

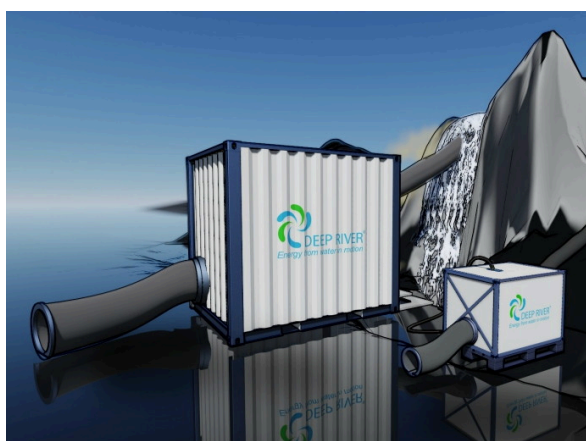
HORIZON
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Energy from water in motion: efficient, customisable off-grid hydro-electricity for rural areas with stream access

Results in Brief

Hydro-powered low-cost green off-grid energy solution

Over one billion people, mostly in rural zones of developing countries live without power, but existing technologies struggle to meet these needs. Furthermore, a 70 % increase in worldwide demand for electricity is expected over the next few decades.



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The United Nations has identified off-grid renewable energy as the only way to end energy poverty and meet decarbonisation targets. Small hydropower is one of the most reliable and affordable power technologies for off-grid systems. However, current technologies that are mobile, light and easy to install, produce too little power to serve an entire community.

Efficient new renewable energy technologies are urgently required to maximise world-wide electricity production, whilst meeting climate targets. In Europe alone, more than 26 400 suitable locations for mini hydropower generation (i.e. less than one megawatt) remain unexploited, partly due to poor accessibility or unsuitability of existing mini-hydropower solutions.

The EU-funded HYDROGO project addressed these challenges by developing a

mobile, easy-to-install hydropower system, which can provide electricity from river currents and waterfalls for individuals or communities living in remote areas. The system is easy to maintain and transport, so it can be located at sites where existing solutions cannot operate. Moreover, as it is not immersed in streams it does not disrupt the environment.

Redesign of proven technology

Researchers redesigned the classic Kaplan propeller-type water turbine to dramatically increase efficiency through computational modelling to maximise performance and minimise weight, using materials such as carbon fibre. “Thanks to our redesign, our turbines can produce energy from smaller water heads than usual enabling us to produce our turbine in series and therefore reduce costs,” says Reidar Vestby project coordinator and CEO of [Deep River, a Norwegian SME](#) .

The project team devised two models based on container modules developed for standardised renewable energy production. These are the Euro-pallet mounted Drop & Go and container-based Plug & Go, which both meet micro (less than 100 kilowatts) and mini electricity demands. “The plants can produce up to 600 kilowatts, depending on the inflow-tube diameter and waterfall’s flow-rate and height,” explains Vestby.

Drop & Go and Plug & Go can both be installed in under a week, requiring only anchoring as no building work is necessary for its installation. According to Vestby: “It is the perfect solution for difficult to access areas and disaster zones where off-grid power is needed immediately. Plug & Go can power up to 1 350 households per year.”

Cheap renewable energy with minimal environmental impact

Either hydropower system can be connected to new low-maintenance micro- and small-scale electricity power plants developed by HYDROGO, which can in turn be connected to both local and national grids. In the power plant, Plug & Go's low weight high capacity lithium batteries are used for electricity storage.

Customers can now opt to install a small hydropower plant that has the lowest energy cost in the market (EUR 0.011-0.024 per kWh). In addition, there is no need to build a structure, only a concrete foundation if they choose Plug & Go.

HYDROGO plants will incorporate a power hub for other off-grid systems, receiving energy from other renewable sources like solar and wind, and redistributing it to local service systems such as waste water treatment and irrigation. “By 2024, HYDROGO will have made clean reliable energy accessible to half a million people, bringing and creating over 380 direct and indirect jobs,” Vestby points out.

Keywords

HYDROGO, hydropower, off-grid, renewable, power plant, Drop & Go, Plug & Go, turbine

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Project Information

HYDROGO

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[Project website](#) 

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