

# The **cook**<sup>®</sup> Solar Oven

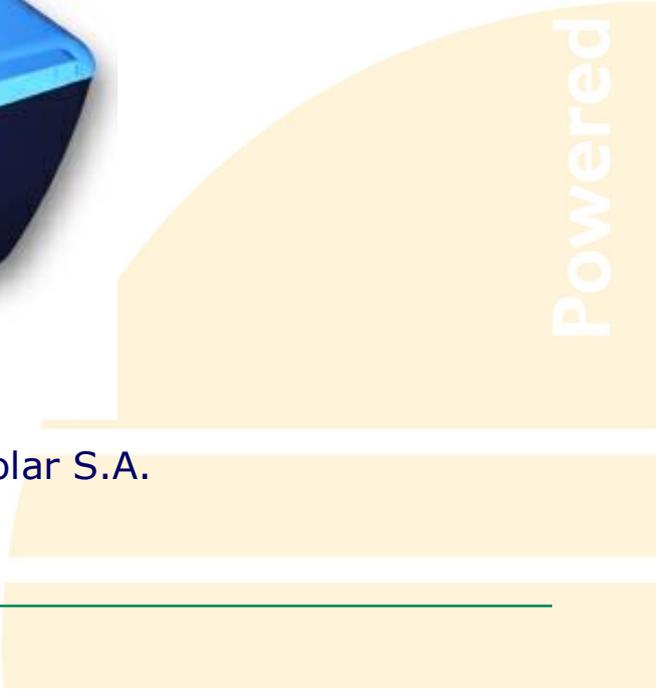
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by Sun Co – Companhia de Energia Solar S.A.

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A large, stylized sun graphic in the bottom right corner, composed of a yellow semi-circle at the top and three horizontal yellow bars below it, all set against a white background.

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# Our goal



## THE PROBLEM

The problems affecting the least developed countries have been extensively diagnosed.

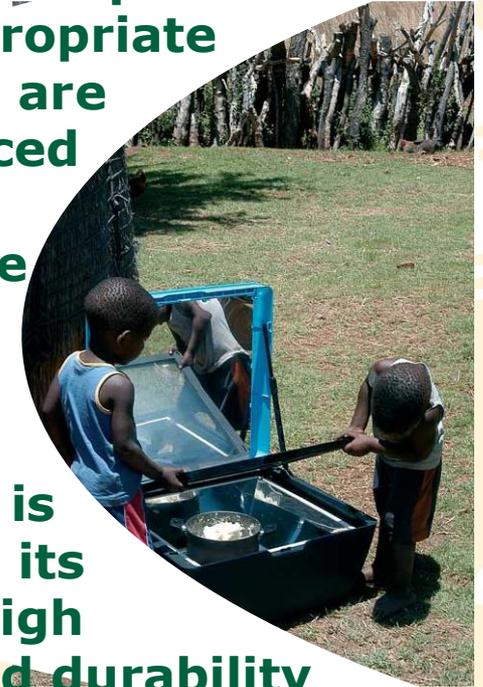
Solar cooking answers some of the challenges placed by sustainable development, as most LDC's have very high solar exposure. However, most of the products used so far failed to enter mainstream habits.



## AN ANSWER

The Sun Cook has been designed with the user requirement's in mind. Appropriate technologies are used: advanced optics are packed inside a sturdy and attractive package.

Sun Co's bet is that through its versatility, high efficiency and durability the Sun Cook will overcome the user's traditional reluctance to solar cooking.



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**... the result**



## **Cooking with the Sun**

### **Ecological**

**No fuel, no pollution, no CO<sub>2</sub>,  
doesn't cause deforestation.**

### **Versatile**

**Temperatures up to 200°C/400°F  
allow for almost any recipe.**

### **Convenient**

**Completely unattended cooking.  
As transportable as a suitcase.**

### **Economical**

**Free source of energy.  
No maintenance required.**

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# ... main features



## Sturdy

First class plastics, tempered glass and aluminium mirrors, all guarantee a long life even under the most unfavourable conditions.



