



SOLAREF - 100% AUTONOMOUS SOLAR ICE FRIDGE
SOLAR AND COOPERATIVE TRADE FOR DURABLE COOLER ENGINE

IDEASS FRANCE

Innovation for Development and South-South Cooperation

Presentation

by **Olivier Dervaux**

Photo credit HEIG-VD, CEAS and SOLAREF

SOLAREF is an autonomous solar ice fridge, 100% thermal solar, without wear nor maintenance, providing affordable and environmentally safe refrigeration for the maintenance of vaccines and medicines, and the preservation of food.

It is **produced** by the SOLAREF company, and it is extremely useful where there is no electricity or difficulties in supplies of electricity (energy).

Furthermore SOLAREF has a cooperative trade distribution network strategy , through which helps installing the solar ice fridge in every part of the world.

The development of the autonomous solar ice fridges started with the CNRS in France during the 80th, and continued with HEIG-VD LESBAT in Swiss during the beginning of 2000th, relieved by CEAS (NGO based in Swiss) at Ouagadougou in Burkina Faso the last 3 years.

Solar thermal technology for cooling, highlighted by European BIC Network, precisely by his local agency THESAME in Haute-Savoie (France), is going to provide new ecological products for the next years, such as:

- Autonomous solar machine making ice cubes intended for conservation of fishes and farmers fruits.
- Solar systems for cold rooms for preservation of seeds.
- Autonomous solar machine for the production of water by condensation of air humidity.

Winner of the prize of innovation 2007 in contest "J'aime ma planète" (I love my planet) awarded by NGO PRIORITERRE (France, November 2007), golden medal and congratulations by the jury and special prize of innovation awarded at the international jury of the exhibition of inventions Geneva (Swiss, April 2008).



SOLAREF won a special prize by the national federation of French inventors association (FNAFI) and special prize of innovation by the European Business Network (EBN, BIC Thesame France) at this event too.

SOLAREF won the second prize of the EBN-UNDP concourse for the best innovations for human development at the 2008 EBN Congress.



■ The problem it solves

SOLAREF gives effective ecological response to the problem of preserving foods, medical drugs, and vaccines without use of electricity, while contributing to the environmental safeguard and to job creation.

SOLAREF is an autonomous engine, without any connection to any energy network, that uses only sun power, without any mechanical part in movement (no wear), able to safe food or vaccines or seeds during 3 days without sun

SOLAREF is, therefore, extremely useful in all the cases there is no possibility, or difficulties of using electrical power, in deserted or isolated areas, where the energy is very expensive, when people want to save energy, or they do not want to contaminate the environment.

SOLAREF does not contaminate, so contributing to the environmental safeguard. In fact it does not use harmful gas or liquids or electrical battery, any electrical system or electronic component, any motor or compressor, no mechanical part in movement (except the door).

All main breakdown factors are eliminated, and the environment is protected.

If the 100 000 kerosene fridges actually in place in development countries would be replaced by devices such as SOLAREF, it would be possible to save more than 85 metric tons of CO2. they emit in the atmosphere every year

It is moreover a cheap solution, taking into account the low maintenance coasts.



Finally it provides new job opportunities because Solaref fridges are assembled, installed and maintained by local working population (also in developing countries) in services centers created and trained by Solaref teams, that gives local work, and local guarantee for the product. This is thanks to the SOLAREF philosophy of cooperative trade, where the product is sold if and only if local population know how to build and repair them.

All programs of evaluation were followed and qualified by HEIG-VD LESBAT, their publications on this subject are accessible on web site <http://igt.heig-vd.ch>





AUTONOMOUS FRIDGES MAIN COMPARATIVE ADVANTAGES

No consumption of distributed energy, no wear, no human action for daily use, 72 hours holdover time without sun at 34°C, free CO2 come out of, antitheft device, cooperative trade are the most advantages of SOLAREF technology. In comparison with other systems actually in use for same issues in isolated areas, our final cost is slightly expensive for more advantages :



