THE SOLAR ICE MAKER PROJECT: UPLIFTING COASTAL COMMUNITIES IN INDONESIA

By the International Pole and Line Foundation (IPNLF)[1]

A prototype solar-powered ice maker in Maluku, East Indonesia, is delivering significant environmental and economic benefits to small-scale tuna fishers and their families. Representing a transformative and scalable renewable energy solution for small-scale fisheries, the project goes beyond just environmental gains; it's a powerful catalyst for social transformation, bringing real income stability to small-scale fishers. With improved cold chain reliability, these fishers can unlock the full value of their catch, minimise their financial losses and boost local economic growth.

Credit: IPNLF

Indonesian handline tuna fisheries are more than just a source of fish; they are lifelines for local communities, fostering equitable wealth distribution, enhancing food security, and empowering women through gender-equal employment opportunities. However, many of these remote coastal fishing communities face significant challenges. Fishers urgently need upgraded shore-based facilities to maintain a continuous cold chain for their catch, reduce reliance on grid electricity and enable improved fish handling and food safety practices. Maintaining this cold chain is critical to ensure that fish and other seafood products arrive fresh and are of the highest quality at their destination.

Furthermore, these small-scale fishers are often out-competed by industrial fisheries for limited resources, sidelined by decision-makers, and forced to compete in seafood markets that fail to offer them a level playing field. To add to their struggles, these communities are often on the front lines of climate change impacts, facing unprecedented challenges that threaten their livelihoods. Therefore, innovative solutions that combat climate change and help them compete on an equal footing in global seafood markets are essential for their future.

Launched by the International Pole and Line Foundation (IPNLF) in 2024, the Solar Ice Maker project supports Indonesia's vision of a Blue Economy in which the ocean is a crucial driver of economic growth and innovation, improving the livelihoods of coastal communities while preserving the country's unrivalled biodiversity through healthier oceans and coastal ecosystems. It contributes directly, amongst others, to SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), and SDG 14b (providing small-scale fishers access to marine resources and markets). The technology used in the ice maker further minimises waste and aligns with global sustainability standards by reducing the carbon footprint of ice production.

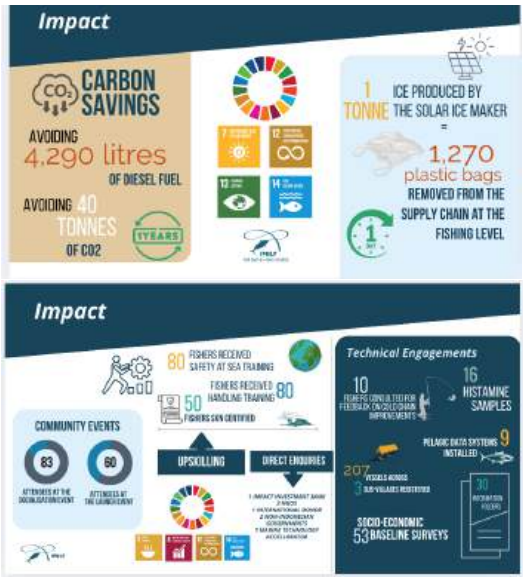
[1] *The International Pole & Line Foundation (IPNLF) is a UK-registered charity dedicated to developing, supporting, and promoting socially and environmentally responsible one-by-one tuna fisheries in 33 countries. These traditional fishing techniques are highly selective, minimising bycatch and environmental impact, while supporting the livelihoods of coastal communities. IPNLF collaborates with fishers, businesses, and policymakers to implement sustainable practices, enhance supply chain transparency, and advocate for equitable policies that benefit both people and the planet. IPNLF has 58 members, including the retailers Marks & Spencer, Sainsbury's, Whole Foods, Edeka, Migros and Woolworths South Africa. Media contact: Clare Harrison (clare.harrison@ipnlf.org).*

100% renewable energy

The Solar Ice Maker[2] is an entirely off-grid facility, using solar energy to produce up to one ton of high-quality ice daily. Thus, it allows for continuous ice production, enhances cold storage capabilities, and minimises spoilage. Access to fresh water is vital for the ice maker to operate efficiently. Replacing expensive batteries is often one of the most significant costs associated with solar energy applications. The technology used in the solar ice maker overcomes this challenge by relying on thermal energy storage rather than batteries.

Impact on people and planet

The project goes beyond just environmental gains; it's a powerful catalyst for social transformation, bringing real income stability to small-scale fishers. With improved cold chain reliability, these fishers can unlock the full value of their catch, minimise their financial losses and boost local economic growth. This initiative is an inspiring model for other coastal regions facing similar hurdles in cold chain logistics and post-harvest losses.



