3</b>	\$75,000 - \$100,000	T&T
<b>4</b>	\$100,000 - \$150,000	T&T
<b>5</b>	> \$150,000	T&T
<b>88</b>	Refused	T&T
<b>99</b>	Don't know	T&T

**T&T** On behalf of the California Public Utilities Commission and the California Center for Sustainable Energy we thank you for your time and thoughtful input on this important effort. Have a nice day. Goodbye.

# Appendix C

## Residential Survey—Nonparticipants Workshop Group

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**NON-PARTICIPANT SURVEY  
ROUND 1  
CCSE SWH PILOT PROGRAM  
PROGRAM YEAR 2007**

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**INTRODUCTION AND FINDING CORRECT RESPONDENT**

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Hello, this is <INTERVIEWER NAME> calling from Itron on behalf of California Center for Sustainable Energy. This is not a sales call. May I please speak with &PROGRAM\_CONTACT? [IF NEEDED]: my understanding is that &PROGRAM\_CONTACT is responsible for making energy-related decisions for your firm at &SERV\_ADDR – may I please speak with him/her?

**Q1**

<b>1</b>	No, this person no longer works/lives here	Q1B
<b>2</b>	No, this person is not available right now	Q1B
<b>4</b>	Yes	Q1C
<b>77</b>	No, Other reason (specify)	Q1B
<b>88</b>	Refused	Q1B
<b>99</b>	Don't know	Q1B

[IF &PROGRAM\_CONTACT WILL NOT EVER BE AVAILABLE]

**Q1B**

May I please speak with the person responsible for making energy-related decisions at this address?

[IF NEEDED] We're calling to do a survey about the CCSE Solar Water Heating Pilot Program. The purpose of the survey is to assess how the program can be improved in order to increase the number of participants.

[IF NEEDED] This is a very important fact-finding survey among CCSE customers that have not participated in a pilot program sponsored by the California Public Utilities Commission. CCSE is administering this pilot program to determine whether a statewide program would benefit California. We are NOT interested in selling anything, and responses will not be connected with you in any way. CCSE wants to understand how customers think about and manage their energy needs.

77	There is no one here with information on that address/wrong address	T&T
1	Address correct/Continue Q1B until you find appropriate contact person	Q1C

**Q1C**

[IF &PROGRAM\_CONTACT IS AVAILABLE]  
 Hello Mr/Mrs &PROGRAM\_CONTACT, this is <INTERVIEWER NAME> calling from Itron on behalf of the California Center for Sustainable Energy. Are you familiar with the CCSE Solar water heater pilot program?  
 [IF NEEDED] We're calling to do a survey about the CCSE Solar Water Heating Pilot Program. The purpose of the survey is to assess how the program can be improved in order to increase the number of participants.  
 [IF NEEDED] This is a very important fact-finding survey among CCSE customers that have not participated in a pilot program sponsored by the California Public Utilities Commission. CCSE is administering this pilot program to determine whether a statewide program would benefit California. We are NOT interested in selling anything, and responses will not be connected with you in any way. CCSE wants to understand how customers think about and manage their energy needs.

1	Yes, and I had considered participating in the program	G1
2	Yes, but I had not considered participating in the program	G1
3	No, but I am familiar with solar water heater technology	G1
4	No, and I am not familiar with solar water heater technology	G1
99	Don't know	T&T

---

**GENERAL**

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**G2**

How long have you been at your current residence (where the SWH would be installed)?

1	< 1 year	G3
2	1-2 years	G3
3	3-5 years	G3
4	6-10 years	G3
5	> 10 years	G3
88	Refused	G3
99	Don't know	G3

**G3** Have you applied for rebates through other CCSE or state energy efficiency programs?

1	Yes	G4
2	No	M1
88	Refused	M1
99	Don't know	M1

**G4** What type of equipment was that rebate for?

1	lighting	M1
2	appliances (specify type)	M1
3	heating/cooling	M1
77	OTHER (Specify)	M1
88	Refused	M1
99	Don't know	M1

**From here:**

If Answer to Q1C was 1 or 2 then ask M1

If Answer to Q1C was 3 then skip to D1

If Answer to Q1C was 4 then skip to W1

**M1** How did you first hear about the Solar Water Heating Pilot program?

1	Chosen Solar Water Heating Company	M2
2	Different Solar Water Heating Company	M2
3	CCSE Print Advertisement (which one?)	M2
4	Television (CCSE SWH commercial, news stories, KPBS special, Rod Luck, Sustain San Diego special?)	M2
5	Newspaper Article (which one?)	M2
6	Radio (KPBS, Clear Channel, Sign on San Diego?)	M2
7	Internet (which website? KPBS, Sustain San Diego, CCSE, craigslist, San Miguel Fire District?)	M2
77	OTHER (Specify)	M2
88	Refused	D1
99	Don't know	D1

**M2** What type of marketing have you seen for the Solar Water Heating Pilot program? (select all applicable)

1	CCSE Print Advertisement (which one?)	M2A
2	Television (CCSE SWH commercial, news stories, KPBS special, Rod Luck, Sustain San Diego special?)	M2A
3	Newspaper Article (which one?)	M2A
4	Radio (KPBS, Clear Channel, Sign on San Diego?)	M2A
5	Internet (which website? KPBS, Sustain San Diego, CCSE, craigslist, San Miguel Fire District?)	M2A
66	NONE	D1
77	OTHER (Specify)	M2A
88	Refused	D1
99	Don't know	D1

**M2A** What did you think of the marketing materials?

1	liked them (specify any positive comments here)	D1
2	did not like them (specify any negative comments here)	D1
77	OTHER (Specify)	D1
88	Refused	D1
99	Don't know	D1

**D1** Have you ever considered installing a SWH?

1	Yes	D1B
2	No	D3
88	Refused	D3
99	Don't know	D3

**D1B** What made you consider installing a solar water heater?

1	Environmental concerns	D1C
2	Energy savings	D1C
3	Money - Payback Period	D1C
4	Money - Internal Rate of Return (IRR)	D1C
5	Money - Net Present Value (NPV)	D1C
77	OTHER (Specify)	D1C
88	Refused	D1C
99	Don't know	D1C

**D1C** Had you researched the costs of a SWH?

1	Yes	D1D
2	No	D1D
88	Refused	D1D
99	Don't know	D1D

**D1D** What concerns are causing you to hesitate in your decision to install a SWH? (rank in the order of most importance)

1	Initial cost	D2
2	Aesthetics	D2
3	Lack of information	D2
4	Reliability concerns	D2
5	Contractor knowledge/experience	D2
77	OTHER (Specify)	D2
88	Refused	D2
99	Don't know	D2

**D2** Would you install a SWH in the future?

1	YES	D2A
2	NO	D2A
88	Refused	D3
99	Don't know	D3

**D2A** Why?

77	OTHER (Specify)	D3
88	Refused	D3
99	Don't know	D3

**D3** Would you install a SWH in the future if: (circle all answers, try to gauge which would be the most influential)

1	there was a higher rebate	B1
2	there was a low interest loan available through the program	B1
3	energy prices increase	B1
4	a friend recommended it to you	B1
5	there was more readily available information	B1
6	your residence had a better solar resource (trees or other factors may be shading their roof)	B1
7	better/more knowledgeable or experienced contractor	B1
77	OTHER (Specify)	B1
88	Refused	B1
99	Don't know	B1

---

**WATER HEATER CHARACTERISTICS**

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The next few questions are about your water heater.

**B1** What type of water heater do you have?

1	Tank (Not Energy Star)	B1A
2	Tank (Energy Star)	B1A
3	Tankless	B2
4	None	RW1
5	Other (Specify)	B2
88	Refused	RW1
99	Don't know	B2

**B1A** What size is the tank? (in gallons)

77	OTHER (Specify)	B2
88	Refused	B2
99	Don't know	B2

**B2** What type of hot water heater do you have?

1	Electric	B3
2	Natural Gas	B3
3	Propane	B3
4	Other (Specify)	B3
88	Refused	B3
99	Don't know	B3

**B3** What is the temperature setting on your water heater?

1	Temperature (Specify - should be from 120 - 140 Fahrenheit)	RW1
2	Range (Specify - warm, very warm, hot)	RW1
88	Refused	RW1
99	Don't know	RW1

### HOT WATER USAGE PROFILE

The next questions are about when and how hot water is used in your household.

**RW1** How many people are in your household?

77	OTHER (Specify)	RW2
88	Refused	RW2
99	Don't know	RW2

**RW2** What is the average number of showers/baths taken per day?

77	OTHER (Specify)	RW3
88	Refused	RW3
99	Don't know	RW3

**RW3** What is the average shower length (minutes)?

77	OTHER (Specify)	RW4
88	Refused	RW4
99	Don't know	RW4

**RW4** Do you have a low flow showerhead? (For more than one bathroom please record the number of low flow and non-low flow)

1	Yes (Specify number)	RW5
2	No (Specify number)	RW5
77	OTHER (Specify)	RW5
88	Refused	RW5
99	Don't know	RW5

**RW5** What are the typical times of day each shower is taken? (Count for each person)

1	morning (Specify number)	RW6
2	afternoon (Specify number)	RW6
3	evening (Specify number)	RW6
4	night (Specify number)	RW6
88	Refused	RW6
99	Don't know	RW6

**RW6** What type of washing machine do you have (front or top loader?)

1	top loader (not EnergyStar)	RW7
2	top loader (EnergyStar)	RW7
3	front loader	RW7
77	NONE	RW7
88	Refused	RW7
99	Don't know	RW7

**RW7** How many loads of laundry are done per week?

1	OTHER (Specify)	RW8
88	Refused	RW8
99	Don't know	RW8

**RW8** How many loads are done at each temperature?

1	Cold (Specify number)	RW9
2	Warm (Specify number)	RW9
3	Hot (Specify number)	RW9
88	Refused	RW9
99	Don't know	RW9

**RW9** What typical day of the week do you do laundry?

1	weekday	RW10
2	weekend	RW10
88	Refused	RW10
99	Don't know	RW10

**RW10** What typical time of the day do you do laundry?

1	morning	RW11
2	afternoon	RW11
3	evening	RW11
4	night	RW11
88	Refused	RW11
99	Don't know	RW11

**RW11** Do you have a dishwasher?

<b>1</b>	Yes, EnergyStar	RW12
<b>2</b>	Yes, not EnergyStar	RW12
<b>3</b>	No	RW12
<b>77</b>	NONE	RW12
<b>88</b>	Refused	RW12
<b>99</b>	Don't know	RW12

**RW12** How many days a week do you wash dishes? (for those with a dishwasher fill in both responses 1 and 2)

<b>1</b>	By hand (Specify)	RW13
<b>2</b>	In dishwasher (Specify)	RW13
<b>88</b>	Refused	RW13
<b>99</b>	Don't know	RW13

**RW13** What time of day do you typically wash dishes?

<b>1</b>	morning	T&T
<b>2</b>	afternoon	T&T
<b>3</b>	evening	T&T
<b>4</b>	night	T&T
<b>88</b>	Refused	T&T
<b>99</b>	Don't know	T&T

**G1** What is your annual household income?

<b>1</b>	< \$50,000	G2
<b>2</b>	\$50,000 - \$75,000	G2
<b>3</b>	\$75,000 - \$100,000	G2
<b>4</b>	\$100,000 - \$150,000	G2
<b>5</b>	> \$150,000	G2
<b>88</b>	Refused	G2
<b>99</b>	Don't know	G2

**T&T** On behalf of the California Public Utilities Commission, the California Solar Initiative, and the California Center for Sustainable Energy we thank you for your time and thoughtful input on this important effort. Have a nice day. Goodbye.

# Appendix D

## Round 1 Contractor Survey

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Hello, my name is \_\_\_\_\_ and I'm assisting the California Center For Sustainable Energy (former the San Diego Regional Energy Office) in evaluating their Solar Water Heating Pilot Program. We identified your business as one that had attended a Contractor and Installer Orientation and Training workshop for the pilot program and I'd like to ask you some questions about your impressions of the program. All of your answers will be kept confidential. Do you have about 40 minutes to talk with me?

[If not, reschedule an appointment] \_\_\_\_\_

I'D FIRST LIKE TO ASK YOU SOME BACKGROUND QUESTIONS.

1. What is your primary business?

How many employees are there?

2. Do you sell and install solar water heating systems?

3. Are there other types of equipment that you sell? [check to see if they sell PV systems]

[if they sell PV] Do you push PV or SWH more? Why? If PV, how many systems do you sell per year?

4. Before the SWH Pilot started, how many SWH systems did you typically sell/install in a year? Residential \_\_\_\_\_ Commercial \_\_\_\_\_

Has that number been fairly constant each year or does it fluctuate a lot? [ if fluctuates, why?]

5. How do you market SWH systems?

[Probe] Advertisements, radio, newspaper, websites, home shows, energy fair, word of mouth?

6. Do you have a sales staff?
7. How long does it typically take from the initial customer contact to a signed contract for a SWH system? [the goal here is to determine time that elapses from initial contact to closing the sale]
8. About what percentage of direct customer contacts results in a sale? Has that changed since participating in the SWH pilot program?
9. How do you size a system for any given customer?  
  
[Probe] Rules of thumb, some form of calculation? Is it different for residential vs. commercial?
10. How do you estimate the savings a customer might get from installing a SWH system?  
  
[Probe] simple calc, software, average estimate? Residential vs. commercial?
11. Do you take shading into account when recommending and sizing a SWH system?  
  
[if yes] Possible future shading as well?  
  
Do you use any shading analysis tools?
12. What influences a customer's decision to install a SWH system? By building type:  
  
Commercial?                  Residential?                  New Construction?  
  
[Probe] Gas / Electric prices, climate change, acquire latest technology, replacement of old equipment?
13. What concerns do potential customers have and ask you about when they are considering SWH? What is the number 1 question they have?  
  
[Probe] Reliability, warranties / guarantees, life expectancy, cosmetics, cost/payback,
14. Is there an out-of pocket cost or payback period threshold above which residential customers seem to balk at installing SWH?
15. How important is having a warranty for the system to the customer?

THESE NEXT SEVERAL QUESTIONS ARE ABOUT THE SWH PILOT PROGRAM

16. About how many applications have you submitted to the program to date?
17. What are the aspects of the CCSE SWH Pilot Program that you like?
18. Are there any aspects of the CCSE SWH Pilot Program that you do not like?  
[Probe] Requirements: Pull a permit, freeze protection, anti-scald valve, SRCC certification of parts & systems, QC
19. Have you had any customers who had a system installed but opted not to participate in the program?  
  
If so, what is/are the reason(s) for not participating (desire not to permit, freeze protection requirements, etc.)?
20. Have you seen or heard on the radio or newspaper any marketing for or information about the SWH Pilot Program?
21. Do you believe that the SWH Pilot Program has been successful in attracting new business for you?  
[Probe] Why or why not?
22. Have you participated in any other SWH incentive programs in the past?  
  
[If yes] What was your experience was with those?  
[Probe if they were installing systems in the 1980's when the SWHs had all the reliability problems]
23. Do you think people are still afraid to install a SWH because of the problems in '80s?  
  
[If yes] What is your marketing strategy for those people?
24. Do you think that some form of additional system financing is needed and would attract more people and businesses to the SWH program? [talking about loans here]
25. Do you feel that interest in SWH is increasing in the San Diego region? If so, to what do you attribute this increase in interest?

26. What recommendations do you have for improving or modifying the current SWH Pilot Program?
- a. Specifically, what can be done to the SWH Program to increase your participation?
  - b. What might be done to stimulate interest in solar water heating systems more generally, either within the SWH Pilot Program or otherwise?

[Probe] Incentive levels, outreach & marketing, customer education, contractor training? And why?

Residential?

Commercial?

THANK THEM FOR THEIR TIME AND CONCLUDE THE INTERVIEW.

# Appendix E

## Round 2 Contractor Survey—Previously Surveyed

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This survey is only for firms that have been previously surveyed in Round 1 interviews, and are active in the SWHPP.

Hello, my name is \_\_\_\_\_ and I'm assisting the California Center For Sustainable Energy in evaluating their Solar Water Heating Pilot Program. We identified your business as one that had attended a Contractor and Installer Orientation and Training workshop for the pilot program and I'd like to ask you some questions about your business and your impressions of the program. All of your answers will be kept confidential. Do you have about 40 minutes to talk with me?

[If not, reschedule an appointment] \_\_\_\_\_

a. Do you install SWH systems in the San Diego area?

I'D FIRST LIKE TO ASK YOU SOME BACKGROUND QUESTIONS:

1. Has your primary business changed in the last six months?
2. In addition to solar water heaters, do you also sell/install radiant heating? absorption chillers? Pool solar water heaters? Instantaneous (tankless/on-demand) water heaters? PV systems? Geothermal heat pumps?
3. Employee questions:
  - a. How many (full-time/part-time?) employees work at your business?
  - b. How many of your employees are experienced (more than one year) in solar water heating?
  - c. How many of your employees have less than one year of working in solar water heating?
  - d. How many of your employees are experienced in PV (more than one year)?
  - e. How many have less than one year of experience in that field?
  - f. Where do you look to hire new employees?
  - g. How many sales staff do you have? Do they work on commission?
  - h. Is your company licensed by the California Contractors State Licensing Board? What kind of licenses do you have? (PROBE: C46-solar, B-general building contractor, C36-plumbing, C10-electrical, C61, etc...)

- i. What type of training do your employees go through? (manufacturer training? Community college programs? On-the job training? CalSEIA? Other?)
  - j. How long does it take for you to train a new employee? At what point do you consider a new employee to be “trained”?
4. Do you plan to expand your business? If no, why not? If yes, in what way will you expand your business (new services, new market sectors, etc.) If yes, what do you need in order to expand (training? Marketing?)
5. Do you market SWH? If yes , Have you changed how you market SWH systems in the last six months?  
  
[If yes] What have you changed? Have you noticed a difference?
  - a. Do you market to any specific segments of the population or market to a specific area? Do you market only certain types of SWH systems?
  - b. [If also sell PV] Do you market PV? Do you market PV the same way? If not how do you market PV and why do you market it differently?
6. Has the number of direct customer contacts increased since July 2007 (start of SWHPP)?
7. About what percentage of direct customer contacts results in a sale? Has that changed since July 2007 (start of SWHPP)?
8. How many SWH systems do you typically sell/install in a year?  
Total: \_\_\_\_\_
  - a. By technology type (talking about drainback vs. ICS, etc. here)
  - b. By back-up water heater type (electric, natural gas, propane)?
  - c. By manufacturer (please list with number)?
  - d. By sector:Residential \_\_\_\_\_ Commercial \_\_\_\_\_
9. How many SWH systems did you typically sell/install in a year prior to the beginning of the SWH Pilot Program (July 2007)?  
Total: \_\_\_\_\_  
  
Has that number been fairly constant each year or does it fluctuate a lot? [ if fluctuates, why?]

10. Would you be able to provide a 10-year labor warranty and if yes, what would be the additional cost? (estimate is fine)

QUESTIONS FOR CONTRACTORS THAT ALSO SELL PV:

11. How many PV systems do you install each year? Do you influence a customer's choice of whether to buy a PV or SWH system? Does the decision to influence a customer's choice depend on the type of fuel used for the water heater (electric vs. natural gas)?
12. Have you participated in any PV incentive programs (such as Emerging Renewables Program, SGIP, or NSHP, CSI)?
  - a. If yes, which ones (list)? How long did you participate in the program(s)?
  - b. Do you think the PV incentive program(s) helped or hurt your sales (of PV and of SWH)? In what ways if any?
  - c. What did you like/dislike about the PV incentive program(s)?
  - d. Were there additional costs/time associated with participation in the PV incentive program(s)?
  - e. If yes, please list amount \$ or labor hours and description. As your company gained experience, did the amount of additional costs/time decrease?
13. How do you handle the rebate for PV? (and why?)
  - a. Does someone at your company fill out the application or does the customer do this?
  - b. How do you pass the rebate on to your customer? (send them a check later? Or decrease up-front cost?)

[If your company fills out the application **AND** receives the incentive payments]:

- i. How long does it take to fill out the application?
- ii. What is the average length of time between installation and receipt of incentive payment?
- iii. What is the maximum length of time you have experienced?
- iv. Has the timing of incentive payments impacted your business?
- v. If incentive payments took longer to be paid (due to an increase in demand for the incentive payment from a statewide program) would this be an issue for your business?

EQUIPMENT QUESTIONS:

14. How many SWH systems do you repair or replace in a year? What percentage of your business is repairs? What percentage of the repair calls are due to freeze damage?
  - a. What types of systems are generally damaged? What types of systems generally are freeze damaged? (drainback, ICS, etc; open-loop or closed-loop)?
  - b. What generally causes the freeze damage? (controller failed? Glycol needed to be changed?)
  - c. Are these systems generally 10 miles or more from the coast?
  - d. What is the average age of SWH systems in need of repair? With freeze damage?
15. (Not Active) Are you aware of the equipment requirements of the SWH Pilot Program?
  - a. Do you use similar equipment in the systems you install (pumps, collectors, etc.)?
16. (Active only) Have you had any problems with the availability of CCSE SWHPP required equipment? (valves, pumps, collectors, etc)
17. Do you ever install systems that are not SRCC certified?
  - a. If yes, do these systems satisfy other certification requirements, for example: Europe (Solar Keymark)?
  - b. Are any sales delayed because the equipment is not yet SRCC certified? [do not say this] (wait on OG-100 certification is 9-24 months.)
    1. Is the delay due to OG100 certification?
    2. Is the delay due to OG300 certification of new system configurations or substitutions?
  - c. Do you use rebuilt or refurbished parts on the SWHs that you install?
18. (Active only) Is there additional or different equipment you now install due to the CCSE incentive program requirements that you were not installing before? If yes, what? Are there additional costs with the new or different equipment?

