



Education Project

Solar Thermal Cooking

INSTRUCTOR MANUAL

RASILIMALI YA MAFUNZO
CREATED AND COMPILED BY
Solar Education Project, GDS

Taarifa ya Ujumbe

Mradi wa Elimu ya Jua unafanya kazi kukuza jiko la jua kama zana za elimu, afya,
uwezesaji wa kiuchumi, na ufufuaji wa mfumo ikolojia

Solar Education Project Team



Jennifer Gasser
United States



Mary Buchenic
United States



Grace Chepkemei
Kenya

Welcome! Karibu! We are here because we believe that solar cookers and integrated fireless cooking solutions are an important part of a sustainable future for all of us. Your role in the process is key to connecting passionate individuals with a diverse network of support through solar cooking. You are the facilitator of a very important program, a catalyst for positive impact through this unique educational experience. Your instruction will impact the lives of many and impact their communities.

The Solar Education Project is committed to developing and implementing programs designed to facilitate effective integrated fireless cooking solutions. The manual, purposeful activities, workbooks, and resources are designed to inspire and motivate participants to achieve their personal and educational goals throughout the workshop. After the successful completion of the program, each participant will receive a certificate of completion. We encourage a formal presentation ceremony for graduation and a handshake for every graduate, celebrating their achievement. We appreciate *your* effort to educate others and are happy to provide a clock hour certificate for your efforts. We respect your time and dedication to solar cooking instruction and integrated cooking solutions. Thank you for your leadership, advocacy and enthusiasm in training others in clean cooking solutions.

SEP's goal is to create successful solar and fireless cooking programs around the globe, and we need your help. We will ask for weekly updates, zoom conference or emails, survey completion, data collection and social media posts, photos or videos and project evaluation for up to six weeks following the workshop. This is your opportunity to give us feedback. Tell us about your workshop and how you used the training manual. With your help, we can identify solutions to our industry's needs, lead program development, and infuse best practices in everything we do.

We recommend that the Retained Heat Cooking Workshop is completed prior to the Solar Cooking Workshop. If this is not possible, please have one or two retained heat baskets/cookers available for this workshop.

Let's get cooking!
SEP Team

GDSnonprofit.org
Email: solareducationproject@gmail.com

©2022 Solar Education Project; All Rights Reserved
No part of this book may be reproduced without express permission from SEP.

CREATE THE WORKSHOP ENVIRONMENT

Physical Environment:

- ✓ Sheltered area with enough space to work comfortably and complete all activities.
- ✓ Enough materials for each participant. (Ovens, baskets, surveys, workbooks, writing and drawing materials, etc.)
- ✓ Chairs or benches for comfortable seating arrangements, ie circle for group discussions.
- ✓ Clean area with tables for food preparation, activities, and group work.
- ✓ Technology, if possible, ie internet, computer, printer, screen, projector, extension cord.

Expectations:

- ✓ Discuss participants' expectations of the workshop.
- ✓ Every participant has the same opportunity.
- ✓ Instructor is well prepared for each session.
- ✓ Review the previous session.
- ✓ Allow for differing opinions, pace, and cooking experience.
- ✓ Discuss permissions for taking and sharing videos and photos.

Relationship Building:

- ✓ Work in teams whenever possible.
- ✓ Rotate team members so that everyone has a chance to work with every participant.
- ✓ Activities should promote conversation and sharing, with relevance to everyday life.
- ✓ Be active with games, music, role playing, dance, etc. Make the workshop enjoyable.
- ✓ Strive to have participants build a community of support.

Storytelling:

- ✓ Compelling stories are captivating.
- ✓ Share your story. Include unexpected detours, mistakes, successes, misunderstandings, and ah-ha moments.
- ✓ Encourage others to share their stories if/when they are comfortable.
- ✓ Photos/videos tell a story and can give evidence of a successful program.

Active Participation:

- ✓ Ask open ended questions to encourage participation and sharing of experiences.
- ✓ Approach learning something new with enthusiasm. Do not be afraid of some failures.
- ✓ Encourage leadership roles in the community through solar and retained heat cooking.

Achievement and Successes:

- ✓ Determine a signal for success and achievement. Recognize achievements daily.
- ✓ The key to success is active participation and sharing real life experiences.
- ✓ Build a community of solar and heat retention cooks.
- ✓ Continue to support one another.
- ✓ Track participant progress after the workshop. Encourage continued use of skills.

Follow up After Workshop

- ✓ Find new and different ways to share knowledge.
- ✓ Find your way to share the benefits of solar cooking. (Community demonstrations, cooking for others in your home, talking about solar and heat retention cooking in your church or organization, posting on social media, attending virtual solar cooking conferences and events online.)
- ✓ Develop ways to communicate after workshop is completed. (WhatsApp groups, Facebook groups, and monthly in-person meetings.)

DAILY WORKSHOP STRUCTURE

- *Designed for participants with little to no experience with solar cooking.*
- *The key to success is active participation and multiple cooking experiences.*
- *Learn about solar energy, the science of solar cooking, how solar cooking can be a solution, and how to prepare a variety of solar cooked foods.*
- *Learn how to use solar and retained heat cooking to reduce fuel use through Integrated Cooking.*
- *Daily Solar Cooking is guided by the instructor and includes cleanliness habits, food preparation, fireless cooking methods, solar oven assembly, cooking with the sun, and safety with solar cooking.*
- *Participants prepare ingredients and cook a variety of foods each day.*
- *Participants gain confidence and become independent in solar and retained heat cooking. These new cooking skills can then be shared with others both formally and informally.*
- *Instructor determines when and where breaks and eating will occur. This must be flexible.*
- *Portions of the workshop will be recorded and photographed. Obtain permission from participants to share video and photos. No personal information will be included.*

WELCOME

Welcome each participant by name. Have participants put on name tags if needed. Allow a short time for informal conversation among participants as everyone settles in. Begin workshop on time each day. Preview the day's cooking and activities. Allow time for each person to set a daily goal.

SOLAR COOKING – From Food Prep to Clean Up

Complete Food Preparation and Set Up of the ovens at the *beginning* of each session. ***While food is cooking, other instruction and activities take place.*** When food is ready, it can be eaten right away or kept warm in an insulated basket until the group is ready to eat. Sessions must remain flexible to accommodate varying cooking times. The workshop is meant to be an interactive and festive celebration of learning and sharing of food and knowledge.

- **Food Preparation** This should be an enjoyable time. Reinforce food preparation cleanliness and safety. Begin by washing hands and preparing a clean work area. Work in teams to prepare food for each participant's oven. Commonly eaten foods should be prepared such as breads, rice dishes, porridges, eggs, beans, stews, cakes, and any local dishes. Suggestions are made, but ask what the participants want to cook. Their input is important to the success of the workshop. For one of the sessions, suggest preparing a recipe from a different part of the world.
- **Oven Set Up** Place food in ovens and demonstrate correct alignment toward the sun. Review DARE. Use this time to have participants explain what they are learning about how the solar oven works. Correct any misconceptions. As participants gain confidence, they become more independent in the solar cooking process. Encourage participants to help one another. Reinforce concepts and knowledge using the EDGE method of instruction.
- **Eating** When food is ready, it can be eaten right away or kept warm in an insulated basket until the group is ready to eat. When participants are eating, discuss results. Does it taste the way you expected? What could you do differently to the recipe? Would you solar cook this food again? Celebrate successes. Do not be afraid to fail. It is all part of the learning process.
- **Clean Up** Everyone must assist with cleanup of at the end of the workshop. This is a good time to discuss care and cleaning of the solar ovens and heat retention baskets. Pots should be washed and made ready for the next session. If each person has their own items, have a way to identify which ovens, baskets, and cookware belong to each person.

CONTENT LESSONS

Content lessons focus on key topics related to solar energy, the science of solar cooking through DARE, home economics, health, safety, and how solar cookers can be a solution around the world. These brief lessons are to be done while food is cooking in the solar ovens or baskets. They are

intended to instill confidence in solar cooking technology and increase likelihood of adoption. Some lessons include activities that reinforce understanding of a concept. Encourage active participation.

GLOBAL CONNECTIONS

Global Connections feature profiles of people around the world involved in the Solar and Fireless Cooking movement. There is a vast network of advocates dedicated to promoting sustainable and clean cooking solutions. We want participants to understand the global nature of solar and retained heat cooking and to feel they are part of this global community. It *may* be possible to connect with these solar cooking advocates to ask questions or share solar cooking experiences.

DISCUSSIONS

Group Discussion topics connect solar cooking to everyday life in participants' homes and communities. ***Topics should be important to the group and are suggestions only.*** Ask for participants to create their own topics as needed. Instructor should be the facilitator of the discussion initially. Participants may also take on this role. Time spent on discussion is flexible. Notes should be taken to create a summary. Discussions can be done in small groups and summaries shared with whole group.

Here are some tips for leading a productive discussion.

- Clearly state the topic of discussion.
- Share the time limit of the discussion.
- Call participants by name and treat each one with respect and consideration.
- Encourage participation by everyone.
- Do not rush a person who is expressing a thought or idea.
- Do not allow the conversation to become negative.
- Revisit past contributions and incorporate them into future discussions.
- Encourage others to add their reactions or ideas to build on someone's comment.
- Be a good listener and be able to include all ideas in a summary.
- If an action plan is needed, record what steps the group wants to take.

EXTENDED LEARNING OPPORTUNITIES (ELOs)

Read through the wide variety of Extended Learning Opportunities at the end of this Instructor's Manual or Workbook. These activities extend the application of solar and retained heat cooking into a variety of disciplines and life situations. Each day, encourage participants to find ones that interest them personally and that they would like to try on their own or with a small group.

