WORLDINNOVATION

GLOBAL ICE TEC

FRIDGE UNOCOOL® 165

THE MOTIVATION

In emerging and developing countries, particularly in hot and subtropical climates, non-existent or often unstable power supplies mean that there is heavy demand for portable and off-grid refrigeration equipment for private and commercial use.

According to recent studies by the United Nations Children‘s Fund (UNICEF) and the World Health Organization (WHO), over 35% of all food on earth is spoilt by lack of refrigeration. Worldwide, more than 1.3 billion people live in households with no electricity supply - 600 million of them in Africa alone. Unstable power grids, resulting in failing refrigeration systems, can adversely affect, sometimes seriously, the lives of almost 3.0 billion people, especially in large parts of Asia, Central and South America, Africa and the Middle East.

This means that there is a very heavy global demand for refrigeration units which maintain the temperatures in the refrigerator constantly cool over longer periods of time - even with no power supply - and that feature a simple and maintenance-free design at an affordable price.

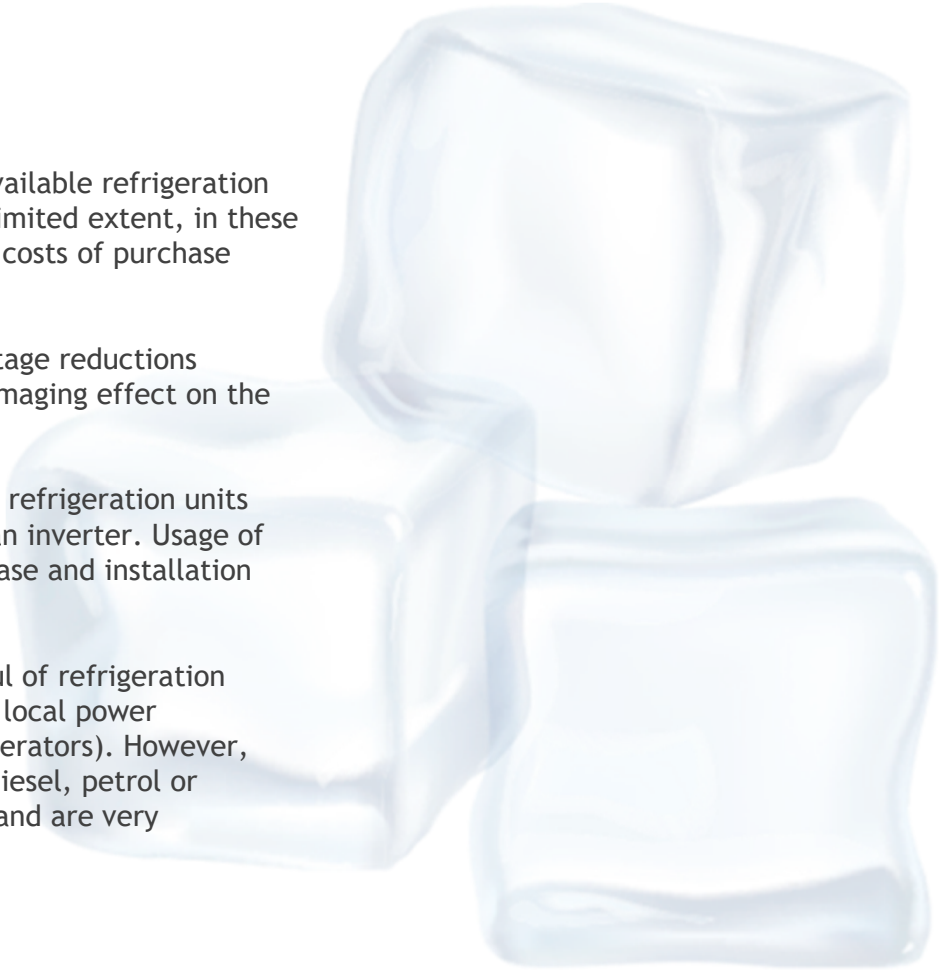
THE ANALYSIS

With their constant energy demands, commercially available refrigeration appliances cannot be used, or at best only to a very limited extent, in these regions. For the majority of the local population, the costs of purchase and electricity are often not affordable.

In regions with unstable power supplies, frequent voltage reductions (brownouts) or power cuts (blackouts) have a very damaging effect on the operation and service life of refrigeration appliances.

