



## SolarChill - the vaccine cooler powered by nature

*Bringing the promise of the Millennium Development Goals nearer to the people*



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# SOLARCHILL



## Harnessing sun power to build people power

**The SolarChill Project** aims to help deliver vaccines and refrigeration to regions of the world without electricity or with inadequate electrical supply. SolarChill is developing a versatile refrigeration technology that is environmentally-sound, battery-free, technologically-reliable, affordable and multi-source powered.

The SolarChill Project bridges health, development and environmental issues through practical cooperation between major international organizations, research institutes and industry.

SolarChill prototypes are presently being field tested in Senegal, Indonesia and Cuba. Once the field tests are completed and the technology is deemed to be reliable, the SolarChill technology will be freely made available to the world and will be publicly owned.



IRDI/Amick Aing

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## Powered by nature: SolarChill

Refrigeration of vaccines and food is problematic in parts of the world where there is no electricity or where the electricity supply is unreliable.

In these regions vaccines are maintained by either kerosene or battery-based solar refrigeration. Kerosene refrigerators are also used for food preservation. There are significant concerns with both kerosene refrigeration and with the existing generation of solar-vaccine coolers.

It is expected that SolarChill technology will improve the cold chain for vaccines as well as provide more reliable refrigeration for perishable foods.

- ▶ SolarChill will provide a more reliable, safer and cleaner form of refrigeration than kerosene refrigerators.
- ▶ SolarChill technology will improve on existing solar-vaccine cooling technology by bypassing the use of conventional lead batteries which have proven to be a major obstacle to the uptake of solar technology in developing countries.
- ▶ SolarChill technology is environmentally-friendly as it does not use any ozone depleting or potent global warming substances.



IRD/Yves Paris



IRD/Jacques Bonvallot



IRD/Bernard Oses

## Spot-light on features

- ▶ Prototypes: Upright and chest refrigerator models
- ▶ Can be used as a vaccine cooler or as household or small commercial refrigerator
- ▶ Energy storage in ice-packs through the use of direct current compressor - no lead battery required
- ▶ Powered by 3 X 60W photo-voltaic panel - no contribution to global warming and no electrical grid required
- ▶ Energy efficiency through efficient insulation
- ▶ R-600 hydrocarbon compressor and cyclopentane blown insulation foam - no contribution to ozone depletion or global warming
- ▶ Temperature control through natural convection between ice storage compartment and vaccine compartment - no electronic control devices required
- ▶ One SolarChill unit can serve a population of 50,000 people for preserving vaccines
- ▶ Expected commercialization price between US\$ 1500-2000 (including solar panels) - 50 to 60% cheaper than currently available solar refrigerators meeting World Health Organization specifications
- ▶ Upright model has the potential to enter the domestic market in remote, off the grid areas of developed as well as developing countries
- ▶ Estimated need in developing countries for vaccine storage purposes is between 10,000 to 20,000 per year
- ▶ Potentially high market demand for domestic and small commercial refrigeration applications in regions of developed and developing countries that are off the grid or have unreliable electrical services.

## Planting the power: SolarChill history

The challenge of providing environmentally safe and affordable vaccine and food refrigeration in the poorer regions of the world bridges health, development, and environmental issues.

The need for environmentally-friendly and affordable solar vaccine coolers and refrigerators was realized in 1998-2000 through separate discussions between United Nations Environment Programme (UNEP), World Health Organization (WHO) and Greenpeace International (GPI).



Independently, around the same time, the Danish Technological Institute (DTI), funded by the Danish Energy Agency, began the development of a new solar refrigerator that bypassed the use of batteries. DTI worked in cooperation with the Danish refrigerator manufacturer Vestfrost. The direct current hydrocarbon compressor was developed by Danfoss Company of Denmark.

The first meeting of the SolarChill Project Partners was hosted by GTZ Proklima in Eschborn, Germany on May 5, 2001. With an initial decision to proceed with the project, Greenpeace International provided the funds for the development of the first SolarChill prototypes.



*The solar panel and vaccinators inspecting vaccines in a SolarChill refrigerator.*

*Photos from SolarChill field tests at Girisobo, Cuba.*





These were exhibited at the World Summit on Sustainable Development in the fall of 2002 in Johannesburg, South Africa.

A second generation of prototypes of the SolarChill Vaccine Cooler went into field testing at the beginning of 2004 in Senegal, Indonesia and Cuba. Ten prototypes of the chest freezer vaccine cooler are being tested under a variety of climatic conditions, 3 units in each of the countries mentioned, and 1 unit at the DTI laboratory in Denmark. The field tests are coordinated by DTI, and overseen in Senegal and Indonesia by PATH, and in Cuba by GTZ. The governments and Ministries of Health of the host countries are active participants in the field tests.

The field tests are scheduled to last for one year. During that time technical data is collected on a regular basis and adjustments are made as required.

Plans call for similar field testing of the upright freezer SolarChill Food Refrigerator in 2005/2006.

*Display of SolarChill prototype at WSSD  
Johannesburg, 2002*



*IRD/Jean-Jacques Lemasson*



# Chilling challenges of a changing world

## Preserving vaccine

Successful public health programs rely on the availability of high-quality vaccines, which must be continuously cooled to remain effective.

Fail-safe refrigeration within a specified range of temperature, from point-of-manufacture to point-of-use, is critical to the effectiveness of any vaccination program.

Fail-safe refrigeration is also vital for maintaining the shelf of some medicines e.g. the liquid forms of antibiotics.

The term “cold chain” refers to a network of fridges, freezers and cold boxes that is organised and maintained by teams of people throughout the world. This network ensures, as much as possible, that vaccines are kept at the proper temperature as they are distributed from the manufacturer to the locations where they are administered. The recommended equipment for storage (cold rooms, refrigerators,

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