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THREE MILLION SOLAR COOKERS WORLDWIDE IMPACTING OVER ELEVEN MILLION PEOPLE

Caitlyn S. Hughes*, Julie L. Greene

Solar Cookers International, 2400 22nd Street #203, Sacramento, CA USA
email: Caitlyn.hughes@solarcookers.org, Julie.greene@solarcookers.org,
web: http://www.solarcookers.org/

Abstract: *The need for an accurate assessment of solar cooking worldwide was identified at the Solar Cookers International (SCI) Global Convention 2014. The solar cooking sector requested that SCI determine the number of solar cookers that have been distributed in the world. SCI compiled this information from published reports and its network of over 350 organizations and individuals. It is displayed in an interactive map on SCI's website. The current count is over three million solar cookers known since 1990. Next steps involve gathering more detailed and up to date information including use rates, exact locations, distribution rates, and impact data. Disseminating this information further will help those within and outside of the sector an accurate understanding of the potential for emissions reduction and biomass savings with increasing use of solar cookers.*

Keywords: solar cooker distribution, map, network

1. INTRODUCTION

1.1. The need & SCI's qualifications

The need for a more comprehensive assessment of the global status of solar cooking worldwide was identified at the Solar Cookers International Global Convention 2014 held in Sacramento, California, USA. The sector requested that SCI calculate the number of solar cookers that exist in the world. This would help the sector track progress, advocate with decision makers, acquire funding, and more. Solar Cookers International was the ideal organization to conduct this research as the leader and convener of the solar cooking sector. The Monitoring and Evaluation Specialist position was created at Solar Cookers International shortly after that convention to research this and other topics. In addition to its proven sector leadership role leading, Solar Cookers International's qualifications to conduct this research include its recent recognition as a top three finalist of the Interaction Data Quality Award. Interaction is a group of more than 180 humanitarian aid organizations.

2. METHODOLOGY

2.1. Information sources

Solar Cookers International has established a network of over 350 solar cooking related individuals and organizations. From this network and additional sources, SCI has been gathering information on the work of these partners including the number of solar cookers that exist worldwide. This includes records of solar cookers that were handmade, sold, subsidized, or given for free.
One of the main sources of information for this research was the Solar Cookers International Wiki (www.solarcooking.org), the largest digital database of solar cooking related information. The Wiki platform allows the hundreds of individuals and organizations in the Solar Cookers International Network to create and update their own webpage with information including how many solar cookers they have made, sold, and/or distributed. In addition, Solar Cookers International has a team of webmasters who regularly monitor solar cooking related news, post it on the SCI Wiki, and initiate further communication. This map also includes information gathered from published reports. SCI staff and SCI Advisory Council members also gathered information from presentations and conversations at solar cooking conventions including the Solar Cookers International Global Convention 2014 in Sacramento, California, USA and ConSolFood 2016 at University Algarve in Faro, Portugal.
The number of people impacted by solar cookers was determined by taking the number of solar cookers distributed in each country and multiplying by the average household size of each country.

2.2. Platform

The Solar Cooker Distribution Map was created using a free online platform called CartoDB. This program was selected because of its price (free) and capability to display the information as an animation over time or categorize by type of solar cookers in addition to the format shown below. The map could also easily be embedded in SCI's website, allowing for the most up to date information to be displayed. A Microsoft Excel spreadsheet can also easily be exported to allow for calculations and

additional ways to share information. The radius of each circle on the map below is proportional to the number of solar cookers in that location.

2.3. Dissemination

After compiling and mapping the information, SCI distributed it through the SCI digital newsletter (the Solar Cookers International Digest) and made it publically available on its website. The online version at http://www.solarcookers.org/our-work/solar-cooker-distribution/ is interactive. The organization or individual name, exact number of solar cookers, and city name are visible when hovering the mouse over a particular location. The user can also zoom in or out on the map. A request for individuals and organizations to include and/or update their information accompanied this dissemination. A simple form for individuals and organizations to add or update their information is also available on that webpage.

