Characteristics of Solar Cooking Households in the United States: Comparison with the U.S. Residential Energy Consumption Survey

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ABSTRACT

How do solar cooking households compare with the average household in the U.S.? The answer will be significant for solar cooker development and marketing plans, and utility incentive acquisition programs. To date, no work has been published which presents these comparisons. To take the first step, a survey was conducted interviewing U.S. solar cooks about their cooking habits during the summer of 2012. Several survey questions paralleled the Residential Energy Consumption Survey (RECS), a well-regarded triennial survey administered by the U.S. Energy Information Administration (EIA).

Results of the solar cooking survey are presented, including comparisons to the typical RECS household profiles with a presentation of noteworthy trends:

1. Surveyed solar cooking households usually own more than one solar cooker, favoring box style cookers.
2. Surveyed solar cooking households averaged over 70 solar cooking days in 2012, saving 33% of their total cooking energy during the solar cooking months (15% of their total annual cooking energy) saving 190 kWh or about $45 per year.
3. Energy savings were not as climate-correlated as one may suppose. There is a large portion of the US in which surveyed solar cooking households tend to solar cook 2 times per week in the months the sun reliably shines.
4. Surveyed solar cooking households tend to have fewer members than the average U.S. household. Also, solar cooking household members tend to be older.
5. Surveyed solar cooking households tend to eat at home more often than the average U.S. household.

1 INTRODUCTION

There are many dedicated energy-conserving and sustainability-promoting people who do not know what solar cooking is. Why is this? In contrast, one may not (yet) have a photovoltaic system installed on their roof, but most people would have at least a vague notion of what an inverter is. Likewise, to spot an article in a cooking blog on "how to brine your Thanksgiving turkey" would not seem out of place to many U.S. cooks; but solar cooking, a slow cook, juicy, perhaps more vitamin retaining cooking method that keeps your kitchen cool in the summer, has somehow slipped mainstream notice.

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Perhaps this is because a solar cooker is not perceived as a significant, flashy, easy energy saver. Having demonstrated solar cooking at community events, this investigator is aware that many people purchase and use solar cookers not because they hope to save a lot of money, but because "it's good for the environment" and "it's the right thing to do". They enjoy being "off-the-grid." or want an emergency cooking method. Specific energy savings and paybacks are rarely mentioned as important reasons that a person chooses to solar cook.

A review of available literature indicates that some work internationally has been done in the area of verifying energy/cost savings, primarily by non-governmental organizations evaluating their solar cooker projects in countries with ample sun and shortages of wood or charcoal for cooking fires (1)(2)(3). This investigator could not find a similar study encompassing solar cooking households within the U.S. A review was made of solar cooker manufacturers, distributors, and other organizations, and specific claims of "how much solar cooking might save" were not found. Though there has been solar cooker research and development in the U.S., for instance the work done at University of New Mexico during the last 8 years (4) and the work done in Sacramento over a decade ago (5)(6), a survey of U.S. solar cooking household habits has not been published.

2 SURVEY OBJECTIVES

The main objective of this study is to aid that mainstreaming process which has proven helpful with other "now emerged" technologies. One part of this objective is to develop a set of protocols to measure energy savings attributable to the use of solar cookers in U.S. households. Another part of this objective is to collect basic cooking and demographic data from solar cooker households. This data may reveal trends that would be suitably incorporated in solar cooker marketing and development plans, and utility incentive acquisition programs. The following questions were asked about the collected data:

- Can the survey data point to any trends in solar cooking households?
- Can the survey data be used to provide an estimate of energy saved by a household that regularly solar cooks?
- Can the survey data be compared to average national data (RECS) in a useful way?

The quick answers are "yes, with caution", "yes", and "a definite yes" with elaboration in the following sections:

3 METHODS

3.1 Residential Energy Consumption Survey (RECS)

EIA administers the RECS. EIA collects comprehensive national data on both consumption and expenditures for energy in the residential sector of the economy. Data are used for analyzing and forecasting residential energy consumption. Housing, appliance, and demographic data are

collected via personal interviews with households, and consumption and expenditure billing data are collected from energy suppliers.

Surveys have been conducted every three years since 1978. The most recent survey completed in 2012 collected data from over 120,000 households statistically selected to represent the approximately 114 million households in the U.S.

Non-linear regression analyses were used to correlate household energy usage with multiple variables. A primary purpose of analyzing the household data is to assist in projecting future energy use for the U.S. economy as a whole. An intermediate result is that typical household energy consumption is estimated for end-uses in a household, such as space heating, water heating, air conditioning, refrigerators, and appliances. The RECS cooking energy estimates are incorporated into the solar cooking energy saving estimates presented further on in this paper.

RECS raw data is publically available as standardized reports available on the EIA website and also as raw data downloadable as .csv files. Data is available on a question-by-question basis allowing straightforward comparison of the solar cooker household and RECS household data.

3.2 Respondent Criterion

There is a learning curve to using certain types of solar cookers. Cooking with a panel or box type solar cooker has been equated with using an electric crock pot: the time to finish is slower than cooking on a traditional stove or oven and one has to typically tweak favorite recipes to get the moisture content just right. So as to gather data from households that had achieved a certain amount of stability in how they used their solar cookers, it was decided that a qualifying survey respondent had to be in a household that had used their solar cooker(s) at least one year.