CONCLUSION OF EACH SESSION

At the end of each workshop session, briefly wrap up what has been learned and done. Participants provide feedback and ask questions. Guide participants in filling out a section of the Data Collection Chart at the end of the workbook. Practice this for each meal prepared during the workshop. Demonstrate how to photograph the chart and send it to the WhatsApp group. Share excitement of what everyone will be learning and cooking at the next session. Announce next workshop date and time. Collect nametags, workbooks, and ovens. Everyone helps with clean up.

CONCLUSION OF WORKSHOP

At the conclusion of the *workshop*, the group should celebrate accomplishments. Each participant who has fulfilled the attendance requirements receives a certificate. Participants take ovens and baskets home on the last day of the workshop. Establish means of communication for follow up and sharing. Use a convenient format, such as WhatsApp. Choose officers to organize meetings and support.

TEACHING TECHNIQUES

EDGE Method

This is a four-step teaching technique used by the Boy Scouts of America for teaching a new task or skill. The process is designed for independence and successful skill mastery. The learner can then instruct others. We highly recommend this technique whenever appropriate.

- E Explain** the task or skill to the learner.
- D Demonstrate** the steps of the task or skill.
- G Guide** the learner through the steps of the task or skill.
- E Enable** the learner to do the task or skill on their own.

E: When **explaining** the task, some keys to include are:

- Tell what you will be doing.
- Tell why you will be doing it.
- Use a visual aid to help your explanation make more sense.

D: When **demonstrating** the task, some keys to include are:

- Show the correct way to do the task.
- Talk to the learner while you are demonstrating the task.
- Help the learner to see what the correct way looks like with visual aids.

G: When **guiding** the learner through the task, some keys to include are:

- Talk the learner through the steps of the task as *they* complete them.
- Assist the learner whenever they get off track.
- Have visual aids available if needed.
- Have patience and be prepared to repeat this step. Work at the pace needed.

E: When **enabling** a learner to master the task, some keys to include are:

- Allow them to repeat the skill independently until they are comfortable with what they have learned. Everyone learns at different rates.
- Quickly review the importance of the task and provide more opportunities for the learner to demonstrate their mastery.
- Encourage the learner to use the EDGE method to teach the skill to someone else.

Throughout the lessons, you will see the EDGE words used frequently.

DARE Method

Learn how to use the solar oven to cook food by remembering these four steps! Then educate others about solar cooking.

D Direct light to the cooking space through alignment and reflective surfaces.

A Absorb the sun's light rays and convert them to heat using the color black.

R Retain the heat inside the cooking space with a heat trap or insulation.

E Eat delicious solar cooked food.

D: When explaining Direct, some keys to include are:

- Identify the front of the oven and point it toward the sun.
- Use reflective surfaces to capture more sunlight.
- Look at the cooking area to see if the sun's rays are striking the cooking pot.
- Check that there are no shadows *inside* the cooking area.

A: When explaining Absorb, some key points to include are:

- The color black absorbs all the wavelengths of visible light.
- When light is absorbed, it is converted into heat energy.
- Thin walled, matte black metal cookware absorbs light very well and transfers the heat to the food.
- Matte black ceramic cookware takes longer to heat up, but it will stay hot for longer periods of time.

R: When explaining Retain, some key points to include are:

- Retaining the heat means you are trapping it inside the cooking space.
- Retaining the heat prevents it from escaping.
- Clear glass or polycarbonate allows the light to enter but won't let the heat out.
- Retained heat will cook your food.

E: When explaining the E in DARE, some key points to include are:

- Eating delicious solar cooked food is the main goal of solar cooking.

- This is the proof that solar cookers can cook food. Share solar cooked food with others so that they believe. Eating is believing.
- Don't stop there! Many other "E" words will make your solar cooking experience more fulfilling: Experiment, Engineer, Enjoy, Educate. What E words can you think of that relate to solar cooking?

MASTER LIST OF MATERIALS

Make copies of all workbooks and materials in advance. Make the master list for food shopping and other materials needed.

Workshop Supplies:

Solar Cooking Workshop Banner (paper or vinyl) – to be displayed each session
 Name Tags
 USB back up for computer. Extension cord. (Generator or electricity needed)
 Workbooks for each participant
 Overview of program complete with workshop dates, times, course outline information
 General Supplies: Paper, pencils, pens, markers
 Soap
 Magnifying lenses
 Measuring Tape (or more if possible)
 World Map or Globe
 WAPI (several if possible)
 Pre/Post Surveys
 Certificates of Achievement
 Other _____

Food shopping list: Determine your food and supplies needed at the start of the course. Quantities for food are dependent upon pot and portion size.

Daily snack: Water, tea and a snack if needed. Solar cook the snack if possible. Have the cups, napkins, spoons, creamer, sugar/honey or other items necessary.

Cooking and food prep utensils: Containers, bowls (if not prepping in the cook pots), measuring cups, spoons, knives, plates, utensils, hand soap, dish soap.

Serviceware for Eating: Dishes, Utensils, Cups, etc.

Video Camera *Set video camera and have one person in charge of camera position. Record short videos of all facets of the workshop AND take still pictures. Share via WhatsApp or record to an SD card. Upload to computer. Send to SolarEducationProject@gmail.com*



SESSION ONE

SOLAR COOKING, BASELINE SURVEY, SAFETY TIPS and DARE, LEARN ABOUT YOUR SOLAR OVEN, MEET ROGER, DISCUSSION

Supplies: workbooks, note cards for nametags, markers
 solar ovens, oven cookware, soap, cake recipe

Vocabulary: As unfamiliar words are encountered, check for understanding. Use glossary.

WELCOME

Welcome each participant. Introduce yourself and tell your story. Tell how you came to be the instructor for the workshop. Discuss the opportunities they will have to learn a new method of cooking that uses clean and free energy from the sun. Share your interest in solar cooking and what you personally love about this method of cooking.

Discuss the organizational structure of the workshop. Review any rules of the site. Obtain approval for photo, video sharing and social media sharing.

Distribute notecards and markers for nametags. Tell participants to write their names on the notecards and add any colorful design on it they choose. Place notecards in plastic holders. Pin nametags on. Then allow time for each person to introduce herself or himself and say what they are hoping to gain from the workshop. Discussion of class and personal goals is important.

Distribute the Workbooks: *Solar Thermal Cooking*. Have participants put names in their workbooks. They will take these home at the end of the workshop.

SOLAR COOKING

Tell participants that you have already placed something in the solar oven to be cooked. When cooked, participants will share the solar cooked food! **Share the food when it is most convenient for the group.** Before distributing the ovens, tell the group that they will take a survey, learn a bit about how solar ovens work, and review some safety tips.

(Set a black pot in the sun that you will use later as an example during the Content Lesson.)

BASELINE SURVEY

Open Workbook to Part 1 Baseline Survey on page 2. Tell participants they will take the Baseline Survey Part 1 today. Part 2 will be taken after they have solar cooked for several months.

Explain the purpose for the survey. Assure participants that surveys will not share personal information. You may have them use their names or an identification code. Guide participants in filling out the survey. Assist in whatever ways are necessary. Photograph each person's survey. Save the results for your own records and share with other designated people including SEP at SolarEducationProject@gmail.com.

CONTENT LESSON

SAFETY TIPS and DARE

Open Workbook to Safety Tips at the bottom of page 45.

Explain that most of the safety precautions are similar to traditional cooking. Examine the tips to see which ones are different. Discuss. (Each time participants are using the ovens, reinforce Safety Tips and DARE.)

Open Workbook to DARE on pages 3 – 4.

Tell participants DARE is the science that explains how solar cookers work. Read each step of DARE on pp 3 - 4, explain each letter, and discuss briefly.

Then take the group outside to demonstrate DARE using both the sample oven, the black pot sitting in the sun, and the oven that is cooking food.

D is Direct: Ask participants what reflection is. Use a solar oven panel as an example. Explain that reflection happens when light bounces off a surface. If a surface is completely reflective, almost all the light bounces off it. Solar ovens use very reflective surfaces. Ask for examples of other very reflective surfaces. (Mirrors, water) Reflective surfaces direct light energy to the cooking area. Move the reflective panels around to demonstrate how they catch and direct the sunlight toward the cooking space. Be careful not to shine directed sunlight at anyone's face. Then face the oven toward the sun.

Show that when oven is aligned correctly, the shadow is behind the oven. Explain how the reflective surfaces are directing light into the cooking space.

Look at the oven that is cooking. Reinforce how the oven is facing the sun. The reflective surfaces are DIRECTING the light into the cooking space.

A is Absorb: Ask what absorb means. What are some examples of absorbing? (Sponges are one example. There are others.) Use the black cookware as an example. Explain that light waves from the sun are absorbed by the color black. Then the light energy changes into heat energy. It is that heat energy that will cook your food. **Do not make the mistake of saying that black absorbs heat. The correct explanation is that black absorbs light. Light energy converts to heat energy.**

Go to the black pot that has been sitting in the sun, let participants carefully feel that it is hot to the touch. Emphasize that the black has ABSORBED the sunlight and changed it to heat.

R is Retain: Ask if they have ever been inside a vehicle on a sunny day with the windows closed. How did it feel? Explain that light energy is coming through the transparent windows of the vehicle and changing to heat energy. But the heat energy cannot get back out. The vehicle can get very hot. The heat is being retained. This is the same idea behind solar cooking. Light comes in through a transparent surface. It is absorbed and changed to heat. But the heat cannot get back out. Explain that lids also retain, or trap, heat. Ask if a pot boils faster with or without a lid? In solar cooking, it is important to *keep the lid on the cooking pot*.