3. RESULTS

Figure 1. Distribution of solar cookers by number

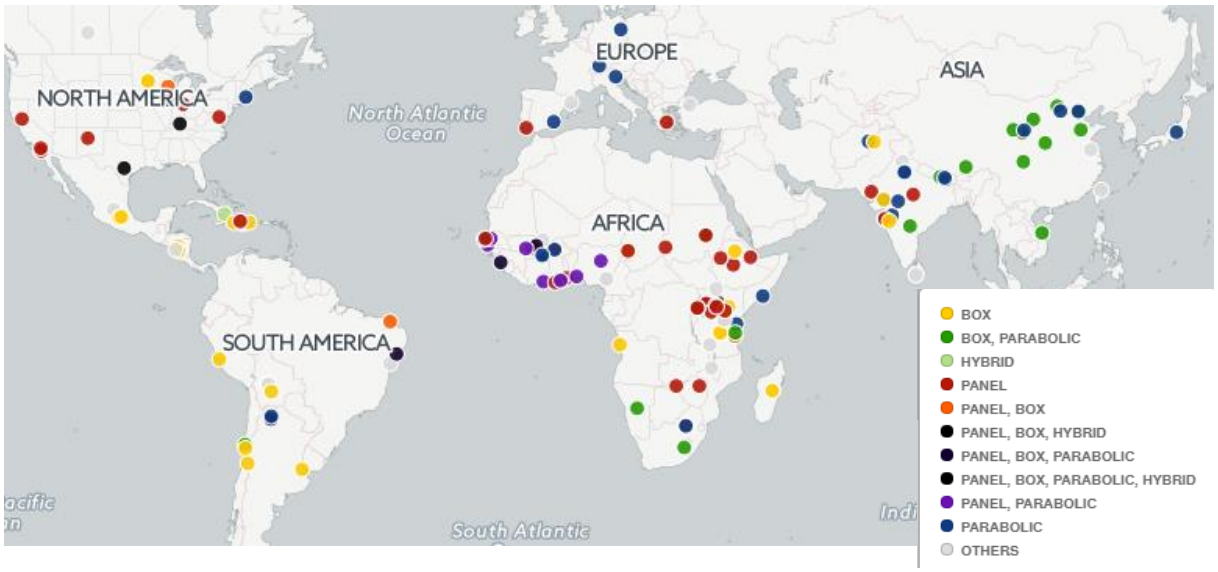

Figure 2. Distribution of solar cookers by type

Organization/Individual	Number
Afghanistan	
Global Hope Network International	338
SERVE	22000
Angola	
El Fuego de Sol	20
Argentina	
Inti-Sud Soleil	473
SOLAR INTI	3000
Fundacion EcoAndina	250
Bolivia	
CEDESOL Foundation	7000
CECAM Bolivia	120
Kyoto Twist	310
Inti-Sud Soleil	6387
Brazil	
Jose Albano	20
Oceanbyte Projects e Servicios	50
Cozinha Escola Experimental Solar	28
Burkina Faso	
ACCEDES	70
UNHCR, Caritas Burkina Faso, HELP	601
DTC Business Women Micro-enterprise	300
Union des Femmes pour le developpement (UFD)	35
Tle Nafa/ACCEDES	16
Cambodia	
Global Roots/ Solar Cookers International	1
Cameroon	
Hai Min Pofti Cameroon	252
Nkambe Rural Council	28
Canada	
Solar Freedom International Inc.	3600
Chad	
PROMOSOL (Center for the Promotion of Solar Energy)	10
Tschad Solaire	14000
Jewish World Watch	128000
Chile	
Canelo de Nos	192
Inti-Sud Soleil	2193
Delicias del Sol Restaurante Solar (Association of Solar Artisans of Villaseca)	43
China	
China Agricultural Statistics yearbook (Lanzhou)	751000
China Agricultural Statistics yearbook (Beijing)	23000
China Agricultural Statistics yearbook (Yinchuan)	326000
China Agricultural Statistics yearbook (Lhasa)	13000
China Agricultural Statistics yearbook (Hohhot)	40000