19. Do you install active open loop systems?
  - a. [IF YES] Do you install these systems in climate zone 7?
  - b. [IF YES] Would you be able to meet a 5-year equipment and labor warranty (CCSE Pilot Program requirement for climate zone 7 installations) ? Why or why not? [Probe for their opinion on the requirement]
  
20. Do you install monitoring equipment on the systems you install? Why or why not? (this can reduce maintenance calls if customer can diagnose and/or fix problems over the phone)
  - IF YES – Do you collect interval data from any sites? if yes - would you be willing to share the data with us? (would only require customer zip code and system characteristics)

QUESTIONS FOR INACTIVE OR NON-PARTICIPATING CONTRACTORS:

21. [ONLY ASK IF THEY SAID WERE FAMILIAR WITH THE SWHPP AT BEGINNING OF SURVEY] In the last six months, have you noticed any changes to the SWHPP that you like? Do not like?
  
22. [IF SERVICE TERRITORY INCLUDES SAN DIEGO] Have you had any customers in the San Diego area who had a system installed but opted not to participate in the program?

If so, what is/are the reason(s) for not participating (desire not to permit, freeze protection requirements, etc.)?

If so, did the customer request not to participate in the program or did you suggest that the customer not participate?

GO TO QUESTION 32.

QUESTIONS FOR (NEW) ACTIVE CONTRACTORS PARTICIPATING IN SWHPP:

23. In the last six months, have you found any additional aspects of the CCSE program that you like? That you don't like?
  
24. Are there additional costs you incur from filling out the paperwork required for the CCSE rebate? If yes, please elaborate on amount of labor/costs and if these costs are passed on to the customer.

25. In the last six months, have you had any customers in the San Diego area who have had a system installed but opted not to participate in the program?
- If so, what is/are the reason(s) for not participating (desire not to permit, freeze protection requirements, etc.)?
- If so, did the customer request not to participate in the program or did you suggest that the customer not participate?
26. Have you received leads from CCSE? If yes, how many of these have resulted in a sale? How many of the sales also participated in the program?
27. In the last six months, do you believe that the SWH Pilot Program has been successful in attracting new business for you?
- [Probe] Why or why not?  
What CCSE efforts have been most successful in attracting new business for you?
28. How do you handle the incentive payment (and why)?
- Does someone at your company fill out the application or does the customer do this?
  - How do you pass the rebate on to your customer? (send them a check later? Or decrease up-front cost?) Why do you use this method?
  - How long does it take to fill out the application?
  - If you provide the discount upfront, how do you reconcile any differences in the actual incentive paid (reimburse the customer or take the loss?)?
29. [If your company fills out the application AND receives the incentive payments for SWH installations]:
- What is the average length of time between installation and receipt of incentive payment?
  - What is the maximum length of time you have experienced?
  - Has the timing of incentive payments impacted your business?
  - If incentive payments took longer to be paid (due to an increase in demand for the incentive payment from a statewide program) would this be an issue for your business?

30. Have your business practices changed since participating in the Pilot Program? If yes, how? (always OG-300 systems? always pulling permits? All employees attending training?)
31. Has CCSE been responsive to questions and concerns regarding the rebate program?
  - a. Are there any questions or concerns you have posed or would like to pose to CCSE regarding the SWH Pilot Program?

GO TO QUESTION 32.

#### QUESTIONS FOR BOTH ACTIVE AND INACTIVE CONTRACTORS

32. Questions about building permit(s)
  - a. In which cities have you installed SWH (and PV if applicable) systems?
  - b. Do they all require permits?
  - c. For the cities that require permits, what is the average cost of a SWH permit? PV permit?
  - d. What is the average amount of time it took for you to receive the permit after you submitted the paperwork for a system with roof loading of less than 5 lbs./sq. ft.? For a system with roof loading over 5 lbs./sq.ft.?
  - e. Have you noticed a change in the approval time for permits associated with SWH (and PV if applicable)?
  - f. (IF DON'T ALSO DO PV, GO TO g) Have you found that SWH or PV were easier to get a permit for? If yes, why do you think it was easier or harder?
  - g. Have you found that certain types of SWH systems were easier to get a permit for than others? If yes, why do think some types of systems were easier or harder?
33. Is three months sufficient time to obtain permits and install a SWH system?  
[If not] How long should be given for installation of the SWH?
34. When asked, CCSE has been letting people know that the average installed cost of a SWH system for applications in the program is \$6,500. Has this affected customer's reactions to your quoted price? Do you think this quote appropriately represents the market cost?

#### MARKET

35. Have you seen or heard on the radio or newspaper any marketing for or information about the SWH Pilot Program? If so, which one?

36. In the last six months, do you feel that interest in SWH is increasing in the San Diego region? If so, to what do you attribute this increase in interest?
37. Technology changes quickly, how do you stay on top of and make decisions to integrate new technologies into your designs and installs? Can you provide examples? What key factors determine if you integrate a new technology and make it a standard practice?
38. What technological advances do you foresee in the SWH marketplace over the next 10 years (i.e valves, distribution pipes, metering, collectors, pumps, tanks etc)? Do you expect any of these to significantly reduce costs?
39. Do you see any competition between PV, SWH, tankless water heaters, demand response, and/or energy efficiency in terms of homeowner's views of energy reduction and available cost and space?
  - a. If yes, do you feel it is possible to integrate SWH systems with energy efficiency, demand response or PV technologies effectively?
  - b. If yes there is competition, what role would incentive programs play in rectifying this situation? Contractors? Government?
40. [If sell PV systems AND participated in a PV rebate program] what aspects of the PV program do you like which should be applied to the SWH Pilot Program?
41. Do you have any recommendations for the Pilot Program or for a future SWH incentive program?
  - a. What might be done to stimulate interest in solar water heating systems more generally, either within the SWH Pilot Program or otherwise?

[Probe] Incentive levels, outreach & marketing, customer education, contractor training? And why?

## REQUESTS

42. As part of our evaluation activities, CalSEIA will be sending out confidential cost surveys, where you will have the option of including your contact information or mailing it back anonymously. Completing the survey will contribute to our evaluation of the cost-effectiveness of SWH and will help us make recommendations to the CPUC about how policy can change to reduce costs and to encourage the SWH market. Please return the survey by August 1.

43. (If install in the commercial sector-question#8d): As part of our evaluation activities, we will be interviewing companies that have installed SWH systems AND are thinking about installing SWH within and outside of the SWHPP. This will also assist in determining the feasibility of a 10-year statewide incentive program. This information will be kept confidential and will only be used for purposes of contacting the customers to conduct the survey. Would it be possible to get a list with contact information of your commercial customers that bought or were thinking of buying solar water heating systems – pool or hot water) within the last year so that we could conduct these surveys?
44. (If install in the residential sector-question#8d): As part of our evaluation activities, we will be interviewing residential customers that have installed SWH systems outside of an incentive program. This will also assist in determining the feasibility of a 10-year statewide incentive program. This information will be kept confidential and will only be used for purposes of contacting the customers to conduct the survey. Would it be possible to get a list of the residential customers who purchased and installed SWH systems outside of a rebate program within the last year?

THANK THEM FOR THEIR TIME AND CONCLUDE THE INTERVIEW.

# Appendix F

## Round 2 Contractor Survey—Not Previously Surveyed

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Hello, my name is \_\_\_\_\_ and I'm assisting the California Center For Sustainable Energy in evaluating their Solar Water Heating Pilot Program. All of your answers will be kept confidential. Do you have about 40 minutes to talk with me?

[If not, reschedule an appointment] \_\_\_\_\_

a. Are you familiar with the CCSE SWHPP?

[If they are not familiar with the program – The CCSE pilot program gives incentives to residential and commercial, retrofit and new construction SWH projects. Residential incentives vary depending on the SRCC kWh or therms savings rating, with a maximum incentive of \$1,500. Commercial and industrial system incentives are \$15/sq ft for open-loop systems and \$20/sq ft for closed loop systems, with a maximum incentive of \$75,000. The Pilot program is the predecessor to a potential \$250 million statewide program.]

b. Do you install SWH systems in the San Diego area?

c. Have you been to a CCSE SWH workshop?

I'D FIRST LIKE TO ASK YOU SOME BACKGROUND QUESTIONS.

1. What is your primary business? (PV, pool SWH, SWH, plumbing, etc.)
2. Do you sell and install solar water heating systems?
3. In addition to solar water heaters, do you also sell/install radiant heating? Absorption chillers? Pool solar water heaters? Instantaneous (tankless/on-demand) water heaters? PV systems? Geothermal heat pumps?
4. Employee questions:
  - a. How many employees are there?
  - b. How many of your employees are experienced (more than one year) in solar water heating?
  - c. How many of your employees have less than one year of working in solar water heating
  - d. How many of your employees are experienced in PV (more than one year)?

- e. How many have less than one experience in that field?
  - f. Where do you look to hire new employees?
  - g. How many sales staff do you have? Do they work on commission?
  - h. Is your company licensed by the California Contractors State Licensing Board? What kind of licenses do you have? (PROBE: C46-solar, B-general building contractor, C36-plumbing, C10-electrical, C61, etc...)
  - i. What type of training do your employees go through? (manufacturer training? Community college programs? On-the-job training? CalSEIA? Other?)
  - j. How long does it take you to train a new employee? At what point to you consider a new employee to be “trained”?
5. Do you plan to expand your business? If no, why not? If yes, in what way will you expand your business (new services, new market sectors, etc.) If yes, what do you need in order to expand (training? Marketing?)
6. Do you market SWH? How?  
[Probe] Advertisements, radio, newspaper, websites, home shows, energy fair, word of mouth?
- a. Do you market to any specific segments of the population or market to a specific area? Do you market only certain types of SWH systems?
  - b. [If also sell PV] Do you market PV? Do you market PV the same way? If not how do you market PV and why do you market it differently?
7. Has the number of direct customer contacts increased since July 2007 (start of SWHPP)?
8. About what percentage of direct customer contacts results in a sale? Has that changed since July 2007 (start of SWHPP)?
9. How many SWH systems do you typically sell/install in a year?  
Total: \_\_\_\_\_
- a. By technology type (talking about drainback vs. ICS, etc. here)
  - b. By back-up water heater type (electric, natural gas, propane)?
  - c. By manufacturer (please list with number)?
  - d. By sector: Residential \_\_\_\_\_ Commercial \_\_\_\_\_

10. How many SWH systems did you typically sell/install in a year prior to the beginning of the SWH Pilot Program (July 2007)?

Total: \_\_\_\_\_

Has that number been fairly constant each year or does it fluctuate a lot? [if fluctuates, why?]

11. Have you participated in any SWH incentive programs (other than the SWHPP)? (such as Emerging Renewable Buydown Program, SGIP, or NSHP (CSI))
- If yes, which ones (list)? How long did you participate in each program?
  - Do you think the SWH incentive programs help or hurt your sales? In what ways if any?
  - What did you like/dislike about the program(s)?
  - Was there additional costs/time associated with participation in the SWH incentive programs?
  - If yes, please list amount \$ or labor hours and description. As your company gained experience with the application process for the SWH incentive program, did the amount of additional costs/time decrease?
12. How long does it typically take from the initial customer contact to a signed contract for a SWH system? [the goal here is to determine time that elapses from initial contact to closing the sale]
13. Would you be able to provide a 10-year labor warranty and if yes, what would be the additional cost? (estimate is fine)

QUESTIONS FOR CONTRACTORS THAT ALSO SELL PV:

14. How many PV systems do you install each year? Do you influence a customer's choice of whether to buy a PV or SWH system? Does your decision to influence depend on the fuel used for the water heater (electric vs. natural gas)?
15. Have you participated in any PV incentive programs (such as the Emerging Renewable Program, SGIP, CSI or NSHP)?
- If yes, which ones [list]? How long did you participate in the program(s)?
  - Do you think the PV incentive program helped or hurt your sales? In what ways if any?
  - What did you like/dislike about the PV incentive program?
  - Was there additional costs/time associated with participation in the PV incentive program(s)?
  - If yes, please list amount \$ or labor hours and description? As your company gained experience, did the amount of additional costs/time decrease?

16. How do you handle the rebate for PV? (and why?)
  - a. Does someone at your company fill out the application or does the customer do this?
  - b. How do you pass the rebate on to your customer? (send them a check later? Or decrease up-front cost?)
  
17. [If your company fills out the application **AND** receives the incentive payments]:
  - a. How long does it take to fill out the application?
  - b. What is the average length of time between installation and receipt of incentive payment?
  - c. What is the maximum length of time you have experienced?
  - d. Has the timing of incentive payments affected your business?
  - e. If incentive payments took longer to be paid (due to an increase in demand for the incentive payment from a statewide program) would this be an issue for your business?

#### EQUIPMENT QUESTIONS

18. How do you size a system for any given customer?

[Probe] Rules of thumb, some form of calculation? Is it different for residential vs. commercial?
  
19. How do you estimate the savings a customer might get from installing a SWH system?

[Probe] SRCC OG300 estimated performance, simple calc, software, average estimate? Residential vs. commercial?
  
20. Do you take shading into account when recommending and sizing a SWH system?

[if yes] Possible future shading as well?

Do you use any shading analysis tools (Pathfinder, SolMetric SunEye)?

21. How many SWH systems do you repair or replace in a year? What percentage of your business are repairs? What percentage of the repair calls are due to freeze damage?
  - a. What types of systems are generally damaged? What types of systems generally are freeze damaged? (drainback, ICS, etc; open-loop or closed-loop)?
  - b. What generally causes the freeze damage? (controller failed? Glycol needed to be changed?)
  - c. Are these systems generally 10 miles or more from the coast?
  - d. What is the average age of SWH systems in need of repair? With freeze damage?
22. Are you aware of the equipment requirements of the SWH Pilot Program?
  - a. Do you use similar equipment in the systems you install (pumps, collectors, etc.)?
23. (Active only) Have you had any problems with the availability of CCSE SWHPP required equipment? (valves, pumps, collectors, etc)
24. Do you ever install systems that are not SRCC certified?
  - a. If yes, do these systems satisfy other certification requirements, for example: Europe (Solar Keymark)?
  - b. Are any sales delayed because the equipment is not yet SRCC certified?  
[do not say this] (wait on OG-100 certification is 9-24 months.)
    1. Is the delay due to OG100 certification?
    2. Is the delay due to OG300 certification of new system configurations or substitutions?
  - c. Do you use rebuilt or refurbished parts on the SWH that you install?
25. (Active Only) Is there additional or different equipment you now install due to the CCSE incentive program requirements that you were not installing before? If yes, what? Are there additional costs with the new or different equipment?
26. Do you install active open loop systems?
  - a. [IF YES] Do you install these systems in climate zone 7?
  - b. [IF YES] Would you be able to meet a 5-year equipment and labor warranty (CCSE Pilot Program requirement for climate zone 7 installations) ? Why or why not? [Probe for their opinion on the requirement]

27. Do you install monitoring equipment on the systems you install? Why or why not? (this can reduce maintenance calls if customer can diagnose and/or fix problems over the phone)
- IF YES – Do you collect interval data from any sites? If yes - would you be willing to share the data with us? (would only require customer zip code and system characteristics)

QUESTIONS FOR INACTIVE OR NON-PARTICIPATING CONTRACTORS:

28. [If attended a workshop] The program records indicate that you or someone with your firm attended a CCSE workshop
- Have you submitted the Contractor Participation Application to participate in the SWH Pilot Program? [If not] Do you plan to complete the application?
  - [If yes, completed application, ask:] Our records show that you have not submitted any applications; would you tell me why you have not submitted any applications?
29. [ONLY ASK IF THEY SAID WERE FAMILIAR WITH THE SWHPP AT BEGINNING OF SURVEY] What are the aspects of the CCSE SWH Pilot Program that you like? Are there any aspects of the CCSE SWH Pilot Program that you do not like or that have discouraged your participation in the Pilot Program?
30. [IF SERVICE TERRITORY INCLUDES SAN DIEGO] Have you had any customers in the San Diego area that had a system installed but opted not to participate in the program?

If so, what is/are the reason(s) for not participating (desire not to permit, freeze protection requirements, etc.)?

If so, did the customer request not to participate in the program or did you suggest that the customer not participate?

GO TO QUESTION 42.

QUESTIONS FOR (NEW) ACTIVE CONTRACTORS PARTICIPATING IN SWHPP:

31. What are the aspects of the CCSE SWH Pilot Program that you like? Are there any aspects of the CCSE SWH Pilot Program that you do not like?

[Probe] Requirements: Pull a permit, freeze protection, SRCC certification of parts & systems, QC, length of time to install the SWHs

32. Are there additional costs you incur from filling out the paperwork required for the CCSE rebate? If yes, please elaborate on amount of labor/costs and are the costs passed on to the customer?

33. Have you had any customers in the San Diego area that had a system installed but opted not to participate in the program?

If so, what is/are the reason(s) for not participating (desire not to permit, freeze protection requirements, etc.)?

If so, did the customer request not to participate in the program or did you suggest that the customer not participate?

34. Have you received leads from CCSE? If yes, how many of these have resulted in a sale? How many of the sales also participated in the program?

35. Do you believe that the SWH Pilot Program has been successful in attracting new business for you?

[Probe] Why or why not?

36. Do you think that some form of additional system financing is needed and would attract more people and businesses to the SWHPP?

37. How do you handle the incentive payment? (and why?)

- a. Does someone at your company fill out the application or does the customer do this?
- b. How do you pass the rebate on to your customer? (send them a check later? Or decrease up-front cost?)
- c. How long does it take to fill out the application?
- d. If you provide the discount upfront, how do you reconcile any differences in the actual incentive paid (reimburse the customer or take the loss?)?

38. [If company fills out the application AND receives the incentive payments for SWH installations]:
- What is the average length of time between installation and receipt of incentive payment?
  - What is the maximum length of time you have experienced?
  - Has the timing of incentive payments affected your business?
  - If incentive payments took longer to be paid (due to an increase in demand for the incentive payment from a statewide program) would this be an issue for your business?
39. Have your business practices changed since participating in the Pilot Program? If yes, how? (always OG-300 systems? always pulling permits? All employees attending training?)
40. Has CCSE been responsive to questions and concerns regarding the rebate program?
- Are there any questions or concerns you have posed or would like to pose to CCSE regarding the SWH Pilot Program?

GO TO QUESTION 42.

QUESTIONS FOR BOTH ACTIVE AND INACTIVE CONTRACTORS

41. Questions about building permit(s)
- In which cities have you installed SWH (and PV if applicable) systems?
  - Do they all require permits?
  - For the cities that require permits, what is the average cost of a SWH permit? PV permit?
  - What is the average amount of time it took for you to receive the permit after you submitted the paperwork for a system with roof loading of less than 5 lbs./sq. ft.? For a system with roof loading over 5 lbs./sq.ft.
  - Have you noticed a change in the approval time for permits associated with SWH (and PV if applicable) ?
  - (IF DON'T ALSO DO PV, GO TO g) Have you found that SWH or PV were easier to get a permit for? If yes, why do you think it was easier or harder?
  - Have you found that certain types of SWH systems were easier to get a permit for than others? If yes, why do think some types of systems were easier or harder?
42. Is three months sufficient time to obtain permits and install a SWH system? [If not] How long should be given for installation of the SWH?

43. When asked, CCSE has been letting people know that the average installed cost of a SWH system for applications in the program is \$6,500. Do you think this quote appropriately represents the market cost? [If heard of SWHPP] Has this affected customers' reactions to your quoted price?

#### MARKET

44. Have you seen or heard on the radio or newspaper any marketing for or information about the SWH Pilot Program? If so, which one?
45. (If know about San Diego area) Do you feel that interest in SWH is increasing in the San Diego region? If so, to what do you attribute this increase in interest?
46. Technology changes quickly, how do you stay on top of and make decisions to integrate new technologies into your designs and installs? Can you provide examples? What key factors determine if you integrate a new technology and make it a standard practice?
- 47.
48. What technological advances do you foresee in the SWH marketplace over the next 10 years (i.e. valves, distribution pipes, metering, collectors, pumps, tanks, etc.)? Do you expect any of these to significantly reduce costs?
49. Do you see any competition between PV, SWH, tankless water heater, demand response and/or energy efficiency in terms of homeowner's views of energy reduction and available cost and space?
- a. If yes, do you feel it is possible to integrate SWH systems with energy efficiency, demand response or PV technologies effectively?
- b. If yes there is competition, what role would incentive programs play in rectifying this situation? Contractors? Government?
50. [If sell PV systems AND participated in a PV rebate program] what aspects of the PV program do you like which should be applied to the SWH Pilot Program?
51. Do you have any recommendations for the Pilot Program or for a future SWH incentive program?
- a. What might be done to stimulate interest in solar water heating systems more generally, either within the SWH Pilot Program or otherwise?
- [Probe] Incentive levels, outreach & marketing, customer education, contractor training? And why?