Credit: IPNLF

Social Responsibility Lead at the IPNLF, Shannon Hardisty (shannon.hardisty@ipnlf.org) explains, "As simple as it may sound, ice is a crucial step in the supply chain to achieve a higher-quality product. With this innovation, fishers can nearly triple their income because of the higher-grade tuna they sell. Their product can be sold to international markets such as Japan and the USA with that grade, which means rural fishers can increase access to global markets and improve their livelihoods".

[2] https://ipnlf.org/what-is-the-solar-ice-maker/

Press release: October 2025

One year on: the solar innovation that's powering coastal livelihoods in Eastern Indonesia

Locals harvest over 176 tonnes of ice from the Indonesian-manufactured ice maker within 12 months of its launch, giving them access to reliable refrigeration, lowering emissions and cutting plastic pollution.

- Over 176 tonnes of ice produced in the first year — an average of 16 tonnes per month
- 223 520 plastic bags—equivalent to more than 2 tonnes of plastic—avoided by eliminating single-use ice packaging
- 4 290 litres of diesel replaced with solar energy
- 40 tonnes of CO_2 emissions prevented annually
- USD 120 000 added to the fishery value chain

A prototype solar-powered ice maker in Maluku, East Indonesia, is delivering significant environmental and economic benefits to small-scale tuna fishers and their families. The technology addresses one of the biggest challenges facing small-scale fishers in coastal fishing.

Ice is vital for fishers whose livelihoods depend on being able to supply high quality fish to buyers, often thousands of miles away. Like many fishers in remote communities, those in Kawa previously relied on ice produced in home freezers and supplied in plastic bags. These supplies were often threatened by frequent power outages.

Over the past year, the solar ice maker has produced a total of 176 tonnes of ice, an average of 16 tonnes per month. The steady supply is benefiting not only Kawa's local fishers but also neighbouring communities.

The project demonstrates how renewable innovation can strengthen fisheries and coastal communities while reducing emissions and plastic waste.

Installed in late 2024 through a partnership between the International Pole & Line Foundation (IPNLF), The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ Indonesia), PT. Aneka Sumber Tata Bahari PT (ASTB), Dinas Kelautan dan Perikanan Provinsi Maluku (DKP Maluku) and AIREF, and endorsed by Indonesia's Ministry of Marine Affairs and Fisheries, Kementerian Kelautan dan Perikanan (KKP). UNDP's Ocean Innovation Challenge selected IPNLF Indonesia from over 300 applicants in 2022 to develop the solution.

The availability of affordable, longer-lasting ice has improved the quality of fish landed and allows fishers to be at sea for longer, catching more fish. The system has also reduced operational costs by eliminating the need for expensive, externally-sourced ice. By making ice consistently available within the village, the system has reduced the need for travel to other communities and reduced household costs.

The project has also contributed to waste reduction, with an estimated 223 520 plastic bags avoided at the community level by eliminating the need for ice packaging. By replacing diesel-generated ice production with solar power, the Kawa system has avoided the use of 4 290 litres of diesel fuel and prevented 40 tonnes of CO_2 emissions annually.

In addition to the installation of the ice maker, the community also received training in fish handling best practices to further improve quality. This had the impact of giving them environmental advantages over industrial fishers, reducing fish and plastic waste and cutting costs.

Additional project outcomes include:

- 80 fishers trained in fish handling
- 50 fishers receiving safety at sea training
- 9 vessel trackers installed to improve data collection for traceability

Commenting on the data, Ismail Noval, Sustainable Fisheries Officer, IPNLF, said:

"We're delighted to see how the community in Kawa has embraced the solar ice maker. This project is a great example of international and local collaboration in action, showing how joined-up thinking across the value chain can deliver real impact. The innovation has improved fishers' access to market, lowered environmental impacts, and reduced costs for local fishers — helping these vital producers secure a stronger foothold in the market."

Frank Stegmüller, Lead Industry Decarbonisation & Energy Island Solutions, GIZ[3], added:

"What we see here is a revolution in the making. Locally available solar energy now freezes water into ice – preserving fish quality and preventing post-harvest losses across the fishery supply chain. We completely replaced fuel for electricity generation and at the same time added USD 120 000 per year to the value chain, without the additional ice would have been lost. This makes it a great business case – aside from its environmental and socio-economic advantages. We thank our partners who believed in the idea and are happy to see its impact after one year of successful operation."

[3] *The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) is Germany's leading agency for international development cooperation. Working in Indonesia since 1975 (and ASEAN since 2009), GIZ partners with governments, industries, and civil society to deliver sustainable development outcomes. Funded by German ministries such as BMZ, BMUV, and BMWK, its programmes focus on clean energy, environmental protection, resilient infrastructure, and economic opportunities for communities.*