China Agricultural Statistics yearbook (Chengdu)	132000
China Agricultural Statistics yearbook (Jinan)	16000
China Agricultural Statistics yearbook (Xining)	230000
China Agricultural Statistics yearbook (Xi'an)	86000
Mengyin Solar Cooker Project	49400
Yancheng Sangli Solar Energy Industrial Co. Ltd	80000
Huining Solar Cooker Project	49400
Huzhu Tu Autonomous County Solar Cooker Project	49400
Cuba	
Grupo de Energias Renovables Aplicadas	250
Dominican Republic	
Solar Oven Partners	75
Ethiopia	
Partnership for Integrated Sustainable Development Association	3700
Solar Cookers International	3603
Sol Solidari	238
Gambia	
Rescue Mission Gambia	9246
Germany	
SK-12, SK-14	16000
Ghana	
African King Foundation	500
Paula Winchester	100
Guinean Volunteers for the Environment (VGE)	6
Greece	
Aftarkeia	100
Guinea	
VGE	976
Haiti	
Kyoto Twist	22
Power from the Sun	40
Friends of Haiti Organization	1657
SCI/Sun Ovens International /International Child Care Ministries/Programme Energie Solaire	400
Haiti Solar Oven Partners	5607
Clean Currents/Solar Cookers International	100
India	
Keshav Srushti	23484
Applied Science and Engineering	50
Shirdi Saibaba Temple	73
various manufacturers IS 13429	505688
Brahma Kumaris World Spiritual University	84
Haryana Renewable Energy Development Agency	8312
Gandhi Ashram	95000
Simplified Technologies for Life	2044
M. Laxman and Co	40
Barli Development Institute for Rural Women	500
Zilla Parishad primary schools	23
Ladakh Autonomous Hill Development Council	650
Italy	
Salvambiente Onlus	100
Ivory Coast	
VGE	6
Japan	
Amane	3000
Kenya	
Altener Energy	30
Kyoto Energy Ltd.	2000
Mwayeo Kenya	40
Sustainable Utilization of Renewable Energy (SURE)	718
Great Hope Orphanage	3
TWR	400
Samaritan's Purse	40
Solar Cookers International	7686
Tonembee Association	860
Friends of the Old (FOTO)	926
Mount Kenya Energy Project	12
Haines Solar Cookers	291
SCI (Sunny Solutions)	3154
Lesotho	
Bethel Business and Community	350
Madagascar	
Kyoto Twist	22
Association pour le Développement de l'Energie Solaire	4640
Malawi	
Care and Support Network	315
Mali	
Kyoto Twist	110
AFIMA	3000
Sun for all	5

VGE	6
Mexico	
Mixtec Children's Project	100
Tolokatsin	480
HotPot (Fondo Mexicano para la Conservacion de la Naturaleza/Solar Household Energy)	25000
Namibia	
Namib Desert Environmental Education Trust (NaDEET)	488
Nepal	
Foundation for Sustainable Technologies	2500
Vajra Foundation Nepal	13000
Rotary/Centre for Rural Technology	136
Nicaragua	
Nicarguaun Solar Oven Project/New Energy Works Timberframers/Victor-Farmington Rotary Club	290
Las Mujeres Solares de Totogalpa	22
Phoneix Group	500
Solar Oven Society	300
Fuprosomunic/Project Gettysburg Leon	1122
Nigeria	
VGE	6
Cosmopolitan Women Organization	3000
Pakistan	
Applied Green Technology/ Lady Fatemah Trust	1000
Peru	
Inti-Sud Soleil	7368
Portugal	
Professor Celestino Ruivo	10
Senegal	
Ministry of Biofuels, Renewable Energy and Scientific Research/ GEF/Ndiop Women's Association/CRESP/Ngaye/ GEN Senegal	11321
Project Cuisiniéres Solaires d'Afrique	7299
Sol Suffit	880
AFSTech	120
Somalia	
Yancheng Sangli Solar Energy Industrial Co., Ltd	1500
South Africa	
Sunstove	15000
Ulog	110
Suncatcher	580

Lazola	11
Papillion, A12, K14, K10, K9	2377
Spain	
Alsol Tecnologias Solares S.L.	1800
Acceso	30
Sri Lanka	
Habitat for Humanity Sri Lanka	1300
EMACE Foundation of Sri Lanka	2209
Sudan	
Solar Energy Enterprises Co Ltd	1300
Solar Cookers International	1750
Switzerland	
Solar Association Tiloo	320
Taiwan	
Earth Passengers	40
Tanzania	
Kyoto Twist	225
Macedonia Ministry/Kyoto Twist	100
Adventures Health, Education, and Agricultural Development	612
TanzSolar Ltd.	20
Solar Oven Society (SOS) Africa	240
Solar Africa Network	30
Global Resource Alliance	900
Solar Circle	3000
Togo	
VGE	15
Turkey	
Foundation for the Support of Women's Work	2000
Uganda	
Solar Connect Association (SCA)	10819
Welfare Society for Solar Development	5000
United States	
Sunny Skies Solar	250
Solar Cookers International	849
Hot Pot	24
Haines Solar Cookers	92
SolCookLLC	1000
Texas Solar Cookers	50
Copenhagen Solar Cooker	100
Solar Oven Reflectors	100
SOS Sport/Solavore	25014
One Earth Designs	4
Sun BD Corporation	2100
Luke Hill	55
Global Sun Oven	80000
Solar Clutch	200