## REQUESTS

52. As part of our evaluation activities, CalSEIA will be sending out confidential cost surveys, where you will have the option of including your contact information or mailing it back anonymously. Completing the survey will contribute to our evaluation of the cost-effectiveness of SWH and will help us make recommendations to the CPUC about how policy can change to reduce costs and to encourage the SWH market. Please return the survey by August 1.
53. (If install in the commercial sector-question#9d): As part of our evaluation activities, we will be interviewing companies that have installed SWH systems AND are thinking about installing SWH within and outside of the SWHPP. This will also assist in determining the feasibility of a 10-year statewide incentive program. This information will be kept confidential and will only be used for purposes of contacting the customers to conduct the survey. Would it be possible to get a list with contact information of your commercial customers that bought or were thinking of buying solar water heating systems – pool or hot water) within the last year so that we could conduct these surveys?
54. (If install in the residential sector-question#9d): As part of our evaluation activities, we will be interviewing residential customers that have installed SWH systems outside of an incentive program. This will also assist in determining the feasibility of a 10-year statewide incentive program. This information will be kept confidential and will only be used for purposes of contacting the customers to conduct the survey. Would it be possible to get a list of the residential customers who purchased and installed SWH systems outside of a rebate program within the last year?

THANK THEM FOR THEIR TIME AND CONCLUDE THE INTERVIEW.

# ***Appendix G***

## **Contractor Confidential Cost Survey**

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**CALIFORNIA SOLAR ENERGY INDUSTRIES ASSOCIATION**

**916-747-6987    info@calseia.org**

**P.O. Box 782, Rio Vista, CA 94571**

Dear Solar Contractor:

I am writing to you on behalf of the California Solar Energy Industries Association (CALSEIA). This letter is being sent to companies who have business interest in Solar Water Heating, some of who are members of CALSEIA. For those of you who are not currently members of CALSEIA, CALSEIA has been working toward establishing a statewide incentive program for customers who purchase a solar water heating system for their home or business.

CCSE is the program administrator for the Solar Water Heating Pilot Program (SWHPP) in San Diego, California, which provides incentives for up to \$1,500 for customers in the San Diego area who purchase a solar water heating system. CALSEIA is working with the California Center for Sustainable Energy (CCSE) and serves as a member of their Technical Advisory Board. The pilot program will help define a statewide solar water heating program being considered for implementation by the CPUC. The CPUC will be evaluating the effectiveness of the Solar Water Heating Pilot Program to determine whether a statewide program is cost effective and in the public interest.

CALSEIA and CCSE request that you help with determining if a statewide program is cost effective and in the public interest by participating in a survey that will provide data to the CPUC.

Attached to this letter is a confidential cost survey to be used by the SWHPP evaluator (Itron, Inc.) in helping assess costs and cost trends among California solar water heating systems and installations. The data will only be used in aggregated format with information from other contractors. Individual reported costs will not be identified to anyone, including CCSE and the CPUC, without first receiving your permission.

Please take a few minutes to fill out this survey and return it to Itron, Inc. in the envelope included with this letter. It is optional to include your contact information when returning the survey.

Additionally you may receive a call from an Itron employee to ask additional questions about your business and your opinions on the Pilot Program, as well as recommendations for a statewide program. Similar to the cost survey, the responses during the phone interview are confidential and results will be presented in aggregate.

We would like to have some of the results available for the August 26<sup>th</sup> workshop on the SWHPP. Consequently, please return the survey by no later than July 31<sup>st</sup>. If you have any questions, please contact Heidi Ochsner at Itron, Inc. either by telephone at (360) 906-0616 or by email at [Heidi.Ochsner@itron.com](mailto:Heidi.Ochsner@itron.com).

Thank you for your time and assistance in providing information needed to move this program forward.

Sincerely,

A handwritten signature in cursive script that reads "Sue Kateley".

Sue Kateley  
Executive Director

**Contact Information (optional)**

Name
Company
City
Phone
Email

**Company Profile**

1. What is your main business? (circle one) If Other please specify:	Domestic SWH	Commercial SWH	Pool SWH	PV
2. Number of years in business				
3. Number of years in SWH business				

4. a. Number of total employees
b. Number of SWH system installers
c. Number of SWH installers with more than 5 years experience
d. Number of SWH installers hired within the past year
e. Number of dedicated SWH sales staff
f. Number of total sales staff
g. Number of employees dedicated to processing rebates
h. Number of employees paid on commission only

5. Do you also sell/install PV? (circle one)	sell and install	sell only	install only	no
6. Do you also sell/install pool SWH? (circle one)	sell and install	sell only	install only	no
7. Are you currently participating in a SWH rebate program? (circle one)	yes	no	plan to in future	
a. If yes, please specify which program(s):				
8. What was your company's annual revenue in 2007?				
a. What percentage of that came from SWH?	yes	no	not sure	
9. Have SWH sales increased from 2007?	yes	no	not sure	

**10. What SWH systems do you currently sell/install most often?**

System design refers to drainback, ICS, active closed-loop, etc.

<p><b>System 1:</b></p> <p>OG300 number (if known):</p> <p>Manufacturer:</p> <p>Model Number:</p> <p>System Design:</p> <p>Collector Size:</p> <p>Tank Size:</p>	<p><b>System 3:</b></p> <p>OG300 number (if known):</p> <p>Manufacturer:</p> <p>Model Number:</p> <p>System Design:</p> <p>Collector Size:</p> <p>Tank Size:</p>
<p><b>System 2:</b></p> <p>OG300 number (if known):</p> <p>Manufacturer:</p> <p>Model Number:</p> <p>System Design:</p> <p>Collector Size:</p> <p>Tank Size:</p>	<p><b>System 4:</b></p> <p>OG300 number (if known):</p> <p>Manufacturer:</p> <p>Model Number:</p> <p>System Design:</p> <p>Collector Size:</p> <p>Tank Size:</p>

<b>Annual Costs</b>	<b>\$/year</b>	<b>Explain (if necessary)</b>
<i>Insurance Premium</i>		
<i>Overhead</i>		
<i>Licensing Costs</i>		
<i>Marketing</i>		
<i>Training</i>		
<i>Misc Costs (Please describe)</i>		

Please provide costs for your two most popular residential SWH systems that you install

SYSTEM 1				
System Manufacturer and Model Number: (Should correspond to a system listed in Question 10)				
OG300 Number (if known):				
Project Cost	Non-Labor Costs (Average \$)	Labor Hours (Total for all employees that would work on the task for one system)	Labor Rate (Average hourly rate for all employees that would work on the task for one system)	Explain (if necessary)
<b>Pre-Installation</b>				
Initial Site Visit			\$	
Planning Design			\$	
Permit			\$	
<b>Equipment</b>				
Collector(s) (before markup)	\$			
Tank(s) (before markup)	\$			
Metering/Monitoring Equipment (before markup) (Please specify what type of metering)	\$			
All Other Equipment Costs Before Markup (Include BOS, Freeze Protection, etc)	\$			
Overall Percent Markup on Equipment	%			
<b>Installation and Post-Installation</b>				
Installation (Labor)			\$	
Filling Out Incentive Application (Specify which Incentive Program)			\$	
Extended Warranty (if offered)	\$			
Maintenance Agreement (if offered)	\$			
Call-Backs	\$		\$	
Misc. Costs (Please describe)	\$		\$	
<b>TOTAL</b> (should be equivalent to total installed system cost before rebates)	\$		\$	

<b>SYSTEM 2</b>				
<b>System Manufacturer and Model Number:</b> <i>(Should correspond to a system listed in Question 10)</i>				
<b>OG300 Number (if known):</b>				
	<b>Non-Labor Costs</b> (Average \$)	<b>Labor Hours</b> (Total for all employees that would work on the task for one system)	<b>Labor Rate</b> (Average hourly rate for all employees that would work on the task for one system)	<b>Explain</b> (if necessary)
<b>Project Cost</b>				
<b>Pre-Installation</b>				
Initial Site Visit			\$	
Planning Design			\$	
Permit			\$	
<b>Equipment</b>				
Collector(s) (before markup)	\$			
Tank(s) (before markup)	\$			
Metering/Monitoring Equipment (before markup) <i>(Please specify what type of metering)</i>	\$			
All Other Equipment Costs Before Markup <i>(Include BOS, Freeze Protection, etc)</i>	\$			
Overall Percent Markup on Equipment	%			
<b>Installation and Post-Installation</b>				
Installation (Labor)			\$	
Filling Out Incentive Application <i>(Specify which Incentive Program)</i>			\$	
Extended Warranty (if offered)	\$			
Maintenance Agreement (if offered)	\$			
Call-Backs	\$		\$	
Misc. Costs (Please describe)	\$		\$	
<b>TOTAL</b> <i>(should be equivalent to total installed system cost before rebates)</i>	\$		\$	

# Appendix H

## Manufacturer/Distributor Survey

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Hello, my name is \_\_\_\_\_ and I'm assisting the California Center For Sustainable Energy in evaluating their Solar Water Heating Pilot Program. I'd like to ask you some questions about your impressions of the SWH market in California. All of your answers will be kept confidential. Do you have about 40 minutes to talk with me?

[If not, reschedule an appointment] \_\_\_\_\_

1. What is your primary business? (primarily manuf? Distributor? Also install systems?)
  - a. How long have you been in business?
  - b. How many employees are there?
  
2. What types of solar water heating equipment does your company manufacture/sell?
  
3. Do you make/sell any SWH systems that are not SRCC certified?  
  
IF YES
  - a. Has the system been submitted for SRCC certification?
  
  - b. Have any sales been delayed because the customer is waiting for the system to be SRCC certified?
  
4. Do you sell the systems as an OG300 kit? Do you know what the OG300 approved substitutions are for that system?

5. Do you sell other types of equipment? [check to see if they make/sell PV systems as well as other equipment associated with SWH like radiant flooring, abs. chillers, pumps, pipes, metering equipment, etc.]

[if they make/sell PV] Do you push PV, SWH or Pool Heating the most (if they do solar pool heating)t? Why? If PV, how many systems do you sell per year?

[if they make/sell metering equipment] What type of metering equipment do you sell? (flow, temp, data acquisition capability, etc.)

6. What type of warranties do you offer?

7. How do you market SWH systems?

[Probe] Advertisements, radio, newspaper, websites, home shows, energy fair, word of mouth?

8. Do you offer training for installers for the systems that you distribute/manufacture?

IF YES

- a. How often do you hold the training?
- b. What is the average attendance at the training? Has attendance been increasing or decreasing? Why? Where are the trainings held?
- c. In the training, do you review SRCC standards and certification? Do you review the Uniform Solar Energy Code?

9. How many SWH systems do you typically manufacture/distribute in a year?

How many of those systems are installed in CA?

Has that number been fairly constant each year or does it fluctuate a lot? [ if fluctuates, why?]

10. Have you seen a change in any of your costs and if yes, which costs and why? [Probe to find out ways they decrease manufacturing costs]

11. What portion of your business holds the greatest potential for cost reductions?

12. What do you believe are the biggest recent breakthroughs in SWH technology and why?
13. What improvements to SWH technology would you like to see over the next 10 years?
14. Are you familiar with the SWH Pilot Program in San Diego?
  - a. If yes, do you believe the pilot has increased/decreased business for you?
  - b. If yes, what do you like/dislike about the pilot?
15. (If familiar with San Diego) Do you feel that interest in SWH is increasing in the San Diego region? Outside of the San Diego region? If so, to what do you attribute this increase in interest?
16. Are there any SWH components that may be limited in supply if a statewide program increased demand?
17. What do you believe the biggest market barriers are currently for SWH in California? Are there different market barriers to sales in northern versus southern CA (if selling statewide)?
18. Do you think that some form of additional system financing is needed and would attract more people and businesses to the SWH program? [talking about loans here] What type of financing would be most beneficial to the growth of the SWH industry in CA?
19. How will your business outlook change if there is a statewide incentive program in California?
20. Do you believe that incentive programs have an effect on equipment or installation costs? Do you think wholesale prices have increased or decreased since the CCSE SWHPP began?
21. Do you anticipate installed prices system prices to change if there is a statewide incentive program? Do you anticipate wholesale prices to change if there is a statewide incentive program?
22. Do you have any advice or concerns for a statewide incentive program?

THANK THEM FOR THEIR TIME AND CONCLUDE THE INTERVIEW.

# Appendix I

## Other Programs Survey

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### Section 1.1 Process questions (how the program works)

1. Could you provide a brief description of how your SWH Incentive Program works? Eligibility criteria? (pool solar water heaters, size, sectors included, etc)
2. How is the incentive amount calculated and what is the maximum incentive for each sector (ask for residential/commercial/industrial)?
3. Do you offer incentives for repairing or retrofitting old systems? If so, how much is the incentive?
4. Does your program offer higher incentives to a) low-income housing, b) non-profits, c) equipment manufactured in-state?
5. When did this program begin (month & year)?
6. What is the annual administrative budget of the program? Incentive budget? How is it funded?
7. Is there a different process for the different sectors? (residential/commercial/industrial)
8. Who fills out and submits the application?
9. On average, how long does it take to approve an application?
10. Who receives the incentive payment? (Is the incentive a one-time payment or a production incentive payment?)
  - a. When is it paid?
11. [non-CA program only, skip to (a) for CA]  
Does your state have an RPS?
  - a. [IF YES or if CA program]  
Do SWH systems contribute towards meeting the RPS goal ? Is it automatic or does the utility need to purchase the rights from the owner of the system?

12. Is there a requirement for how long the system must be in place?
  - a. [If yes] What is the requirement?
13. Are there any program requirements for the situation in which the home is sold to a new owner?
14. Does the program require the participant to obtain a building permit from the city?

Are there any other required permits?

Do you know how much the permits cost and how long it takes to obtain the permit?

  - a. [If yes] How much does the building permit cost?
    - i. What is the amount compared to PV (if known)?
  - b. [If yes] How long do they normally take to get?
    - i. How does this compare to PV (if known)?

#### Section 1.2: Program Results

15. What type of marketing and outreach has been done to get the word out about the program? (pamphlets, mail inserts, radio or TV ads, workshops, etc.)
  - a. Was the outreach successful? How was the success measured?
  - b. Which forms of media were most successful – how determined which worked better?
16. What is the total number to date, and annual totals since program inception per building sector of solar hot water system:
  - a. applications received?
  - b. Payouts (both # and \$ amount for each sector)?
17. Do you think the presence of a SWH incentive program has affected the installation cost or equipment costs of SWHs in the area?
  - a. [If yes] How?
  - b. [If yes] How do you know the change in price can be attributed to the program?

18. Have you conducted an evaluation of the program? Did you have measurable objectives?

a. [If yes] Can you send us the evaluation report?

### Section 1.3: Program Design

19. [non-CA programs only] In your state is SWH considered an energy efficiency measure?

20. Before this program started, was there a pilot program or other SWH incentive?

a. [If yes] How long did the pilot program run before the program was expanded?

i. How many systems were installed in the pilot program? Specific types? Specific sectors?

b. [If yes] What was the process for deciding to expand the pilot program? (lessons learned, what research was valuable to make the decision to expand the program) Did certain criteria need to be met? What were the criteria?

c. [If yes] Were any requirements of the program changed when it was expanded?

d. [If no] How did you determine the requirements for the program?

i. What was the policy driver for this program (legislatively mandated? Customer-decision (Publicly-owned utilities)?

ii. Prior to starting the program, were other SWH programs researched? What other program(s) were researched to determine criteria?

iii. Did you conduct stakeholder input sessions?

### Section 2: Technical requirements of solar hot water system

21. How do you size the systems?

22. Is there a minimum solar fraction or other minimum threshold for system performance for program eligibility?

23. What fuel sources are acceptable as backup water heaters (gas/electric/propane/both/other)?

24. Does the system have to be new? Probe: the entire system including the backup tank and all plumbing?
- a. What about retrofitting a new collector to an existing set-up, are any incentives given for that?
  - b. Are there other age related requirements for other existing system parts or supporting structure of system? Probe: In some cases programs have indicated that if installed on a roof the roof must have a remaining useful life of 15 years.
25. Is the solar hot water collector required to be SRCC certified (OG-100)? What about the entire system (OG-300)?
- a. Are SolarMark (European equivalent of SRCC) certified systems acceptable?
26. Is freeze protection required?
- a. [If yes] What is required? (e.g. Closed loop glycol? Drainback with controls? Specific freeze tolerance?)
27. Are there any valve requirements beyond what is required by local building code?
- a. [If yes] What are they? ASSE standard number (if known)?
28. Does the program require that systems be installed by a licensed contractor? or can a homeowner, for example, install the system?
- a. [If yes for licensed contractor] What are requirements for the contractor? (do they require installers to attend a workshop/training?)
29. Are systems required to be inspected by the program administrator prior to payout?
- a. [If yes] What percentage of total installations are inspected?
30. Do you monitor the performance of any of the completed projects in the program?
- a. [If yes] What data points are being monitored? (metering the temperatures and flow in order to calculate the heat provided to the backup tank by the SWH, or (bare bones) metering hot water flow out of back-up tank)
  - b. [If yes] At what time interval is the data being collected?
  - c. [If yes] How is data transferred? (via internet to remote website, direct meter read)

- d. [If yes] Currently what percentage of the installations are monitored? (break out by commercial/residential/industrial)
  - iv. Are you willing to share this performance data with the CCSE?  
Explain: The CCSE program is hoping to go statewide and this data could be valuable in adjusting the current program requirements, and determining the performance and cost-effectiveness of projects. The data would not be used for any other purpose and only system data would be needed (no data needed regarding the applicant, other than what sector and the zip code).
    - 1. [If yes] Who would be the contact for the data?

31. Do you collect system cost and labor cost data?

- a. [If yes] Would you be willing to share a summary of that data with us? (summarize by zip code, system type, residential only, electric vs. NG)

### Section 3: Program success

- 32. What are the goals of the program? Do you feel the program has achieved the goals?
- 33. How successful do you feel this program is? What criteria do you use to measure your program's success?
- 34. What are the most effective aspects of the program? Least effective?
- 35. How do you think participants (customers) feel about the program? What feedback have you gotten regarding what aspects of the program work and what does not work?
- 36. How do you think participating contractors feel about the program? What feedback have you gotten regarding what aspects of the program work and what does not work?
- 37. What would you change about the program, if anything?
- 38. What do you think makes your program unique from other SWH incentive programs? (program requirements, implementation, anything goes here)
- 39. Do you have any advice for creating a statewide solar water heating incentive program?
- 40. Is there anything else you would like to share with us, which we have not covered?

# Appendix J

## Market Actor Survey

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1. What do you feel are the market barriers to SWH? [probe for opinions on residential versus commercial, competition with PV and energy efficiency]
2. Do you believe that an incentive program is needed to stimulate the growth of the SWH market?
3. How should the incentive structure be designed? [Fixed rate? Tiered? Performance based?]
4. Should there be a minimum efficiency requirement for incentive eligibility?
5. Should repair or replacement of system components on an older SWH system be eligible for financial incentives from SWH programs? Should there be different requirements for existing vs. new?
6. What types of system requirements should there be regarding freeze protection, valves, roof-life, minimum production, system maintenance?
7. Is there value in requiring certification of equipment? What type of certification should be required?
8. Is there value in requiring certification for contractors? What type of certification should be required?
9. What types of businesses should be doing the installations? solar contractors, plumbing contractors?
10. Is a high degree of penetration into the new construction market required before there will be enough public acceptance to sustain a replace/retrofit market?
11. Where is the technology headed in the next 10 years?
12. Historically, which SWH incentive programs do you feel have been most effective in transforming the market? Why?
13. Do you feel that SWH incentive programs affect installation and/or equipment costs of SWHs? If so, how? Do you know of any research that supports this?

14. Do you know of any carbon credit markets for which SWH is eligible? If yes, is the value of the credits enough to have much impact in improving cost-effectiveness?
  
15. Do you have any comments, advice or suggestions for the development of the SWH market in California where the majority of water heaters are currently fueled by natural gas?

# Appendix K

## Demographics and Hot Water Use Characteristics

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This appendix discusses the demographics and hot water use characteristics of the residential and commercial sectors in SDG&E territory and throughout California. For the residential sector, the efficiency of appliances which utilize hot water, the time of use of each appliance, and hot water use profiles are discussed. For the commercial sector, hot water use characteristics and profiles are provided.

Information on hot water use was gathered from the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE),<sup>1</sup> the Residential Appliance Saturation Study (RASS),<sup>2</sup> the Commercial End-Use Survey (CEUS),<sup>3</sup> and other sources, including a market study and an appliance efficiency saturation study. ASHRAE provides residential and commercial sector hourly hot water use profiles. RASS, CEUS, and the other studies referenced contain data specific to California. All of these data sources are explained in more detail in Section 3. In addition to these resources, Itron staff surveyed the participants in the CCSE SWHPP, attendees of the CCSE SWH Basics for Homeowners workshop, and SWH owners throughout California regarding their hot water use patterns.

### K.1 Residential—Single-Family

There are several household characteristics that influence whether or not SWH would be a cost-effective option for a consumer. These include number of people living in the home, household income, fuel used for the water heater, amount of hot water used, and the presence of water saving devices and energy saving appliances. Another factor to consider is whether or not homeowners are planning to remodel their house; timing the install of a SWH with a remodel can save the homeowner money on the SWH installation.

