HYDRO 4U
Sustainable Small-Scale Hydropower in Central Asia

„Innovative and sustainable concept“

Kaplan EVO – Innovative Kaplan Turbine

KEY PARTNER

Lead Partner / Owner:

GlobalHydro

Contributing Partner:

Technical University of Munich

MUHR

OVERALL PROJECT

EU-Programme: Horizon 2020
Activity type: Innovation Action

Coordination:
Technical University of Munich

European grant: 9.9 M €

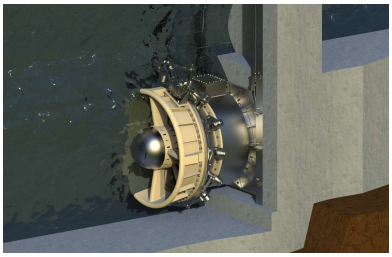
Project duration:
06/2021 – 05/2026

eMail: coordination@hydro4u.eu
www: https://hydro4u.eu/

LinkedIn: Hydro4U
X: @Hydro4Uproject
YouTube: Hydro4U

▶ RESULT IN A NUTSHELL

- Kaplan EVO is unique turbine to be easily integrated to new and existing power plant systems.
- Simple, compact and modular design, environmentally friendly;
- High flexibility due to vertical or horizontal installation possibilities;
- Underwater turbine with:
  - use of biodegradable lubricants,
  - reduced to low noise,
  - lower maintenance costs.
- Speed and flow control for higher efficiency.



© Global Hydro Energy GmbH

▶ DEMONSTRATION-SITE

© Bertalan Alapfy, TUM

Country: Kyrgyz Republic
Region: At-Bashy District
River: At-Bashy

Site Parameters:
- Existing Diversion weir with around 7 m head and three pressure segments
- Emergency spillway for water diversion during construction in place
- Elevation at 2,400 m

CONTEXT

Hydro4U overall…
… is an EU-funded project with 13 partners from 8 countries with the goal of implementing sustainable small-scale hydropower in Central Asia.
… focusses on the modularity and pre-fabrication of hydropower plants to enable a fast and simple implementation also at remote sites.
… will demonstrate EU quality standards and create entry points in developing markets for the European small-scale hydropower industry.

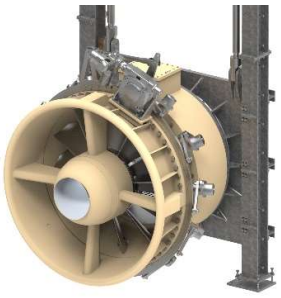
Global Hydro Energy GmbH - Role in Hydro4U
- Industrial Partner
- Provider of different technologies in collaboration with partners
- Leader of the implementation work in Hydro4U
- Analysis of technology optimisation potential
- Manufacturing of Kaplan-Shaft-Turbine with integrated generator for the Hydroshaft Powerplant Solution
- Installation and Commissioning of the Equipment

DETAIL ON RESULT

Technical aspects

Net Head (m)	2 – 14
Discharge (m³/s)	1,5 – 20,5
Power Output (MW)	0,02 – 2

- Flow and speed regulation of the water
- Wide operation range
- Combination of turbine and generator
- Lifting system for maintenance



Kaplan EVO demonstration
© Global Hydro Energy GmbH

Value Proposition

The underwater Kaplan EVO turbine generates sustainable energy without the need to interfere a lot with an existing structure. It can be easily integrated into existing systems (old and newer powerplants) resulting in less installation work and lower environmental impact on the surroundings. It offers a high flexibility due to vertical or horizontal installation possibilities. It has a much simpler, compact and modular design eliminating the need of bigger components and powerhouse which also reduces the need for an extended civil structure resulting in a shorter lead time and saves installation process time.

Through an optimised plant performance due to a flow and speed regulation of the water and the use of biodegradable lubricants, the Kaplan EVO combines lower operation and maintenance costs in the long run with a higher efficiency and wider operation range. Furthermore, the automated operation reduces workforce costs.

Working with the Innovative Kaplan Turbine means to use latest technology and pushing the limits in the hydro power industry. Consequently, these turbines have a higher acceptance rate compared to common designs.

FURTHER DEVELOPMENT

Thanks to successful inhouse R&D and international collaboration within Hydro4U, Global Hydro Energy has developed this technology turning it into a turnkey solution and reaching maturity.

Further potential lays in the modularization and standardization of the system. A new solution for broader use cases in project development is available now.

▶ REPLICABILITY ASPECTS

Crucial for the feasibility of the Kaplan EVO are:

- access to a water source / hydropower site which fits the technology operation range;
- availability of a connection to the energy grid;
- governmental and local authorisations to start the project.

A replication model will be developed in Hydro4U to address the identification of further potential small-scale hydropower sites suitable for the Hydro4U technologies in Central Asia. This will be supported by a web-based Decision Support System.

HYDRO4U Sustainable Small-Scale Hydropower in Central Asia

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101022905.