



International Pole & Line Foundation and Yayasan IPNLF Indonesia

Factsheet and Catalogue of the Solar Ice Maker (SIM) facility

IPNLF

LOCATION: KAWA INDONESIA

IN PARTNERSHIP WITH: UNDP OIC, GIZ INDONESIA, AIREF, THE MARINE AND FISHERIES AGENCY OF MALUKU PROVINCE, PT ANEKA SUMBER TATA BAHARI (PT. ASTB)

ABOUT

The small-scale handline yellowfin tuna fishers of Kawa Village, Seram Bagian Barat, Maluku Province, form the backbone of the local economy. Their sustainable one-by-one fishing methods, targeting large tuna with environmentally friendly techniques, are a cornerstone of Indonesia's artisanal fishing sector. However, they often face challenges in preserving the quality and freshness of their catch due to the lack of reliable cooling technology, particularly ice-making facilities, stemming from limited access to the electricity grid. This challenge has led to high post-harvest losses and reduced incomes.

To address these issues and build on the success of the solar ice maker (SIM) developed and deployed in Kupang by GIZ Indonesia in 2022—which produces 1 ton of ice per day using solar energy—Yayasan IPNLF Indonesia (YII), in partnership with the GIZ Energy Program, has implemented the second solar ice maker in Kawa, West Seram. This unit has been operational since early October 2024 with an optimised container-based design. The SIM is a pioneering solution designed to operate entirely off-grid, harnessing solar energy to produce ice sustainably and cost-effectively.

Funded by the UNDP Ocean Innovation Challenge, this project aims to provide a sustainable ice production solution for local fishing communities. The solar ice maker has been procured by the YII under the UNDP award and was manufactured by AIREF, an Indonesian company specialising in cooling and refrigeration. The Marine and Fisheries Agency of Maluku Province, along with PT Aneka Sumber Tata Bahari (PT. ASTB), have provided support throughout. The local fishing communities, who are integral to the success of this project, will be the ultimate beneficiaries of this innovative solution.

This initiative specifically targets small-scale handline yellowfin tuna fishermen, whose livelihoods depend on maintaining the freshness and quality of their catch. Furthermore, by integrating renewable energy, the project aligns with Indonesia's broader national goals of reducing carbon emissions and promoting sustainable economic growth, particularly in remote coastal communities.



PV Solar-Powered Ice Machine

Think global, Act local. Indonesia's solution for connecting the cold chain to the first mile with 100% Greenhouse Gas Emission-Free Cooling

The Future Of Ice Making In Indonesia

- 100% powered by renewable energy
- 100% greenhouse gas emission free. Running on natural
- refrigerants with minimal impact to global warming
- 100% energy self-sufficient. Independent from external
- power supply, only requires fresh water
- Automated 4.0 technology with dynamic operation:ice
- generation synchronous to sunshine, remote control
- access and monitoring
- No fuel needed. Cheaper than Diesel

Specifications

- Ice capacity 1.2Ton/Day
- Dynamic ice making process according to sunshine
- 12HP Semi hermetic compressor
- R290 Refrigerant
- Minimal operational costs

Benefits

- Full automated autark energy-supply system
- Reliable performance
- Ice generation in remote regions
- Ozone friendly
- Durable material
- Efficient and minimal operational costs



Applications

- Keeping fresh raw material
- Fresh fish
- Fresh meat



Standar Unit Includes

- Condensing Unit
- Brine Storage
- Bin Tank
- Standar Unit Includes
- PV-Solar Panel
- Battery
- Electrical panel control system
- Electrical panel control PV-Solar
- Water pump
- Accessories

Refrigerant

A PV-Solar Plant Ice Machine is using propane R290 refrigeration. R290 capable of high performing, excellent thermodynamic performance and very low global warming potential R290 Refrigerant Minimal operational costs

