NEXT-GENERATION BATTERY ECOSYSTEM FOR A CARBON-NEUTRAL LIFESTYLE

EcoFlow hopes to create a renewable energy ecosystem for every household WITH INNOVATIVE POWER STATIONS AND ACCESSORIES.

The global push for carbon neutrality has spurred the development of clean energy solutions, but most innovations to cut emissions have focused on making changes at the industry level. EcoFlow, founded in 2017 and based in Shenzhen, has been developing environmentally friendly and convenient power appliances for household use, featuring a renewable energy ecosystem and fast-charging battery technology.

"Progression towards carbon neutrality requires both top-down and bottom-up approaches, and we see significant market potential in filling the need for green-power storage products on the consumer front," says Lei Wang, EcoFlow co-founder and CEO.

A *BloombergNEF* report from 2021 estimated that there will be 20 times more global energy storage installations in place by the end of 2030, with about 25% located at homes and businesses.

The demand, as Wang sees it, is driven by people seeking next-generation power for homes and businesses. Growing cases of massive power outages caused by natural disasters or grid production limitations are only adding to that need.

CONSUMER-LEVEL INNOVATIONS

EcoFlow was among the first companies to start designing renewable energy systems, mainly portable power stations for the consumer setting — a big market, considering household consumption is estimated to contribute 60% of greenhouse gas emissions.

After working at drone tech leader DJI's battery R&D department, Wang wanted to bring renewable energy to households in ways that could make a bigger impact on people's daily life.

While the rapid adoption of electric cars has fuelled the advancement of lithium-ion batteries, creating unprecedented opportunities for the energy storage industry, EcoFlow aims to bring a more comprehensive set of power solutions for multiple scenarios both indoor and outdoor that span clean power generation, storage and end use.

EcoFlow's portable power stations (the name for power banks in the company's line of products) stand apart due to a proprietary bi-directional inverter system called X-stream, allowing for efficient electric power conversion between direct current and alternating current.

The inspiration came from the USB Type-C connector system, Wang explained. Through a Type-C portal, electric power may flow in two directions: a laptop can charge a phone, and we can charge a laptop with the help of an adaptor.

Conventional power stations need a tailored adapter to charge up their batteries from a wall outlet. Plus, the output of electric power to appliances may also require device-specific adapters especially for small gadgets such as phones and laptops.

With bi-directional inversion, X-stream can negate the need for adapters. Doing so makes the power station smaller and easier to carry around. From a manufacturing perspective, even the design contributes to carbon reduction by using fewer materials.

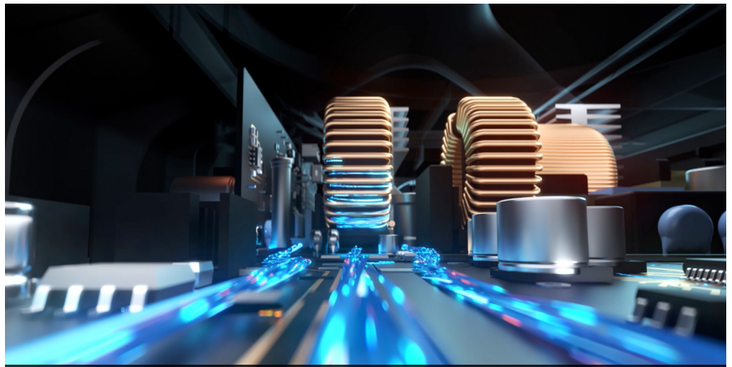
More importantly, by minimizing the steps of AC-DC conversions, the bi-directional inversion system cuts energy losses and boosts transmission efficiency. For users, that means rapid recharging. Powered by X-stream, the EcoFlow DELTA Pro portable power stations of 3.6 kWh capacity can be fully charged from a 240 V AC wall outlet in 1.8 hours.

To be user-friendly and environmentally sustainable, compact power stations should offer more than just rapid speed and a large capacity. The company is incorporating solar panels as one of several possible recharge input options, and is also exploring supporting other renewable energy sources such as wind power.

For its solar panels, EcoFlow developed maximum power point tracking (MPPT) algorithms with a proportional integral differential (PID) controller to tackle unpredictable solar energy production. The algorithms, built in the EcoFlow Solar Tracker, can calculate the best angle for a solar panel based on sun irradiation and position. The tracker can then automatically adjust the solar panel's orientation to ensure maximum power generation. Compared with systems without auto-adjustment, a solar panel using the solar tracker can generate 30% more energy.

Portable power station, solar panel and solar tracker are all part of a clean power ecosystem that EcoFlow is building for various energy consumption settings. By channelling energy from a smart solar panel to a power station, users could avoid the frustration of intermittent energy production intrinsic to renewable energy resources and achieve more stable output. That feature could come in handy in an outdoor setting where there are fewer wall sockets.

In the case of an emergency, a separate EcoFlow Smart Generator can serve as an additional back-up that integrates with a power station through DC charging. An EcoFlow DELTA Pro station can simultaneously receive recharging input from three sources—a solar panel, an AC outlet, and a smart generator—with the help of a Smart Extra Battery.



EcoFlow's proprietary bi-directional inverter system, X-stream, allows for efficient electric power conversion between direct current and alternating current.

EcoFlow DELTA Pro portable power bank offers rapid speed and big capacity.

EcoFlow's design goal is a carbon-neutral lifestyle for every household.

For users who have excessive standby power storage or who want to power a larger system, EcoFlow provides the Smart Home Panel, which can feed power units into home circuits.

To give users additional control and an overview of power use, EcoFlow provides a mobile app that allows users to manage settings, including charging and discharging levels and even prioritize which appliances get power first during blackouts.

ACCELERATING GLOBAL TRANSFORMATION

For all its R&D moves, EcoFlow is built around Wang's philosophy of "meaningful innovation". That is, to develop new technologies that solve real problems and meet consumers' real-world expectations.

EcoFlow has invited consumers into its R&D process through crowdfunding. The development of EcoFlow DELTA Pro, for example, was supported by a crowdfunding campaign launched on Kickstarter. The company had originally aimed for US$100,000, but eventually raised about US$12.2 million. With funders' feedback, EcoFlow gets direct access to users' needs, which could help the company make adjustments in future designs, Wang said.

EcoFlow's work fits into a major global transformation, which involves the wider adoption of renewable energy as a more sustainable resource, Wang said. During this process, "electrifying everything" is the key to carbon neutrality—as evident in electrical vehicles—and smart devices are necessary to enable better penetration, he added.

"We're offering consumers more than just a piece of equipment," Wang said. "By adding more products in our EcoFlow energy solution ecosystem, we aim to foster a carbon-neutral lifestyle which each person and household can practice in everyday life." ■

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