

SOLAR COOKING:
Advances and
learning from solar
thermal cooking
programs in Kenya





Keith Wingard,
Strategic Partnerships Manager,
Solar Cookers International

What is a solar cooker?

Collect light

Absorb light

Retain heat

Ease and Efficient

Safe and Sustainable



What is a solar cooker?



Reflective panel

Photo credit: Alan Bigelow, Ph.D.



Box
oven

Photo credit: Shannon Watkins



Parabolic reflector

Photo credit: Alan Bigelow, Ph.D.

- Collects and absorbs direct sunlight and retains heat to cook food or pasteurize water
- Solar-thermal cooking
- Hundreds of variations of these types

Complementary technologies:

- Retained-heat basket
- Water pasteurization indicator (WAPI)

What is a Solar Cooker?



Evacuated tube



Fresnel
mirror

Fresnel lens



Institutional Cooking

Photo credits: Alan Bigelow, Ph.D.

Why solar cooking?

- Zero air pollution and zero greenhouse gas emissions
- Zero inhalation of smoke
- Zero fuel cost
- Scalable and sustainable solution
- Inclusive and equitable
- Reduces deforestation and protects biodiversity
- Provides nutritious meals
- Lessens time and danger from collecting biomass fuel
- Can be used for drying food, pasteurizing water
- Cost effective and requires no infrastructure



Photo credit: FoST

Why Solar Cooking?

Household Air Pollution:

- ~ 2.3 billion people cook using polluting open fires
- 3.8 million people die prematurely each year
- Half of pneumonia deaths of children under 5 are caused by household air pollution



Photo credit: Unknown

Who is Solar Cookers International?

Mission & Vision

SCI promotes climate-friendly solar cooking to improve human health, economic well-being, women's empowerment, and the environment for vulnerable populations worldwide.

- Non-profit leading and convening the solar cooking sector since 1987
- Hundreds of collaborators in over 140 countries



Photo credit: Kriti Shrestha

How does Solar Cookers International work?

Solar Cooking

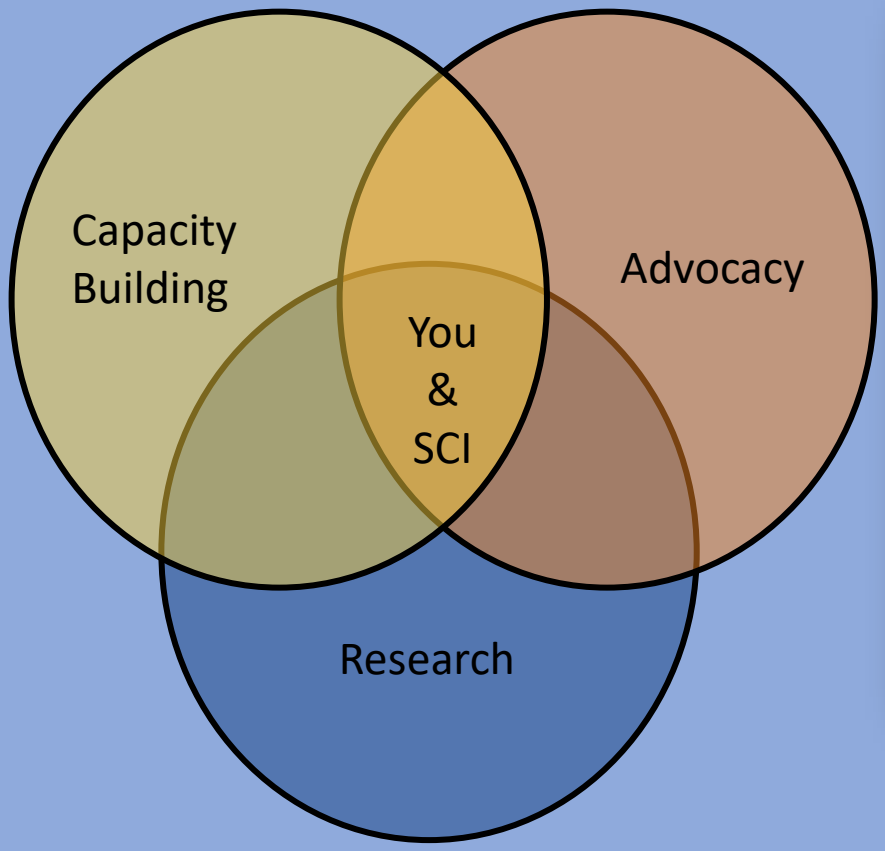


Photo credit: Varendra Joshi

Research



Research: Performance Evaluation Process (PEP)

- Harmonizes with the International Organization for Standardization (ISO)
- Measures Standard Cooking Power in watts
- Unbiased, scientific, replicable
- Helps to make informed decisions
- Brings credibility to the sector



SCI Performance Evaluation Process test centers

(1) California
(USA)



(2) New York
(USA)



(3) Nepal
(Asia)



(4) Kenya
(Africa)



Photo credits:
Shannon Steffy,
Raman Aylur
Subramanian,
Alan Bigelow,
Ph.D.