## Sustainable

Reliance on solar energy and reduced maintenance needs translates into high sustainability, even on the most remote spots.

## Efficient

Patented mirrors with compound parabolic concentrating shapes allow for a unique combination of both performance and simplicity.

## Compact

When closed it becomes a compact and easily transportable plastic box. Two side handles allow for its easy transportation.

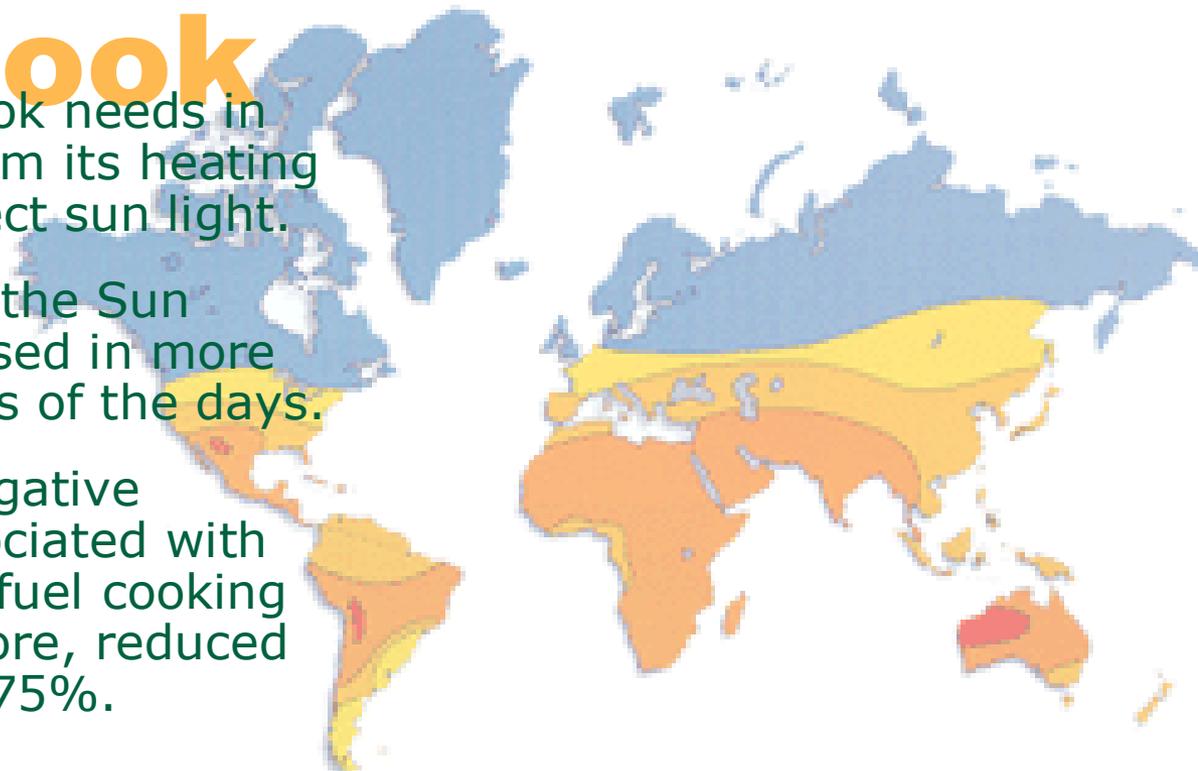
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**FACT** Most least developed countries are located in regions of the Earth where the sky is clear in more than 280 days per year.

## Sun Cook

- All the Sun Cook needs in order to perform its heating function is direct sun light.
- In most LDC's the Sun Cook can be used in more than 3 quarters of the days.
- Most of the negative indicators associated with wood or fossil fuel cooking can be, therefore, reduced by more than 75%.