Dimensional

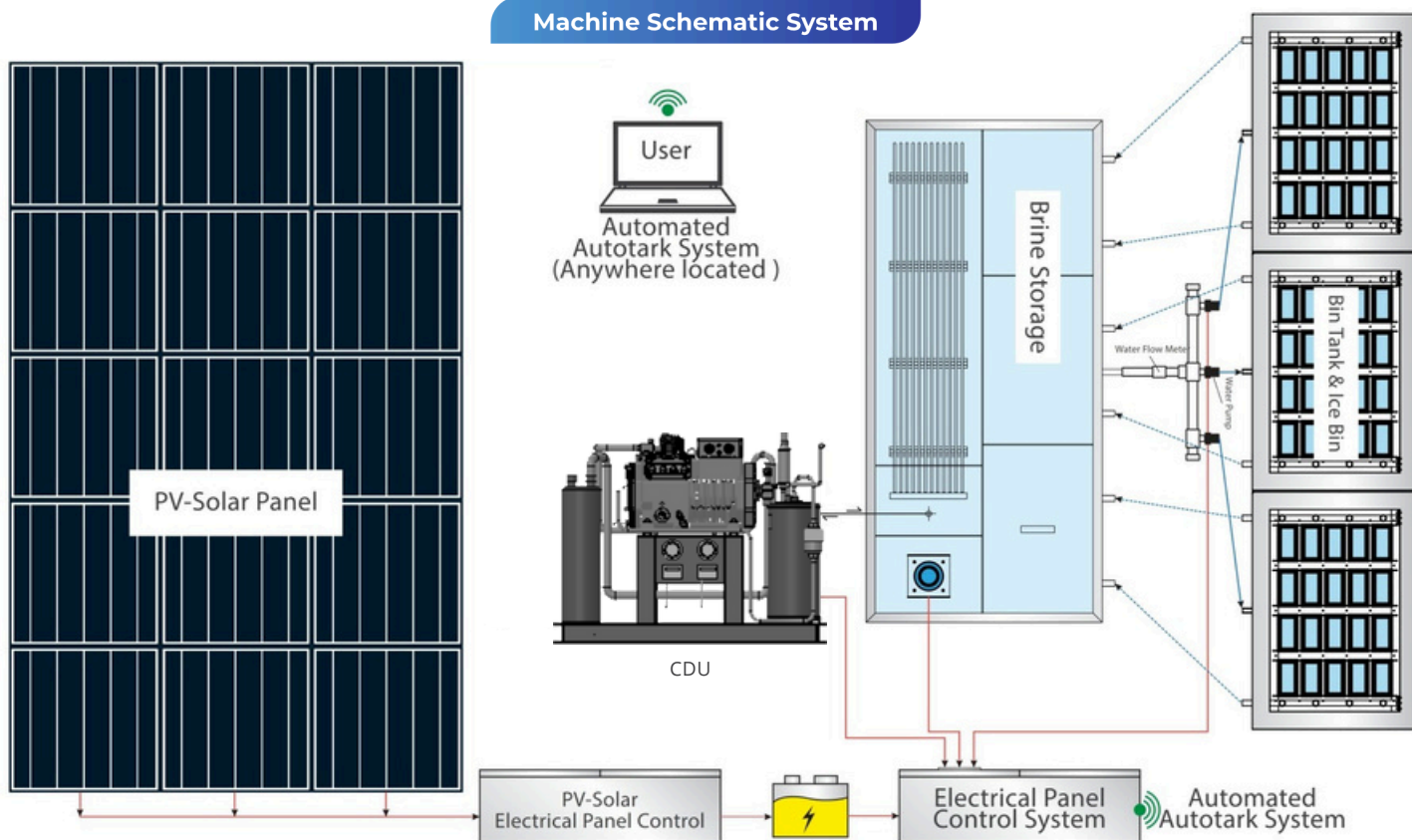
2 X 20 Ft Container
(Ice Maker & Panel Control)
&
1 x 20 Ft Container
(Ice Storage)

Point of Operation

The components were chosen for two points of operation (OP). An operation reserve was considered if possible.

	Frequency	Evap. temp.	Condensing temp.	Cooling power
min. OP	25 Hz	-13 °C	45 °C	9.4 kW
max. OP	70 Hz	-14.5 °C	45 °C	24.5 kW