Official Results from the Solar Cookers International (SCI) Performance Evaluation Process (PEP)

Solar cookers are listed below and color-coded by type: reflective-panel cookers (orange); box ovens (green); and evacuated tubes (purple).

Solar Cooker Name (alphabetically)	SCI Solar Cooking Website	Standard Cooking Power (watts)
Arco Solar Cooker	Arco Solar Cooker	600
Arco Solar Cooker (2018)	Arco Solar Cooker	600
Arco Solar Cooker (2019)	Arco Solar Cooker	600
Arco Solar Cooker (2020)	Arco Solar Cooker	600
Arco Solar Cooker (2021)	Arco Solar Cooker	600
Arco Solar Cooker (2022)	Arco Solar Cooker	600
Arco Solar Cooker (2023)	Arco Solar Cooker	600
Arco Solar Cooker (2024)	Arco Solar Cooker	600
Arco Solar Cooker (2025)	Arco Solar Cooker	600
Arco Solar Cooker (2026)	Arco Solar Cooker	600
Arco Solar Cooker (2027)	Arco Solar Cooker	600
Arco Solar Cooker (2028)	Arco Solar Cooker	600
Arco Solar Cooker (2029)	Arco Solar Cooker	600
Arco Solar Cooker (2030)	Arco Solar Cooker	600
Arco Solar Cooker (2031)	Arco Solar Cooker	600
Arco Solar Cooker (2032)	Arco Solar Cooker	600
Arco Solar Cooker (2033)	Arco Solar Cooker	600
Arco Solar Cooker (2034)	Arco Solar Cooker	600
Arco Solar Cooker (2035)	Arco Solar Cooker	600
Arco Solar Cooker (2036)	Arco Solar Cooker	600
Arco Solar Cooker (2037)	Arco Solar Cooker	600
Arco Solar Cooker (2038)	Arco Solar Cooker	600
Arco Solar Cooker (2039)	Arco Solar Cooker	600
Arco Solar Cooker (2040)	Arco Solar Cooker	600
Arco Solar Cooker (2041)	Arco Solar Cooker	600
Arco Solar Cooker (2042)	Arco Solar Cooker	600
Arco Solar Cooker (2043)	Arco Solar Cooker	600
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Arco Solar Cooker (2061)	Arco Solar Cooker	600
Arco Solar Cooker (2062)	Arco Solar Cooker	600
Arco Solar Cooker (2063)	Arco Solar Cooker	600
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Arco Solar Cooker (2096)	Arco Solar Cooker	600
Arco Solar Cooker (2097)	Arco Solar Cooker	600
Arco Solar Cooker (2098)	Arco Solar Cooker	600
Arco Solar Cooker (2099)	Arco Solar Cooker	600
Arco Solar Cooker (2100)	Arco Solar Cooker	600



Performance Evaluation Process

TESTED FOR COOKING POWER

A representative model of this solar cooker was tested for standardized cooking power (watts) in accordance with ISO 19867-1:2018. Results →