	Classical fridge on petrol electricity-generator	Gas or kerosene fridge	Low consumption fridge on P.V. sensor	SOLARCHILL (UNPD, WHO and Greenpeace development)	SOLAREF
Consumption	Yes	Yes	No	No	No
Electrical Battery	No	No	Yes	No	No
Gas, CFC...	Yes	Yes	Yes	Yes	No
Wear (mecanical parts in movement)	Yes	Yes	Yes	Yes	No
Holdover time	8 hours at 27°C	8 hours at 27°C	8 hours at 27°C	20 hours at 27°C	72 hours at 34°C
Place of manufacturing	North or low-cost	North or low-cost	North or low-cost	Denmark	France and local population in services center
Operations of installation	By the user	By the user	By the user	By the user	By local population in services center
Maintenance	Return to manufacturer	Return to manufacturer	Return to manufacturer	Return to manufacturer	By local population in services center
Price (capacity in liters)	300E (90) without generator nor petrol	800E(90) without gaz nor kerosene	3.000E (120) with P.V. sensor and batteries	1.940E (40)	2.600E (70) 3.700E (200)

Autonomous solar ice fridges in practice

DURING DAY, the solar collector generates vapor which is transformed into water by the condenser.

DURING NIGHT, this water goes up in the collector by generating sufficient cold (by evaporation) to create ice in the tank.

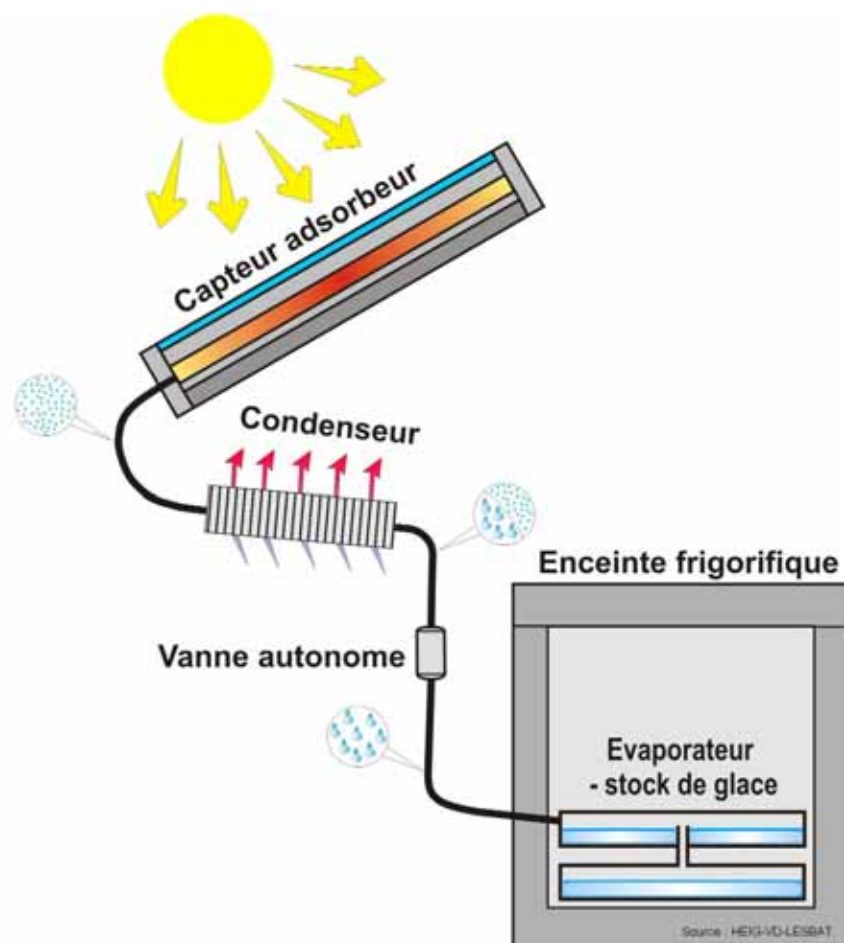
More it's hot during the day, more stock of ice grows during the night. This cycle functions work in closed circuit under vacuum. The refrigerant fluid used is water, and the material used to create evaporation (by adsorption) is a natural desiccant.