Look at the oven with food cooking. Point out the polycarbonate sleeve and cover. Also point out that the pot has a lid on it. These all help to RETAIN the heat.

E is Eat: E represents Eat. Eating nutritious and delicious food is one of the goals of learning how to solar cook. (Everyone will have the opportunity to taste the food cooking in the oven.)

LEARN ABOUT YOUR SOLAR OVEN

Open Workbook to LEARN ABOUT YOUR OVEN on page 5.

Distribute ovens and cookware to participants. Tell them that many people around the world use Haines Solar Ovens. This is the oven they will be learning how to use. At the end of the workshop, they will get to keep the oven and use it whenever the sun shines. Allow time for them to attach or write their names on them. Page 5 will help remind them of the features.

Use the **EDGE** method to instruct. Refer to DARE as you go through the process of learning how to set up the oven.

- **EXPLAIN** Unpack the cooker and review each part. Discuss its care and how to clean it.
- **DEMONSTRATE** assembly of the oven. Demonstrate how to place the polycarbonate sleeve onto the pot. Recall its purpose is to retain heat. Demonstrate how to add the clear cover and secure it. Explain its purpose is to retain heat and to deflect wind. Identify the front of the oven and the back of the oven.
- **GUIDE** participants in assembling their own ovens. Assist anyone having difficulty. Then guide them in disassembly and putting ovens back into the boxes or carrying bags.
- **ENABLE** This step may take some time. When participants are enabled, they can assemble and disassemble ovens independently. They can also instruct others.

Reinforce Understanding: Have participants team up to practice assembling ovens and then folding and putting them away.

Reinforce Understanding: Ask the group to recite steps of DARE. Ask for volunteers to explain DARE using the various parts of the solar oven. Video if possible.

GLOBAL CONNECTIONS

Open Workbook to Where in the World? on page 6. Meet Roger from the United States. Find the United States on the globe. Read together and discuss. If you could meet Roger, what questions

would you ask him. What would you like to tell him? Make a list. These questions and comments can be emailed to him, or a Zoom appearance may be scheduled if possible.

CONCLUSION

Briefly wrap up what has been learned and done during the day. Ask for feedback and questions. Were goals met today? What was good? What was not so good? Did anything funny or unexpected happen during the workshop? Share excitement of what everyone will be learning and cooking at the next workshop. Announce date and time of next workshop. Collect nametags, workbooks, and ovens. Everyone helps with clean up.



SESSION TWO

SOLAR COOKING, AMAZING SUN, HISTORY OF SOLAR COOKING, GLOBAL CONNECTIONS – CELESTINO, DISCUSSION

Supplies: nametags, workbook

solar ovens, oven cookware, recipe ingredients, soap, magnifying glasses

Vocabulary: As unfamiliar words are encountered, check for understanding. See glossary.

WELCOME

Welcome participants as before. Preview the day's cooking and activities. **Open Workbook to SESSION TWO on page 7.** Allow time for each person to write a goal.

SOLAR COOKING

Share today's recipe with group. Allow time to take notes on page 46 - 47 as needed.

- **Food Preparation** Wash hands and prep area. Teams work to prepare selected recipe(s). Compare traditional method vs solar method. If more than one recipe is being prepared, assign some groups one recipe and other groups another.
- **Oven Set Up** Place food in ovens and demonstrate correct alignment toward the sun. Review DARE. Use this time to have participants explain what they are learning about how the solar oven works. Correct any misconceptions. As participants gain confidence, they become more independent in the solar cooking process. Encourage participants to help one another. Use the EDGE method of instruction.
- **Eating** When food is ready, it can be eaten right away or kept warm in an insulated basket until the group is ready to eat. The instructor must be flexible with this aspect of the workshop. When participants are eating, discuss results. Does it taste the way you expected? What could you do differently to the recipe? Would you solar cook this food again? Celebrate successes. Do not be afraid to fail. It is all part of the learning process.
- **Clean Up** Everyone must assist with cleanup of at the end of the workshop. This is a good time to discuss care and cleaning of the solar ovens. Pots should be washed and made ready for the next session. If each person has their own solar oven and cookware, have a way to identify which ovens and cookware belong to each person.

Tips For Solar Cooking

Use the charts on pages 44 – 45 for tips for solar cooking. These pages can be used any time they are needed. Encourage participants to take cooking notes on pages 46-47.

CONTENT LESSON

OUR AMAZING SUN

Open Workbook to Amazing Sun on pages 7. Discuss what participants already know about the sun and solar energy. What is the sun? How important is the sun's energy to living things on earth? Discuss examples.

What does energy independence mean? How can we use the sun's energy to become energy independent? Read the information together. Ask if anything they have learned is surprising or new.

Reinforce Understanding: Stand with one arm stretched out to the side. To estimate one meter, it is approximately the distance from the middle of your chin to the tip of your longest finger (for average adult). Using this distance, have participants mark out a one square meter space. Recall what was read in the workbook about one square meter being equal to 1000 Watts. Relate this to solar cooking. Tell them they will learn how to use their solar oven reflectors to collect solar energy (sunlight) and direct it to a cooking space.

Reinforce Understanding: Go outside and show the magnifying glass. Tell them that it is a curved lens that bends light rays. (Recall picture in workbook.) This is one way to collect solar energy, or sunlight, and direct it. Demonstrate with a small piece of wood that the magnifying lens can direct a small amount of sunlight to a focus point that will burn wood. It is the concentrated light energy (solar energy) that is burning the wood. This is one example of how powerful solar energy is if we understand how to direct it and use it. Let volunteers burn their names or a design into a piece of dry wood using the magnifying glass. Tell them about sunlight art, a form of art that uses concentrated sunlight to burn designs into wood. Photo: Cedar Skull Studio



HISTORY OF SOLAR COOKING

Open Workbook to History of Solar Cooking on pages 8-9 Read together and discuss. Emphasize that solar cooking has been understood and used for many years. Why have so many people not heard of solar cooking? Discuss what the future of solar cooking might be.

GLOBAL CONNECTIONS

Open Workbook to Where in the World? on page 10. Meet Celestino from Portugal. Find Portugal on the globe. Read together and discuss. If you could meet Celestino, what questions would you ask him. What would you like to tell him? Make a list. These questions and comments can be emailed to Celestino, or a Zoom appearance may be scheduled if possible.

DISCUSSION

Open Workbook to Discussion on page 11. Topic: What do you hope to learn from this workshop? How can new methods of cooking be empowering? What will the challenges be? How can this discussion lead to action?

CONCLUSION

Briefly wrap up what has been learned and done during the day. Ask for feedback and questions. Were goals met today? What was good? What was not so good? Did anything funny or unexpected happen during the workshop? *Guide participants in filling out a section of the **Data Collection Usage Chart on pp 58-59** for the meal prepared during the session. Demonstrate how to photograph the chart and send it to the WhatsApp group.*

Share excitement of what everyone will be learning and cooking at the next workshop. Announce date and time of next workshop. Collect nametags, workbooks, and ovens. Everyone helps with clean up.



SESSION THREE

SOLAR COOKING, LATITUDE AND LONGITUDE, SEASONS, DAYLIGHT AND WEATHER, SOLAR COOKING AND SHADOWS, GLOBAL CONNECTIONS - SARAH, DISCUSSION

Supplies: nametags, workbook, pencil or pen

solar oven, oven cookware, recipe ingredients, soap, world map or globe, measuring tape

Vocabulary: As unfamiliar words are encountered, check for understanding. See glossary.

WELCOME

Welcome participants. Preview the day's cooking and activities. **Open Workbook to SESSION THREE on page 12.** Allow time for each person to write a goal.

SOLAR COOKING

- **Food Preparation** Wash hands and prep area. Teams work to prepare selected recipe(s). Compare traditional method vs solar method. If more than one recipe is being prepared, assign some groups one recipe and other groups another.
- **Oven Set Up** Place food in ovens and guide participants as they align ovens. Continue to talk about DARE and what they are learning about solar cooking. Correct any misconceptions. Encourage participants to help one another. Continue using the EDGE method of instruction.
- **Eating** When food is ready, it can be eaten right away or kept warm in an insulated basket until the group is ready to eat. When participants are eating, discuss results. Does it taste the way you expected? What could you do differently to the recipe? Would you solar cook this food again? Celebrate successes. Do not be afraid to fail. It is all part of the learning process.
- **Clean Up** Everyone must assist with cleanup of at the end of the workshop. This is a good time to discuss care and cleaning of the solar ovens. Pots should be washed and made ready for the next session. If each person has their own solar oven and cookware, have a way to identify which ovens and cookware belong to each person.

CONTENT LESSON

LATITUDE AND LONGITUDE

Open Workbook to: Latitude and Longitude on page 12. Show a world map or globe. Explain that latitude and longitude are a grid that helps us find locations on the map. Discuss the Equator (0° latitude), Prime Meridian (0° longitude), and International Date Line (180° longitude).

Reinforce Understanding: Practice finding places on the map or globe by using latitude and longitude. Find places you have been. Find places you would like to visit.

SEASONS

Open Workbook to: Seasons on page 13. Explain that the diagram shows Earth tilted on its axis. Earth stays tilted as it moves through space. Earth **rotates**, or spins on its axis. This is one complete day. Earth also **revolves**, or travels around the sun. This trip around the sun takes one year. Earth's tilt is responsible for the seasons of the year. Earth's tilt is also responsible for the position of the sun in the sky and for the number of daylight hours in each day. Ask participants how the seasons, the sun's position, and the number of hours of daylight affect solar cooking.