View PEP test results: www.solarcookers.org



SCI



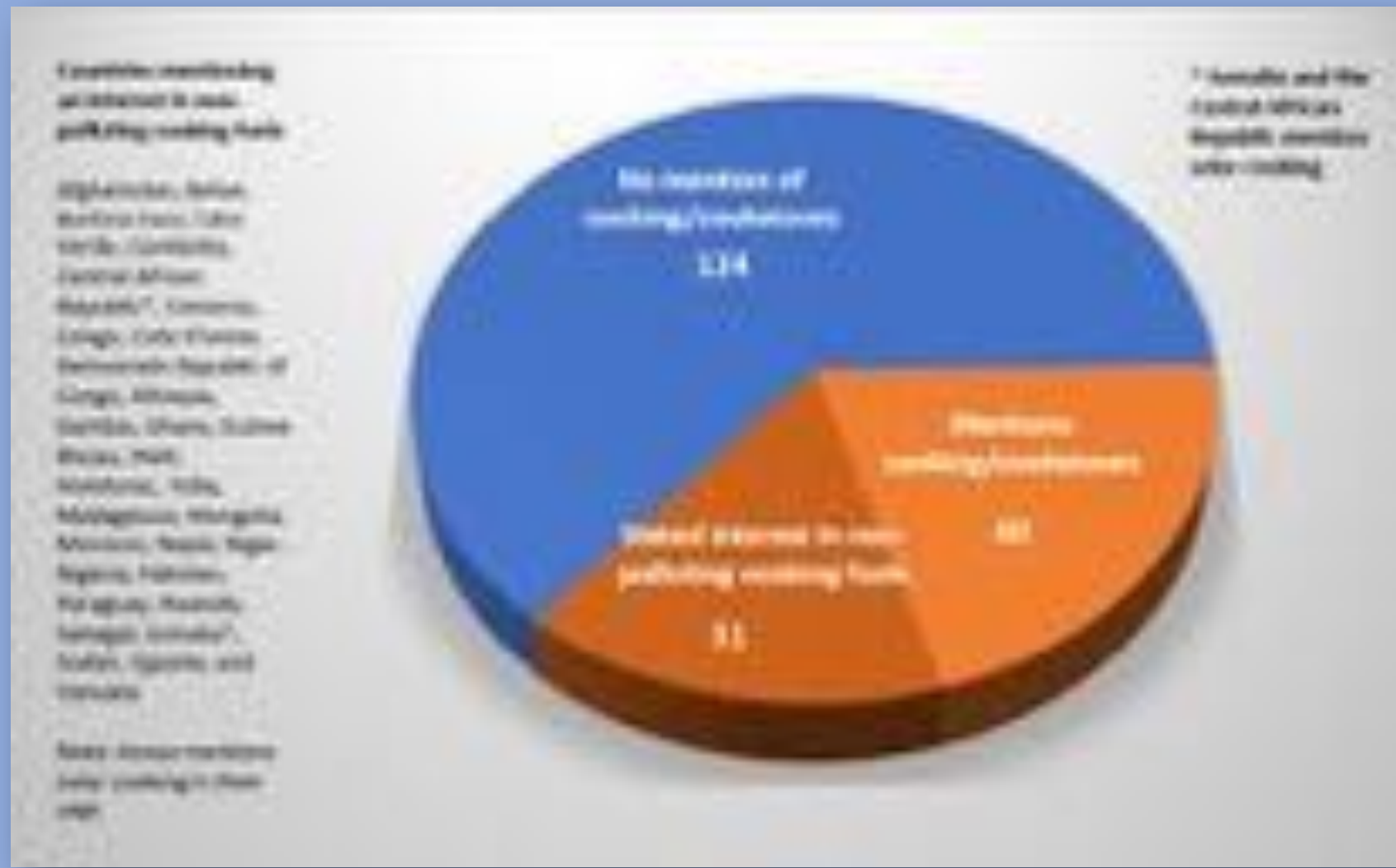
SOLAR COOKERS
INTERNATIONAL

How and why does SCI advocate?

SCI encourages governments and civil society organizations to include solar cooking and has had Special Consultative Status with the United Nations since 1996!



Countries' Plans to Address Climate Change: Nationally Determined Contributions (NDCs)



1 simple solar cooker can save 1 family from burning one ton of wood in a year

Imagine that multiplied by the ~ 2.3 billion people cooking over open fires

Building Capacity



How and why does SCI build capacity?

A big challenge requires a united and collaborative effort!



Photo credit: Cleophas Kosgei

Solar Cooking Worldwide

- 4+ million solar cookers worldwide:
 - Over 14 million people directly impacted by solar thermal cooking
 - 7.7 billion meals cooked via solar thermal
 - 1 solar cooker avoids 1 metric ton of firewood annually
 - Reducing CO₂ emissions by over 30 million tons over the lifetime of the solar cookers



Leadership through Data Collection and Analysis

Quick Needs Assessment

- Assess need and desire for solar cooking
- Critical step towards success
- Formulates appropriate initiatives

Adoption and Impact Survey

- Baseline and post-distribution data
- Quantify use and impact
- Support adoption of solar cookers with user data



Photo credit: FoST

Resources for the solar cooking sector

Solar Cooking Wiki

The world's largest online solar cooking resource with over 1,800 pages of online solar cooking information and translatable into over 35 languages