3.3 Questionnaire

The questionnaire consisted of less than 40 questions which asked about a solar cooking household's demographics, solar cookers and their use, and traditional cooking appliances and their use. Survey questions necessarily drew upon people's qualitative memories of their 2012 solar cooking season while, questions were worded to minimizing their biases. A sample questionnaire is in Appendix A.

Questions about a household's traditional cooking appliances paralleled questions in the 2009 RECS. This is because of the availability of raw data from RECS and the general public acceptance of the reports published by EIA. This allows a direct comparison, question by question, between the collected solar cooking and the RECS data.

3.4 Respondent Search

From October 2013 through February 2013, surveys were distributed. The first 20 respondents were from Sacramento area households which were at least indirectly known to the investigator through her involvement in demonstrating solar cooking at community events. Several other networks were successfully tapped to find additional survey respondents including several U.S. non-profit solar organizations, and solar cooker suppliers. Several organizations posted the request for respondents on Facebook (FB), and Solar Cookers International in particular supported the survey with FB postings, tweets, and space on their solar cooking wiki. The Yahoo Solar Cooking Group was notified and became a good way to inform the solar cooking community of the survey. After eliminating duplicate responses and responses from households that had recently begun solar cooking, this survey's results are based upon data from 85 solar cooking households.

4 RESULTS

4.1 Solar Cooker Appliances and their Use

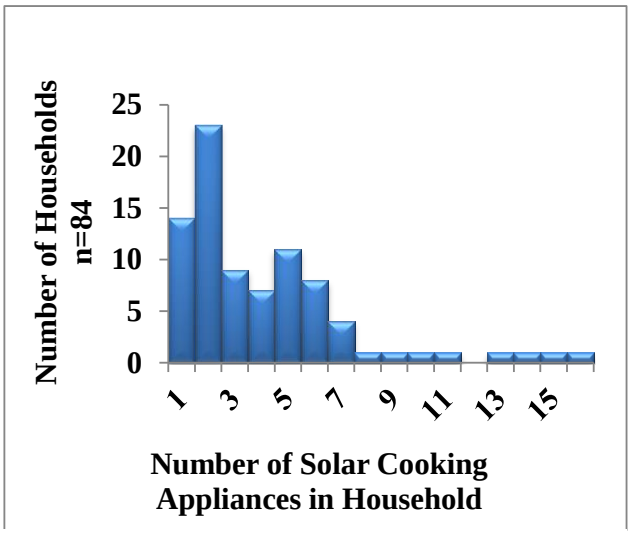

Figure 1: Number of Solar Cooking Appliances

Though it would not surprise most solar cooks, once solar cooking becomes a household habit, many of us can't just own one. The experimenters among us own many more, even more than a dozen. See Fig. 1 for more details. The types of solar cookers households owned by the surveyed households are shown in Table 1.

Many respondents who classified their solar cookers as "Other" gave details. Some cookers were custom made such as one constructed from an electric roaster. There were several hybrids, one incorporating auto-sun-tracking and another with back-up electric heat. Several concentrating type solar cookers incorporated Fresnel lenses instead of parabolic reflectors. Several respondents classified their solar cooker type as solar dryers. There was an evacuated glass tube solar cooker and also a solar cooker that heated oil that then heated an upper adjacent frying tray.

Table 1: Type of Solar Cooking Appliances

Type of Solar Cookers	Number of Households
Box	85%
Panel	67%
Parabolic	25%
Other	22%

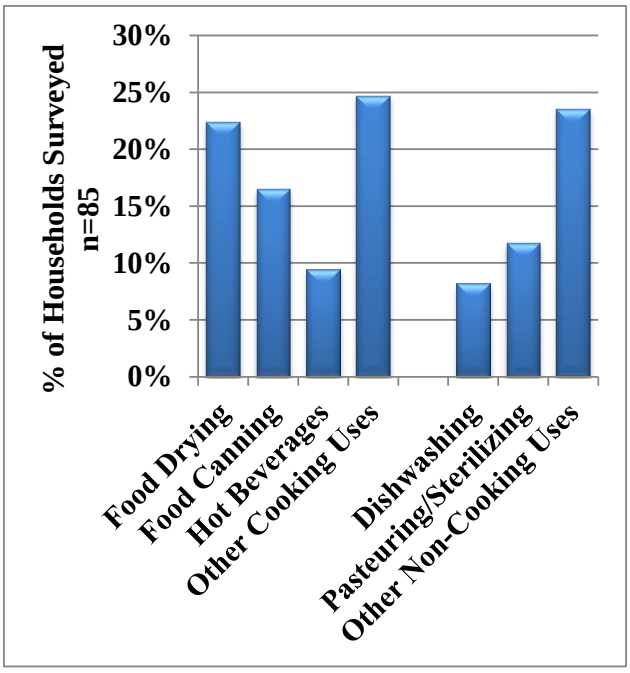

Figure 2: Solar Cooker Uses Other than Meal Preparation

Fifty-four percent of the households used their solar cookers for other food related cooking, and a third of the households listed at least one non-food cooking use of their solar cooker. The frequently reported "other uses" are shown in Fig. 2.

Table 2 is the compilation of the rest of the "other uses" mentioned by respondents. (Note: This investigator's solar cooker, like most solar cookers, is not capable of smelting. However, several respondents reported that they deep fry and pressure cook with theirs. It just shows that there are some very inventive people pushing the "solar cooker" boundaries.)