Machine Schematic System



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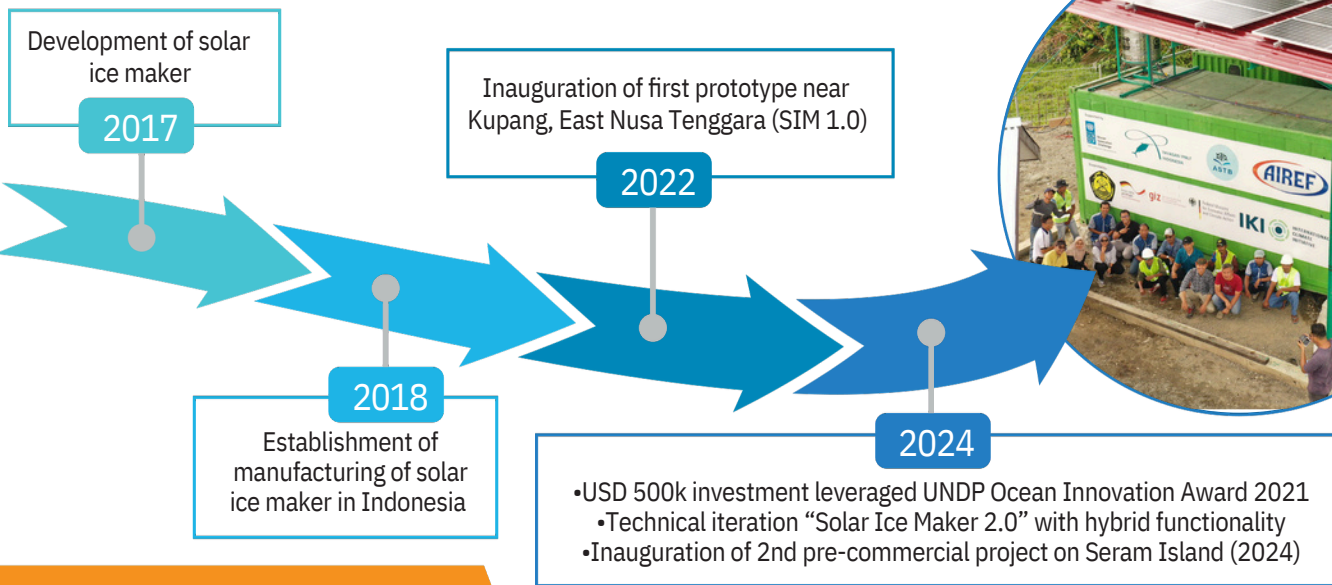
TOWARDS COMMERCIALISATION: SOLAR-POWERED ICE PRODUCTION TO EXPAND SUSTAINABLE FISHERIES AND EMPOWERING SMALL-SCALE FISHERS IN COASTAL AREAS



The journey of the solar ice maker, an innovative technology designed to empower coastal communities through clean energy and sustainable fishing practices

The Solar Ice Maker is an off-grid, solar-powered solution that supports small-scale fishers by providing sustainable ice production. It enhances cold chain infrastructure, reduces carbon emissions, and increases fishers' incomes by preserving their catch.

KEY TIMELINE



NEW CONCEPT: SOLAR ICE MAKER 2.0



100% Solar-Powered:
Fully off-grid, generating ice blocks solely from solar energy, with dynamic operation that adapts to available sunlight for continuous performance.



Smart Energy Management:
Advanced storage systems optimize solar usage, ensuring uninterrupted ice production even during cloudy or low-sunlight days.



Designed for Remote Islands:
Tailored for high fish-producing areas like Maluku's WPP zones (714, 715, 717, 718), providing a reliable ice solution where electricity access



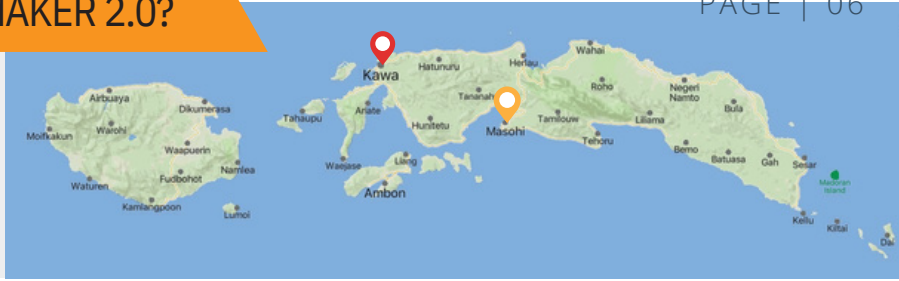
Scalable and Containerized:
Compact, easy-to-deploy unit that can work off-grid or in hybrid mode, making it adaptable for various sizes of fishing communities.



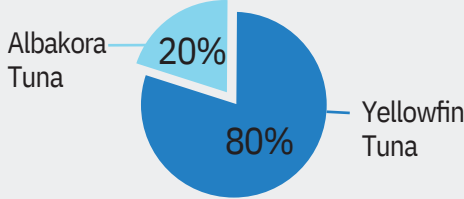
Harnessing Indonesia's Solar Potential:
Ideal for regions like Eastern Indonesia with strong solar irradiance, supporting sustainable fisheries and clean energy solutions.