CONCLUSION



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# ... poverty reduction

**“Erradicate extreme poverty and hunger.” (UN Millenium Goals)**

**“Today, two billion people rely on traditional fuels such as wood, dung and agricultural residues to meet their heating and cooking needs, entrenching poverty and limiting opportunities.” (UNDP, Energy Praticce Area)**

**“... Hundreds of millions of people – mostly woman and children – spend many hours a day hauling water and gathering fuels. As a result they are seriously overburdened and limited in their pursuit of educational and income generating activities.” (UNDP - Energy for Sustainable Development brochure.)**

## Sun Cook

- **Cooking food for sale becomes an inexpensive task. As it can cook 10-12kg per day, it has a high potential as an income generator for the most disadvantaged people.**
- **Freed from wood collecting and the need to attend cooking, people can dedicate themselves to other chores.**
- **Consumption of expensive and hazardous fuels can be eliminated on at least 75% of all days.**

# ... equality and education



**“Promote gender equality and empower women.” (UN Millen. Goals)**

**“Ensure that all boys and girls complete primary school.” (ibidem)**

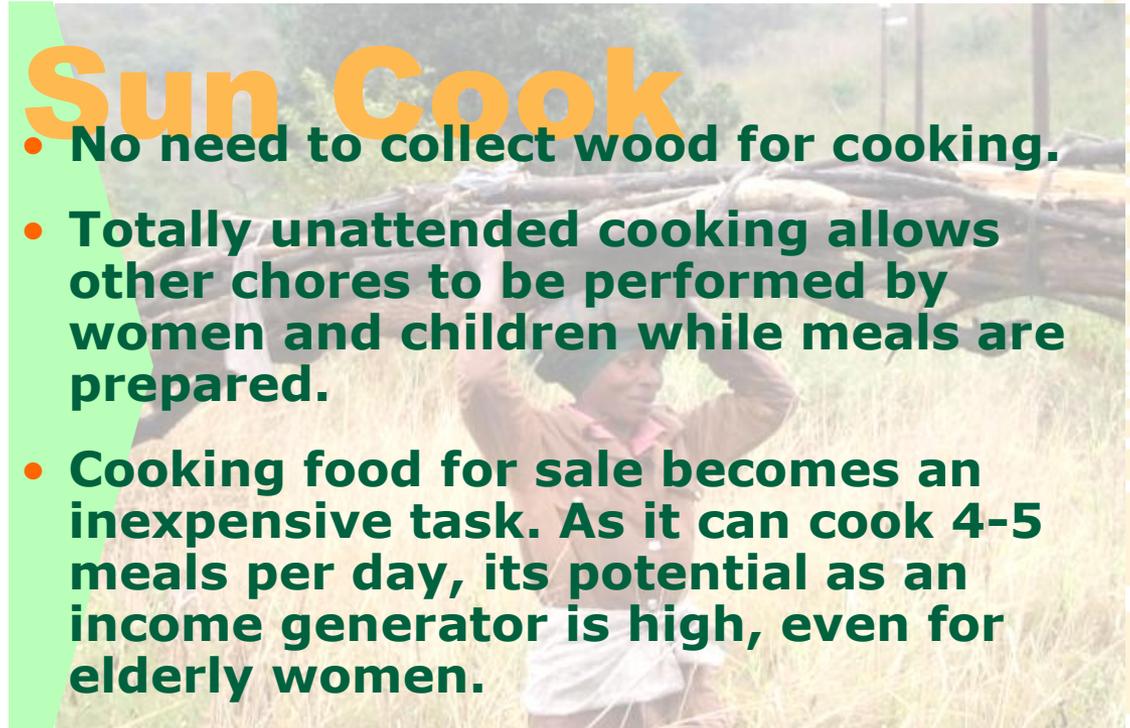
**“... educating girls yields spectacular social benefits...” (UNICEF)**

**“... gender equity in education cannot be achieved as long as girl children are withdrawn from school to collect ever-scarcer fuels for family subsistence.**

**(Mark Malloch Brown,  
UNDP Administrator)**

## Sun Cook

- **No need to collect wood for cooking.**
- **Totally unattended cooking allows other chores to be performed by women and children while meals are prepared.**
- **Cooking food for sale becomes an inexpensive task. As it can cook 4-5 meals per day, its potential as an income generator is high, even for elderly women.**