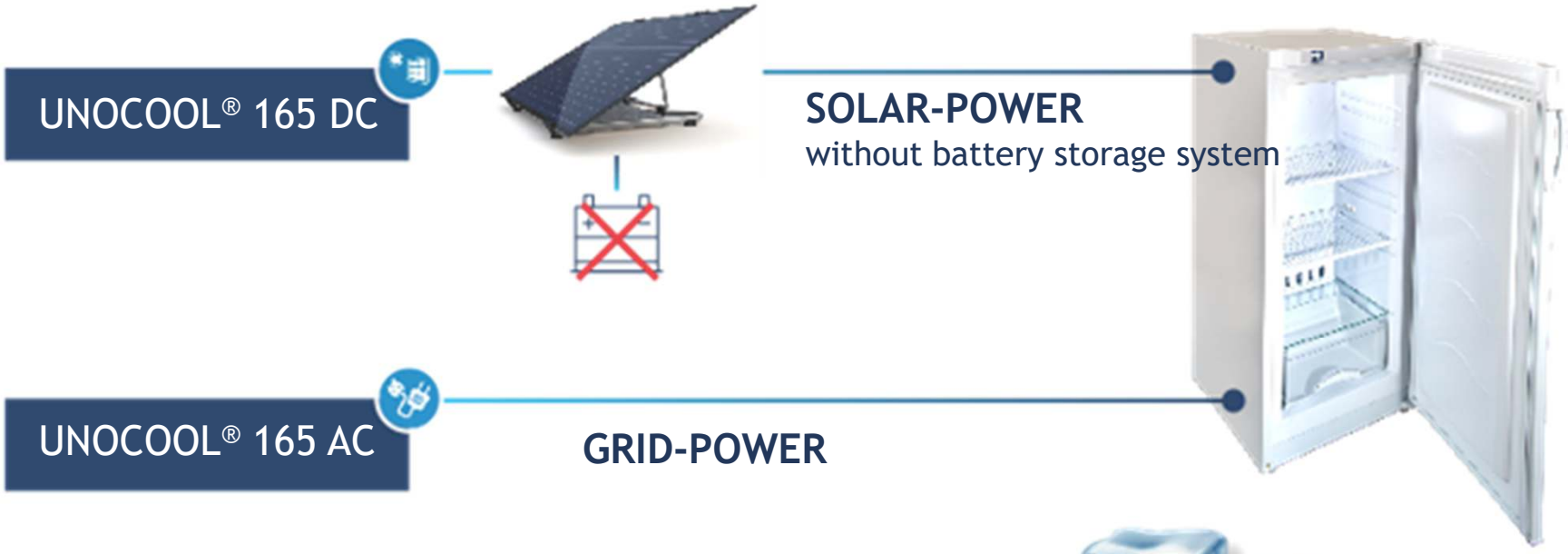
The up to now available on the market solar-powered refrigeration units depend on an additional battery storage system and an inverter. Usage of this kind of system is heavily restricted by high purchase and installation costs and the limited lifetime of the batteries.

Several manufacturers are currently offering a handful of refrigeration systems that are supplied with alternating current by local power generation systems (emergency power systems or generators). However, such systems consume large amounts of fossil fuels (diesel, petrol or petroleum), are highly damaging to the environment and are very expensive to purchase and operate.



THE SOLUTION

Using the ice storage technology patented by GLOBAL ICE TEC AG, refrigerators can keep chilled goods constantly cool, between **4° and 12°C,** for more than 36 hours at outside temperatures of **35° to 40°C**, even **without a continuous power supply**.
Based on this completely new, cutting-edge technology, GLOBAL ICE TEC AG has developed the UNOCOOL® 165 household refrigerator, which can be powered by either the conventional low-voltage grid (220-230V AC) or by photovoltaic systems (10-40V DC).



THE SOLUTION

THE SPECIAL FEATURES OF THE INNOVATIVE UNOCOOL® 165 REFRIGERATOR ARE:

- **World first** - no comparable product available on the market!
- **Patented ice storage technology** with dual, flexible power supply (AC/DC)
- **Power grid independent**, mobile and uninterrupted operation
- Simple, robust, **maintenance-free** and easy-care design
- Stable and reliable operation from **a solar power supply, with no battery storage system**
- **Inexpensive to purchase**
- **No additional operating costs** for power generators
- **No environmental damage** from electricity generation
- Uses environmentally friendly **CFC-free coolant**
- Optimal scope of applications **in all climatic conditions** in the target markets

WITOUT BATTERY STORAGE SYSTEM

THE TECHNOLOGY

Technically, the implementation of the ice storage cooling concept relies on the high specific heat capacity of water. Inside the cooling unit, an ice storage module, mounted on the rear wall, is filled with approx. 8-10 litres of PCM (Phase Change Medium) refrigerant. In this module, ice is produced, using the most effective operating principle of a compressor refrigerator.

In periods when there is no solar-power or a loss of the grid, the stored cooling energy is steadily released into the interior of the refrigerator to keep the food cool.

The use of the UNOCOOL® 165 is similar to common refrigerators on the market.