DAYLIGHT AND WEATHER

Open Workbook to: Daylight and Weather on page 14. Explain and discuss information in the workbook. This is practical information about the sun's position in the sky and weather conditions that affect solar cooking.

SOLAR COOKING AND SHADOWS

Open Workbook to: Solar Cooking and Shadows on pages 15-16. Explain that shadows are related to the sun's position in the sky. Discuss how the length of a shadow can indicate if the sun will be good for solar cooking.

Reinforce Understanding: Go outside and measure the shadows of people or objects. How does the length of the shadow compare to the length of the person or object? How does the length of the shadow relate to the position of the sun in the sky?

GLOBAL CONNECTIONS

Open Workbook to: Where in the World? on page 17. Sarah from Sweden. Read together and discuss. If you could meet Sarah, what questions would you ask her. What would you like to tell her. Make a list. These questions and comments can be emailed to her, or a Zoom appearance may be scheduled if possible.

DISCUSSION

Open Workbook to: Discussion on page 18. How can your group turn this cooking experience into a cooking show? Could videos be made and shared on YouTube? Could the group create a cook-book? Share ideas. How can this discussion lead to action?

CONCLUSION

Briefly wrap up what has been learned and done during the day. Ask for feedback and questions. Were goals met today? What was good? What was not so good? Did anything funny or unexpected happen during the workshop? *Guide participants in filling out a section of the **Data Collection Usage Chart on pp 58-59** for the meal prepared during the session. Demonstrate how to photograph the chart and send it to the WhatsApp group.*

Share excitement of what everyone will be learning and cooking at the next workshop. Announce date and time of next workshop. Collect nametags, workbooks, and ovens. Everyone helps with clean up.



SESSION FOUR

SOLAR COOKING, MICROBES, PASTEURIZATION AND THE WAPI, GLOBAL CONNECTIONS - ELIE, DISCUSSION

Supplies: nametags, workbook, pencil or pen

solar oven, oven cookware, recipe ingredients, soap, WAPI

Vocabulary: As unfamiliar words are encountered, check for understanding. See glossary.

WELCOME

Welcome participants. Preview the day's cooking and activities. **Open Workbook to SESSION FOUR on page 19.** Allow time for each person to write a goal.

SOLAR COOKING

Before food preparation begins, set out two ovens with water to heat. These will be used for the WAPI activity later.

- **Food Preparation** Wash hands and prep area. Teams work to prepare selected recipe(s). Compare traditional method vs solar method. If more than one recipe is being prepared, assign some groups one recipe and other groups another.

- **Oven Set Up** Place food in ovens and guide participants as they align ovens. Continue to talk about DARE and what they are learning about solar cooking. Correct any misconceptions. Encourage participants to help one another. Continue using the EDGE method of instruction.
- **Eating** When food is ready, it can be eaten right away or kept warm in an insulated basket until the group is ready to eat. When participants are eating, discuss results. Does it taste the way you expected? What could you do differently to the recipe? Would you solar cook this food again? Celebrate successes. Do not be afraid to fail. It is all part of the learning process.
- **Clean Up** Everyone must assist with cleanup of at the end of the workshop. This is a good time to discuss care and cleaning of the solar ovens. Pots should be washed and made ready for the next session. If each person has their own solar oven and cookware, have a way to identify which ovens and cookware belong to each person.

CONTENT LESSON

MICROBES, PASTEURIZATION AND THE WAPI

Open Workbook to: Pasteurization and the WAPI on page 19. Discuss waterborne illnesses and their causes. Allow for discussion of this issue in communities. How have people been personally impacted? What solutions are available to purify water? Explain the temperatures at which water pathogens are killed. This is not boiling temperature. Pathogens are killed at 65°C (150°F). Explain how the WAPI is made with wax that will melt at the correct temperature that kills germs.

Reinforce Understanding: Distribute a WAPI to each person or small group. Go outside and let each person test the WAPI in the heated water. Watch how the participants use the WAPIs and correct any mistakes or improper use.

GLOBAL CONNECTIONS

Open Workbook to: Where in the World? on page 20. Elie Joseph from Haiti. Find Haiti on the globe. Read together and discuss. If you could meet Elie Joseph, what questions would you ask him. What would you like to tell him. Make a list. These questions and comments can be emailed to Elie, or a Zoom appearance may be scheduled if possible.

DISCUSSION

Open Workbook to: Discussion on page 21. Expand the Content Lesson to other parts of daily life. What is the importance of keeping our own environments clean? What are the challenges? How can problems be solved? Take notes. Optional: Make a poster to encourage cleanliness in homes and communities. How can this discussion lead to action?

CONCLUSION

Briefly wrap up what has been learned and done during the day. Ask for feedback and questions. Were goals met today? What was good? What was not so good? Did anything funny or unexpected happen during the workshop? *Guide participants in filling out a section of the **Data Collection Usage Chart on pp 58-59** for the meal prepared during the session. Demonstrate how to photograph the chart and send it to the WhatsApp group.*

Share excitement of what everyone will be learning and cooking at the next workshop. Announce date and time of next workshop. Collect nametags, workbooks, and ovens. Everyone helps with clean up.



Education Project

SESSION FIVE

SOLAR COOKING, SUSTAINABLE DEVELOPMENT GOALS, GLOBAL CONNECTIONS - JUANA, DISCUSSION

Supplies: nametags, workbook, pen or pencil
solar oven, oven cookware, recipe ingredients, soap

Vocabulary: As unfamiliar words are encountered, check for understanding. See glossary.

Background Content for Instructor

Watch: *Sustainable Development Goals - Introduction* <http://youtu.be/5EW5vVCiXIQ> 6:18. *Sustainable Development Goals (SDGs) Explained in 10 minutes or less* 9:08 <https://youtu.be/xubK4T9Nc8A>.

WELCOME

Welcome participants. Preview the day's cooking and activities. **Open Workbook to SESSION FIVE on page 22.** Allow time for each person to write a goal.

SOLAR COOKING

- **Food Preparation** Wash hands and prep area. Teams work to prepare selected recipe(s). Compare traditional method vs solar method. If more than one recipe is being prepared, assign some groups one recipe and other groups another.
- **Oven Set Up** Place food in ovens and observe participants as they align ovens. Participants should be doing this independently. But continue to help when needed using the EDGE method. Encourage participants to help one another.
- **Eating** When food is ready, it can be eaten right away or kept warm in an insulated basket until the group is ready to eat. When participants are eating, discuss results. Does it taste the way you expected? What could you do differently to the recipe? Would you solar cook this food again? Celebrate successes. Do not be afraid to fail. It is all part of the learning process.
- **Clean Up** Everyone must assist with cleanup at the end of the workshop. This is a good time to discuss care and cleaning of the solar ovens. Pots should be washed and made ready for the next session. If each person has their own solar oven and cookware, have a way to identify which ovens and cookware belong to each person.

CONTENT LESSON

THE SUSTAINABLE DEVELOPMENT GOALS (SDGs)

The SDGs are widely known as the United Nations Global Agenda 2030 project. The Sustainable Development Goals represent the 5 P's with over 200 indicator targets for all countries involving People, Prosperity, Planet, Peace and Partnerships. Educators, businesses, community service organizations and individuals alike, need to work together at the local level to lead each region in support of the national and international efforts to achieve the SDG's.

We believe that it is our responsibility to take ownership of the SDG goals, both in our business and personal lives. Innovative educational efforts lead to program development when looking at local strengths and needs. By developing a shared vision with common goals, we prioritize the needs of our community and reduce unnecessary duplication of effort, to forego our differences and create more sustainable solutions. We are better together. We serve as champions for each key priority.

The United Nations website has valuable information on government and stakeholder involvement; however, by solar cooking, YOU can join the effort.

Open Workbook to: The Sustainable Development Goals from SCI pp 22-24. Review each of the 17 SDGs and how solar cooking relates to each one.

Making the SDGs a reality will take our best combined efforts. Utilize all available resources to develop a personal plan to support the SDGs.

<https://solarcookers.sharepoint.com/Programs/Forms/AllItems.aspx?id=%2FPrograms%2FProgram%2FImpact%20Data%20and%20relevant%20studies%2FEconomic%20impact%20summaries%208%202021%2Epdf&parent=%2FPrograms%2FProgram%2FImpact%20Data%20and%20relevant%20studies&p=true&ga=1>

<https://www.developmentperspectives.ie/ResourcesPDFS/Stepping%20stones%20for%20SDGs.pdf>

<https://www.solarcookers.org/work/advocacy/role-united-nations>

<https://www.solarcookers.org/resources/download>.

Discuss *Sustainable Development Goal 4.7*. "ensure all learners acquire knowledge and skills needed to promote sustainable development, including among others through education for sustainable development and lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship, and appreciation of cultural diversity and of culture's contribution to sustainable development." What does that look like in your community today?

Return to the group and discuss. Entertain all answers and thoughts. Use **page 25 in the workbook** as you guide participants to think about the following ideas. Extend the conversation by asking each individual about what they can do in their own home and family to support the SDGs. Make notes and share your group's commitment.

Each participant will soon be certified as a solar cooker trainer for their community. How will they use this newly acquired skill to support the SDGs? Is that the same or different from the group commitments? How comfortable are they discussing the SDGs and what are the pros and cons of connecting it to solar cooking?

Look at the SDGs and develop a citizens' checklist of local challenges in your community. List 2 examples of each challenge on the checklist. What will success look like? Define progress. How can you, as a group, raise public awareness of the importance of the SDGs? Cite two examples. How can you help to connect people with their community, nature, and the future?

As a group, discuss the environmental issues of deforestation (environmental concerns) and relate to solar cooking. Are there any connections? What improvements will occur if more people solar cook? How can you get involved?