The system is totally neutral and respects the environment without any pollution (directly or indirectly), until the end of life of the product.

The stock of ice is calculated to preserve a temperature of conservation up to 3 days without sun (established in Sahel climate with 43°C the day and 34°C the night) after 5 first sunny days.

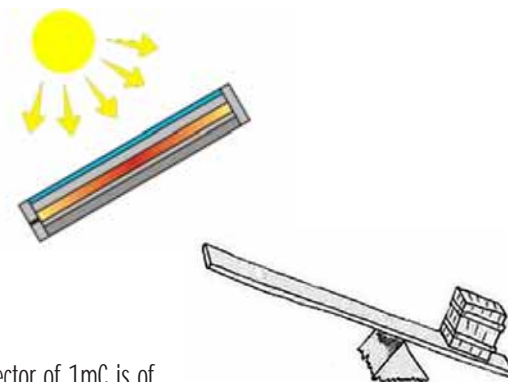
All technological parts are situated in the closed vacuum circuit and must be manufactured with care. The assembly and the installation can be made by operators beforehand trained.

Technological parts are packed in kit in destination to the services centers created by Solaref. This concept of cooperative trade can be generalized everywhere around the world, notably in sunny and isolated countries.





The **production** of the solar ice requires solar sensors. Those, cover a surface of 1m². And, obviously, more one wishes a solar ice fridge of great capacity, more the number of sensors necessary is tall. It will thus be necessary to find a space sufficiently large and sunny to accommodate them (the roof of a house is extremely recommended).



The **weight** of each solar collector of 1m² is of approximately 100kg, and that of the cold compartment is of approximately 60kg (empty contents) for a capacity of 70 liters. The displacement of a solar ice fridge is so difficult after its installation. In the same way, the junction between the solar sensor(s) and the cold compartment being realized in rigid piping, the position of the elements of the refrigerator must remain fixed.

The **autonomous** solar ice fridges do not comprise control electronics of temperature inside the cold compartment. This one remains nevertheless included between 0°C and + 6°C up to 3 days without sun, thanks to the own-produced stock of ice (for a dimensioning of the refrigerator adapted to its conditions of use).

Such as shown previously, solar thermal fridges don't need any distributed energy. That eliminates problems of storage of tins of gasoline or gas, that eliminates problems of plunders of these tins or P.V. solar sensors, that eliminates problems of their supplies.

Thanks to the absence of mechanical parts in movement, electric or electronic system, harmful gases or polluting materials, refrigerators are more durable than any other adopted technical method to solve the same issue.

SAMPLE IN AFRICAN CONDITIONS OF USE (43°C THE DAY, 30°C THE NIGHT) :

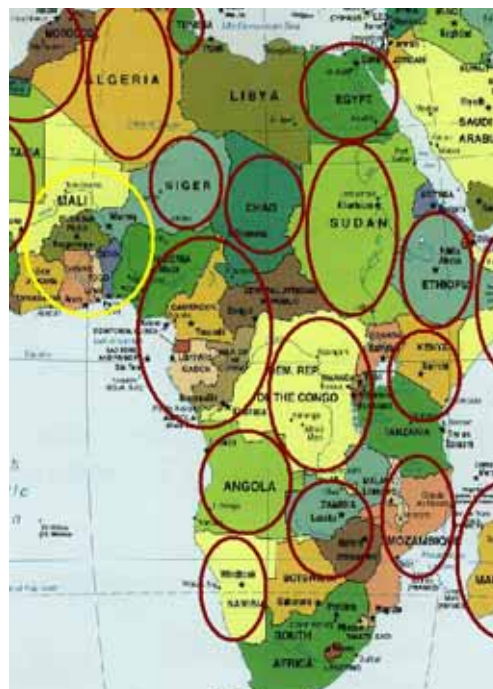
SOLAREF Model	Capacity of the cold compartment	Solar thermal sensor
SR70	70 litres	1x1m ²
SR200	200 litres	2x1m ²



International interest

The diffusion of SOLAREF's autonomous solar ice refrigerators in developing countries is based on the co-operative trade. The goal is to help under developed countries creating new jobs with the service needed by this innovation.