# ... health improvement



**“Reduce child mortality and improve maternal health.”(UN M. G.)**

**“Worldwide, two billion people rely on traditional fuels (...). Cooking with inefficient and poorly-vented stoves has significant health impacts, causing about 2 million premature deaths annually.” (UNDP - Energy for Sustainable Development brochure.)**

**Supplying safe water will not be possible without energy for pumping, and clean fuels for boiling water.**

**(Mark Malloch Brown, UNDP Administrator)**

## Sun Cook

- **No exposure of users to smoke prevents lung and eyes diseases.**
- **Easy water pasteurisation (1.5l in 45 min with an outside temperature of 28°C).**
- **Boiling water (less than 90min) allows for sterilisation of surgical instruments.**
- **Cooking with low temperatures and less water results in better nutrition and tastier food.**

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# ... desertification control



**"Ensure environmental sustainability." (UN Millenium Goals)**

**"Drought and desertification threaten the livelihood of over 1 billion people in more than 110 countries around the world."  
(Kofi Annan)**

**"Biodiversity loss exacerbates poverty, and likewise, poverty is a major threat to biodiversity."  
(UNDP)**

## Sun Cook

- Reliance on solar energy, reduces the need for other fuels by more than 75%.
- Reduction of wood gathered for cooking results in less deforestation.
- Reduced usage of fuels for cooking has a positive impact on pollutant and CO2 emissions.
- Flat external mirrors avoid the danger of setting fire to the surroundings in case of bad adjustment.

# ... avoided GHG emissions



## Calculation of potential avoidance of greenhouse gases emissions when replacing wood cooking

		Dry Wood		Wet Wood	
<b>Energy content of wood</b>	Kcal/kg	4400		3600	
	MJ/kg	18.41		15.06	
<b>Efficiency of 3-stone fire</b>		5%	14%	5%	14%
<b>Used Energy/kg of wood</b>	MJ/kg	0.92	2.58	0.75	2.11
<b>Energy/Meal Portion (a)</b>	MJ	1.18	1.18	1.18	1.18
<b>Wood/Meal Portion</b>	kg	1.28	0.46	1.57	0.56
<b>CO2 emissions/MP (b)</b>	kg	1.64	0.59	2.01	0.72
<b>Equiv. CO2 emissions/MP (c)</b>	kg	2.35	0.84	2.87	1.02
<b>CO2 emissions/HH (d)</b>	kg	11.73	4.19	14.34	5.12
<b>Avoided CO2 em./HH/year (e)</b>	kg	3285.05	1173.23	4015.06	1433.95
<b>Estimated income from Certified Emission Reduction certificates (f)</b>					
<b>Current price (PCF, Cerupt)</b>	USD/ton CO2	4.25	4.25	4.25	4.25
<b>Income for 10 year period</b>	USD	<b>139.61</b>	<b>49.86</b>	<b>170.64</b>	<b>60.94</b>
<b>Estim. Price for 2008 by the EU</b>	EUR/ton CO2	10.00	10.00	10.00	10.00
<b>Income for 10 year period</b>	EUR	<b>328.50</b>	<b>117.32</b>	<b>401.51</b>	<b>143.39</b>

(a) Michael Grupp, Memo: "Calculation of fuelwood/3-stone GHG emission reductions by different models of solar cookers during field test: for CO2 only, and for the direct GHG (CO2, CH4 and N2O)", 19th October 2003

(b) Carbon accounts for approximately 40% of wood. CO2 generated has a weight 3.67 times superior.

(c) Emissions of N2O and CH4 constitute an additional 43% CO2 equivalent.