Table 2: More Solar Cooker Uses

OTHER FOOD USES	OTHER NON-FOOD USES
Decrystalizing honey	Curing glue
Drying salt	Degreasing auto parts
Keeping food warm	Drying clothes
Reheating food	Drying homemade paper
Thawing frozen food	Heating water (hand washing, bathwater, spa water)
Making applesauce	Heating plates or mugs
Making beer and wine	Heating towels
Making bread, cake, and	Killing insects in infested dry goods, fabric and yarn
Making candy	Killing weed seeds prior to composting
Making cream cheese	Making candles, cleaning candle holders
Making popcorn	Making clay pots, drying clay art
Making yogurt	Making liquid soap
Roasting coffee	Smelting metal (not kidding)
Roasting nuts	Space heating
	Warming paint
	Warming PVC pipe (to bend)

4.2 Annual Cooking Energy Savings

Several factors affect how much energy a solar cooking household saves. These factors include the frequency of solar cooking, the length of the solar cooking season, and how the solar cooker is used. Average energy savings can thus be expressed:

$$E_{sc\ yr} = \sum_{i=1}^{n} (f_i \ x\ 4.33\ x\ S_i\ x\ e_{sc\ day\ i}) \ / \ n \qquad (1)$$

where

$E_{sc\ yr}$	Average annual energy saved per solar cooking household, % of total cooking energy
n	Number of households
f	Frequency that a household solar cooks during the solar cooking season , days/week
4.33	Conversion, weeks/month
S	Solar cooking season, months/year
$e_{sc\ day}$	Daily energy saved when household solar cooks, % of total cooking energy

Table 3: Average Values of Terms in Eqn. 1

TERM	VALUE
n	**85 solar cooking households surveyed**
f_{ave}	**2.9 solar cooking days/week (mean average)**
S_{ave}	**6 solar cooking months/year (mode average)**
$e_{sc\ day\ ave}$	**80% saved daily when solar cooking (mean average)**
$E_{sc\ yr}$	**15% annual cooking savings by solar cooking households**

Each term of the equation will be discussed briefly in the next subsections. More detailed discussion of each term is found in ref (7). Table 3 is a summary of the term averages. To summarize, however, the surveyed solar households averaged over 70 solar cooking days in 2012, saving 33% of their total cooking energy during the solar cooking months which is estimated to be equal to 15% of their total annual cooking energy.

Frequency that a Household Solar Cooks (*f*)

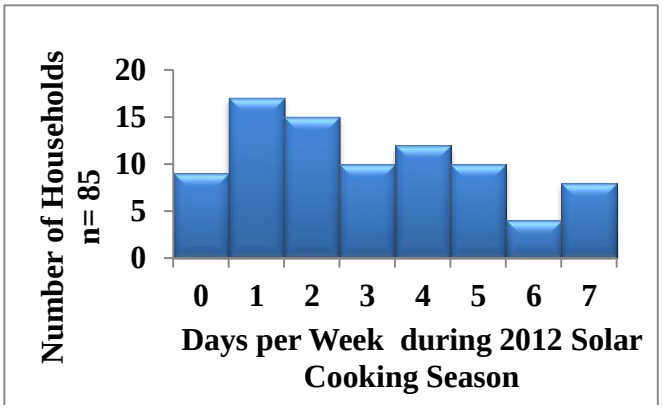

Figure 3: How Often Households Solar Cooked (*f*)

Respondents were asked to estimate the number of days per week that someone in their household solar cooked during the solar cooking season of 2012 (*f*). The survey question was tailored to the climate where the respondent lived. To do that, each respondent was asked their zip code and a quick check was made of where the respondent lived and the question was suitably modified before querying. The frequency distribution of responses to the question (*f*) is shown in Fig.3.

Weather Suitable for Solar Cooking (*S*)

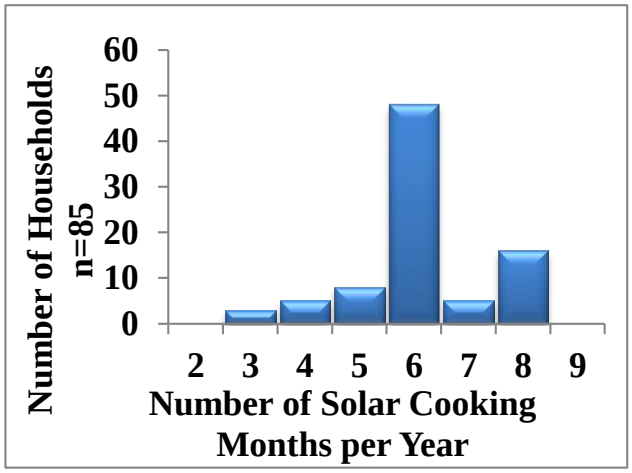

Figure 4: Solar Cooking Season of Households (*S*)

Solar data from the Solar Prospector website (http://maps. nrel.gov/prospector) was used to tailor the question for each respondent. The web-site, developed by National Renewable Energy Laboratory, is a public mapping and analysis tool. The distribution of respondent locations compiled by "pretty good" solar cooking months is shown in Fig. 4:

Another surprise may be that solar cooking frequency was not found to be a strong function of a sunny climate. The box and whisker plot shows the maximum, "75%" quartile, median, "25%" quartile and the minimum solar cooking frequency group by number of solar cooking months[1]:

Note that for climates with 4-6 solar cooking months per year, the box lengths are very similar and the means are essentially the same. U.S. areas with 4-6 solar cooking months include all of southern U.S. except parts of California, Arizona, Utah, New Mexico, and Texas which have more months. It also includes areas as far north as Idaho, Minnesota, and Maine.