Make one "I CAN STATEMENT". Share it with the group. Which SDG will it impact?

Creating a decarbonized society through the use of solar cooking and other integrated cooking solutions (including biogas/mass and fireless cooking solutions). SDG 7,12, 13, 3, 4, 5, 17.

GLOBAL CONNECTIONS

Open Workbook to: Where in the World? on page 26. Juana from northern Mexico. Find Mexico on the globe. Read together and discuss. If you could meet Juana, what questions would you ask her? What would you like to tell her? Make a list. These questions and comments can be emailed to Juana, or a Zoom appearance may be scheduled if possible.

DISCUSSION

Open Workbook to: Discussion on page 27. What else can solar cookers be used for? Discuss how foods might be dried. What benefit is there to drying vegetables, fruits, and meats? Discuss how solar drying foods improves their longevity. How can this discussion lead to action?

CONCLUSION

Briefly wrap up what has been learned and done during the day. Ask for feedback and questions. Were goals met today? What was good? What was not so good? Did anything funny or unexpected

happen during the workshop? *Guide participants in filling out a section of the **Data Collection Usage Chart on pp 58-59** for the meal prepared during the session. Demonstrate how to photograph the chart and send it to the WhatsApp group.*

Share excitement of what everyone will be learning and cooking at the next workshop. Collect name-tags and workbooks and ovens. Everyone helps with clean up.



SESSION SIX

SOLAR COOKING, HEALTH AND OPEN FIRE COOKING, CARBON MONOXIDE, EYES AND BURNS, GLOBAL CONNECTIONS – LUTHER, DISCUSSION

Supplies: nametags, workbook, pencil or pen
solar oven, oven cookware, recipe ingredients, soap,

Vocabulary: As unfamiliar words are encountered, check for understanding. See glossary.

WELCOME

Welcome participants. Preview the day's cooking and activities. **Open Workbook to SESSION SIX on page 28.** Allow time for each person to write a goal.

SOLAR COOKING

- **Food Preparation** Wash hands and prep area. Teams work to prepare selected recipe(s). Compare traditional method vs solar method. If more than one recipe is being prepared, assign some groups one recipe and other groups another.
- **Oven Set Up** Place food in ovens and observe participants as they align ovens. Participants should be doing this independently. But continue to help when needed using EDGE method. Encourage participants to help one another.
- **Eating** When food is ready, it will be plated creatively based on today's lesson. When participants are eating, discuss results, including how the food was plated. Does it taste the way you expected? What could you do differently to the recipe? Would you solar cook this food again? Celebrate successes. Do not be afraid to fail. It is all part of the learning process.
- **Clean Up** Everyone must assist with cleanup of at the end of the workshop. This is a good time to discuss care and cleaning of the solar ovens. Pots should be washed and made ready for the next session. If each person has their own solar oven and cookware, have a way to identify which ovens and cookware belong to each person.

CONTENT LESSON

HEALTH AND OPEN FIRE COOKING

Open Workbook to: Health and Open Fire Cooking on page 28. Recall the lesson on microbes and how a solar oven can be used to pasteurize water and milk, thereby killing microbes that cause disease. Explain that there are other health issues that using solar energy can address. Ask if they, or someone they know, have ever experienced a problem with the daily smoke of cooking fires. Discuss. Explain that solar and retained heat cooking can reduce the use of wood and charcoal and thereby reduce the amount of fire and smoke in the home. Discuss information in the workbook. While our bodies are able to filter out many pollutants, it is more difficult when the pollutants are breathed in on a daily basis. Explain the role of the lungs to bring oxygen to the blood and the body and to release carbon dioxide. Alveoli are the part of the lungs where the oxygen is released into the blood. When they are damaged, our ability to take in oxygen and get rid of waste is weakened. But understanding some of the health issues caused by daily smoke inhalation can help us make informed choices for

ourselves and our families. Education is important to being a good decision maker. Having options is important.

CARBON MONOXIDE

Open Workbook to: Carbon Monoxide on page 29. Discuss carbon monoxide. Ask what kind of burning releases carbon monoxide. Read about the symptoms. Carbon monoxide builds up in poorly ventilated areas. Burning indoors can cause this gas to build up. Using a chimney or other ventilation is important to protect against the effects of this gas.

EYES AND BURNS

Open Workbook to: Eyes and Burns on page 30. Discuss the importance of good eyesight in our everyday lives. Look at the diagrams of the eye and discuss. Talk about burns from cooking and what we can do to prevent them. Solar cooking is fireless, but we must be safe with this type of cooking too.

GLOBAL CONNECTIONS

Open Workbook to: Where in the World? on page 31. Luther from northern the United States. Find the United States on the globe. Read together and discuss. If you could meet Luther, what questions would you ask him. What would you like to tell him? Make a list. These questions and comments can be emailed to Luther, or a Zoom appearance may be scheduled if possible.

DISCUSSION

Open Workbook to: Discussion on page 32. Create a song about solar cooking and DARE. Perform it for the larger group. Video it.

CONCLUSION

Briefly wrap up what has been learned and done during the day. Ask for feedback and questions. Were goals met today? What was good? What was not so good? Did anything funny or unexpected happen during the workshop? *Guide participants in filling out a section of the **Data Collection Usage Chart on pp 58-59** for the meal prepared during the session. Demonstrate how to photograph the chart and send it to the WhatsApp group.*

Share excitement of what everyone will be learning and cooking at the next workshop. Announce date and time of next workshop. Collect nametags, workbooks, and ovens. Everyone helps with clean up.



**Education
Project**

SESSION SEVEN

SOLAR COOKING, PLATING TECHNIQUES, GLOBAL CONNECTIONS - ALAIN, DISCUSSION

Supplies: nametags, workbook, pencil or pen, markers or crayons
solar oven, oven cookware, recipe ingredients, soap,

Vocabulary: As unfamiliar words are encountered, check for understanding. See glossary.

WELCOME

Welcome participants. Preview the day's cooking and activities. **Open Workbook to SESSION SEVEN on page 33.** Allow time for each person to write a goal.

SOLAR COOKING

- **Food Preparation** Wash hands and prep area. Teams work to prepare selected recipe(s). Compare traditional method vs solar method. If more than one recipe is being prepared, assign some groups one recipe and other groups another.
- **Oven Set Up** Place food in ovens and observe participants as they align ovens. Participants should be doing this independently. But continue to help when needed using EDGE method. Encourage participants to help one another.
- **Eating** When food is ready, it will be plated creatively based on today's lesson. When participants are eating, discuss results, including how the food was plated. Does it taste the way you expected? What could you do differently to the recipe? Would you solar cook this food again? Celebrate successes. Do not be afraid to fail. It is all part of the learning process.
- **Clean Up** Everyone must assist with cleanup of at the end of the workshop. This is a good time to discuss care and cleaning of the solar ovens. Pots should be washed and made ready for the next session. If each person has their own solar oven and cookware, have a way to identify which ovens and cookware belong to each person.

CONTENT LESSON

PLATING TECHNIQUES

Open Workbook to: Plating Techniques on pages 33-34. Explain that today's lesson will bring out the artistic talents of the participants. Discuss what Culinary School is. Ask anyone if they have ever thought about starting a restaurant or being a chef. What are some skills that a chef and restaurant owner would need to be successful? Discuss. How important is it to make food look attractive on the plate? Does it help make customers feel special? Discuss the examples in the workbook. Make sure participants know that the restaurant, Le Présage, is a solar restaurant.

Tell participants about The Conrad Hotel in Washington, DC where the Executive Chef, Josh Murray solar cooks on the rooftop when conditions are right. If possible, show the YouTube video with Pat Mcardle interviewing Josh Murray and Director of Food and Beverages, Troy Knapp. Find the video at <https://www.youtube.com/watch?v=ndXeZGELAZ0>

Also, see a Hilton produced video at <https://vimeo.com/600633423>

Reinforce Understanding: Imagine that you are the owner and/or chef of a new restaurant. Use the space on the workbook page to create a drawing of an artistic plate of food for an imaginary restaurant. Choose the foods you want to plate. Draw and color what the food would look like. When the food is done today, be creative in how you plate it.

GLOBAL CONNECTIONS

Open Workbook to: Where in the World? on page 35. Meet Alain from northern France. Find France on the globe. Read together and discuss. If you could meet Alain, what questions would you ask him. What would you like to tell him? Make a list. These questions and comments can be emailed to Alain, or a Zoom appearance may be scheduled if possible.

DISCUSSION

Open Workbook to: Discussion on page 36. Collaborate to prepare short presentations for the celebrations during this Session. Work in pairs or small groups. Share what you've learned. Create a song, dance, art, or other way to celebrate success.

CONCLUSION

Briefly wrap up what has been learned and done during the day. Ask for feedback and questions. Were goals met today? What was good? What was not so good? Did anything funny or unexpected happen during the workshop? *Guide participants in filling out a section of the **Data Collection Usage***

Chart on pp 58-59 for the meal prepared during the session. Demonstrate how to photograph the chart and send it to the WhatsApp group.

Share excitement of what everyone will be learning and cooking at the next workshop. Announce date and time of next workshop. Collect nametags, workbooks, and ovens. Everyone helps with clean up.



SESSION EIGHT

SOLAR COOKING, COOKING TRADITIONS, COOKING FUELS AND INTEGRATED COOKING, GLOBAL CONNECTIONS - MATTEO, DISCUSSION

Supplies: nametags, workbook, pen or pencil
solar oven, oven cookware, recipe ingredients, soap,

Vocabulary: As unfamiliar words are encountered, check for understanding. See glossary.