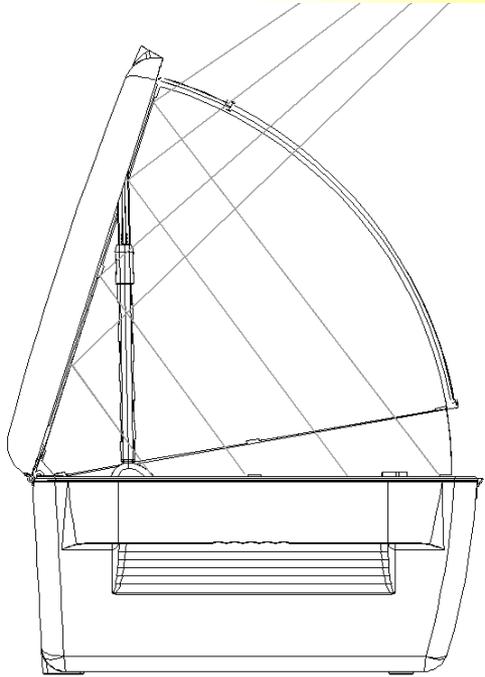
(d) Assuming 5 users per household (HH) or per cooker.

(e) Assuming 5 users per cooker and 280 meals per year (solar availability of 77%).

(f) Steve Thorne and Stefan Raubenheimer, "Evaluation of a potential in attracting finance through Clean Development Mechanism – Solar cookers and carbon mitigation possibilities", 24th November 2003

**Note:** these calculations assume that 100% of the wood used for cooking is unsustainably cropped.

# Our Concept - outside



The Sun Cook oven uses for the first time ever the so called "ideal optics" or "non imaging optics".

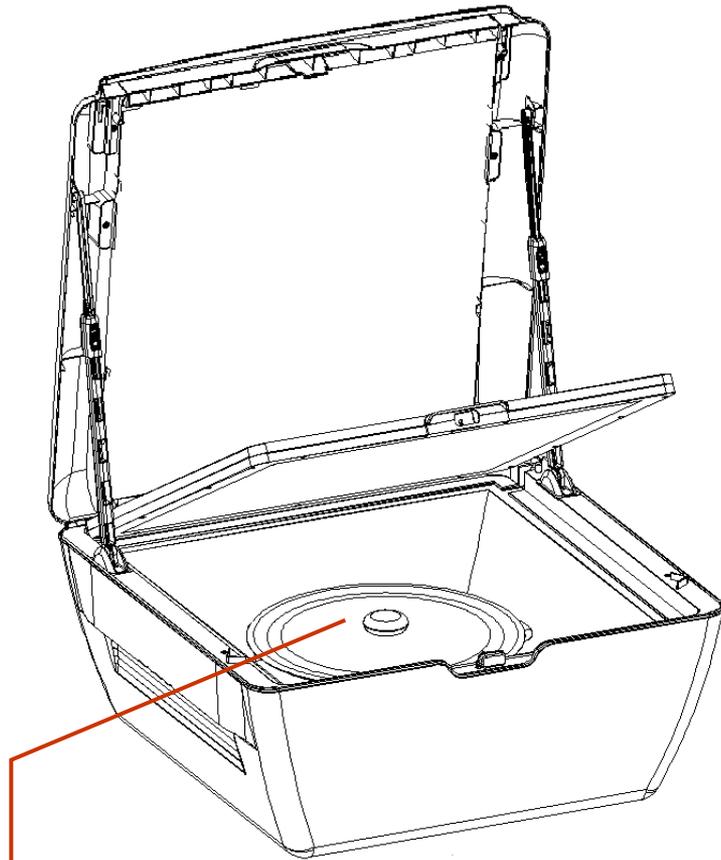
Solar radiation is reflected by the external flat mirrors into the inside compartment through a lid made of two solar class tempered glasses.

All the radiation directed inside is then transformed into thermal energy for cooking purposes.

The whole is placed inside a box made up of carefully chosen plastics allowing both for lightness and durability.