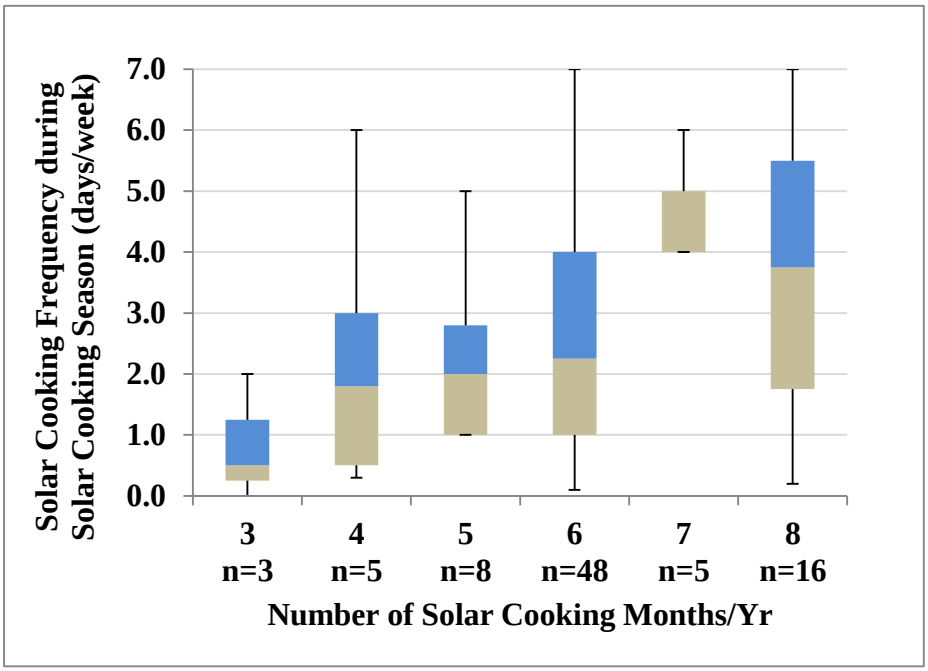

Figure 5: Solar Cooking Frequency (*f*) as a Function of Climate (*S*)

[1] For each climate ranging from n=3 being Seattle and n=8 being Tucson, the beige/blue belly band of each box indicates the average solar cooking frequency for households in that climate. Each box brackets the 25% - 75% quartiles, or the middle half of the survey responses. That would be like the center peak of a normal distribution curve. This survey data, by the way, is non- normal; however, one can still speak of quartiles even in a non-normal frequency distribution. The "whiskers" are the ¼ of the respondents above and below the box (the tails in a normal distribution curve).

In other words, most solar cooking households used their solar cookers about 2 days per weeks when the sun shone no matter where they lived in the U.S.

Daily Energy Saved when a Household Solar Cooks (e_{sc_day})

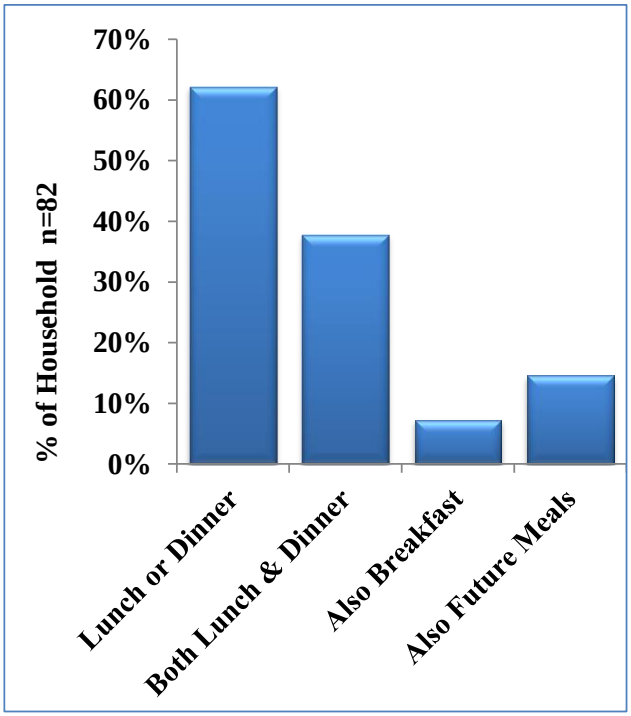

Figure 6: Typical Meals Solar Cooked

The respondents were asked about the typical meals that they solar cooked. Ninety percent reported that they solar cooked dinner and a surprising 50% solar cooked lunch, that is, they succeeded in regularly solar cooking with just half of a day of sunshine. Nineteen percent of the respondents supplemented their answer by reporting that they solar cooked other times also: mostly breakfasts, and cooking in quantity for future meals. Baking breads and desserts were also specifically mentioned. Fig. 6 shows details.

To arrive at the daily energy saved when a household solar cooks ($e_{sc\ day}$). it was assumed that a household's main meal, either a solar cooked lunch or dinner, saved 75% of the daily cooking energy.[2] It was assumed that a second or third solar cooked meal saved an additional 10% of the house-hold's daily cooking energy each. For instance, if it was reported that three meals were solar cooked, it was assumed that 95% of the daily cooking energy was saved with the last 5% still being used in traditional heating methods for making hot beverages, snacks, and reheating.