Visit: www.solarcooking.org

John Collentine Solar Cooking Toolkit

An online collection of materials organized for multiple audiences by modules

 <p>INTRODUCTORY TOOLS</p> <p>Learn about the benefits of solar cookers, how they work, and how to obtain a cooker.</p>	 <p>TECHNICAL TOOLS</p> <p>Learn about solar cooker designs, materials, solar tracking, and solar radiation.</p>	 <p>NETWORKING TOOLS</p> <p>Learn about the Solar Cooking Wiki, consulting SCI Global Advisors, and more.</p>	 <p>PROJECT TOOLS</p> <p>Learn about data, impacts, and significant projects; add your data to the global map.</p>
 <p>TESTING TOOLS</p> <p>Learn about SCI's Performance Evaluation Process - why, how, what, and where.</p>	 <p>ADVOCACY TOOLS</p> <p>Learn about the United Nations work, other clean cooking advocacy groups, and promoting solar cooking.</p>	 <p>BUSINESS TOOLS</p> <p>Learn about financing projects and carbon credits.</p>	 <p>TEACHING TOOLS</p> <p>Learn about classroom resources and building solar cookers.</p>

Visit: www.solarcookers.org/sci-toolkit

Solar
Cooking
successes in
Kenya



Cooking scene in Kenya



Photo credit: Alan Bigelow,
Ph.D.

Cooking-fuel market Kakuma Refugee Camp, Kenya



Photo credit: Alan Bigelow, Ph.D.

Quick Needs Assessment

Pre-solar cooking approaches of selected participants



Success: Locally Manufactured solar ovens



Training sessions and solar cooker distribution



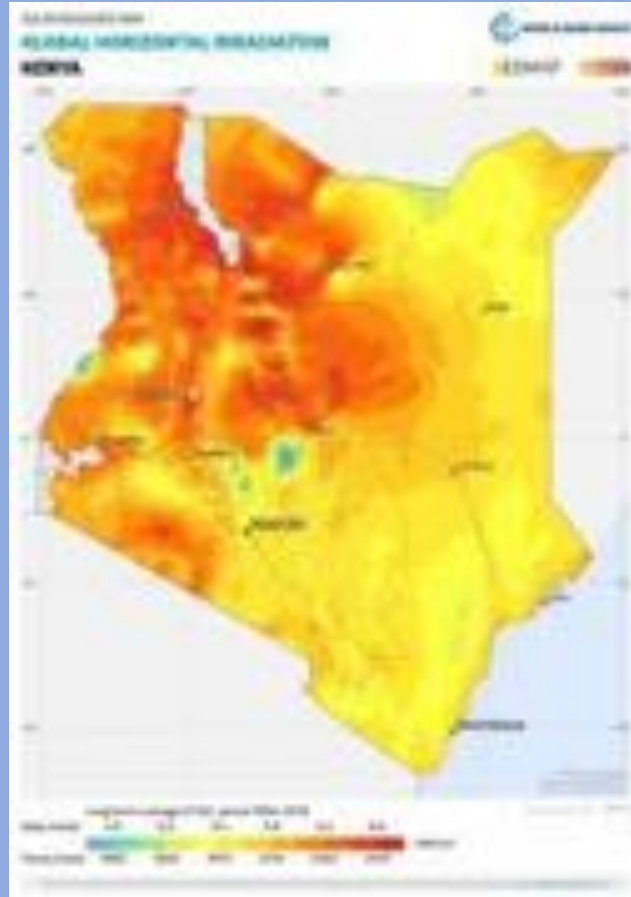
Success: Empowering women



Outcomes and key cooking statistics in Kenya

Data from SCI's project at Kakuma Refugee Camp, Kenya, indicates:

- One solar cookstove can save one tonne of wood per year
- Cookstove users save an average of ~ \$70 USD per year on cooking fuel
- Cookstoves projected to last 15 years and cook for up to 10 family members
- Kenya averages 2,400 hours of sunshine per year



Kenya cooking sector study data indicates*:

- 64.7 % of Kenyan households use wood as primary cooking fuel source
 - = 8.1 million households
- Average of 25.9 kg of fuel wood for cooking per week
 - = 1.3 tonnes per year
- Average 396 KES/week (\$2.82 USD/wk) spent on fuel wood for cooking
 - ~ 20,592 KES/yr
 - ~ \$147 USD/yr