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## ... and inside



Cooking Pot is placed inside insulated compartment

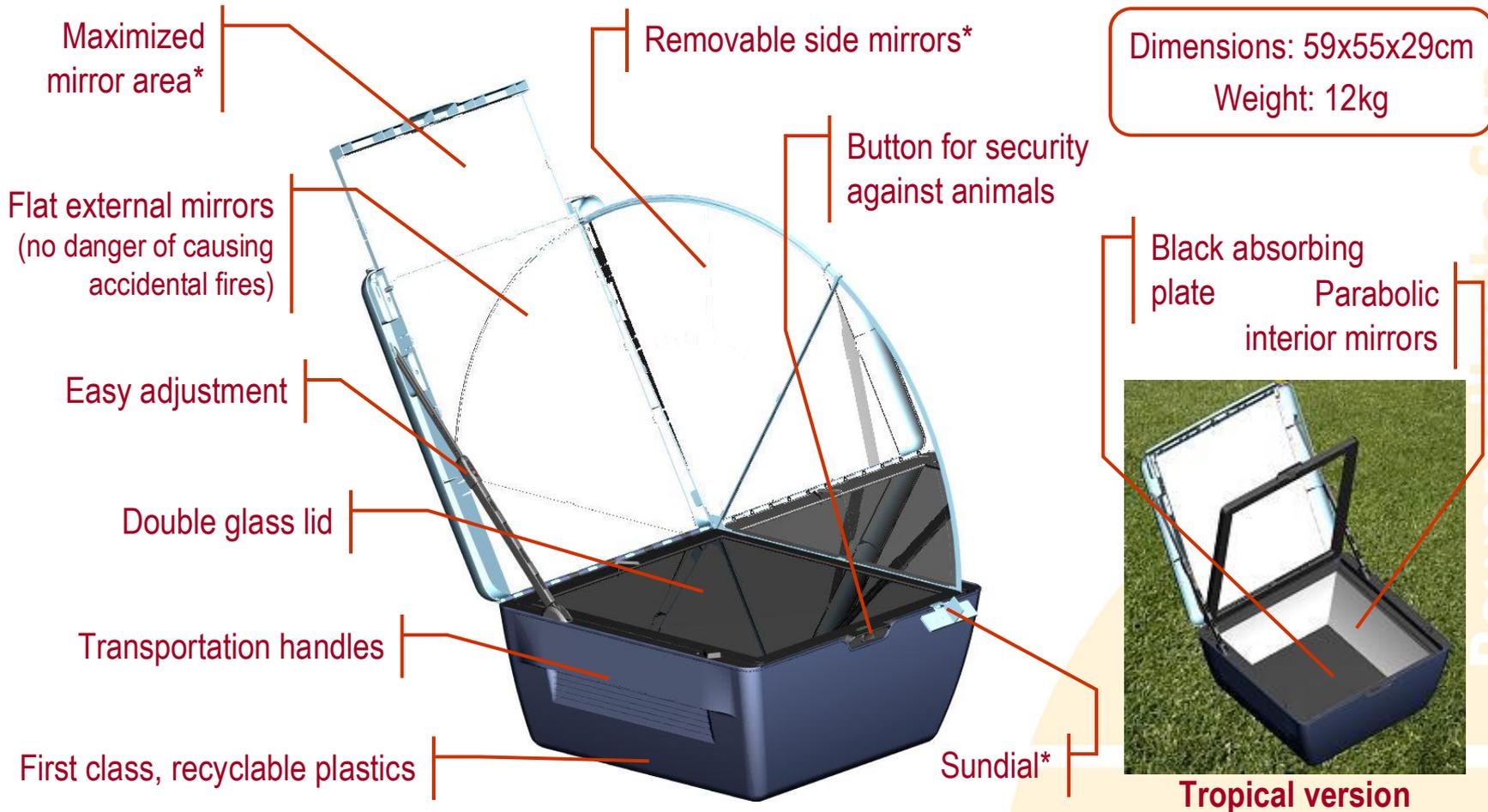
Inside the oven's cooking compartment mirrored walls act as compound parabolic concentrators greatly reducing the need for regular re-orientation. These concentrate all incoming solar radiation to the bottom absorbing plate, thereby heating it up.

The cooking compartment is surrounded with thick insulating materials all around and underneath for good insulation.

A double glass lid allows for the inflow of solar energy while preventing any thermal losses.

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# ... its characteristics



\* Marked components are needed only under temperate climates. They are not included in the lower cost Tropical version.