It was found that, on average, solar cooking households saved 33% of their total cooking energy during the solar cooking months or 15% of their total annual cooking energy. A result from the 2009 RECS is that 6.5% of the average U.S. household energy is consumed by the range top, oven, micro-wave, and toaster oven. That amounts to 1240 kWh per year or 3.4 kWh per day. If the average solar cooking household saves 15% of its cooking energy in a year, that would amount to 190 kWh/yr.

[2] This 75% compares favorably with other solar cooking research that has been done recently: 75% of the typical daily U.S. cooking energy (RECS) is equivalent to the stove top cooking of about 1 cup of dried chickpeas/garbanzo beans (8). A pot of beans or something similar represents the majority of the cooking involved in many a meal. It is encouraging that the bottom-up approach in ref. (8) corroborates the top-down approach used in the analysis presented here.

4.3 Comparison with the Residential Energy Consumption Survey Data

Demographic Data

Using raw data from the 2009 RECS, it was straight forward to compare those responses to responses made by the solar cooking households. It appears that a solar cooking household is more likely to contain just 2 members than the average U.S. household. Also it appears that solar cooking household members are older than the member of a typical U.S. household:

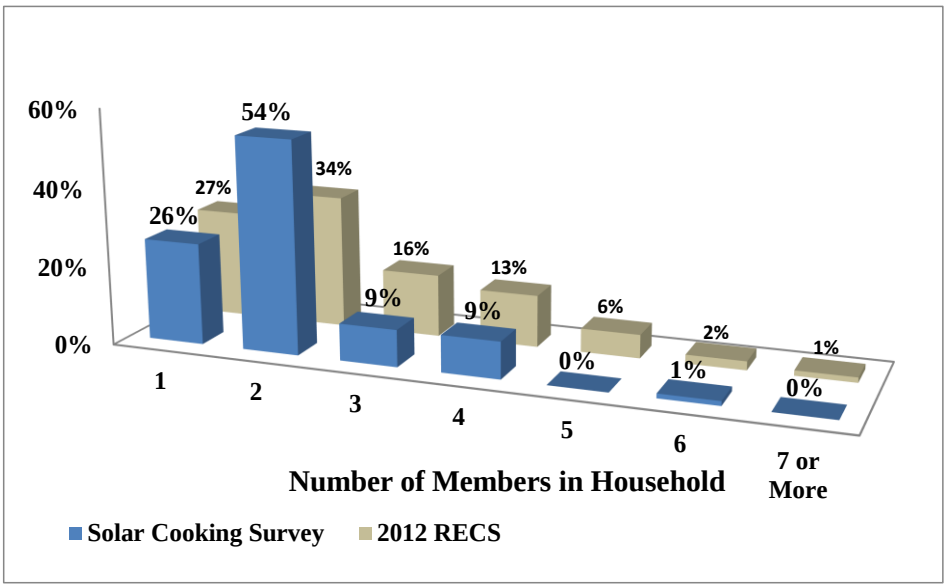

Figure 7: Household by Size

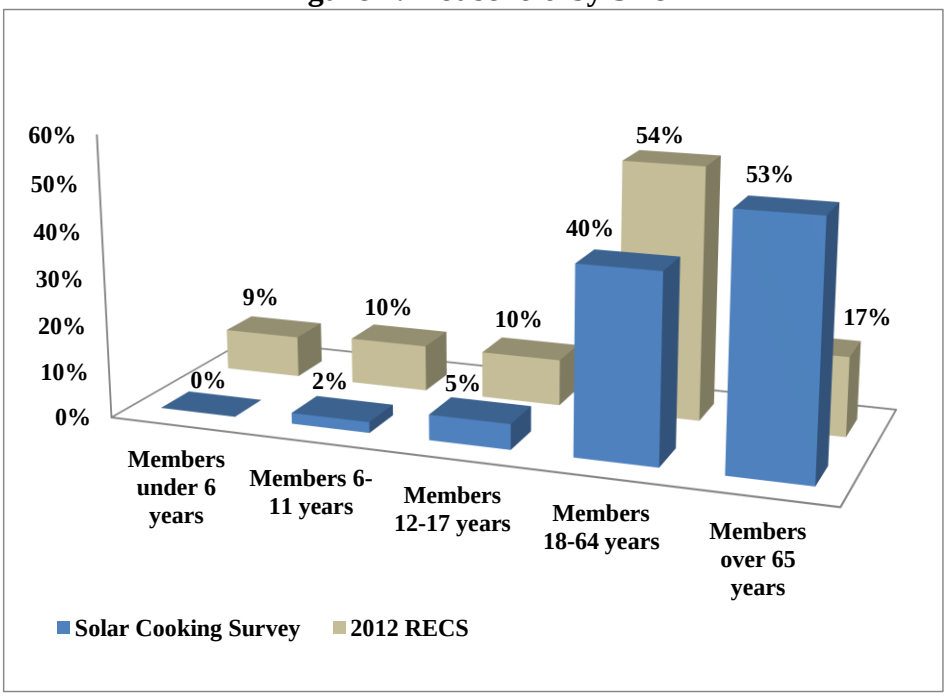

Figure 8: Household Members by Age

"Traditional" Cooking Appliances and Their Use

Solar cooking survey respondents were asked several questions regarding their "traditional" cooking appliances which were identical to 2009 RECS questions, including what type of cooking appliances the households had: stoves, stovetops, wall ovens, microwave ovens, outdoor grills, indoor grills, toaster ovens and coffee makers. A side-by-side comparison of responses is as follows:

Table 4: Traditional Cooking Appliances

Households having at least one:	SURVEY	2009 RECS
Stove, Oven, or Combination	99%	100%
Microwave Oven	85%	96%
Toaster Oven	47%	37%
Coffee Maker	48%	63%

A comparison between the survey and 2009 RECS shows that the solar cooking households reported that they used their oven and /or stove more often (when they were not solar cooking) than the RECS survey households. Solar cooking households also report that they ate at home more often:

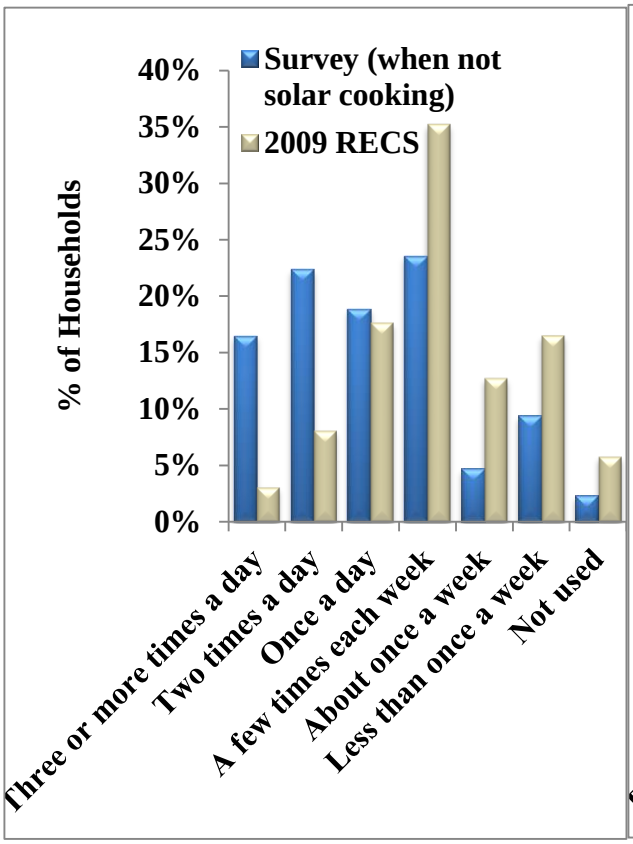

Figure 9: Oven and Stove Use

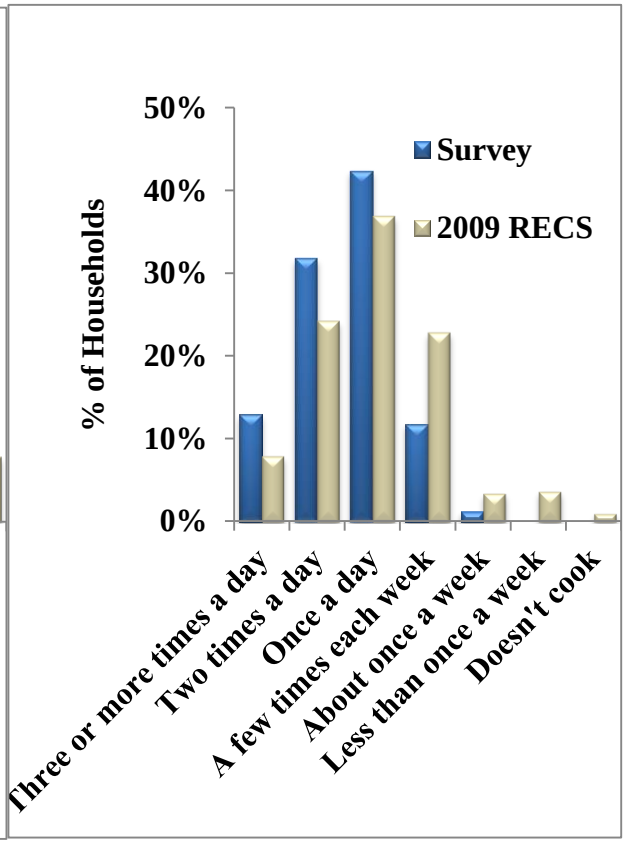

Figure 10: Hot Meals Cooked at Home

5 CONCLUSIONS

Results of the survey include the following noteworthy trends:

1. Surveyed solar cooking households usually own more than one solar cooker, favoring box style cookers.
2. Surveyed solar cooking households averaged over 70 solar cooking days in 2012, saving 33% of their total cooking energy during the solar cooking months (15% of their total annual cooking energy) saving 190 kWh or about $45 per year.
3. Energy savings were not as climate-correlated as one may suppose. There is a large portion of the US in which surveyed solar cooking households tend to solar cook 2 times per week in the months the sun reliably shines.
4. Surveyed solar cooking households tend to have fewer members than the average U.S. household. Also, solar cooking household members tend to be older.
5. Surveyed solar cooking households tend to eat at home more often than the average U.S. household.