All Season Solar Cooker	176
Vietnam	
Vietnam Solar Serve	1750
Zambia	

Solaris Africa	20
Zimbabwe	
DTC Business Women Micro-enterprise	14000

Table 1. Number of solar cookers by country and organization

4. CONSIDERATIONS AND NEXT STEPS

Solar Cookers International does not have the capacity to independently verify all of this information. Classifying solar cookers by type is difficult as the industry evolves and new models are developed. Location of distribution of solar cookers is shown on the map. If that information was not available, or easily represented, location of solar cooker origination is shown on the map. The cities are the ones nearest the project site, or are capital cities if the project involved a whole region.

4.1. More information needed

Although this is a good beginning for compiling information, more specific information is needed to create an accurate assessment of solar cooking worldwide and over time. The map and data are only as up to date as the information that is submitted to SCI, and/or that SCI is able to find.

Solar Cookers International's information sources, communications, and verifications are limited by language, as SCI's staff primarily work in English. Although some staff and the SCI Wiki have the ability to translate, communications such as the SCI Digest are distributed in English. Sector members find Solar Cookers International if they search for terms that are more common with native English speakers. SCI aims to strengthen its connection, network, outreach and information gathering and sharing with more non-native English speaking partners. SCI is working on a communications strategy to accomplish this goal.

Some information displayed on the map is from 1990, which tracks change over time from a historical perspective. However, this display does not indicate how many solar cookers are currently in use or how frequently they are being used. This information would increase the level of detail and usefulness of the global assessment of solar cooking worldwide. The frequency with which distribution data is gathered and reported varies significantly by organizations and individuals, making it difficult to track changes over time. Having more specific information from all solar cooking distribution past, present, and future such as the time span, rate of distribution, and more exact locations would allow for more accurate calculations and visualizations of the change in the status of solar cooking. However, SCI acknowledges that there is a tradeoff between the amount of information requested and people's likelihood to share it due to time constraints, etc.

One way that Solar Cookers International is leading the sector in addressing this need for more detailed information is the creation of the Solar Cooking Adoption and Impact Survey. This survey was created by the Solar Cooking Adoption and Impact Working Group (a dozen sector experts led by Solar Cookers International). The sector previously lacked a consistent evaluation and baseline data tool. The Solar Cooking Adoption and Impact Survey is currently being pilot tested with project partners in Cambodia, Kenya, and Tanzania. As this survey is used more and data is shared with Solar Cookers International, it will positively contribute to a more standardized, detailed and accurate

assessment of solar cooking worldwide and over time. The Solar Cooking Adoption and Impact survey corresponds closely with the Global Alliance for Clean Cookstoves Adoption and Impact Survey, because many partners work in both improved combustion stove and solar cooking sectors. The Solar Cooking Adoption and Impact Survey is available in multiple formats including Microsoft Word and Google Forms at http://www.solarcookers.org/our-work/association-and-network/adoption-and-impact-survey/ The Google Form version makes it easy to automatically share data with SCI and is mobile friendly. The Microsoft Word format is suitable for areas with limited technological access. Currently, SCI staff manually input data collected into the map. Ideally in the future, sector members could automatically update their own information.

4.2. Information dissemination

This information is useful in displaying the scope and scale of solar cooking. It has been distributed to other agencies including the Global Alliance for Clean Cookstoves, GIZ (the German government development organization), and the United Nations through SCI's consultative status in the Economic and Social Council.

Solar Cookers International would like partners and solar cooking advocates to share and publicize this data to inform and advance solar cooking. Publicizing this data offers a target for consistent and high-quality data outcomes for the solar cooking community.

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