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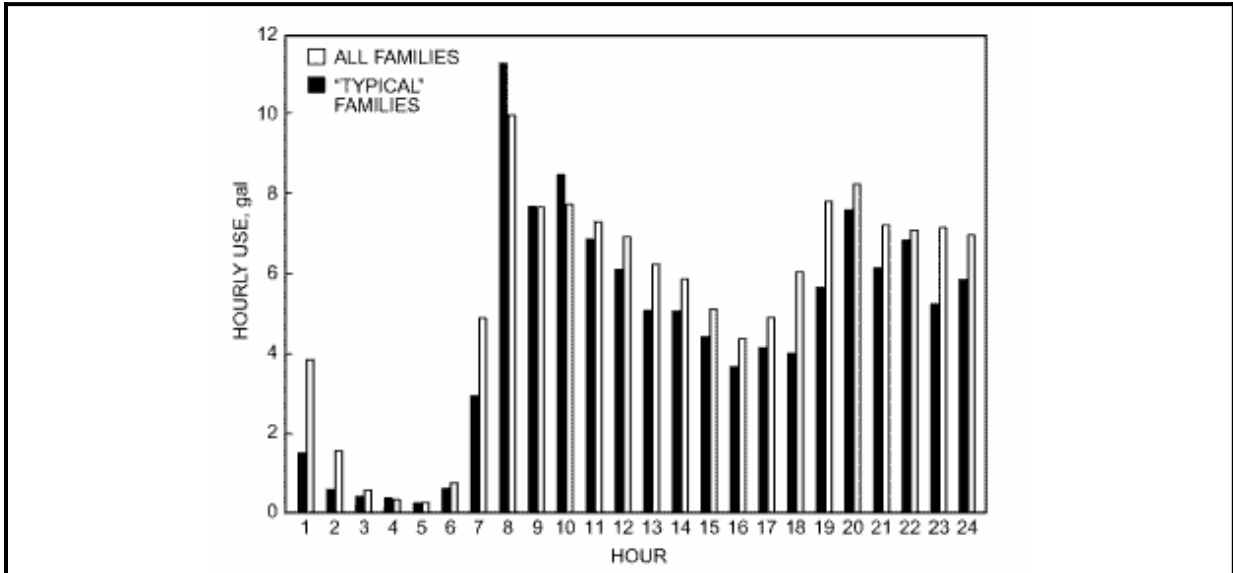
<sup>1</sup> American Society of Heating, Refrigerating, and Air Conditioning Engineers. *2007 ASHRAE Handbook HVAC Applications*. Chapter 49 Service Water Heating.

<sup>2</sup> KEMA-XENERGY, Itron, and RoperASW. *2003 California Statewide Residential Appliance Saturation Survey*. Publication # 400-04-009. Prepared for California Energy Commission. 2004.

<sup>3</sup> Itron. *California Commercial End-Use Survey*. Publication # 400-2006-005. Prepared for California Energy Commission. 2006.

Figure K-1 shows the ASHRAE residential hourly hot water use profile which is applicable to households throughout the United States, with gallons of hot water used per hour on the y-axis and hour of the day on the x-axis. The profile shows that the hot water use peaks at 8:00 am and again at 8:00 pm. Nationally, the average amount of hot water used per day in the “typical” family profile is 63.1 gallons.

**Figure K-1: ASHRAE Residential Hourly Hot Water Use, 95 Percent Confidence Level**



### ***SDG&E Residential Market***

Homeowners in SDG&E territory are summarized into three groups: 1) SDG&E customers included in the RASS, (the “baseline SDG&E group”), 2) SDG&E customers who are participants in the SWHPP, and 3) SDG&E customers who considered participating in the SWHPP and attended one of the SWH Basics for Homeowners workshops held by CCSE.

### ***Baseline SDG&E Group***

The RASS<sup>4</sup> data were filtered for SDG&E customers who are owners of a single-family home and who are full-year residents.

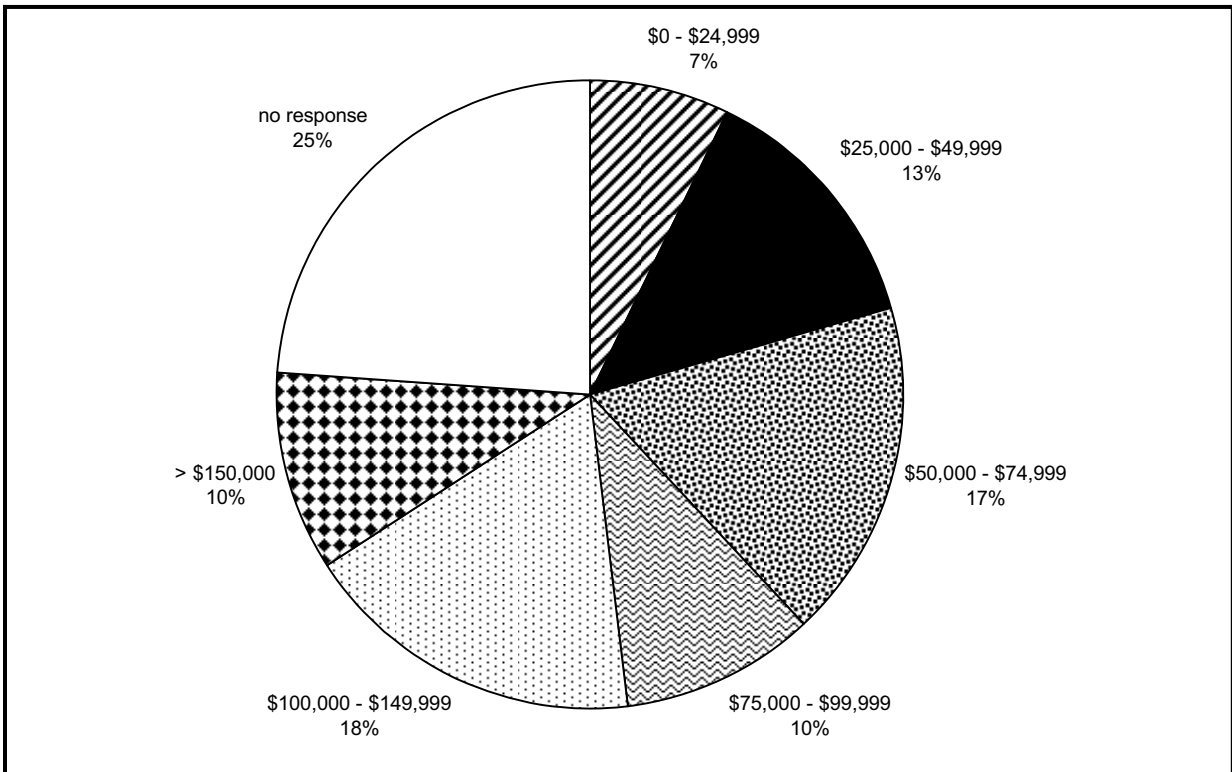
<sup>4</sup> KEMA-XENERGY, Itron, and RoperASW. 2003 California Statewide Residential Appliance Saturation Survey. Publication # 400-04-009. Prepared for California Energy Commission. 2004.

Demographics

The baseline group’s demographic information includes annual household income, education level, number of years the home has been owned, and current number of people living in the home.

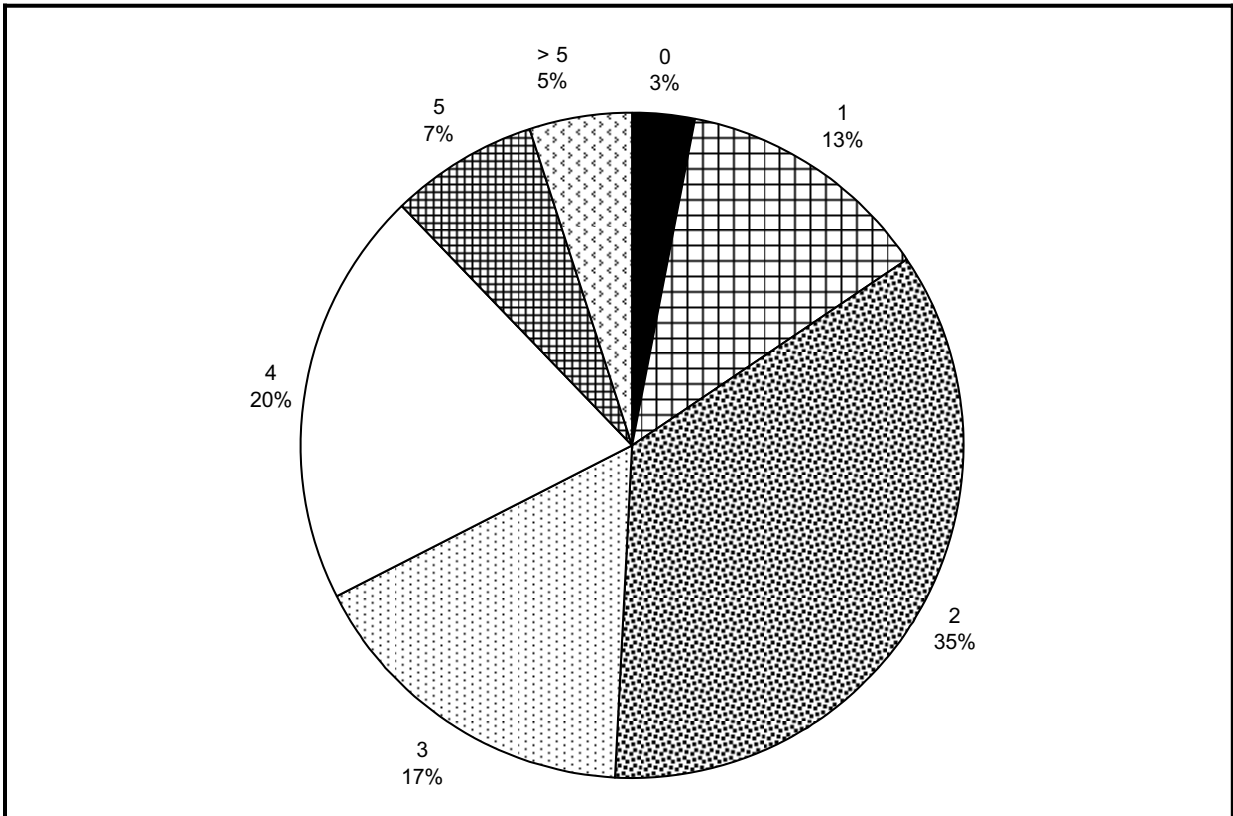
Household income can determine how likely the homeowner is to be concerned about the upfront cost of the SWH system. In 2004, the average annual household income of homeowners in SDG&E territory who were full-year residents was \$85,296. Figure K-2 shows that 28 percent of these homeowners had an annual household income greater than \$100,000. The head of household had a college degree in 62 percent of homes.

**Figure K-2: Annual Household Income among Homeowners—Baseline SDG&E Group**



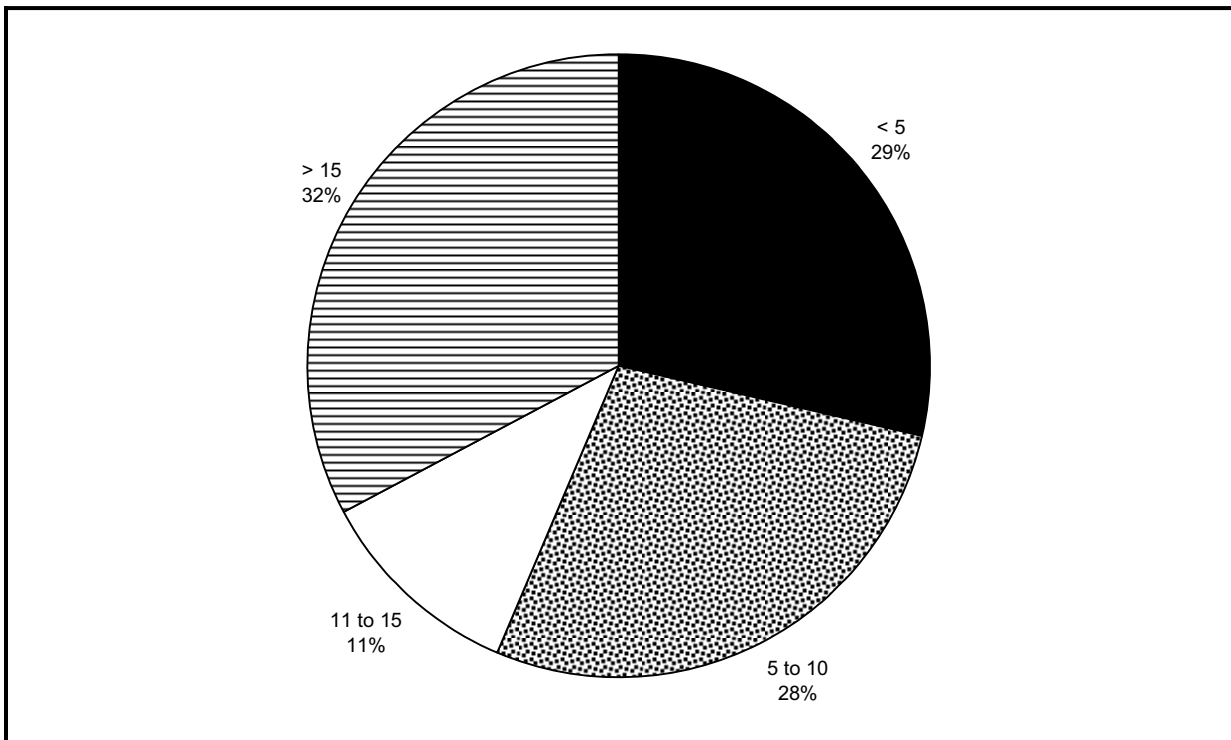
The number of people living in a home can influence a homeowner's decision to purchase a SWH because generally the amount of hot water used is dependent on the number of people living in the home. Figure K-3 shows that 35 percent of single-family homes in SDG&E territory had two residents. Seventeen percent of homes had three residents and 20 percent of homes had four residents.

**Figure K-3: Number of Residents per Household—Baseline SDG&E Group**



The number of years in the home can provide an estimation of the amount of equity and likelihood that a homeowner would qualify for a home equity loan for home improvements such as installing a SWH. Figure K-4 shows that 32 percent of homeowners had lived in their home for more than 15 years. Eleven percent had lived in their home for 11 to 15 years, 28 percent had lived in their home for five to 10 years, and 29 percent had lived in their home for less than five years. Eighteen percent of homeowners had remodeled their homes during the year prior to filling out the RASS survey.

**Figure K-4: Number of Years Lived in Home—Baseline SDG&E Group**



Hot Water Use Characteristics

Ninety-three percent of homeowners in SDG&E territory had a natural gas water heater (standard tank or tankless). Ninety-four percent of homeowners had standard tank water heaters (includes natural gas and electric) and 77 percent of these tanks were set to a medium temperature (130°F to 150°F), which is the factory setting.

Seventy-eight percent of homeowners reported that one to three showers were taken per day. Seventy-six percent of homeowners reported that at least some of their showerheads were low-flow and 52 percent reported that at least some of their faucets contained aerators for saving water.

Eighty-two percent of homeowners in SDG&E territory had a dishwasher in their home. Homeowners were not asked whether they had ENERGY STAR-rated dishwashers in the RASS survey, and these data were instead obtained from the *2005 California Statewide Residential Lighting and Appliance Efficiency Saturation Study*. In SDG&E territory 21 percent of homeowners had an ENERGY STAR-rated dishwasher. Sixty-three percent of these homeowners did four or less loads of dishes per week. Eighty-four percent of homeowners in SDG&E territory had a top-load clothes washing machine in their home, and 14 percent had a front-load clothes washer. Front-loading machines on average use 73 percent less hot water per year than the typical clothes washer found in homes in California in 2005.<sup>5,6</sup> RASS survey participants were not asked whether they had ENERGY STAR-rated clothes washers. Fifty-eight percent of homeowners reported that on average they used the hot water cycle less than once per week. Twenty-eight percent washed one to two loads of laundry per week using the hot water cycle. Sixty-six percent reported doing one to five loads of laundry per week on the warm water cycle.

**SDG&E Customers: SWHPP Participants**

Itron's Computer Assisted Telephone Interviewing (CATI) Center interviewed 40 residential SWHPP participants. To better understand any connection between demographic features and participation in the SWHPP, participants were asked questions regarding home occupancy levels, household income level, and the number of years they had lived in their current home. They were also asked about their hot water use patterns and the type and efficiency of hot water appliances that they own.

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<sup>5</sup> National Renewable Energy Laboratory. *Method for Evaluating Energy Use of Dishwashers, Clothes Washers, and Clothes Dryers*. NREL/CP-550-39769. August 2006.

<sup>6</sup> RLW Analytics, Inc. *2005 California Statewide Residential Lighting and Appliance Efficiency Saturation Study*. Final Report prepared for California's Investor Owned Utilities. June 2, 2005.

*Demographics*

The participants were asked which income range defined their household income. Five of the survey participants refused to provide income information. Of the remaining 35 participants, over half stated their household income was more than \$100,000 per year. Twenty-three percent of the participants had a household income between \$75,000 and 100,000 per year, 10 percent had a household income between \$50,000 and \$75,000 per year, and 10 percent had an annual household income of less than \$50,000.

**Figure K-5: Annual Household Income—SWHPP Participants**

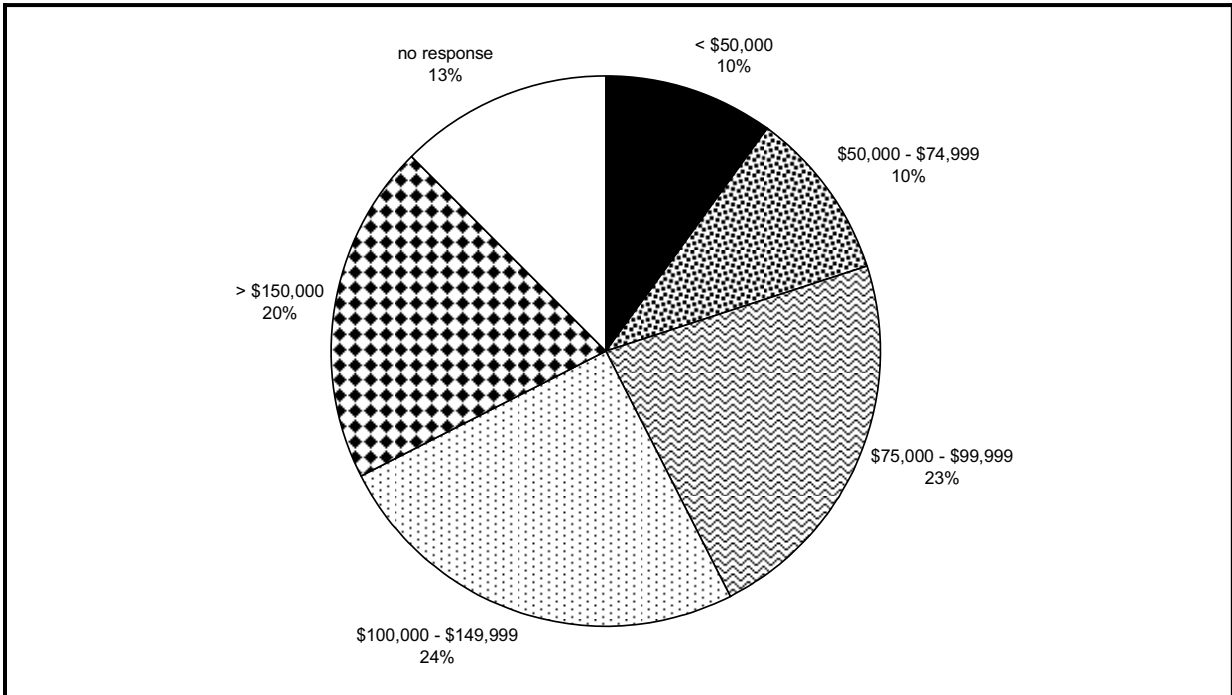


Figure K-6 shows that the majority of the program participants had two people living in the household (54 percent). Only one participant had one individual in the household. A little more than one-third (43 percent) of the surveyed participants lived in a household with three or more individuals. None of the participants lived in a household with more than six individuals.