Background Content for Instructor

Read Burning Opportunity from World Health Organization

WELCOME

Welcome participants. Preview the day's cooking and activities. **Open Workbook to SESSION EIGHT on page 37.** Allow time for each person to write a goal.

SOLAR COOKING

- **Food Preparation** Wash hands and prep area. Teams work to prepare selected recipe(s). Compare traditional method vs solar method. If more than one recipe is being prepared, assign some groups one recipe and other groups another.
- **Oven Set Up** Place food in ovens and observe participants as they align ovens. Participants should be doing this independently. But continue to help when needed using EDGE method. Encourage participants to help one another.
- **Eating** When food is ready, it will be plated creatively based on today's lesson. When participants are eating, discuss results, including how the food was plated. Does it taste the way you expected? What could you do differently to the recipe? Would you solar cook this food again? Celebrate successes. Do not be afraid to fail. It is all part of the learning process.
- **Clean Up** Everyone must assist with cleanup of at the end of the workshop. This is a good time to discuss care and cleaning of the solar ovens. Pots should be washed and made ready for the next session. If each person has their own solar oven and cookware, have a way to identify which ovens and cookware belong to each person.

CONTENT LESSON

COOKING TRADITIONS

Open Workbook to: Cooking Traditions on pp 37-38. Follow along with the page and have participants write answers as you discuss content. Emphasis is on awareness of other cultural foods and methods of cooking. Cooking over open fire has been the main way of cooking throughout history. Other methods have developed. Adopting new methods of cooking has been occurring for centuries. Point out that the slow cooking examples can be compared to solar and retained heat cooking. Slow cooking tenderizes meats. Inexpensive cuts of meat are delicious when slow cooked. Nutritional value of many foods is retained with slow cooking. Breads can be baked at low temperatures over a longer period of time. Encourage participants to be part of a new tradition of solar and retained heat cooking.

Reinforce Understanding: Use the globe to locate the countries used in the examples of cooking methods.

COOKING FUELS AND INTEGRATED COOKING

Open Workbook to: Cooking Fuels and Integrated Cooking on pages 39-40.

Discuss the types of cooking fuels commonly use. Solar cooking will not completely replace other cooking methods. But it can supplement our cooking methods no matter what types of fuels we use.

What is Integrated Cooking? It is cooking by using a combination of methods that includes solar and retained heat along with a traditional method. By combining methods, you are able to reduce the amount of traditional fuels used. Look at the examples in the workbook. Discuss the various ways you can combine cooking methods to save fuel and money.

It may not seem like much to save a little fuel a couple times a week. But discuss how small numbers multiplied over and over can equal a very large impact. For example, three solar or retained heat meals per week is $52 \times 3 = 156$ per year. If all ten participants do the same, that equals 1,560 solar and retained heat meals per year. Think of the fuel saved. Think of the money saved.

If you teach someone about integrated cooking and they do the same, you have doubled the impact.

Reinforce Understanding: Calculate the financial impact you could have by using integrated cooking. Calculate the impact if you share this cooking method with others.

GLOBAL CONNECTIONS

Open Workbook to: Where in the World? on page 41. Matteo from Italy. Find Italy on the globe. Read together and discuss. If you could meet Matteo, what questions would you ask him. What would you like to tell him? Make a list. These questions and comments can be emailed to Matteo, or a Zoom appearance may be scheduled if possible.

DISCUSSION

Open Workbook to: Discussion on page 42. Can solar and retained heat cooking provide a business opportunity? Discuss options such as selling cakes, selling ovens, teaching about solar and retained heat cooking, etc. How can this discussion lead to action?

CONCLUSION

Briefly wrap up what has been learned and done during the day. Ask for feedback and questions. Were goals met today? What was good? What was not so good? Did anything funny or unexpected happen during the workshop? *Guide participants in filling out a section of the **Data Collection Usage Chart on pp 58-59** for the meal prepared during the session. Demonstrate how to photograph the chart and send it to the WhatsApp group.*

Share excitement of what everyone will be learning and cooking at the next workshop. Announce date and time of next workshop. Collect nametags, workbooks, and ovens. Everyone helps with clean up.



**Education
Project**

SESSION CONCLUSION

SOLAR COOKING, CELEBRATION WITH INVITED GUESTS, CERTIFICATE PRESENTATION, GLOBAL CONNECTIONS - GUESTS

Supplies: nametags, nametags for guests, workbooks, certificates
solar oven, fireless cooker basket, oven cookware, recipe ingredients, soap

WELCOME

Welcome each participant by name. Distribute name tags. If guests are already arriving, introduce them to the group. Provide name tags and welcome them to take part in all aspects of the workshop.

Allow a short time for informal conversation among participants and guests as everyone settles in. Begin workshop on time. Welcome everyone and preview what will be happening in today's workshop. Turn the instruction over to the participants.

SOLAR AND RETAINED HEAT COOKING (Led by Participants)

The instructor steps back and lets the participants take the lead. The goal in using the EDGE method is that learners will be Enabled. Let the students become the teachers and show they are Enabled.

- **Food Preparation** Wash hands and prep area. Teams work to prepare selected recipe(s). Explain to guests the differences between traditional method vs solar and retained heat method. If more than one recipe is being prepared, teams will prepare different foods.
- **Oven Set Up** Place food in ovens and baskets. Embrace the Integrated Cooking approach. Participants Explain and Demonstrate for guests. Rely on one another if an issue arises. Help each other solve problems. Build a community that participants can rely on after the workshop.
- **Eating** When food is ready to be eaten, plate it creatively based on Session Seven lesson. Take photos. This is the celebration of the important skills learned. The sharing of food should be a joyful time. Incorporate customs that bring a special meaning to the event.
- **Clean Up** Everyone must still assist with cleanup of at the end of the workshop. Pots should be washed and made ready to take home. All ovens and baskets are to be taken home.

CERTIFICATE PRESENTATIONS

Invite special guests to the celebration. If internet is available, consider inviting Where in the World guests. SEP co-founders will attend via zoom if possible. The local community as well as the global community celebrate the group's accomplishments.

Have an outline of the ceremony that has been created by participants ahead of time. Include a welcome and an acknowledgment of guests. Allow for a couple minutes of comments by guests. Allow for a couple minutes of comments by Zoom guests. Instructor makes a few comments then turns it over to participants.

Participants share what they have learned with others through brief presentations. Include customary ways of celebrating, ie song, dance, prayer, etc.

Each person is called up and presented with a certificate. (Determine ahead of time who will have the honor of presenting the certificates.) A photograph is taken. When all certificates have been presented, a group photograph should be taken.

CONCLUSION

The sharing of food may be done after the Certificate Presentations. Once everyone has finished eating, final remarks should be made by the instructor. (Have a plan for follow up that includes regular communication.)

Open Workbook to: Focus Group POST Questionnaire on page 43.

Have participants fill out the Focus Group Survey. Explain that the oven maker, Roger Haines, would like their opinions about the oven and the solar cooking process using the Haines 1 Pop Open Solar Cooker. Assist in any way necessary.

Part 2 of the Solar Cooker Adoption and Impact Survey on pp 55-56 is not filled out until participants have had the opportunity to cook with ovens for several weeks. Determine how this can be done.

GDSnonprofit.org

Email: solareducationproject@gmail.com

**©2022 Solar Education Project, Global Development Solutions; All Rights Reserved
No part of this book may be reproduced without express permission from SEP.**

EXTENDED LEARNING OPPORTUNITIES (ELO)

Read through the wide variety of Extended Learning Opportunities. Find one that interests you and do it! Bring a friend along or have your family involved. Make the activity inter-generational. Be an ambassador for clean cooking and champion of the Sustainable Development Goals! Then think of your own idea and add it to our list! Let us know how you used the ELO in your classroom or community. We are better together!

SCIENCE

- Experiment with different heat traps. Discover the best heat traps for a reflective panel cooker.
- How does matter convert light energy to heat energy? Draw a diagram that shows the process?
- Make solar cooking/cookers the focus of a science fair experiment.
- Find the optimal height for the pot from the base of a panel oven to maximize the oven's efficiency.
- Make two Copenhagen reflective solar cookers using two different reflective materials. Design an experiment to see if the reflective material makes a difference when heating water. Chart the results.
- Create a new game related to solar cooking concepts. List materials and directions for making the game. Write the instructions for play.
- Research Haiti and their weather patterns of the past 10 years. What are the key environmental problem areas? How can solar cooking help?
- Research phase changing materials. How can they affect solar cooking? Create a materials list with cost and total to harness the energy of phase changing materials safely. How can the phase changing materials help the world? How can they be used for solar cooking?

TECHNOLOGY/GAMING

- Develop a superhero series for solar cooking. Champion of the Planet. The hero uses science and the principles of solar cooking as his or her superpowers. Create a comic book style story of your superhero.
- How can 3D printing be used to improve solar cookers?
- Solar cooking has potential to be included in video games. Add the concept to an existing game. Use a laser light to ray trace the angles of the sunlight. Develop the ray tracing into the same video game.
- Create an app to connect solar cooker manufacturers and enthusiasts from around the world to funding sources through sustainable development projects.
- Develop a QR code to connect solar cooking enthusiasts with school classrooms, where schools interested in a virtual solar cooking program can easily find interested groups to share the benefits of solar cooking.
- Use a video camera to record a chat with a solar cooker, Luther Kreuger style. Watch two YouTube videos from the Big Blue Sun Museum and mimic the interviewing style by creating your own solar cooker video to add to the history of solar cooking.
- Create a multimedia journal for a podcast on the sounds of solar cooking. Close your eyes and hear solar cooking happening.
- Develop a PowerPoint presentation from audio, images, movies to represent the feeling of solar cooking.
- Design a window solar cooker for home using auto cad software. Research commercial kitchens and apply the same concepts to develop a commercial solar cooker.