Kawa is located in West Seram, Maluku, known as the "Amazon of the ocean" with the world's largest fisheries biodiversity. Renowned for Big Tuna production, essential for local and international fish markets.



Small-scale fishers in Kawa use traditional, sustainable methods (handline fishing) to preserve biodiversity and export high-value fish internationally. Fish catch primarily includes:



Unstable electricity supply, limiting reliable cold chain infrastructure with the nearest cold chain and electricity grid are located in Masohi, Central Seram, far from Kawa Village.



Reliable ice production is essential for maintaining their income, reducing losses, and enhancing competitiveness against industrial fisheries.

IMPACT OF SOLAR ICE MAKER 2.0



Economic Benefits

Produces 1 ton of ice daily with 5-ton ice storage, boosting fishers' income by preventing spoilage and improving market competitiveness.



Environmental Impact

- 100% solar-powered with natural refrigerants.
- Low Carbon Emissions with up to 100% Operation on Solar PV combined with a Natural Refrigerant (R290).
- Eliminating plastic-wrapped ice.



Empowering Fishers:

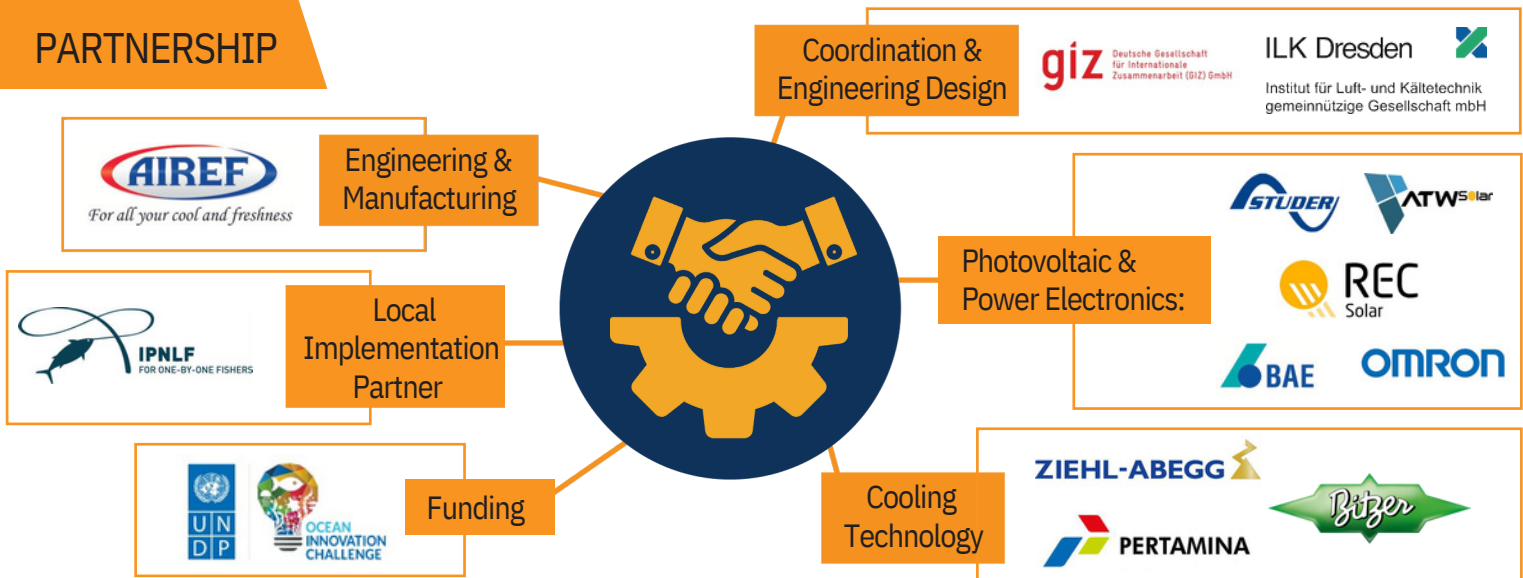
Provides reliable ice production to preserve fish quality, supporting small-scale fishers and their livelihoods.



Supply Chain Stability:

Ensures a steady ice supply, strengthening the fish supply chain and connecting fishers with buyers more effectively.

PARTNERSHIP





IPNLF

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