**Figure K-6: Number of Residents per Household—SWHPP Participants**

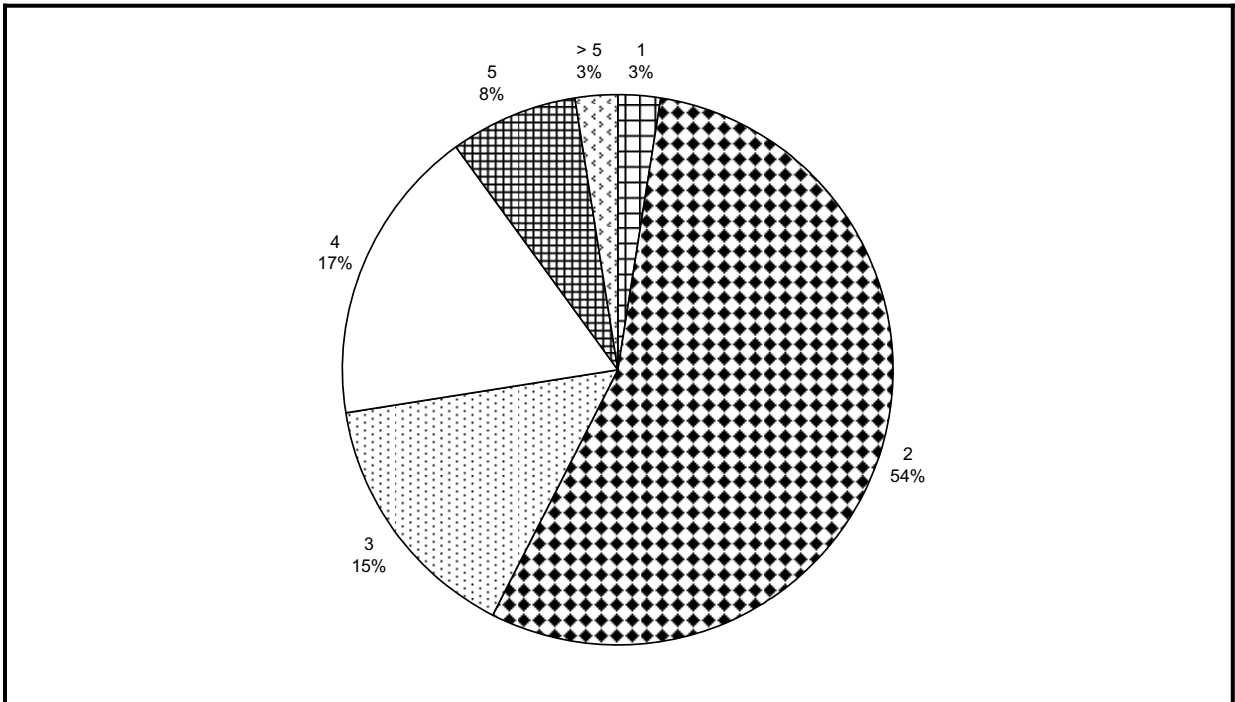
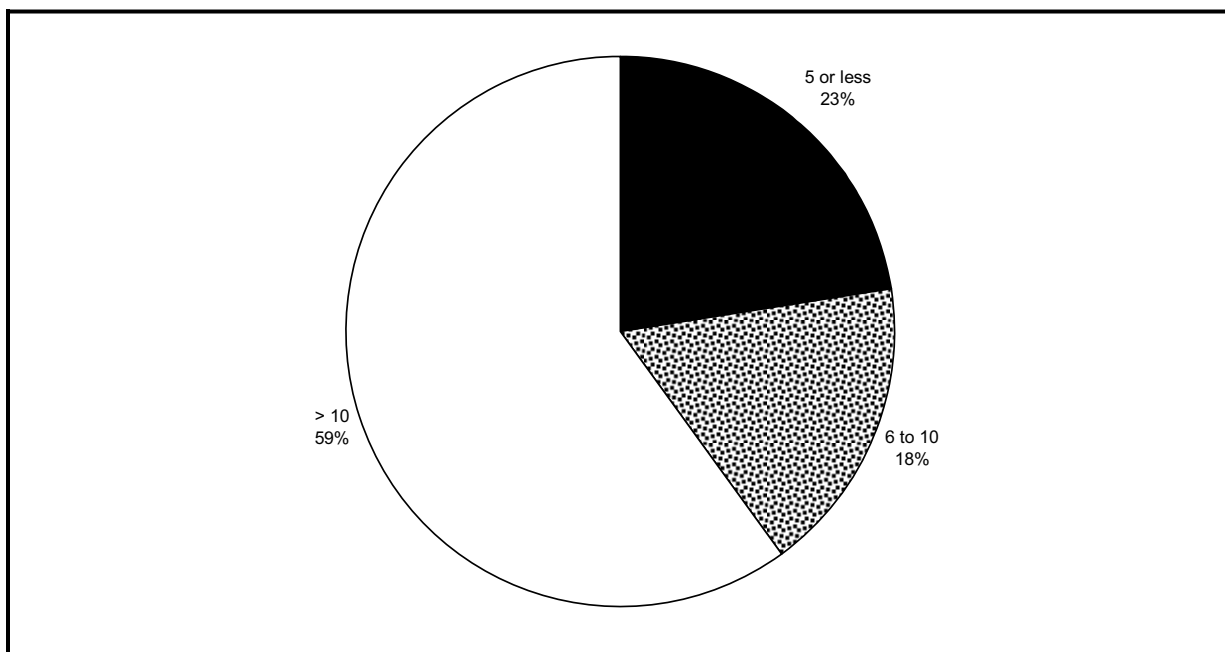


Figure K-7 shows that the majority (59 percent) of SWHPP participants had owned their house for more than 10 years. Twenty-three percent had owned their home for five years or less and 18 percent had owned their home for six to 10 years.

**Figure K-7: Number of Years in the Home—SWHPP Participants**



#### Hot Water Use Characteristics

As of October 31, 2008, 32 percent of the residential systems installed had an electric backup water heater, while 45 percent had a natural gas backup water heater and 20 percent had a propane backup water heater. Thirty-four percent of these SWH systems used a tankless water heater for backup. Seventy-two percent of these systems were set to a low temperature (below 130 degrees Fahrenheit), three percent were set to a medium setting (130 degrees to 150 degrees Fahrenheit), and 25 percent of respondents did not know what temperature their backup water heater was set to.

Eighty-eight percent of SWHPP participant survey respondents reported that one to three showers are taken per day. Eighty percent reported that at least some of their showerheads were low-flow. Eighty percent reported that at least one shower was taken during the morning and 38 percent reported that at least one shower was taken during the evening. Twenty percent reported that at least one shower was taken during the afternoon and 25 percent said that at least one shower was taken late at night. The hot water use for showers is consistent with the ASHRAE hot water load profile shown in Figure K-1, where the peak hours for hot water use were shown to be 8:00 A.M. and 8:00 P.M.

Eighty-three percent of SWHPP participants had a dishwasher in their home. Sixty-one percent of the participants with dishwashers had an ENERGY STAR-rated dishwasher. ENERGY STAR dishwashers were the market baseline in California in 2005 and dishwashers purchased in 2005 use 37 percent less hot water than the typical dishwasher found in California homes in 2005.<sup>5,6</sup> Eighty-five percent of these homeowners did four or less loads of dishes per week and no one reported doing more than seven loads of dishes per week in their dishwasher. Twenty-seven percent of survey respondents did at least one load of dishes in the morning, 24 percent did at least one load in the afternoon, 33 percent did at least one load in the evening, and 39 percent did at least one load late at night.

All SWHPP participants that were surveyed had a clothes washing machine in their home. Fifty-five percent of SWHPP participants had a top-load clothes washing machine and 45 percent had a front-load clothes washing machine. Of the 55 percent of participants with top-load washing machines, 50 percent of them reported that their machine was ENERGY STAR rated. ENERGY STAR Tier 2 top-loading machines use 17 percent less hot water per year than the market baseline machine purchased in 2005. ENERGY STAR Tier 3 clothes washers, which include most front-load and some high efficiency top-load machines, use 40 percent less hot water per year than the market baseline for machines purchased in 2005.<sup>5,7</sup> Seventy-three percent of homeowners reported that, on average, they used the hot water cycle less than once per week. Eighteen percent did one to two loads of laundry per week using the hot water cycle. Seventy percent reported doing one to five loads of laundry per week on the warm water cycle. Sixty percent said that they did laundry on both weekdays and the weekend, 25 percent did laundry only on weekdays, and 15 percent did laundry only on the weekend. Seventy-eight percent did at least one load of laundry in the morning, 53 percent did at least one load of laundry in the afternoon, 43 percent did at least one load of laundry in the evening, and 33 percent did at least one load of laundry late at night.

#### **SDG&E Customers: SWHPP Workshop Attendees**

The Itron CATI Center interviewed 30 homeowners who had attended one of the CCSE SWH Basics for Homeowners workshops but had not submitted an application to the program. It should be noted that it is not mandatory for SWHPP participants to attend this workshop. Out of the 422 workshop attendees, only two have participated in the program as of October 31, 2008. Twenty-nine of the 30 respondents were SDG&E customers, while the other respondent owned a home elsewhere in California. In order to understand any connection between demographic features and an interest in SWH, workshop attendees were asked similar questions to the SWHPP participants. Questions included home occupancy levels, annual household income, and the number of years they had lived in their current

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<sup>7</sup> Itron, Inc. *California Residential Efficiency Market Share Tracking Appliances 2005*. Prepared for Southern California Edison. October 30, 2006.

home. They were also asked about their hot water use patterns and the type and efficiency of appliances they own that use hot water.

Demographics

The workshop attendees were asked which annual income range best described their household, and the results are shown in Figure K-8. Ten percent refused to provide income information. Seventeen percent of workshop attendees had a household income of less than \$50,000 per year, 23 percent had a household income of \$50,000 to \$74,999 per year, 23 percent had a household income of \$75,000 to \$99,999 per year, 17 percent had a household income of \$100,000 to \$149,999 per year, and 10 percent had a household income greater than \$150,000 per year.

**Figure K-8: Annual Household Income—SWHPP Workshop Attendees**

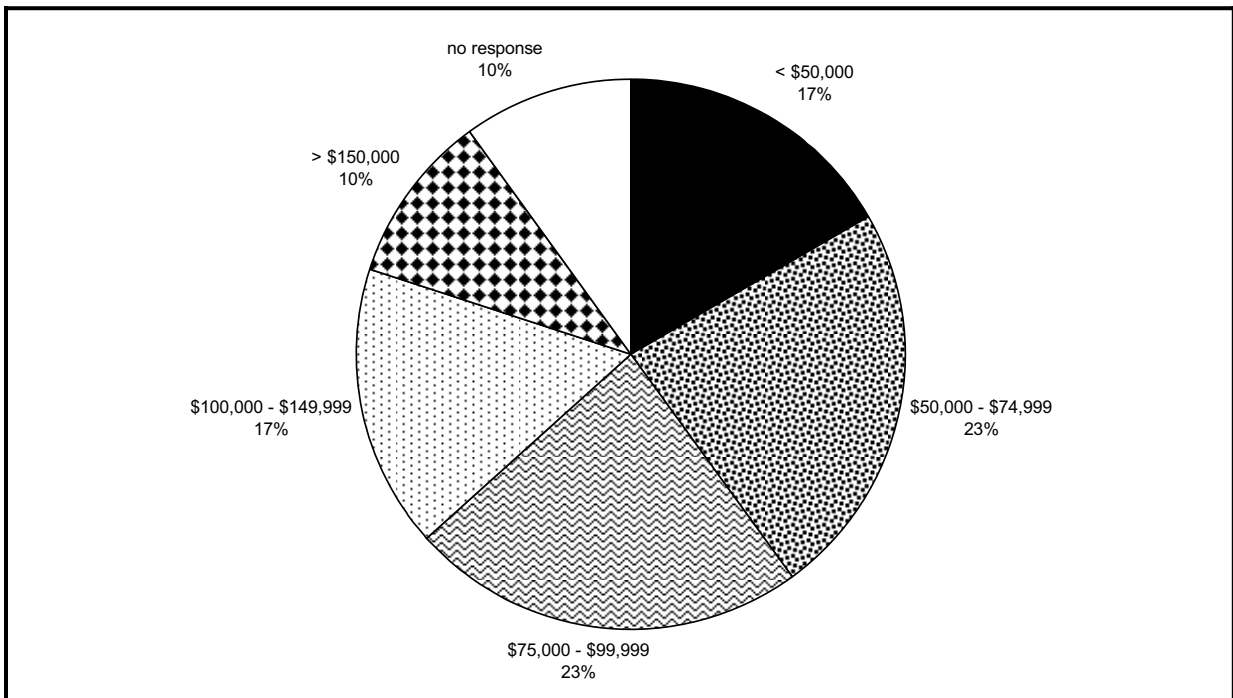


Figure K-9 shows that 46 percent of workshop attendees have three or more people living in their homes. Seventeen percent had only one individual in the household. About 37 percent of the surveyed workshop attendees had two people living in their household. None of them lived in a household with more than five individuals.

**Figure K-9: Number of Residents per Household—SWHPP Workshop Attendees**

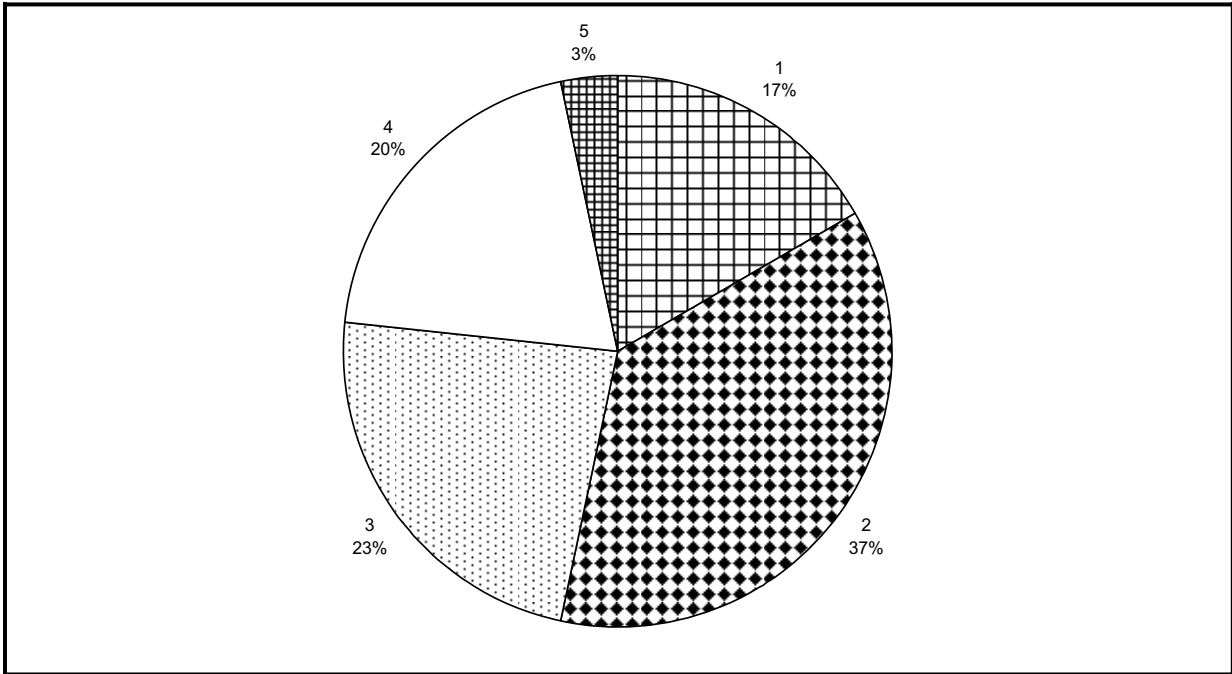
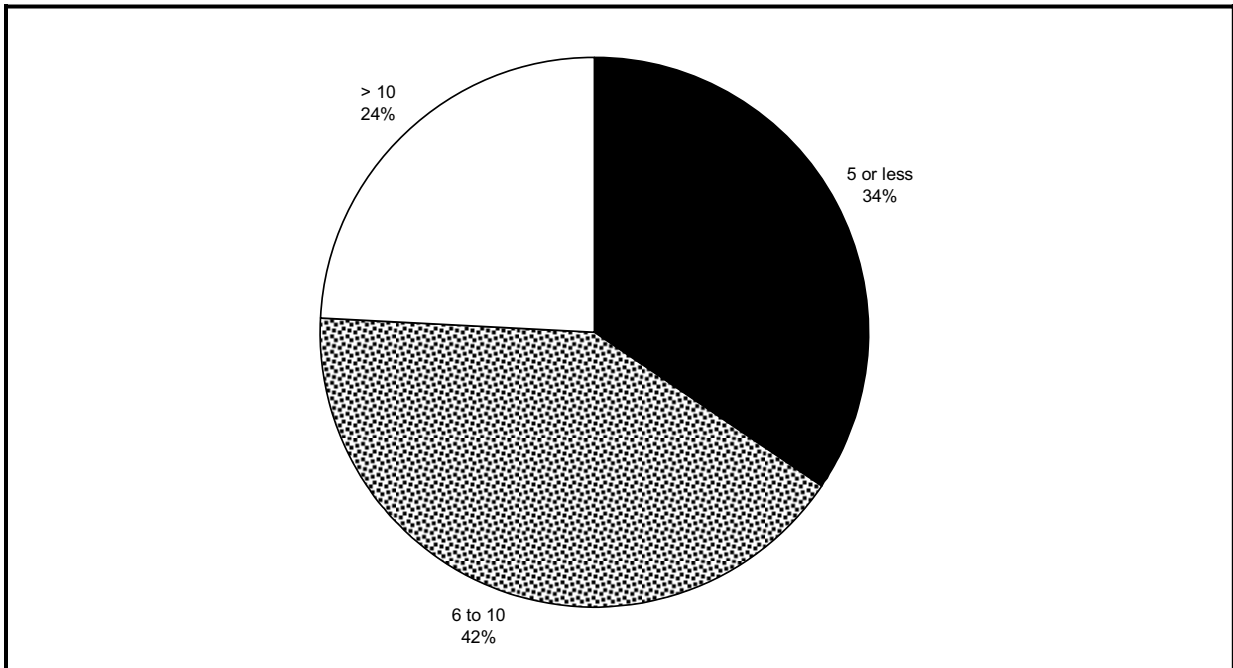


Figure K-10 shows that 34 percent of workshop attendees surveyed had lived in their home for five years or less. Forty-two percent had lived in their home for six to 10 years and 24 percent had lived in their home for more than 10 years.

**Figure K-10: Number of Years in the Home—SWHPP Workshop Attendees**



Seven of the 30 workshop respondents have previously participated in an energy efficiency incentive program, and three other respondents have received an incentive for installing a PV system.

#### Hot Water Use Characteristics

Fourteen percent of the interviewed workshop attendees had an electric water heater, 83 percent had a natural gas water heater, and 4 percent had a propane water heater. Ten percent of the workshop attendees had a tankless water heater. Fifty-nine percent of respondents had their water heater set to a low temperature (below 130 degrees Fahrenheit), 34 percent had their water heater set to a medium temperature (130 degrees to 150 degrees Fahrenheit), and seven percent did not know the set temperature of their water heater.

Eighty-seven percent of SWHPP workshop attendees that were interviewed reported that one to three showers were taken per day. Eighty percent reported that at least some of their showerheads were low-flow. Seventy-three percent reported that at least one shower was taken during the morning and 37 percent reported that at least one shower was taken during the evening. Twenty percent reported that at least one shower was taken during the afternoon and 20 percent said that at least one shower was taken late at night. The hot water use for

showers is consistent with the ASHRAE hot water load profile shown in Figure K-1 where the peak hours for hot water use were shown to be 8:00 A.M. and 8:00 P.M.

Sixty-seven percent of surveyed workshop attendees had a dishwasher in their home. Sixty percent of the workshop attendees with dishwashers had an ENERGY STAR-rated dishwasher. Eighty percent of these homeowners did four or less loads of dishes per week and no one reported doing more than seven loads of dishes per week in their dishwasher. Twenty-five percent of survey respondents did at least one load of dishes in the morning, 25 percent did at least one load in the afternoon, 50 percent did at least one load in the evening, and 70 percent did at least one load late at night.

Ninety-three percent of the workshop attendees that were surveyed had a clothes washing machine in their home. Seventy-five percent of the group with washing machines had a top-load clothes washing machine and 25 percent had a front-load clothes washing machine. Of the 75 percent of participants with top-load washing machines, 43 percent of them reported that their machine was ENERGY STAR rated. Sixty-eight percent of workshop attendees with washing machines in their home reported that they on average used the hot water cycle less than once per week. Twenty-five percent did one to two loads of laundry per week using the hot water cycle. Forty-six percent reported doing one to five loads of laundry per week on the warm water cycle. Fifty-seven percent said that they did laundry on both weekdays and the weekend, 14 percent did laundry only on weekdays and 29 percent did laundry only on the weekend. Seventy-nine percent did at least one load of laundry in the morning, 50 percent did at least one load of laundry in the afternoon, 57 percent did at least one load of laundry in the evening, and 43 percent did at least one load of laundry late at night.

### ***California Statewide Residential Market***

This section describes the characteristics for all of California, not just the SDG&E territory. The demographics of the residential single-family homeowner market in California are summarized using data from the 2004 RASS,<sup>8</sup> which includes characteristics of electric and gas utility customers such as income level, education level, and home size, and type of appliances in the home.

#### ***Single-Family Homes***

The RASS data was filtered for owners of single-family homes who are full-year residents. Household characteristics and factors that determine hot water usage are discussed in the following sections.

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<sup>8</sup> KEMA-XENERGY, Itron, and RoperASW. *2003 California Statewide Residential Appliance Saturation Study, Volume 2, Study Results*. Publication # 300-00-004. Prepared for California Energy Commission. 2004. page 25, Table 2-22.

*Demographics*

The average annual household income of homeowners in California who were full-year residents was \$75,445 in 2004. Figure K-11 shows that 22 percent of these homeowners had an annual household income greater than \$100,000. The head of household had a college degree in 50 percent of homes.