# ... what can it cook?

All sort of dishes can be cooked, except frying. A recipes booklet is supplied, including (cooking times between parenthesis):

- Manioc puree (45 min);
- Grilled fish (30-45 min);
- Curry chicken (90-120 min);
- Vegetables soup (120 min);
- Cake (60-75 min);

Quality is superior as temperature is lower and more homogeneous. For instance, the formation of grommets in manioc is avoided.



# ... what's included?

## Ready to use product

In order to enable users to start cooking with the SUN COOK immediately after receiving it each unit includes:



# ... questions and answers



## **What is it good for?**

The SUN COOK is a complement to existing cooking gas or electrical stoves, microwave ovens, grills, etc., providing food for a 4 to 6 persons, in a healthier fashion, outdoors and using clean energy.

## **How does it work?**

A set of properly shaped mirrors, concentrates solar radiation onto a black solar absorber plate, which in turn heats up the whole oven and the cooking vessels.

## **What are the weather requirements?**

It is independent from ambient temperature. Solar exposure is what is required for cooking to be achieved. Sunny days are the best, but a few clouds will not be too important. Moreover its efficient heavy thermal insulation keeps the food warm for many hours after cooking.

## **Can it cook inside a house?**

It may cook inside as long as it is exposed to the sun (better not behind any glass). It is fully autonomous and thus it can be placed outside easily.

## **What kind of cooking can be done?**

It does all types of cooking like boiling, stewing, grilling, baking, except frying. However it allows for sautéing. It substitutes for traditional methods with advantage, as it gives an extra taste to the cooked food.

## **What cooking vessels should be used?**

To take full advantage of the Sun Cook's capacities it is wise to use the cooking vessels provided by SUN CO. However many others can be used provided they are black on the outside, with a perfectly flat bottom, and with thin metallic walls. Plastics, ceramics or light coloured vessels will not give good enough results.

## **How long does it take to cook?**

Between 1 and 2 hours is enough to cook most foods. Although cooking is slower than with conventional stoves, the SUN COOK does not require any assistance, thereby freeing people for other activities. In the end users spend less time cooking than if they were using other more traditional methods.

## **Is it fragile?**

It uses plastics with high resistance to mechanical impacts and temperature. It uses tempered glass and mirrors conceived for solar applications. The whole is very robust and has been intensively tested under the most unfavourable conditions. One should be careful not to damage the mirrors through scratching or banging since that would hinder the oven's efficiency.

## **What special care is it necessary?**

The inside of the Sun Cook should not be touched while hot and it should be placed in a stable position, on flat surfaces well supported on its feet. While removing the cooked food care should be taken to let the first steam come out.

## **How to keep it in perfect shape?**

Under normal circumstances, food never contacts directly the oven. However some spillage may accidentally occur. In that case wipe it clean with a soft cloth or paper tissue. If necessary use a non-abrasive detergent or soft soap and dry it with a soft cloth or simply under the sun.

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## At Sun Co leading skills converge to address growing human and environmental demands.

- World renowned investigators in the field of solar energy;
- Iberomoldes ([www.iberomoldes.pt](http://www.iberomoldes.pt)) - one of the world's largest groups in the moulds for plastic industry, with a solid background in product design, development and production;
- API-Capital and Caixa Capital - adding the credibility and support of state founded venture capital partners.

# ... “modus operandi”



- ▶ **Sun Co is building a network of partnerships throughout Africa with NGOs, government agencies, cooperatives and other community level groups.**
- ▶ **Local partners contribute with logistics, project management and user’s training while Sun Co gives them technical assistance and training.**
- ▶ **The aim is to make the Sun Cook affordable to those populations which are in most pressing need of it.**
- ▶ **Insertion of our initiatives onto wider projects is privileged or, alternatively, donor’s grants can be directed to the local partners.**

**... contact us**



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**Sun Co is incorporated in Portugal**

**Sun Cook is a registered trademark of Sun Co**

**Patent pending for the Sun Cook solar oven**

**Sun Co products are manufactured in the EU**