ENGINEERING

- Draw an outdoor solar cooker that blends into the landscape in color and shape. It must still function.
- Draw a solar oven with complete dimensions. List five steps that must be completed to recreate the oven.
- Pair learners. One has a photo and the other a plain piece of paper and pencil. Sit back-to-back and have one instruct the other to draw a picture of what they see in their photo. After 5 minutes, compare the photo with the drawing. Reverse the roles and repeat. How does this exercise relate to solar cooking?
- Skype or Zoom with a class from another country to talk about solar cooking and oven designs.
- Design a model solar cooker to use for publicity. Make it to scale for a doll. Develop a story of why solar cookers are sustainable. Send it to Mattel.
- Design a solar cooker that works from found or discarded items that can be upcycled. No new materials are allowed. How difficult or easy is it to find items that make a functional solar cooker?
- Design a community that uses solar thermal energy for heating homes, water, and cooking food. Highlight the green features of the community and estimate the energy savings.
- Design an indoor solar cooker that works with solar panels on the roof. Draw the path of sun rays into the home.

- Create a simple engineering design challenge using a solar cooker. Improve an existing solar oven design to increase its ability to heat water. Test your new design against the original design. Record your results.

ENTREPRENEURSHIP

- Create a color print ad for a solar cooker for a specific sun rich area of the world.
- From makerspace to manufacturing using solar cookers. Create an engineering design challenge that includes a time and budget limit. How does this affect the way you approach your project?
- Use the engineering design process to come up with a product or service related to solar cooking or solar cooking education that is not currently available in your community.
- Make cookies in the solar oven and sell as a fundraiser for a nonprofit you support.
- Pick a style of solar oven and list the benefits and features of the oven. Develop an add to market the oven. Develop a jingle and slogan for the ad.
- Promote Corporate Social Responsibility by creating entrepreneurship opportunities using solar cookers for sustainable development. Investigate solar cookers as tools for micro funding and mutual solidarity projects.
- Develop a solar cooking business plan, complete with business name and logo.

ART

- Take a selfie. Use the filters and editing features to make a series of three self-portraits, altering the portrait using the colors of visible light. Add a concave or convex lens view. Label the Self Portrait "THIS IS THE FACE OF CHANGE: I BELIEVE..."
- Use the colors of visible light (red, orange, yellow, blue, green, and violet) to create a landscape that includes a solar cooker. Add a black frame to your piece.
- Practice shading, using the sun at various times of day on a solar cooker. Add the shadows and length of shadow appropriately. Make a series of six or nine small sketches.
- Find a photo of a masterpiece from a famous artist such as Renoir, Degas, or Van Gough. Add a solar cooker to the piece that looks like it belongs there.
- Design an artistic cover for a solar cooker that protects it from rain and other weather.
- Food art. Make the plate match the magazine. Investigate plating techniques learned in culinary school. Try out plating techniques with meals you cook. Include solar cooked meals in this activity.
- Create a colorful line of accessories for solar cooking.
- Make a model of a reflective panel solar cooker and decorate the outside panels.
- Make an artistic reflective panel cooker that heats to 200 degrees F.
- Make a mixed media art presentation using all four types of solar cookers.
- Sketch a solar cooker from a photo. Shade correctly for the location of the sun. Add your family solar cooking.
- Develop a coloring page for the elementary school students. Present the page and explain how a solar cooker works. Have the students add the sun and color the picture.

MATH

- Introduce tessellations (tiling) using the drawings of M.C. Escher, and online research. Create a solar cooker using geometric shapes: regular and irregular polygons, triangles, squares, and hexagons.
- Learn budgeting, financial literacy and practical math through building a solar cooker, develop a materials list, cost, and budget.
- Devise a formula to represent exponential growth. If each person in the session told one person about one solar cooking, how many people would be reached each day? After 7 sessions? What if each of their friends told one more friend? How many more people would learn about solar cooking?
- Calculate the fuel cost saved per month by using a community solar cooker 50% of the time cooking two meals a day for 100 people. Recalculate for using the oven 50% of the time for 200 people eating three meals a day.
- Go outside on a sunny day. Measure the angles of the shadow of a building once an hour for 3 hours. Note the changes and position of the sun. Use the shapes of the shadows to create an abstract art piece.
- Research sundials. Make a sundial to show the time of day. Use your knowledge of sun and shadows to measure the angles, include the latitude of your location.
- Learn how to draw a parabola and find the focal point.
- Learn about angles and ray tracing using a low mW laser. Place the laser pointer directly at the back of the cooker. Use graph paper to trace the path of the light as it reflects off the cooker's surface. Measure the angle formed. Label the incident ray and reflected ray. Do this several times starting at different positions.

HEALTH, FOOD and NUTRITION

- What is your favorite color? How does color influence your emotion? How does light affect your favorite color?
- Express culture through food, share with others using the solar cooker.
- What is food insecurity? How can a solar food dryer help? Read Juana's story from Mexico and see how solar cooking and drying can extend the life of fresh foods.
- Discuss a communal solar food drier with organizations in your community. Survey people to find out their knowledge of solar drying and their interest in learning to use a communal drier. Make a plan of action.
- List the ingredients of your most recent dinner. List all the ingredients and the plant or animal they come from. Chart or graph your results.
- What is food insecurity? How can solar cooking and drying help?
- Introduce solar cooking to your shop class. Make a box oven and post the results. Cook foods.
- Introduce solar cooking to the food science/home economics class. Guide students in preparing a simple recipe for the cookers.
- Research and investigate to determine if solar cooked food changes the nutrients from your traditional method of cooking.
- Water pasteurization is a problem in many areas. How can solar cookers be used to make water safe to drink?
- Research some nutrient-dense foods grown in your area. What are they? Can they be solar dried?

CAREER/COMMUNITY

- Make a list of five questions about solar cooking. Find a solar cook to interview and write an article for the newspaper.
- Create a survey that helps you discover people's interests in solar cooking. What are the difficulties of introducing a new method of cooking? What are the benefits?
- Create a Public Service Announcement about solar cooking and benefits. Send to the local media.
- Interview a solar oven manufacturer. What are job qualifications for a marketing position? How did the owner make a business from solar ovens? Investigate careers in weather. Track the times for sunrise and sunset, peak sun elevation angle, cloud cover and wind velocity. What conditions are best for solar cooking? Interview a meteorologist. What are job qualifications and availability?
- Investigate jobs related to the field of solar energy and locations. List the top five jobs of interest, salaries, educational requirements, and potential growth of the field.
- Develop a solar cooking youth group. Meet to cook new foods and share foods. Invite new members.
- Create a business model based upon a making and selling box ovens made of locally sourced materials. Complete the Business Model Canvas.
- Write a criterion for a solar cooking badge for girl/boy scouts. Discuss the idea with a troop leader. Design the badge and show the scout leader.

GEOGRAPHY/ HISTORY

- Make a compass rose on the map. What are the positions of the sun and direction for sun rich areas to solar cook north and south of the equator?
- Make a timeline for history of solar cooking. Select one event to research for a History Day project.
- How can solar ovens help in times of disaster? Name 2 regions in the world that are sun rich and located on a tectonic fault. How can solar cooking help?
- Pick 2 numbers between -90 to 90 and -180 to 80. Using the latitude and longitude grid, find the location on a map. Research the location and culture. Name the top 3 foods. Can they solar cook in their region? If so, which type of oven would be best? Now find the latitude, and longitude of your hometown. Write it down. How many miles are you from the first location you selected? Compare the two locations' weather, culture, and foods.
- Look at a topographical map of your town. Where is the best place to find a large community solar cooker for everyone to use? Why?
- Make an exhibit explaining the diverse cultural cooking methods in the world. In the sun rich regions, explain how solar cooking could have a positive impact on the resources of the target area.
- Research celebrities known for environmental awareness and activism. Where do they live? List the latitude and longitude and name. Which ones are the best suited to solar cooking? PM their media asking if they have ever used a solar cooker.
- Continue the Learning: Look for successful programs and replicate the framework and model for solar cooking.

LANGUAGE ARTS

- **STORY TIME:** Create a Compelling Story Involving a Sun Rich Region of the World and Solar Cooking.
- Create a word search with key vocabulary words from Solar cooking: Direct, Absorb, Retain, Eat, Enjoy, Engineer, Entrepreneurship, Science, Technology, Art, Math, Solar Cooking, Sun, Shadows, Panel Cooker, Box Oven, Parabolic Burner, Food.
- See how many words can be made from "sustainable development goals"? Use the words to write a story.
- Write a poem about solar cooking (Haiku or Limerick) or the colors of a rainbow. Add a drawing.
- Take an article about solar cooking and rewrite it using figurative language, add more description and details to make the article more dramatic and interesting.
- Personalize solar cooking by telling a story from your life. Add solar cooking to your story and make each meal in the solar cooker. Tell about the challenges, what other people said, and how you felt trying something new. Tell your story to someone.
- Write a story about a family that cooks using a three stone fire until they learn about solar cooking.
- Chain Message: Whisper "you can have fun and cook food with the sun and write a funny pun". Pass it along to 10 people and see what the last message is!
- Using sign language, sign a story about solar cooking.
- Offer to translate a solar cooking video on YouTube into another language
- Look up solar cooking social media groups in other countries and learn more details from a native speaker.
- Read the story, Stone Soup. Write a play about this story. Change the setting of the story to your community. Make the characters into puppets. Perform the puppet show with costumes and props on a puppet stage.