Thus, local units to the countries of sale are installed. These units, which form and employ local labor, have responsibility of the assembly, the installation and after sale of autonomous solar ice fridges, on the field sites. This way of diffusion, generator of employment, allows to widen the services suggested by companies and/or organizations already present on the field.



Since the beginning of developments, Swiss NGO CEAS is integrated in the plan of cooperative trade. One service center will be created very soon in Ouagadougou (Burkina Faso) in CEAS's delegation in that place. 2 new centers will be created in 2009-2010 in Senegal and MADAGASCAR, still in CEAS's delegations.

SOLAREF won several international prizes, as mentioned in the presentation.



COOPERATIVE TRADE

Further information

If more information should be required on any of the aspects mentioned in this brochure, please contact:



CNRS/LIMSI

Mr Michel PONS www.limsi.fr

Tel. + 33 (0)1 69 85 80 75 Michel.Pons@limsi.fr

Bâtiments 508 et 502bis Université Paris-Sud, 91403 ORSAY (France)



HEIG-VD LESBAT

Ms Catherine HILDBRAND

http://igt.heig-vd.ch/web/rubrique.php?id_rubrique=3

Tel. + 41 (0)24 55 76 354 Catherine.Hildbrand@heig-vd.ch

Avenue des Sports 14, CH-1401 Yverdon-les-Bains (Swiss)



CEAS

Mr Daniel SCHNEIDER www.ceas.ch

Tel. + 41 (0)32 72 50 836 d.schneider@ceas.ch

Centre Ecologique Albert Schweitzer, Rue de la Côte 2, CH-2000 Neuchâtel (Swiss)

Who to contact

The following institutions can provide support and technical assistance to interested parties in implementing Solaref in their own countries.

BIC THESAME

www.thesame-innovation.com

Pascal BOURGIER

pb@thesame-innovation.com

Tel: + 33 (0)4 50 43 96 04

Fax: + 33 (0)4 50 33 58 22

7, Avenue du Parmelan

BP 2444

74041 Annecy cedex (France)



SOLAREF

Mr Olivier DERVAUX

www.solaref.com

info@solaref.com

Tel. + 33 (0)951 870 920

Fax : + 33 (0)956 870 920

12 Allée Lac de Garde,

B.P.325,

73 377 Le Bourget Du Lac (France)

Personal notes

The **IDEASS** Programme – Innovation for Development and South-South Cooperation – is part of the international cooperation Initiative ART. IDEASS grew out of the major world summits in the 1990s and the Millennium General Assembly and it gives priority to cooperation between protagonists in the South, with the support of the industrialised countries.

The **aim** of IDEASS is to strengthen the effectiveness of local development processes through the increased use of innovations for human development. By means of south-south cooperation projects, it acts as a catalyst for the spread of social, economic and technological innovations that favour economic and social development at the local level. The innovations promoted may be products, technologies, or social, economic or cultural practices. For more information about the IDEASS Programme, please consult the website: www.ideassonline.org.

ideass

Innovation for Development and South-South Cooperation



ART - Support for territorial and thematic networks of co-operation for human development - is an international co-operation initiative that brings together programmes and activities of several United Nations Agencies. ART promotes a new type of multilateralism in which the United Nations system works with governments to promote the active participation of local communities and social actors from the South and the North. ART shares the objectives of the Millennium Development Goals.

In the interested countries, ART promotes and supports national co-operation framework programmes for Governance and Local Development - ART GOLD. These Programs create an organized institutional context that allows the various national and international actors to contribute to a country's human development in co-ordinated and complementary ways. Participants include donor countries, United Nations agencies, regional governments, city and local governments, associations, universities, private sector organizations and non-governmental organizations.

It is in the framework of ART GOLD Programmes where IDEASS innovations are promoted and where cooperation projects are implemented for their transfer, whenever required by local actors.