ICE STORAGE MODULE

THE TECHNOLOGY

The special physical and chemical properties of the patented ice storage medium (PCM) offer the following advantages for operating the refrigerator:

IMPROVED ENERGY EFFICIENCY

» The powerful AC and DC compressors operate with optimised efficiency
» Approx. 10 - 20% less energy consumption than conventional cooling appliances in energy efficiency class A+++
» Refrigeration units can be operated from Smart Grid power supply systems

INNOVATIVE ICE STORAGE MEDIUM

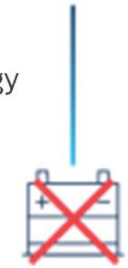
» Controlled minimal volume-increase during refrigeration – totally sealed ice storage
» Faster and evened ice storage charging, thanks to the improved thermal conductivity of the PCM
» Maintenance-free and unlimited use

OPTIMAL OPERATION

» Cold loading can be carried out by DC or AC compressors
» No ice build-up in the refrigerator
» Uniform cooling temperature in the whole interior
» No dehumidification (dehydration) of the chilled goods
» Optimal conservation of freshness, no loss of vitamins and minerals
» Reliable operation in all regions and climatic zones

The compressors used in the UNOCOOL® 165 are pre-fitted for the installation and use of a payment monitoring module (PayG module).

THE DATA UNOCOOL® 165 DC



SOLAR POWER
without battery storage system

FUNCTION

Device type:	Household refrigerator with ice storage technology
Type:	Upright unit, freestanding
Cooling system:	Compressor
Refrigerant:	R600a
Power supply:	Direct current (DC)
System voltage:	10 – 40 V
Rated power:	50 W ... 80 W
Power generation:	**Photovoltaic module 120 - 180 W without battery storage system**
Cooling temperature:	+ 4°C...+12°C
Ambient temperature:	+16°C...+40°C
Autarky time:	Ice-storage period during self-sustained operation at 25°C ambient temperature 60 hours at 35°C ambient temperature 36 hours at 40°C ambient temperature 27 hours

CONSTRUCTION

Dimension:	1300 x 595 x 636 mm
Weight:	refrigerator: 50 kg, Ice storage: 10 kg
Net capacity:	140 L
Doors:	1 piece, alternately mountable
Shelves:	2 pieces grid shelves, height adjustable 1 piece glass shelf
Drawer:	1 piece

QUALITY

- Application of the patented ice storage technology
- CE-compliant according to EU regulation 765-2008
- RoHS compliant according to EU 2011-65
- Use of CFC-free refrigerants according to EC 1005-2009
- Production in Europe according to ISO 9001 and ISO 14001

THE DATA UNOCOOL® 165 AC GRID-POWER

FUNCTION

Device type:	Household refrigerator with ice storage technology
Type:	Upright unit, freestanding
Cooling system:	Compressor
Refrigerant:	R600a
Power supply:	**Alternating current (AC)**
System voltage:	**220 - 230 V +/- 10 %**
Rated power:	50 W ... 80 W
Power generation:	Low voltage grid
Cooling temperature:	+ 4°C...+12°C
Ambient temperature:	+16°C...+40°C
Autarky time:	Ice-Storage period during Self-sustained operation at 25°C ambient temperature 75 hours at 35°C ambient temperature 45 hours at 40°C ambient temperature 37 hours

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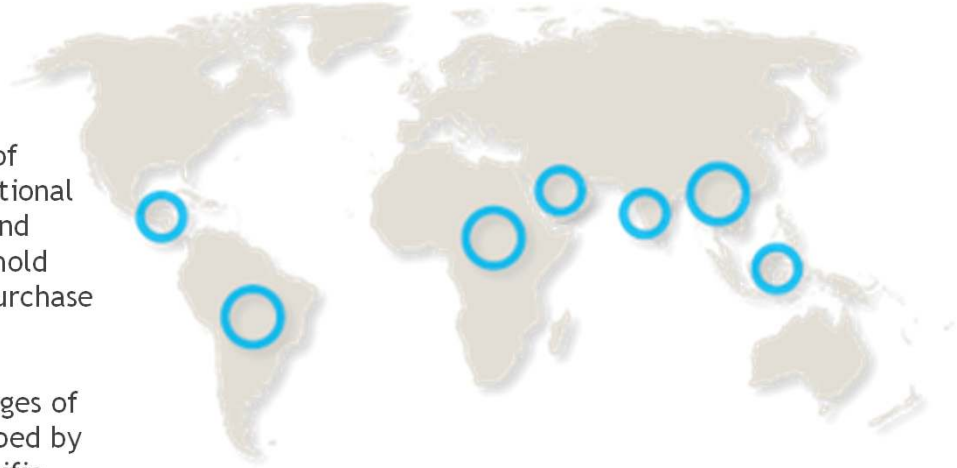
THE MARKET POTENTIAL



According to the latest market analyses by the University of Aachen, the Fraunhofer Institute Munich and other international trade and aid organizations, particularly in the emerging and developing countries, the annual sales potential for household refrigerators with an independent power supply and low purchase costs is estimated at 100 to 120 million units.

The special performance features and operational advantages of the UNOCOOL® 165 AC/DC household refrigerators developed by GLOBAL ICE TEC AG - produced in Europe - match the specific requirements of these rapidly growing target markets.

No technically comparable refrigerators are being manufactured or supplied anywhere in the world.

UNOCOOL® refrigerators are unique. With their **ice storage technology**, they are revolutionising the market for refrigerators and freezers. This new generation of refrigerators, with its beneficial and user oriented innovations, is set to **improve the quality of life** of many people all around the world.

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