**Figure K-11: Annual Household Income among Homeowners—California Statewide**

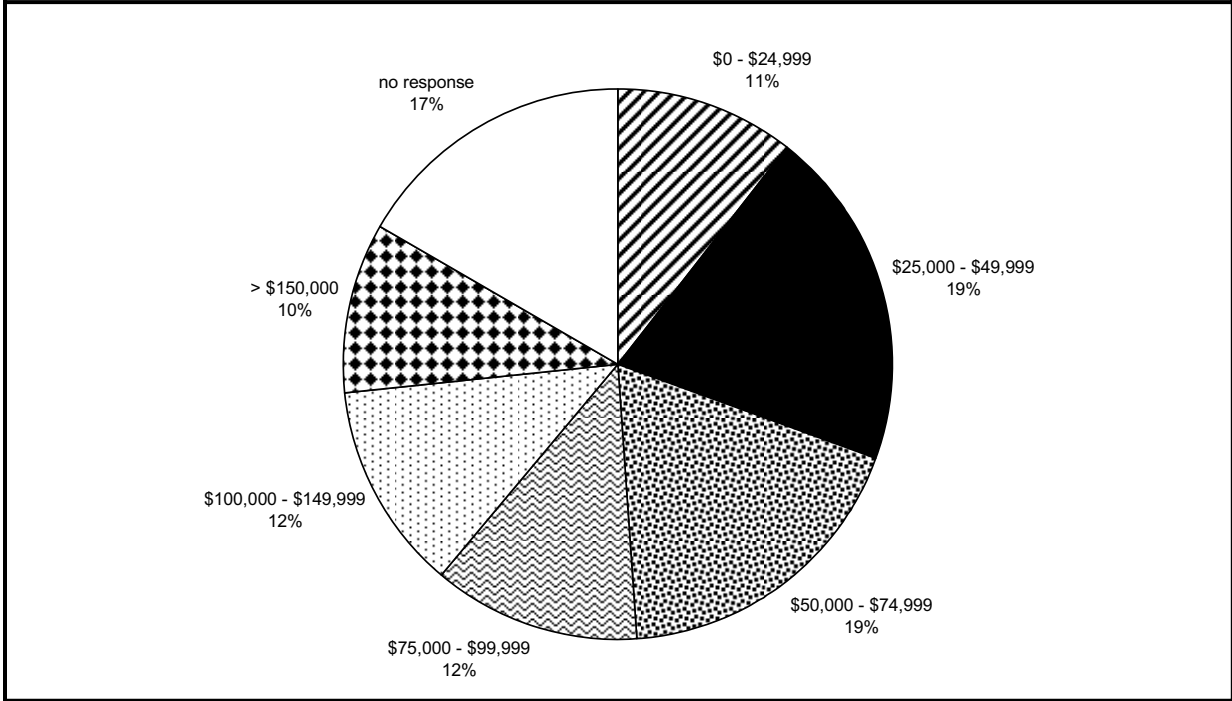


Figure K-12 shows that 34 percent of single-family homes in California have two residents. Eighteen percent of homes have three residents, and 18 percent of homes have four residents.

**Figure K-12: Number of Residents per Household—California Statewide**

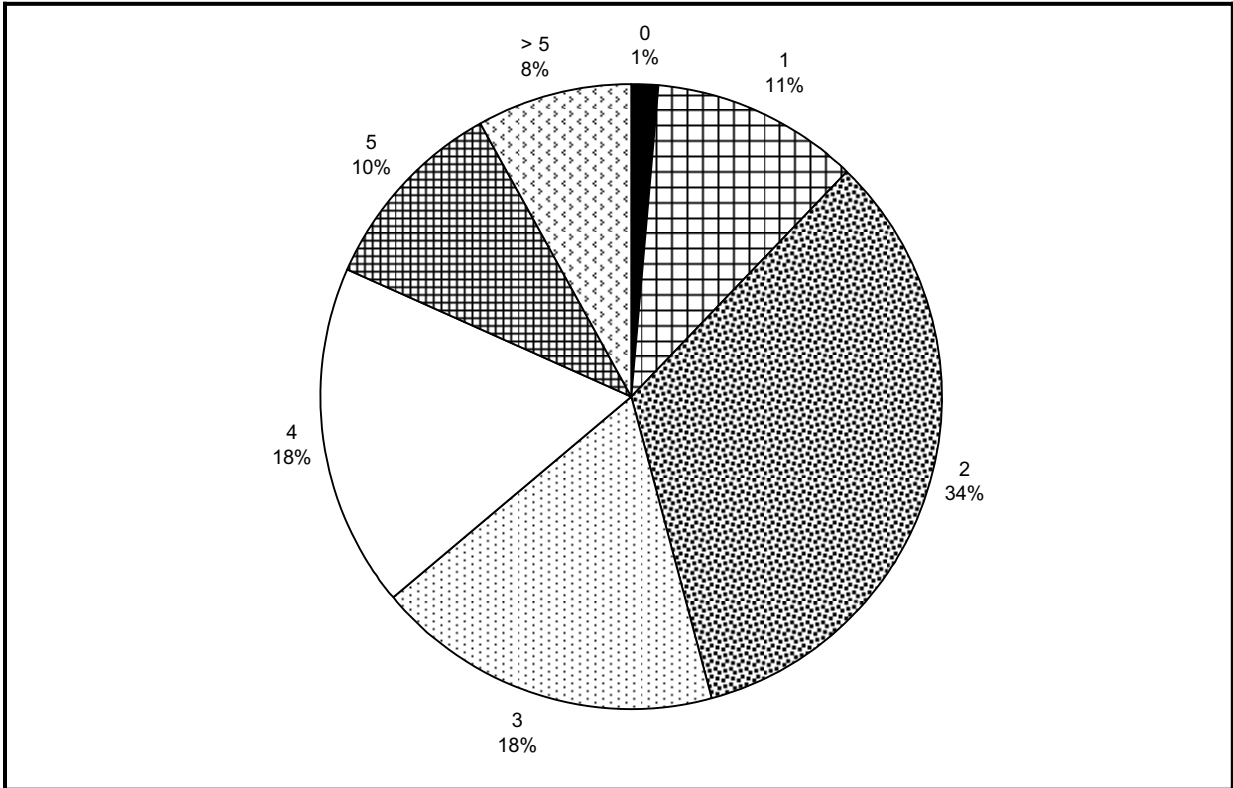
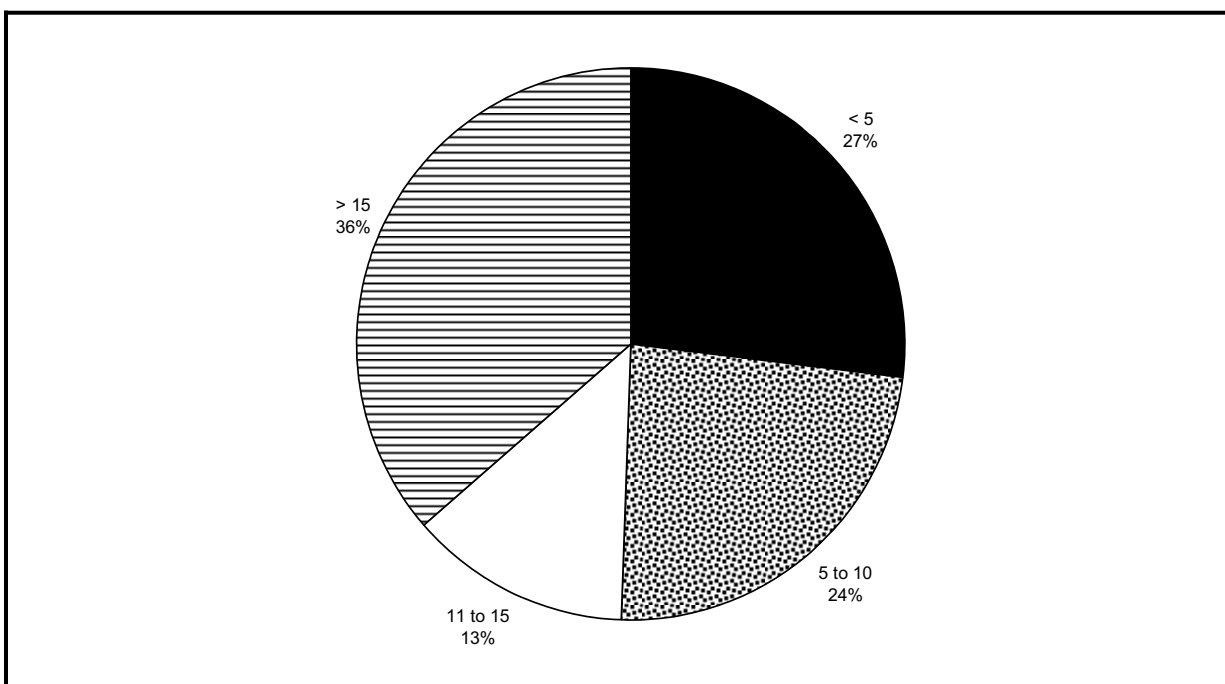


Figure K-13 shows that 36 percent of homeowners had lived in their home for more than 15 years. Thirteen percent had lived in their home for 11 to 15 years, 24 percent had lived in their home for five to 10 years, and 27 percent had lived in their home for less than five years. Sixteen percent of homeowners had remodeled their homes during the year prior to filling out the RASS survey.

**Figure K-13: Number of Years Lived in the Home—California Statewide**



### Hot Water Use Characteristics

Eighty-nine percent of homeowners in California had a natural gas water heater. Ninety-one percent of homeowners had standard tank water heaters (includes natural gas and electric) and 77 percent of these tanks were set to a medium temperature (130 degrees to 150 degrees Fahrenheit).

Seventy-two percent of homeowners reported that one to three showers were taken per day. Seventy-one percent of homeowners reported that at least some of their showerheads were low-flow and 48 percent reported that at least some of their faucets contained aerators for saving water.

Seventy-four percent of homeowners in California had a dishwasher in their home. Sixteen percent of homeowners had an ENERGY STAR-rated dishwasher. Fifty-seven percent of the homeowners with a dishwasher did four or less loads of dishes per week. Eighty-eight percent of homeowners in California had a top-load clothes washing machine in their home,

and 10 percent had a front-load clothes washer. Fifty-two percent of homeowners reported that they on average used the hot water cycle less than once per week. Thirty percent did one to two loads of laundry per week using the hot water cycle. Sixty-two percent reported doing one to five loads of laundry per week on the warm water cycle.

**SWH Owners**

Twenty-four SWH owners outside of SDG&E territory but throughout California were interviewed about their general characteristics, their hot water use, and the efficiencies of the appliances they own.

**Demographics**

Figure K-14 shows that the most commonly reported household income by survey respondents was \$75,000 to \$99,000 per year, which received 25 percent of the responses. Twenty-one percent had an annual household income greater than \$100,000. Seventeen percent had an annual household income of \$50,000 to \$74,999 and 8 percent had an annual household income of less than \$50,000. Twenty-nine percent of the survey respondents did not answer this question.

**Figure K-14: Annual Household Income—SWH Owners in California**

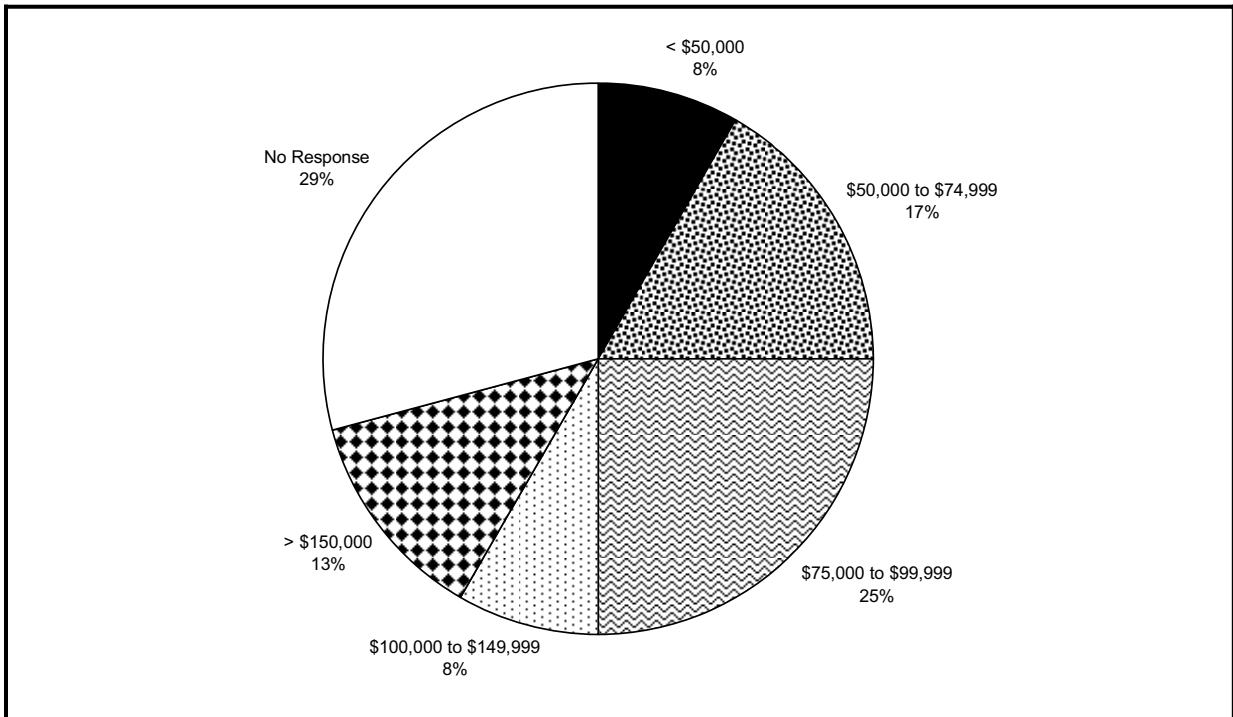


Figure K-15 shows that 54 percent of SWH owners throughout California had two residents. Seventeen percent of homes had three residents and 17 percent of homes had four residents.

**Figure K-15: Number of Residents per Household—SWH Owners in California**

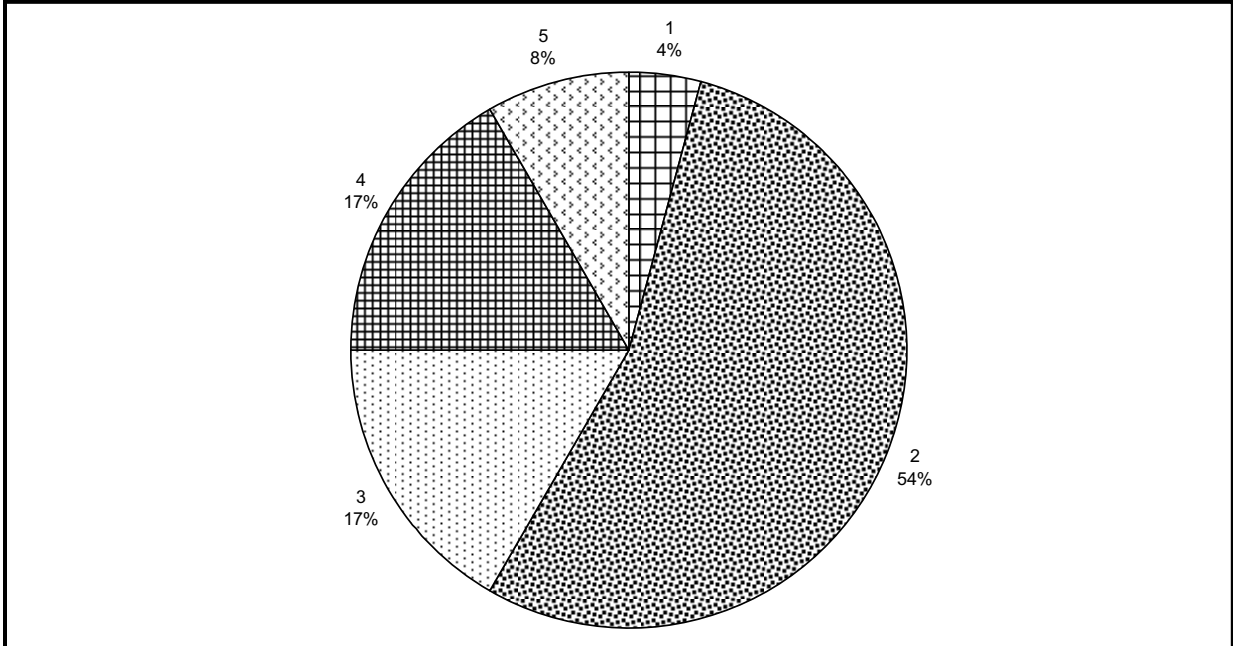
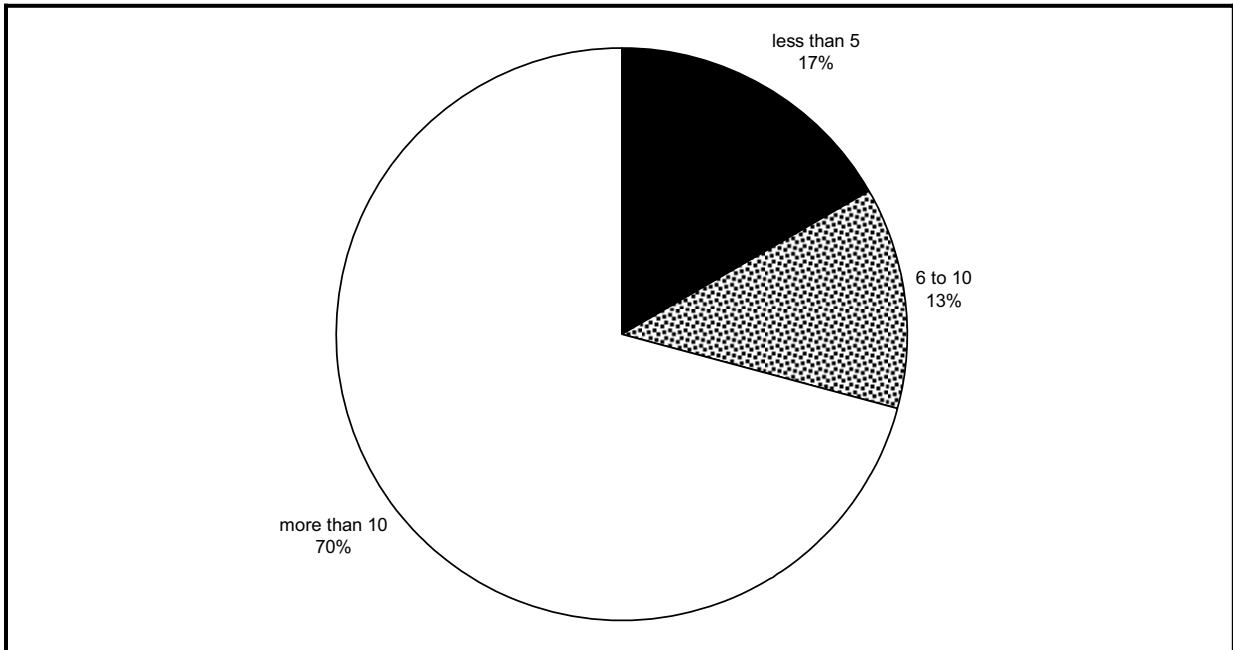


Figure K-16 shows that 70 percent of homeowners had lived in their home for more than 10 years. Thirteen percent had lived in their home for 6 to 10 years, and 17 percent had lived in their home for less than five years.

**Figure K-16: Number of Years Lived in the Home—SWH Owners in California**



Only four of the 24 survey respondents had not recently made any energy efficiency upgrades besides installing a SWH. Of the 20 who had made energy efficiency improvements, 38 percent had installed energy efficient lighting, 29 percent had purchased energy efficient appliances, 17 percent had upgraded their heating or cooling system to be energy efficient, 4 percent had a tankless water heater, and 28 percent had installed a low-flow toilet, energy efficient windows, or more insulation. In addition to the energy efficiency upgrades made, forty-two percent of the SWH owners surveyed also had a PV system.

#### Hot Water Use Characteristics

Sixty-three percent of the interviewed SWH owners outside of the SDG&E territory had an electric water heater, 29 percent had a natural gas water heater, four percent had a propane water heater, and four percent did not know what type of fuel their water heater used. Four percent of the SWH owners have a tankless water heater. Only nine of the 24 respondents knew the temperature setting of their hot water heater. Of these nine, four set their water heaters to the low setting (130 degrees Fahrenheit or less), three set their water heaters to the medium setting (130 to 150 degrees Fahrenheit), and two set their water heaters to the high setting (greater than 150 degrees Fahrenheit).

Seventy-nine percent of SWH owners outside of SDG&E territory that were interviewed reported that one to three showers were taken per day. Fifty-eight percent reported that at least one of their showerheads was low-flow. Seventy-four percent reported that at least one shower was taken during the morning and 26 percent reported that at least one shower was taken during the evening. Thirteen percent reported that at least one shower was taken during the afternoon and 13 percent said that at least one shower was taken late at night. The hot water use for showers is consistent with the ASHRAE hot water load profile shown in Figure K-1, where the peak hours for hot water use were shown to be 8:00 A.M. and 8:00 P.M.