CULTURE/ENVIRONMENT/ SUSTAINABILITY

- Investigate the UN SDGs. Find 3 that can benefit from using solar cookers to solve world problems.
- Make some noise: Use social media to spread the word of solar cooking.
- Why are a variety of trees important to an ecosystem? Name 5 ways we benefit from the trees, besides wood products and fuel. Organize a tree planting day (Arbor or Earth Day are a good start).
- Make an online environmental club (Facebook, Instagram, etc.). Build following to 3,000 people. Make two-minute videos once a month on important local environmental topics. Interview a guest speaker, blog and be visible. Bring new technologies to light, like solar cooking.
- Investigate biogas and composting. Keep a container in the kitchen/cafeteria to collect food scraps daily. Start a compost bin outdoors. How does this practice benefit Earth's Ecosystem? Use the compost
- Demonstrate how to make a simple reflective panel solar oven to a group. Show how it can be used to purify water.
- Identify four countries that have a shortage of cooking fuels. How could solar cooking help?
- Create a scavenger hunt to find plants, trees, and flowers. Discuss deforestation, erosion and places that use wood to cook their meals. Give clues to discover another way to help our environment, using a solar cooker to reduce deforestation and erosion.
- Name two world problems solar cooking can help solve.
- Research the United Nation's Sustainable Development Goals. Pick four and write how solar cooking fits into that category. What is a sustainability mindset and how does solar cooking fit in? What affects the social, economic, and environmental pillars?
- Research what happens to the environment when trees are cut down to use for cooking fires. Name the top three areas in the world where deforestation and soil erosion are a problem. Name the top 2 states in the United States where deforestation is a problem. How can using solar ovens decrease environmental problems? Do the same with Countries, how can solar cooking help slow deforestation?
- Research and explain the uses of paraffin, charcoal, LPG and other fuels for cooking. What are the long-term environmental effects and how does solar cooking fit into the solution?
- Consider attending a local meeting: civic groups and school clubs (Rotary, Library, churches, farmers market, health fair, youth group, environmental group, teacher meeting, etc.). Ask to be a speaker for 15 minutes about the benefits of solar cooking. Demonstrate the solar oven and DARE Method.
- Research fireless cooking solutions other than solar cookers. What are integrated clean cooking solutions? Consider making a heat retention basket and to extend the cooking and also keep food warm.

Glossary of Terms

absorb – to take in, to transform radiant energy into a different form, especially with a resulting rise in temperature

axis – the imaginary line through Earth from north to south around which Earth rotates, or spins

box oven – solar cooking appliance in which the cooking space is contained inside a box. Usually, a box oven is insulated on all sides except one transparent side through which light enters. An exception to this is a box with multiple transparent sides

electromagnetic radiation – a kind of radiation in which electric and magnetic fields vary simultaneously

carbon sequestration – a natural or artificial process by which carbon dioxide is removed from the atmosphere and stored in solid or liquid form

concentric – circles, arcs, or other shapes which share the same center, the larger completely surrounding the smaller

convert – to cause to change in form

ecosystem – all the living things in an area that interact with one another and their surroundings

engineer - a person who designs, builds, or maintains engines, machines, or public works

engineering design process - an open-ended method of problem solving those cycles through a process of imagining, researching, designing, constructing, evaluating, and improving

equator – imaginary line around Earth equal distance from both poles; divides Earth into northern hemisphere and southern hemisphere

evacuated tube – a tube that consists of two layers of borosilicate glass between which a vacuum is created by removing the air

greenhouse effect – the trapping of the sun's warmth in a planet's lower atmosphere

heat – the flow of thermal energy

infrared – part of the electromagnetic spectrum; the wavelengths emitted by heated objects

kinetic energy – the energy an object has because of its motion

latitude – imaginary lines around Earth parallel to the equator, identifying locations north and south

longitude – imaginary lines running from north pole to south pole, identifying locations east and west

opaque – not able to be seen through

reflective panel oven – a type of solar oven that consists of reflective panels surrounding a cooking space made of black cookware and a heat trap

parabola – a symmetrical open plane curve formed by the intersection of a cone with a plane parallel to its side

parabolic burner – a type of solar cooking appliance that uses the shape of a reflective parabola to direct incoming light to a focal point

radiation – the transmission of energy in the form of waves

reflect – bouncing back of a light ray after hitting a surface

refract – bending of light waves as they change direction because of change of speed

retain – keep something in place

revolution – one complete journey of Earth around the sun that takes approximately 365 ¼ days

rotation – one complete spin, or turn, of Earth on its axis that takes approximately twenty four hours

solar energy – energy generated by the sun

sunlight – waves of electromagnetic radiation that pass through the atmosphere and reach Earth: visible light, ultraviolet light, and infrared light

Sustainable Development Goals – goals adopted by all United Nations Member States in 2015 to end poverty, protect the planet, and ensure all people enjoy peace and prosperity by 2030

sustainability – use of resources in a way that helps to keep natural, social and economic resources in balance

thermal energy – energy due to motion of particles in a system

transfer – to move from one place to another

transform – to change forms

translucent – allowing some light to pass through but not in a way that allows objects on the opposite side to appear clearly

transmit – allow to pass through a medium

transparent – allowing light to pass through so that objects can be clearly seen

tropical – a climate that is frost free with temperatures high enough to support year round plant growth

ultraviolet – part of the electromagnetic spectrum

visible light – the part of the electromagnetic spectrum that is made of visible bands of color that allow us to see

weather – the state of the atmosphere based on heat or cold, wetness or dryness, calm or storm, clearness or cloudiness

zero-emission – device, process or energy source that does not produce waste that pollutes the environment

Reference

Google's English dictionary provided by Oxford Languages

Merriam Webster online dictionary

Unless otherwise noted, photos sourced through creative commons.

Where in the World? maps sourced through Wikimedia.org

Sources

- A Brief History of Cooking with Fire, by Rebecca Rupp, September 2015,
<https://www.nationalgeographic.com/people-and-culture/food/the-plate/2015/09/02/a-brief-history-of-cooking-with-fire/>
- A Golden Thread 2500 Years of Solar Architecture and Technology, by Ken Butti and John Perlin, 1980
- A History of the World, Contributors of Faraday Museum, 2014
<http://www.bbc.co.uk/ahistoryoftheworld/objects/ueq9AH6iTwqox0tmEW3fFg>
- Ancient and Modern Solar Water Heaters, by Bryce Bickel,
<https://solarwaterheaters02.weebly.com/the-history-of-solar-water-heaters.html>
- Food and Agriculture in Ancient Greece, by Mark Cartwright, July 2016,
<https://www.ancient.eu/article/113/food--agriculture-in-ancient-greece/>
- Food in an English Medieval Castle, by Mark Cartwright, May 2018
<https://www.ancient.eu/article/1229/food-in-an-english-medieval-castle/>
- History of Wood Burning Stoves, by Roko Vasilis
<https://www.traditionaloven.com/2889/history-of-wood-burning-ovens>
- Horace Be n dikt de Saussure (1740–1799). *Nature* **145**, 254 (1940). <https://doi.org/10.1038/145254b0>
- Horace-Benedict De Saussure, by World Heritage Encyclopedia, Project Gutenberg Self-Publishing Press, <http://self.gutenberg.org>
- How Does Anaerobic Digestion Work? United States Environmental Protection Agency, <https://www.epa.gov/agstar/how-does-an-aerobic-digestion-work>
- https://www.edinformatics.com/math_science/how-is-heat-transferred.html
- How Propane is Made, by Marie-Luise Blue, April 24, 2017
<https://sciencing.com/how-propane-made-4909713.html>
- How Thermal Energy is Transferred, Kansas State University Physics Department
<https://web.phys.ksu.edu/fascination/Chapter11.pdf>
- Inca Food and Agriculture, by Mark Cartwright, February 2015
<https://www.ancient.eu/article/792/inca-food--agriculture/>
- Propane Production and Distribution, US Department of Energy, https://afdc.energy.gov/fuels/propane_production.html
- SciJinks It's All About Weather, NASA Space Place team, NASA Jet Propulsion Laboratory, <https://scijinks.gov>
- Solar Cooker Technologies, by Michelle Nii, November 2012
<http://large.stanford.edu/courses/2012/ph240/nii1/>
- Solar Cookers International, Solar Cooking Wiki [https://solarcooking.fandom.com/wiki/Solar_Cooking_Wiki_\(Home\)](https://solarcooking.fandom.com/wiki/Solar_Cooking_Wiki_(Home))
- Solar FAQs, Edited/Compiled by: Jeff Tsao (U.S. Department of Energy, Office of Basic Energy Science) Nate Lewis (California Institute of Technology) George Crabtree (Argonne National Laboratory)
<https://www.sandia.gov/~jytsao/Solar%20FAQs.pdf>
- The Solar Kettle Thermos Flask: A Cost Effective, Sustainable and Renewable Water Pasteurization System for the Developing World, by Alex Kee Koo Yak, 2006
- The Sun, Explained, by Michael Greshko and National Geographic Staff, September 2018
<https://www.nationalgeographic.com/science/space/solar-system/the-sun/>
- What is Thermal Energy? Khan Academy
<https://www.khanacademy.org/science/physics/work-and-energy/work-and-energy-tutorial/a/what-is-thermal-energy>
- 15 of Man's Greatest Engineering Marvels, by Christopher McFadden, December 2016
- 16th Century Timeline 1500-1599, by Mary Bellis, February 2020
thoughtco.com/16th-century-timeline-1992483.

** 2022 Solar Education Project, Global Development Solutions; All Rights Reserved
No part of this book may be reproduced without express permission from SEP.**