

### **EU HORIZON 2020 PROJECT**

# HYDROPOWER FOR YOU - Sustainable small-scale hydropower in Central Asia

Acronym: Hydro4U

Horizon 2020 call for proposals: LC-SC3-RES-34-2020 Demonstration of innovative and sustainable hydropower solutions targeting unexplored small-scale hydropower potential in Central Asia

Innovation Action, maximum EU contribution € 9.93 million, total project budget: € 11.49 million.

Coordinator: Technische Universität München (TUM)

Size of the consortium: 13 partner from 8 countries.

Besides European academic and industrial partners, the project includes beneficiaries in Kyrgyzstan (Kyrgyz State Technical University) and Uzbekistan (TIIAME) and local partners in Kazakhstan and Uzbekistan.

#### **Objectives**

Hydro4U will bring together industry, politics, science and stakeholders from both Central Asia and the European Union with the aim of contributing to a sustainable and climate-resilient future for the region by demonstrating European small hydropower equipment & technologies, considering legislation similar to the EU Water Framework Directive and the EU Renewable Energies Directive, and by using sustainable technologies developed by the European hydropower industry.

# Specific objectives (SO) of the project:

- SO 1: Bringing together industry, politics, science and stakeholders from Central Asia and the EU to develop visionary SHP solutions for a climate resilient and sustainable future of Central Asia
- SO 2: Demonstration and assessment of two sustainable, innovative European small-scale hydropower technologies (FCPS and HSPS) in Central Asia
- SO 3: Optimizing the sustainability impact of small hydropower plants (SHP) through a more holistic approach by focusing on long-term solutions in a climate-sensitive, transboundary Water-Food-Energy-Climate nexus context
- SO 4: Implementation of a GIS-based decision support system covering all Central Asian countries to explore unexploited SHP potential and determine site-specific hydropower plant sustainability
- SO 5: Development of a scalable water accounting system to manage water resources in a sustainable way and to share energy and agriculture benefits in a climate-sensitive manner under the Water-Food-Energy-Climate nexus context in Central Asia, thus contributing to regional cooperation
- SO 6: Supporting the competitiveness and sustainable market uptake of European small hydropower technologies in Central Asia and globally





SO 7: Enhancing problem awareness and objectiveness of policy makers and implementers, NGOs and the public

1 Analysis of unexploited small hydropower (SHP) in Central Asia Level1 **Engineering: Natural Sciences** Socio-Economics: → HPP potential and restrictions → Hydrology/climate change, morphology → NEXUS approach in Central Asia → Technical innovation potential → River ecology and main drivers → Deficits in decision making 2 Implementation of Innovative Sustainable SHP Solutions in Central Asia → Innovative hydropower equipment → Innovative tools for impact assessment 2.1 Demonstration Activities (DA) Planning, design, implementation of two demonstration sites integrating: Francis container power solution (FCPS) → Hydro shaft power solution (HSPS) Considering: Up- and downstream migration, innovative tools for optimized design Ecologically sound operation and flow management Sustainable sediment management based on integrative GIS tool Socio-economic impact 2.2 Planning Activities (PA) Feasibility studies for follower test cases integrating: → Application and adaptation of replication guideline → Aspects not covered in demo sites (e.g. Eflow, rapidly changing flow, rehabilitation) Level3 3 Decision support Decision matrix for hydropower type-specific decision support Guidance tool for the implementation of small hydropower in Central Asia (public use) 4 Dissemination and Capacity building → Share information and knowledge, workshops, website, webinars, printed materials Level Business models, exploitation materials, support of Enterprise Europe Network Cross border lectures, tours, professional training, open source educational materials

Figure 1: Hydro4U levels

#### Planned technical demonstrations

- 1) Low-head run-of-river (up to 500 kW) small hydropower plant using the innovative hydro shaft power solution (HSPS) at Badam (Kazakhstan)
- 2) Medium-head approx. 2 MW small hydropower plant using the Francis-container power solution (FCPS) at Shakhimardan (Uzbekistan)



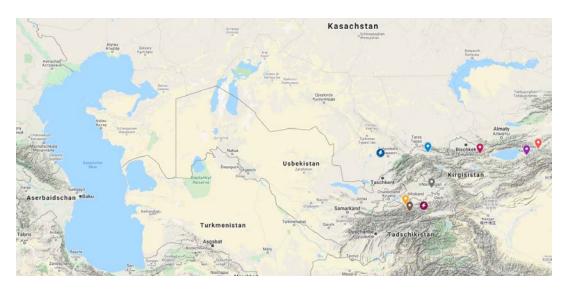


Figure 2: Overview of the location of the DAs (circles) and possible PAs in Hydro4U



## Specific Challenge

The challenge is to demonstrate innovative solutions targeting unexploited small-scale hydropower potential in Central Asia that will contribute to solving the specific cross-border water and energy management challenges in the region. Therefore, the hydropower technological solutions will need to be socio-economically and environmentally sustainable and embedded in a forward-looking cross-border Water/Food/Energy/Climate nexus concept for this region.

# Scope of the call

Projects will demonstrate innovative hydropower equipment exploiting unexplored small-scale hydropower potential in Central Asia up to 10 MW installed capacity by means of sustainable and cost-effective small-scale hydropower solutions. The demonstration will provide solutions for realising innovative and sustainable hydropower, based on synergies between innovative European hydropower technology, research and industry partners, and the Central Asian hydropower sector. Therefore, the demonstration activities shall take place in Central Asia (Kazakhstan, the Kyrgyz Republic, Tajikistan, Turkmenistan or Uzbekistan), with participation of local partners.

The project should also fulfil the highest standard in terms of socio-economic and environmental sustainability and impact, and engagement of local civil society. It should also demonstrate how it will contribute positively to the regional cross-border Water/Food/Energy/Climate nexus and refer to embedded sustainable hydropower auxiliary services.

#### **Expected Impact**

The action is expected to support the competitiveness of the European hydropower technology sector as a responsible actor in global markets in the long-term, with a strong focus on overall sustainability of the provided hydropower solutions within the Water/Food/Energy/Climate nexus in Central Asia. The expected outcomes will strengthen the worldwide leadership of the European hydropower industry in providing innovative and sustainable hydropower solutions and will support international cooperation with developing countries. Expected are outcomes which are in line with UN sustainable development goals