It would not be appropriate to make a claim of statistical significance for the data presented. Obtaining a larger population sample and using a study methodology which included a random sample component would be important. Bearing this mind, however, the data is still useful, because it offers a snapshot of solar cooking households. This initial survey points to future possibilities and is intended to encourage more encompassing and statistically robust work. With that in mind, here are some observations regarding each trend:

1. Many solar cooks eventually purchase more than one solar cooker appliance. A couple reasons for this suggest themselves: household members may start with the first inexpensive solar cooker that they find and then buy up as they become more knowledgeable about solar cookers and how they will use them. Or they may purchase additional solar cookers as they become interested in cooking larger quantities of food as the same time.

2. With an average savings of $45 annually, solar cookers cannot be sold on the basis of savings alone. Further discussion of this is worth its own section which follows in Next Steps.

3. If most households use their solar cookers about 2 days per week during the summer season no matter where they live, is this because of the many different methods of cooking that are available to us in the U.S.? Are there custom and habit based tendencies that discourage households from solar cooking more frequently?

4. The difference in size and member age of solar cooking households may reflect a bias in this survey. However, if this is truly a trend, it would be significant for solar marketing and incentive program designs. Several possible interpretations of the data come to mind: One is that families with fewer younger children at home may more readily adopt solar cooking (having more time to try something new?). Another interpretation is that solar cooking outreach may have inadvertently focused upon older people. (Many of us learned of solar cooking because we were first donors to non-profit organizations supporting solar cooking programs.) A third view of the

data may indicate that several decades ago, solar cooking outreach was more intense than it is today and the "converts" of that time have aged. (If so, how should solar cooking appliances be developed and introduced to appeal to the 20-30 year old crowd?)

5. Are members of solar cooking households avid cooks in general? Or do they cook and eat at home more because it is economical? In either case, solar cooking marketing should be geared towards people who are comfortable or even excited about cooking in general. This would place solar cooker appliances among the specialized cooking implements found in gourmet outlets, for example.

These are, no doubt, other explanations of the data that are also worth considering.

6. NEXT STEPS

Though there is a wealth of speculation and study of why ostensibly cost-effective energy efficiency technologies are not widely adopted (9)(10)(11), clearly with respect to solar cooking, a $45 annual savings will not substantially enter into a household's buying decision. Solar cookers cannot be sold on the basis of savings alone.

What kind of nurturing will grow the solar cooker industry at this stage? The strategies that successfully encouraged "now emerged" technologies can be applied to solar cooking as well. This emerging technology process has been characterized by three stages: evolution, entrepreneurism, and policy (9). With the evolution and entrepreneurism stages well established for the solar cooker industry, it stands poised today to move into the policy stage of development. At this stage an important effort needs to be a better understanding of the saving potential of solar cooking.

Why is this important for the U.S.? It is because to a government and utility provider policy maker, energy savings need not be large on an individual basis; they can be small savings magnified by many households. Also, they can be ball-park numbers as long as they are robust in the aggregate. For instance, if 50,000 households saved 15% of their cooking energy by solar cooking, then that 190 kWh/yr savings per household translates into 9,500 MWh/yr or over $1 million dollars for a community. There are additional second order savings from reduced cooling of the kitchens, and also a peak demand reduction which would indicate even greater savings. Now these are the type of numbers that interest policy makers.

What about utility support? To make solar cooking a candidate for a utility conservation acquisition program, more and statistically more robust surveys may be required to create confidence in the potential energy savings. Alternate sampling for future surveys could be obtained from utilizing a customer base of a utility provider or a solar cooker distributor. The survey sizes need not be large: a population of 100 random sampled respondents is sufficient for basic valid statistical analysis. In the long term, as solar cooking gains acceptance in the U.S., it would be a milestone to have solar cooker questions included in a future RECS.

Equation 1 can form the basis of a methodology to verify energy savings, an essential component of any utility conservation acquisition program. The equation is based upon the experience of solar cooking households and includes relevant factors that impact the amount of solar cooking done. It opens the way for verification from an inexpensive survey oriented approach:

$$E_{sc\ yr} = \sum_{i=1}^{n} (f_i \ x\ 4.33\ x\ S_i\ x\ e_{sc\ day\ i}) \ / \ n \qquad (1)$$

Still to be done is gaining a better understanding of the "persistence of savings" of a solar cooker program, i.e. how long do solar cookers last and what factors affect how long people continue to use them. What causes a solar cooking household to sometimes retire their cookers to the closet?

On the state and national level, policy makers should be made aware that solar cooking has the potential to be a low-cost, viable, energy saving technology. Policy makers should be encouraged to include solar cookers in their energy-saving and carbon-reducing tool kits.

Here are some things that the solar cooker community can be doing now to assist the policy stage process: fostering lifestyles that include solar cooking (thereby increasing the scale of the market and the persistence of savings) and continuing to collect long term data (increasing data robustness and showing trends). The way forward needs to be inexpensive. The key resource is the already proactive solar community.

Right now solar cooking is being adopted by households in the U.S. (and globally) who "are doing the right thing" and/or who are trying to live "off-the-grid". This will remain a small number in the U.S. until the environmental "handprint"[3] of solar cooking is considered at the policy level. The community benefits far outweigh the $45 per year each household could typically save by solar cooking. In addition the potential for contributing to the international collective environmental handprints in the areas of reduced deforestation, improved indoor air quality, and preventing childhood diseases is immense.