Ninety-six percent of SWH owners have a dishwasher in their home. Forty-three percent of the SWH owners with dishwashers had an ENERGY STAR-rated dishwasher. Seventy-nine percent of these homeowners washed four or less loads of dishes per week in their dishwasher and no one reported doing more than seven loads of dishes per week in their dishwasher. Only 16 of the 24 respondents answered the question regarding the time of day that they wash their dishes. Twenty-five percent of survey respondents did at least one load of dishes in the morning, 19 percent did at least one load in the afternoon, 56 percent did at least one load in the evening, and 13 percent did at least one load late at night.

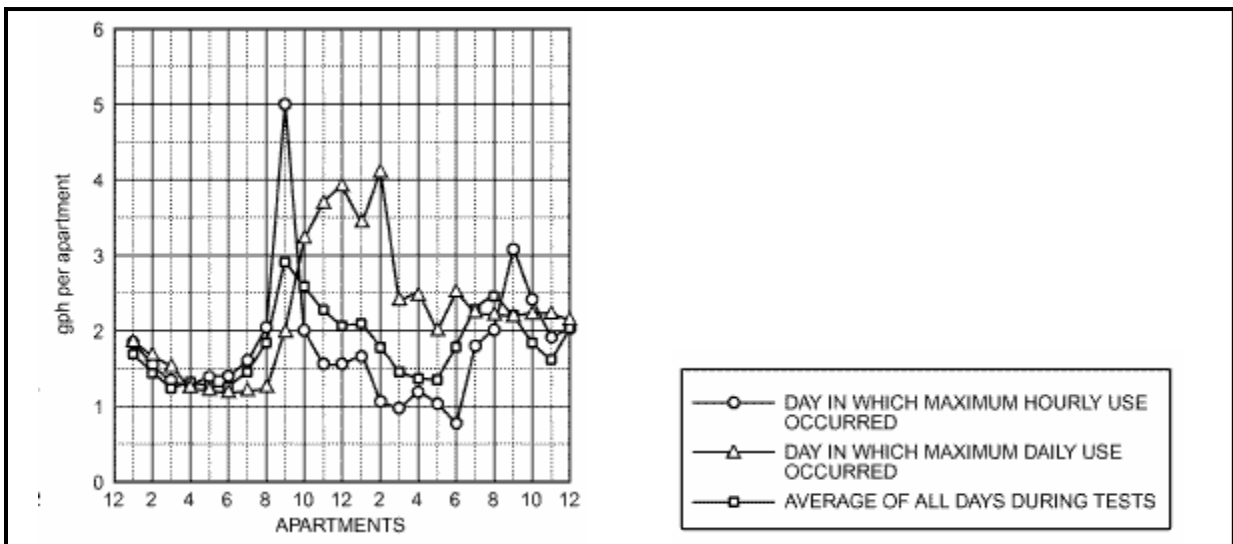
Twenty-three of the 24 SWH owners outside of San Diego (96 percent) that were surveyed had a clothes washing machine in their home. Fifty percent of the group with washing machines had a top-load clothes washing machine and 46 percent had a front-load clothes washing machine. Of the 50 percent of SWH owners with top-load washing machines, 50 percent of them reported that their machine was ENERGY STAR rated. Eighty-eight percent of respondents with washing machines in their home reported that they on average used the hot water cycle less than once per week. Thirty-three percent reported doing one to seven loads of laundry per week on the warm water cycle. Twelve of the 24 survey respondents answered the question about the day of the week they wash their clothes. Eight percent said that they did laundry on both weekdays and the weekend, 58 percent did laundry only on weekdays and 33 percent did laundry only on the weekend. Fifteen of the 24 survey respondents answered the question about the time of day they wash their clothes. Of the 15 respondents, fifty-three percent washed at least one load of laundry in the morning, 33 percent did at least one load of laundry in the afternoon, 33 percent did at least one load of laundry in the evening, and no respondents did their laundry late at night.

## K.2 Residential—Multifamily

The majority of larger scale SWH installations in California have been for apartment buildings. Therefore, multifamily demographics and hot water use data are presented here in order to assess the potential of natural gas displacement by SWH in this sector. Multifamily demographics and hot water use data come from the RASS and ASHRAE.

The ASHRAE profile shown in Figure K-17 shows the daily hot water usage profile for an apartment building, with gallons of hot water used per hour per apartment on the y-axis and hour of the day on the x-axis. Nationally, the average profile (in squares) shows that the peak water use occurs at 9:00 A.M. and at 8:00 P.M.. Hot water is used for showering, laundry, dish washing, and general cleaning. The average daily hot water use ranges from 42.0 gallons per apartment for buildings with 20 apartments or less to 35.0 gallons per apartment for buildings with 200 apartments or more.

**Figure K-17: ASHRAE Daily Hot Water Use Profile for Apartment Buildings**



### Demographics

RASS data were reviewed for apartments and condos with five or more units in SDG&E territory and in California. The average number of people living in each apartment was 2.4 in SDG&E territory and 2.5 in California.

In SDG&E territory, 77 percent of people living in an apartment or condo with five or more units were renting, and 19 percent owned their apartment or condo; the other four percent did not respond to the question. Thirty-nine percent of apartments were one bedroom and 48 percent were two bedroom. Forty-four percent of apartments and condos paid for their water heating and 88 percent of these apartments had natural gas water heaters.

Statewide, 85 percent were renting their apartment or condo and 15 percent owned their apartment or condo. Thirty-seven percent of apartments were one bedroom and 48 percent were two bedroom. Fifty-four percent of apartments paid for their water heating and 94 percent of these apartments had natural gas water heaters. In California, 0.4 percent of apartment and condo buildings had a solar water heater.

### ***Hot Water Use Characteristics***

Seventy-two percent of RASS respondents that lived in an apartment or condo building in SDG&E territory reported that two or less showers were taken per day in their apartment or condo. Sixty percent of apartment dwellers had at least one low-flow shower head. Fifty-five percent of apartment dwellers had a dishwasher. Sixty percent of these used their dishwasher four times or less per week. Fifty-five percent of apartment buildings had clothes washers in a common area, while 32 percent had a clothes washer in their apartment. Ninety-two percent of apartment dwellers with laundry facilities in the building had a top-load clothes washing machine, and 18 percent of apartment dwellers with access to a clothes washer in their building used the hot wash cycle once per week. Results for more than one load per week on the hot wash cycle were not statistically significant due to a small number of responses. Thirty-eight percent of apartment dwellers did one or two loads of warm water cycle per week. Thirty-nine percent did not use the warm water cycle and 57 percent did not use the hot wash cycle.

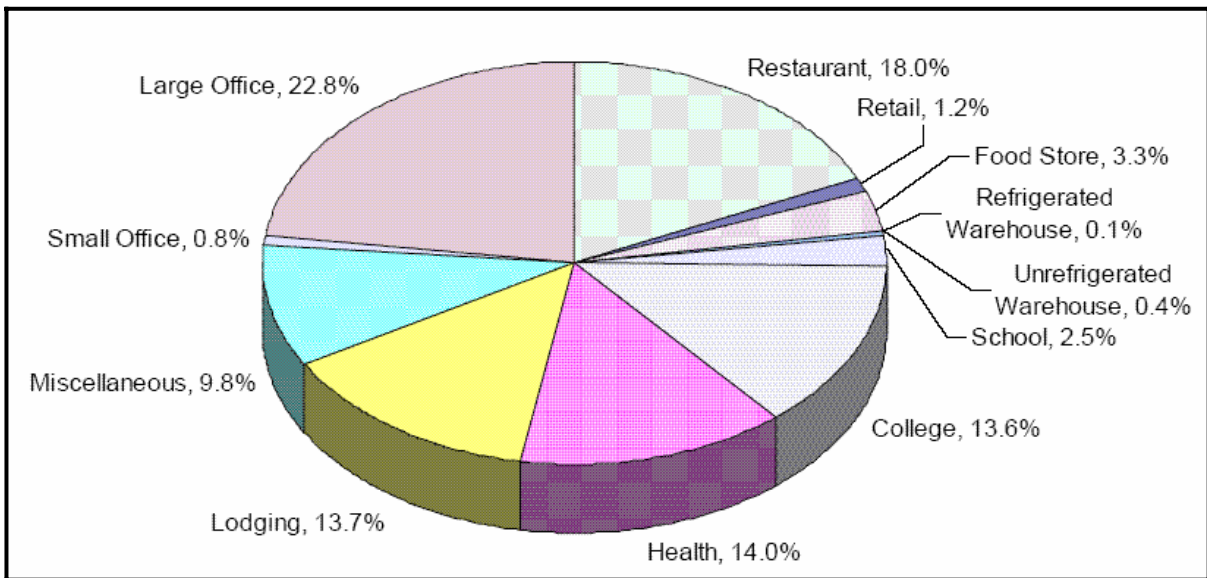
Sixty-six percent of RASS respondents that lived in an apartment or condo building in California reported that two or less showers were taken per day in their apartment or condo. Fifty-two percent of apartment dwellers had at least one low-flow shower head. Forty-six percent of apartment dwellers had a dishwasher. Fifty-nine percent of these used their dishwasher four times or less per week. Sixty-one percent of apartment buildings had clothes washers in a common area and 27 percent had a clothes washer in their apartment. Eighty-four percent of apartment dwellers with laundry facilities in the building had a top-load clothes washing machine. Fifty-two percent of apartment dwellers with access to a washing machine in their building did not use the hot wash cycle and 24 percent did not use the warm wash cycle. Forty-five percent did one to two loads of laundry per week on the warm wash cycle and 29 percent did one to two loads of laundry per week on the hot wash cycle.

### K.3 Commercial

Many commercial sectors, such as restaurants, lodging, hospitals, and colleges use natural gas to heat water and have potential to reduce their natural gas usage by installing a SWH. Commercial End Use Survey (CEUS) natural gas use data for other sectors such as restaurants, lodging, hospitals and care facilities, and colleges are presented here along with the ASHRAE hot water use profiles for the five sectors that use the most natural gas for heating water. Natural gas is the only fuel discussed here because heating water with electricity accounts for only one percent of commercial electricity use in California.

In SDG&E territory, 32.4 percent of natural gas use in the commercial sector was for heating water. The building types using the highest percentage of natural gas were large offices, restaurants, health, lodging, and colleges, as shown in Figure K-18.

**Figure K-18: Natural Gas Use by Building Type in SDG&E Territory—CEUS Data**



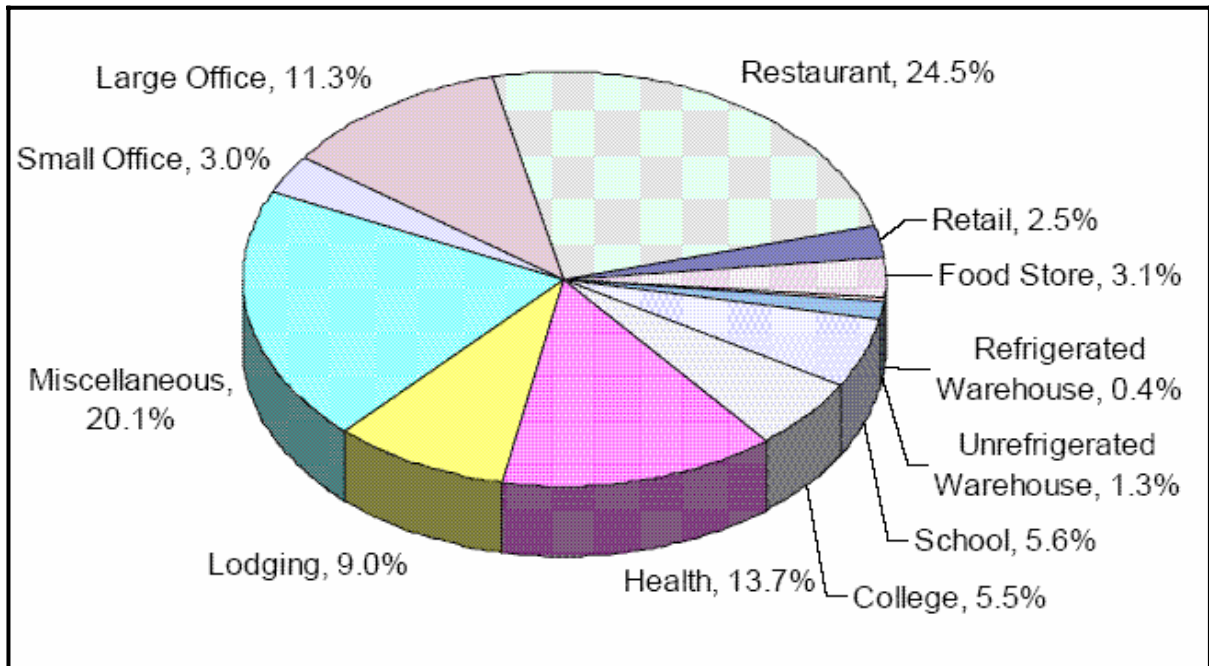
Natural gas use for water heating is shown in Table K-1. In SDG&E territory the lodging sector used the most natural gas for heating water, followed by the health and restaurant sectors. The same is true when looking at the natural gas used for water heating by square foot of building space. The lodging and health sectors can attribute the majority of their natural gas bills to water heating, and therefore could see the most impact in bill reduction if a SWH was installed to offset natural gas use for water heating. Even though large office buildings account for the greatest percentage of total natural gas used, only 11 percent of their use was for heating water.

**Table K-1: Natural Gas Used per Year for Water Heating by Building Type in SDG&E Territory—CEUS Data**

<b>Building Type</b>	<b>Natural Gas used for Water Heating (MTherms/year)</b>	<b>Natural Gas Intensity for Water Heating (kBTU/ft<sup>2</sup>-yr)</b>	<b>Percentage of Total Natural Gas Use</b>
Lodging	15.6	45.8	74%
Health	13.7	39.1	64%
Restaurant	5.5	35.4	20%
School	1.1	2.1	29%
College	5.3	11.0	25%
Large Office	3.8	4.2	11%

In California, 31.8 percent of natural gas use in the commercial sector was for heating water, however the sectors using the highest percentage of natural gas varied from SDG&E territory. The building types using the highest percentage of natural gas in California were restaurants, miscellaneous, health, large offices, and lodging, as shown in Figure K-19. The majority of natural gas use in large offices was for space heating.

**Figure K-19: Natural Gas Use by Building Type in California—CEUS Data**



Natural gas use for water heating is shown in Table K-2. In California the lodging sector used the most natural gas for heating water, followed by the health and restaurant sectors. However, when looking at the natural gas used for water heating by square foot of building space, the restaurant sector used the most, followed by the health and lodging sectors. The lodging sector can attribute the majority of their natural gas bill to water heating, and therefore could see the most impact in bill reduction if a SWH was installed to offset natural gas use for water heating.

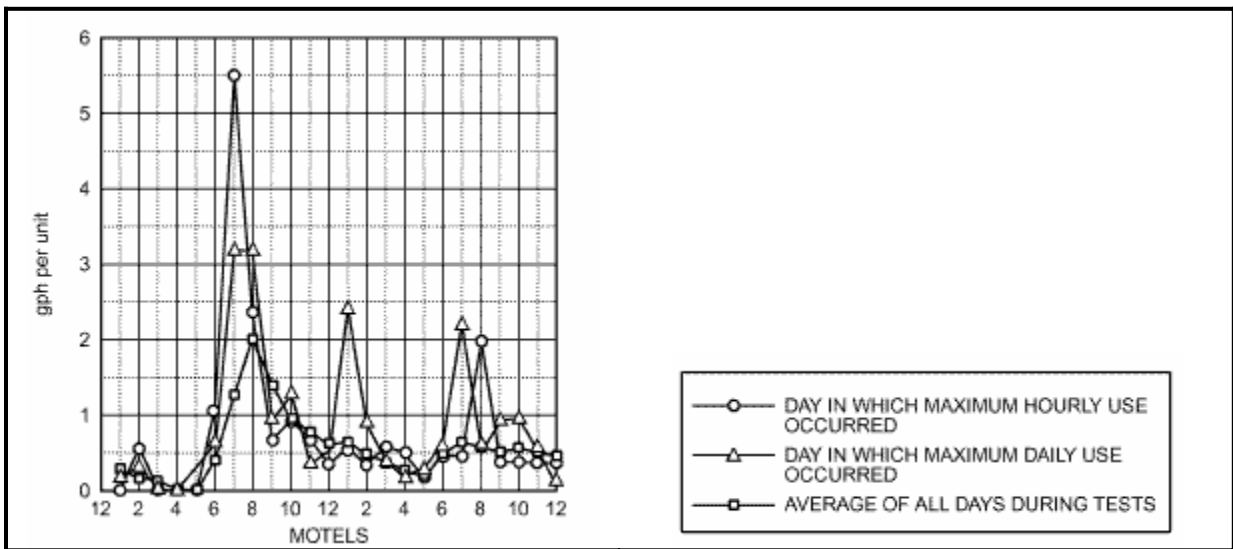
**Table K-2: Natural Gas Used per Year for Water Heating by Building Type—  
CEUS Data**

<b>Building Type</b>	<b>Natural Gas used for Water Heating (MTherms/year)</b>	<b>Natural Gas Intensity for Water Heating (kBTU/ft<sup>2</sup>-yr)</b>	<b>Percentage of Total Natural Gas Use</b>
Lodging	78.2	29.00	68%
Health	73.0	31.40	42%
Restaurant	72.4	48.60	23%
School	20.9	4.70	29%
College	17.3	8.40	25%
Large Office	17.2	2.60	12%

**Lodging**

The ASHRAE profile shown in Figure K-20 shows the daily hot water usage profile for motels, with gallons of hot water used per hour per room on the y-axis and hour of the day on the x-axis. Nationally, the average profile (shown with squares in the graph below) shows that the peak water use occurs at 8:00 A.M. Hot water is used mainly by the motel guests for showering or bathing. The average daily hot water use is 20.0 gallons per room for motels with 20 rooms or less, 14.0 gallons per room for motels with 60 rooms, and 10 gallons per room for motels with 100 or more rooms. This does not include hot water use for laundry or for a restaurant.

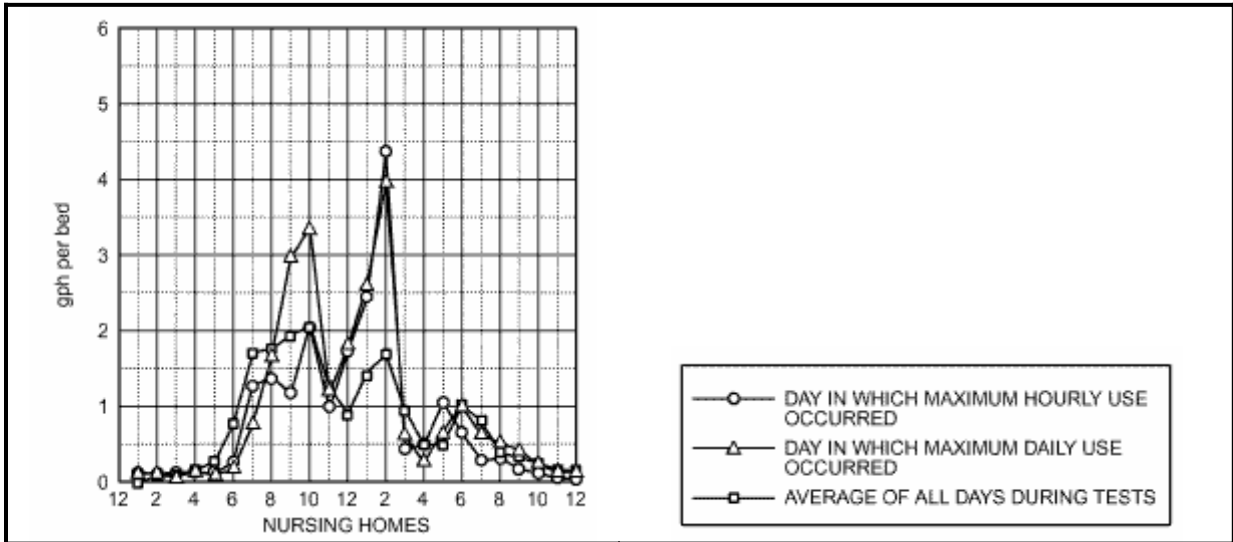
**Figure K-20: ASHRAE Daily Hot Water Use Profile—Motels**



### Health

The ASHRAE profile shown in Figure K-21 shows the daily hot water usage profile for hospitals and nursing homes, with gallons of hot water used per hour per bed on the y-axis and hour of the day on the x-axis. Nationally, the average profile (in squares) shows that the peak water use occurs at 10:00 A.M. and 2:00 P.M. Hot water is used for tubs, showers, wash basins, cafeteria food preparation and dish washing, and general cleaning. The average daily hot water use is 18.4 gallons per bed.