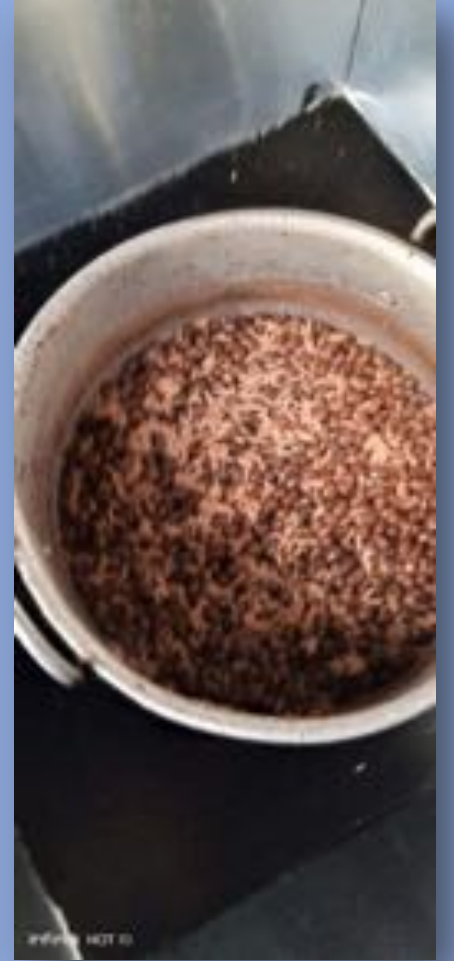
*Source: [Kenya Household Cooking Sector Study \(2019\)](#)

Success: SCI Wins Keeling Curve Prize in 2021 for work in Kakuma



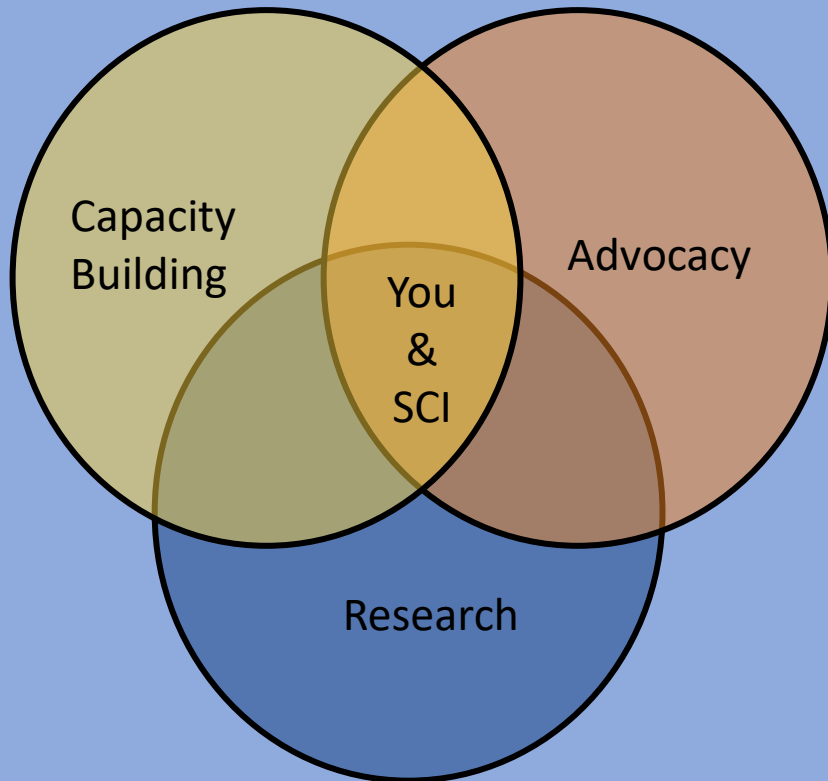
Solar Cookers International has been named a winner of the Keeling Curve Prize! The Keeling Curve Prize recognizes “the most impactful climate projects around the world.”

Solar cooked food at Kakuma Refugee Camp



Solar cooked local food, left to right: peas, rice, beans, potato and tomato stew, and rice & beans

What can you do? (How to engage with SCI)



- Sign up for more information:
www.solarcookers.org/connect/get-our-news
- Access and use SCI's resources: www.solarcookers.org & www.solarcooking.org
- Support SCI <https://www.solarcookers.org/donate>
- Join the SCI Association:
www.solarcookers.org/partners/sci-association
- Consult with SCI: www.solarcookers.org/connect.consult
- Include solar cooking in your individual, organization, and country's work, support, and policies

Thanks to...:

- ReEnergy Africa Summit 2022 organizers
- SCI Global Advisors
- SCI Board of Directors
- SCI United Nations Representatives
- You!
- SCI Associates
- SCI supporters
- SCI volunteers
- SCI collaborators



Photo credit: Ecomandate