7 ACKNOWLEDGEMENTS

I thank Jon Biemer, P.E. of Creating Sustainability in Portland OR who was instrumental in encouraging me to look at how this survey fits into the big picture. I thank Bill Blackburn who was my chief editor and is my partner in solar cooking. I also thank the following people and organizations for their time and other resources in getting the word out about the survey: Solar Cookers International in Sacramento CA, Citizen for Solar centered in Tucson AZ, Solar

[3] Environmental "handprint" is an emerging term which is complementary to the environmentl footprint. The "handprint" attempts to elucidate the good that we do beyond reducing our global footprint, such at educating and inspiring people, promoting sustainable causes, and doing things that may not payback to our own pocket but build the greater community instead.

Household Energy headquartered in Chevy Chase MD, Cantina West in St. George UT, those involves with the solar cooking work done at the University of New Mexico, Gallup NM, and, definitely not least of this list, Yahoo Solar Cooking Group. I also thank all of the solar cooks who participated in this survey. Any errors herein were mine in the making.

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APPENDIX A: Solar Cooking Questionnaire

Email or mail survey to: Natalia Blackburn
natalia.a.blackburn@gmail.com
5040 Cothrin Ranch Road
Shingle Springs, CA 95682

US Solar Cooking Initial Survey

Please complete this survey only if you have been using a solar cooker since before July, 2011: I/we have been cooking that long. I/we have not. Please answer questions based upon last summer (2012).
Survey ID: Zip Code: Date:

Section A: Housing Unit Characteristics

This survey is collecting data on a household by household basis. If someone else in your household has already responded in this survey, please let us know here._____

A-1: Is this your primary residence? (Your primary residence is where you live most of the year.) Yes No

Section B: Solar Cookers

We would first like to ask about your solar cookers.

B-1: How many solar cookers do you have? _____
B-2: What type do you have?
1. Panel cooker (CooKit or Hot Pot) 2. Box cooker (Global Sun Oven) 3. Parabolic cooker 4. Other

B-3: It has been suggested that in central California there are 6 "pretty good" months for solar cooking, April through Sept. How many days per week during those months does someone in your household use a solar cooker? _____ days/week

B-4: On those days, is hot food usually prepared for lunch? For dinner? For both?

B-5: Are your solar cookers used for other cooking uses?
1. Food drying 2. Food canning 3. Other

B-6: Are they used for other than cooking?

Section C: (Traditional) Cooking Appliances

Now we would like to ask about your traditional cooking appliances.

C-1 Stove

How many stoves do you have (that is, that appliance that is both a stovetop and an oven)?
Number of stoves = _____
What fuel does it (or the most used one) use? 1. Elec 2. Nat Gas 3. Propane 8. Other fuel_____

C-2 Separate Cooktop

How many separate cooktops do you have?
Number of cooktops = _____
What fuel does it (or the most used one) use? 1. Elec 2. Nat Gas 3. Propane 8. Other fuel_____

C-3 Separate Wall Oven

How many separate wall ovens do you have?

Number of wall ovens = _____

What fuel does it (or the most used one) use? 1. Elec 2. Nat Gas 3. Propane 8.Other fuel_____

C-4 Frequency

How often is the (most used) stove or oven used when you are solar cooking? When you are not solar cooking?

Three or more times a day 1	 1
Two times a day 2	 2
Once a day 3	 3
A few times each week..... 4	 4
About once a week 5	 5
Less than once a week..... 6	 6
Not used (if volunteered) 0	 0

Does the oven have a self-cleaning feature? Auto or manual?

C-5 Microwave oven

Does your household use a microwave oven?

Used to cook or reheat *most* meals and snacks 1
Used to cook or reheat *about half* of meals and snacks 2
Used to cook or reheat *a few* meals and snacks 3
Used very little 4

Does your household use the microwave for defrosting?

C-6 Outdoor Grill

Does your household use an outdoor grill?

What fuel does it use? 1. 2. Natural Gas 3. Propane 4. Wood 8. Other fuel_____

C-7 Indoor Grill

Does your household use a built-in grill?

What fuel does it use? 1. 2. Natural Gas 3. Propane. 8. Other fuel_____

C-8 Toaster Oven

Does your household use a toaster oven?

C-9 Coffee Maker

Does your household use an electric coffee maker?

C-10 Meals

How often are hot meals usually cooked in your home?

Doesn't cook/Never cooks (If volunteered) 0
Three or more times a day 1
Two times a day 2
Once a day 3
A few times each week..... 4
About once a week 5
Less than once a week..... 6

Section D: Household Characteristics

Last, we have a few questions about the people living in your household.

D-1 How Many People

Including you, how many people normally live in your household? Do not include anyone who is just visiting, those away in the military, or children who are away at college.

How many people = _____

D-2 Ages

What is the age of the oldest person in the household? _____
What are the ages of other household members?_____

Section E: Fuels Used

H-1 Fuels Used

You have mentioned using electricity/natural gas/propane to prepare hot meals. Do you use any other fuel for any purpose in your home?

Which other fuels? 1. Electricity 2. Natural Gas 3. Propane 4. Wood 5. Fuel Oil
6. Kerosene 7. "Solar"* 8. Other fuel_____

*"Solar" refers to PV system or solar preheating of domestic water or space heating

Section F Clarifications

(Record any information here that might provide clarification to the answers above.)

Name:
Zip Code:
Survey ID:

Preferred Contact: Tel? or Email?
Tel:
Email:

Thank you for taking the time to answer questions about your solar cooking. Information will be coded and personal information (name, tel, and email) will not be intentionally shared. You should contact Natalia Blackburn (see first page for email and address) if you have questions about the survey, the procedures, or if at some future time you would like your responses removed from the survey.