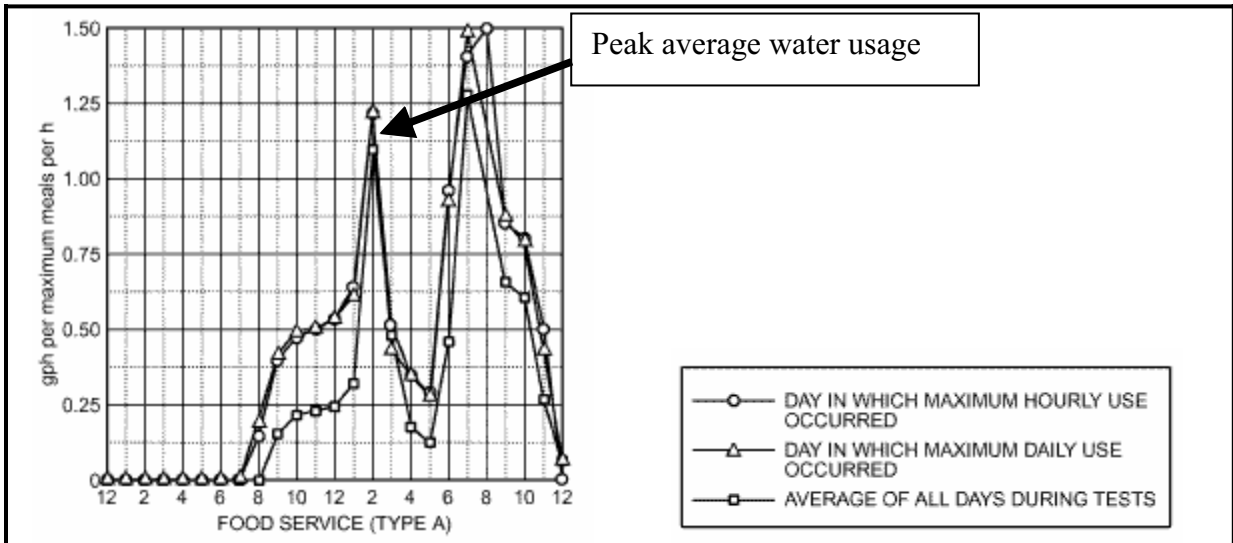
**Figure K-21: ASHRAE Daily Hot Water Use Profile—Hospitals and Nursing Homes**



### Restaurants

The ASHRAE profile shown in Figure K-22 shows the daily hot water usage profile for full-meal restaurants and cafeterias (Type A food service), with gallons of hot water used per hour per maximum number of meals served per hour on the y-axis and hour of the day on the x-axis. Nationally, the average profile (in squares) shows that the peak water use occurs at 2:00 P.M. and 7:00 P.M. Hot water is mainly used for dishwashing, but is also use for food preparation, hand-washing, and cleaning the floors. The average daily hot water use is 2.4 gallons per average number of meals per day.

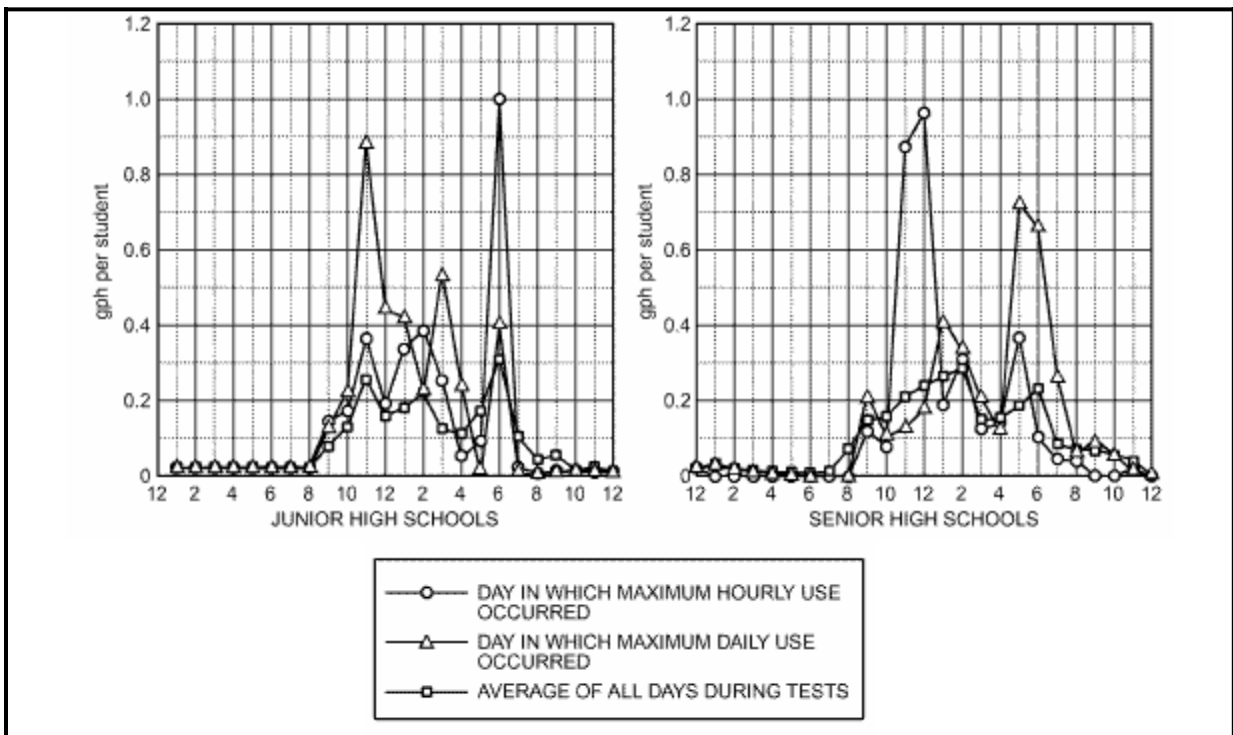
**Figure K-22: ASHRAE Daily Hot Water Use Profile—Restaurants**



**Schools**

The ASHRAE profile shown in Figure K-23 shows the daily hot water usage profile for junior high and senior high schools, with gallons of hot water used per hour per student on the y-axis and hour of the day on the x-axis. Nationally, the average profile (in squares) shows that the peak water use occurs at 11:00 A.M. and 6:00 P.M. for junior high schools and 2:00 P.M. and 6:00 P.M. for senior high schools. Hot water is used for showering, cafeteria food preparation and dish washing, and general cleaning. The average daily hot water use is 1.8 gallons per student.

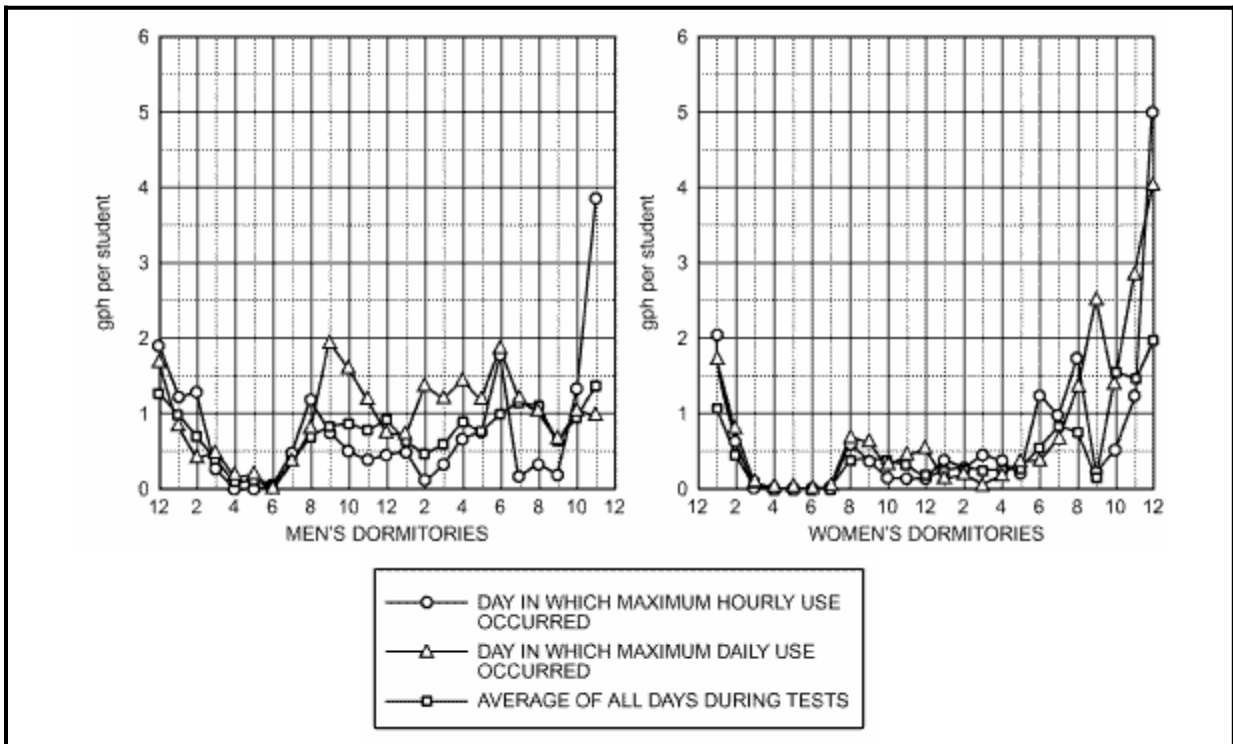
**Figure K-23: ASHRAE Daily Hot Water Use Profile—Junior High and Senior High Schools**



### Colleges

The ASHRAE profile shown in Figure K-24 shows the daily hot water usage profile for men’s and women’s college dormitories, with gallons of hot water used per hour per student on the y-axis and hour of the day on the x-axis. Nationally, the average profile (in squares) shows that hot water use is pretty steady throughout the day, with the exception of 4:00 A.M. to 6:00 A.M. where hot water use is near zero. The peak hour of hot water use on an average day is at midnight for both the men’s and women’s dormitories. Hot water is mainly used for showering and for laundry. The peak hot water use is due to the use of showers. The average daily hot water use is 13.1 gallons per student for the men’s dormitories and 12.3 gallons per student for the women’s dormitories.

**Figure K-24: ASHRAE Daily Hot Water Use Profile—Men’s and Women’s Dormitories**



Data for commercial buildings in California show that there is a lot of potential for natural gas displacement if SWHs are installed. In order to see a higher implementation rate from the commercial sector as well as the residential sector, several market barriers need to be addressed.

# Appendix L

## CCSE SWHPP Marketing Efforts

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### L.1 Media

#### TV

1. 10/16/07 Fox 6 news story on SWHPP and AB1470 aired at 10pm and 6am
2. 12/12/07 NBC 7/39 story on SWHPP
3. 12/17/07 Fox 6 news story on SWHPP with additional live studio interview the following morning after re-broadcast of the story
4. 02/15/08 Cox Cable Commercials begin. Over 500 spots over next 3 months.
5. 02/20/08 Media Event at the San Miguel Fire District Station 22
6. 02/20/08 KGTV, KUSI and Fox6 News coverage of SMFD media event for the SWHPP
7. 02/24/08 Rod Luck Live morning show coverage
8. 04/17/08 Commercial air on ABC during Who Wants to Be a Millionaire and Nightline
9. 04/17/08 KPBS Special – San Diego’s Carbon Footprint
10. 04/18/08 Commercial air on ABC during Nightline
11. 04/22/08 ABC Special – Sustain San Diego: Working for Tomorrow
12. 04/22/08 Commercial air and 10 second billboard tip during ABC special
13. 04/27/08 Second airing of ABC’s Sustain San Diego with SWH commercial
14. 09/29/08 ABC 10 news story on the Euclid Terrace Apartment SWH installation (<http://www.10news.com/video/17586338/index.html>)
15. 09/29/08 Telemundo news story on Euclid Terrace Apartments
16. 10/01/08 Fox News story on Euclid Terrace Apartments

#### Print

1. 09/24/07 Image Magazine (150,000 San Diego homes)
2. 10/18/07 San Diego Union Tribune SWHPP article (Readership over 750,000)
3. 12/21/07 Direct Mailer (220,000)
4. 12/28/07 Solana Beach Sun
5. 10/19/07 Solana Beach Sun
6. 10/19/07 Del Mar Times
7. 10/25/07 Navy Dispatch Newspaper

8. 10/25/07 San Diego Reader
9. 10/26/07 San Diego Sentinel
10. 11/8/07 San Diego Daily Transcript
11. 12/14/07 North County Times Escondido
12. 12/17/07 San Diego Business Journal
13. 12/31/07 San Diego Business Journal's 2008 Book of Lists
14. 02/08 OB People's Co-op newsletter and advertisement on register screens
15. 02/26/08 San Diego Business Journal special supplement
16. 03/27/08 Alpine Sun (readership – 4500)
17. 04/01/08 Carlsbad Business Journal – front page article promoting local workshop
18. 04/07/08 North County Times
19. 04/24/08 Earth Times Article and advertisement
20. 04/24/08 Carmel Valley Leader article
21. 04/24/08 Del Mar Times article
22. 04/24/08 Julian News article
23. 04/24/08 La Jolla Light article
24. 04/24/08 Mira Mesa Sentinel article
25. 04/24/08 Rancho Santa Fe Record article
26. 04/24/08 Solano Beach News article
27. 04/24/08 Union Tribune Earth Day article
28. 08/05/08 San Diego Chamber of Commerce, Business Online  
(<http://www.sdchamber-members.org/Business%20Online/Aug%20B%20Online/Auguststory3.htm>)
29. 06/08 and 10/08 North American Clean Energy ads
30. 10/09/08 North County Times  
(<http://www.nctimes.com/articles/2008/10/09/news/columnists/rb/z53903e69df2d0df0882574dc0058cd71.txt>)

### **Web**

1. 11/10/07 – 11/15/07 KPBS Events Calendar listing for Solar Homes Tour 2007
2. 11/13/07 Signonsandiego.com Events Calendar listing
3. 01/16/08 Link from GreenPlumbers to Conservation Partner CCSE
4. 02/04/08 Press Release for GreenPlumbers
5. 02/20/08 Press Release for SMFD Donation SWH system
6. Videos, news clips, and commercial available at YouTube.com – commercial viewed over 465 times in February and March
7. 02/20/08 Highlighted placement on the SMFD website
8. 03/19/08 Renewable Energy World
9. 04/01/08 Carlsbad Business Journal online article

10. 04/03/08 Registration Page required for Eligible Contractor list
11. Ongoing advertisements on craigslist.com – 3/12, 3/28, 4/02, 4/03, 4/07, 4/09, 4/16
12. 04/11/08 Banner ad and Link on the KPBS website to the SWHPP
13. 04/22/08 Link on Sustain San Diego webpage
14. 04/08 SWH Commercial streaming on Sustain San Diego webpage
15. 04/08 Logo and link on KPBS “Gorgeously Green” event website
16. 05/08 Streaming commercial video on Rebuild Central website
17. 06/2008 Article on Union Tribune’s “Going Green” website
18. Continuous since April – Distribution of leads from the online registration for the Eligible Contractors list
19. 09/08 Energy Saving Tips on KiFM “Green Page”  
<http://www.kifm.com/sponsor/KIFMGreenPage.cfm>
20. 9/23/08 Article on Union Tribune’s SD Backyard website  
[http://www.sdbackyard.com/index.php?page\\_id=1000&site\\_page\\_id=5&post\\_id=50747](http://www.sdbackyard.com/index.php?page_id=1000&site_page_id=5&post_id=50747)
21. 09/08 Video airs/links on JackFM, Channel 8 and AM760 websites

### **Radio**

1. Continuous Clear Channel spots
2. 09/29/07 “These Days” program on KPBS
3. 03/28/08 15-minute segment on SWHPPP with “Clark and Copper”, steaming on-line radio at SignOnSanDiego.com  
<http://signonradio.sosd.com/programs/clark-copper/>
4. 04/07/08 KPBS – 145 fifteen second spots on local NPR station running for 8 weeks
5. 12/15/08 KPBS – 8 week radio campaign on local NPR affiliate

### **Newsletters**

1. 07/07 through 4/08 CCSE Energy Connections (5,000)
2. 12/07 League of Women Voters
3. 01/08 SD County Apartment Association (2,700)
4. 03/08 San Miguel Fire District “The Zone”
5. 04/08 Genesee Highlands Association (800)
6. 09/08 San Diego Housing Federation  
[http://www.housingsandiego.org/news\\_archive/NewsletterSeptember2008.pdf](http://www.housingsandiego.org/news_archive/NewsletterSeptember2008.pdf)
7. 12/08 through 2/09 KPBS Newsletter Frequency logo, message and weblink on weekly newsletter to 9,000 KPBS members in San Diego for 6 issues (dedicated landing page for efficient tracking)

## **L.2 Outreach**

### **Workshops**

1. 06/14/07 First of monthly Contractors and Self-Installers Training and Orientation
2. 09/19/07 First of monthly Solar Water Heating Basics for Homeowners
3. 09/14/07 Josh Plaisted Workshop
4. 01/23/08 Solar Depot SWH
5. 01/29/08 CalSEIA Marketing and Sales Training
6. 03/26/08 League of Women Voters
7. 05/14-05/16/08 SWH Hands-on Training
8. 07/31/08 SWH Economics with Dr. Von Spreckelson
9. 10/29/08 Morgan Muir: Tankless, Radiant and SWH workshop
10. 12/11/08 CalSEIA SWH Sales and Marketing Seminar

### **Presentations**

1. 09/27/07 Solar Power 2007
2. 09/26/07 SEIA SWH Stakeholders meeting
3. 10/25/07 CCSE's Solar Energy Conference
4. 11/07/07 SD International Code Council meeting
5. 12/07/07 League of Women Voters
6. 01/03/08 SD Association of Realtors
7. 01/10/08 SD Chapter of Plumbing-Heating-Cooling Contractors
8. 01/10/08 GreenPlumbers
9. 01/22/08 SD County Apartment Association (10 minutes)
10. 01/25/08 La Mesa Kiwanis Club
11. 02/12/08 SD County Apartment Association (2 hours)
12. 02/20/08 Ocean Beach People's Co-op "SWH Basics"
13. 02/27/08 US Department of Commerce, Indian Delegation
14. 03/05/08 Chula Vista Planning and Inspection Departments
15. 03/17/08 City of San Diego Inspectors
16. 03/25/08 County of San Diego Inspectors
17. 03/28/08 Deer Park Monastery
18. 03/29/08 Fletcher Hills Kiwanis Club
19. 04/08/08 SMFD Board of Directors Meeting
20. 04/09/08 San Diego Chapter of IAPMO
21. 04/10/08 Carlsbad Community "SWH Basics"
22. 04/12/08 Mt. Helix Community Meeting
23. 05/04/08 ASES Consumer Presentation (A. Henderson)
24. 05/06/08 ASES Presentation on SWHPP (A. McAllister)

25. 05/08/08 ASES Presentation on SWH Freeze Protection (S. Fralick)
26. 05/12/08 Clean Energy States Alliance Spring Meeting, New Haven, CT
27. 05/22/08 EcoBuild America Conference
28. 06/03/08 ACEEE DHW Forum
29. 06/10/08 34th Annual Rental Housing Education Conference and Expo (2,700)
30. 08/19/08 ACEEE Presentation at Asilomar (A. McAllister)
31. 10/15/08 SWH Basics at Solar Power International Public Night

### **Events**

1. 08/18/07 “Be An Energy All-Star” night at PetCo Park (44,000)
2. 08/21/07 “Solar at the Capitol” in Sacramento
3. 09/15/07 “Green Planet, Blue Ocean” Family Sustainability Day at Birch Aquarium (500)
4. 09/24/07 Solar Power 2007 conference in Long Beach (over 10,000)
5. 10/20/07 House Beautiful Home Show (10,000)
6. 10/25/07 Solar Energy Conference (400)
7. 02/11/2008 Media and community events with the San Miguel Fire District
8. 04/04/08 Home Design and Landscape Expo (20,000)
9. 04/24/08 Earth Fair 2008
10. 06/12/08 KPBS “Gorgeously Green” Event
11. 09/13/08 SMFD Fire Expo
12. 09/29/08 Euclid Terrace Apartment’s SWH Installation Ribbon-cutting with Councilmember Tony Young

### **E-Blasts**

1. 10/03/07 Vote Solar News (420 in San Diego)
2. 12/05/07 Environment California “Give the Gift of Solar” (100,000)
3. CalSEIA News Alerts
4. 7/12/07 Solar Water Heating Pilot Program Launch
5. CCSE Weekly Round-up
6. 06/23/08 SWH Survey to Homeowners (400)
7. 06/24/08 E-brochure to CSI PV participants (1000)
8. 08/06/08 E-brochures to PV workshop attendees (265)

## **L.3 Collateral**

### **Handbooks**

Program and Technical handbooks available online and updated as needed

### **Tri-fold Brochure**

1. Completed in August and available online
2. Update October 2008

### **Call to Action**

Concise single panel hand-out aimed at homeowners

### **Flyers**

1. Bi-fold targeted at homeowners as follow-up to the call for action piece
2. Carlsbad Workshop Flyer

### **“Quick Facts” Fact Sheet**

Simple one page fact sheet

### **SWHPP Questionnaire**

Short survey of homeowner workshop attendees and website registrants to collect data on contractor responsiveness, consumer decision process, existing SWH systems, program experience, and interest in energy efficiency

### **SWHPP Radio Commercial Script**

15 and 30 second scripts for on-air reads of SWHPP promotion

### **SWHPP Commercial**

Local firefighters promote SWHPP in the San Diego region

### **SWHPP Video News Release**

B-roll footage of SWH installation at the SMFD Station #22

### **On-line Advertising**

1. HTML for craigslist advertisement
2. HTML for Carlsbad advertisement
3. Banner ad for SMFD promotional installation, KPBS website, and CCSE main webpage