METS 2019 Hyper-Chute Systems Poster Abstract

Joseph Santos, and Pietro Valsecchi, PhD

Joseph Santos, Inventor and Founder, San Carlos, Ca., USA,
jsantos@hyperchute.com

Dr. Pietro Valsecchi, Engineer, Düsseldorf, DE.,

pivalse @protonmail.com

While conventional hydropower is associated with dams and alpine rivers, a vast amount of energy remains untapped in low-speed flow such as canals, river deltas, and tides. Since these types of flow are characterized by low hydrostatic head, they require, however, a much larger volume of water to generate a comparable amount of electrical power.

Interestingly, a large majority of projects that attempted to harness that energy, e.g. Swansea Bay, UK, consisted of massive infrastructures that converted the naturally slow flows into high-speed flows that could drive conventional hydro-turbines.

Such turbines can indeed reach very high levels of efficiency and represent an ideal solution, as long as the flow is constant and above a minimum flow rate. The price for that efficiency is the size and complexity of the infrastructures. Such systems are also not intrinsically scalable. See Fig 1.

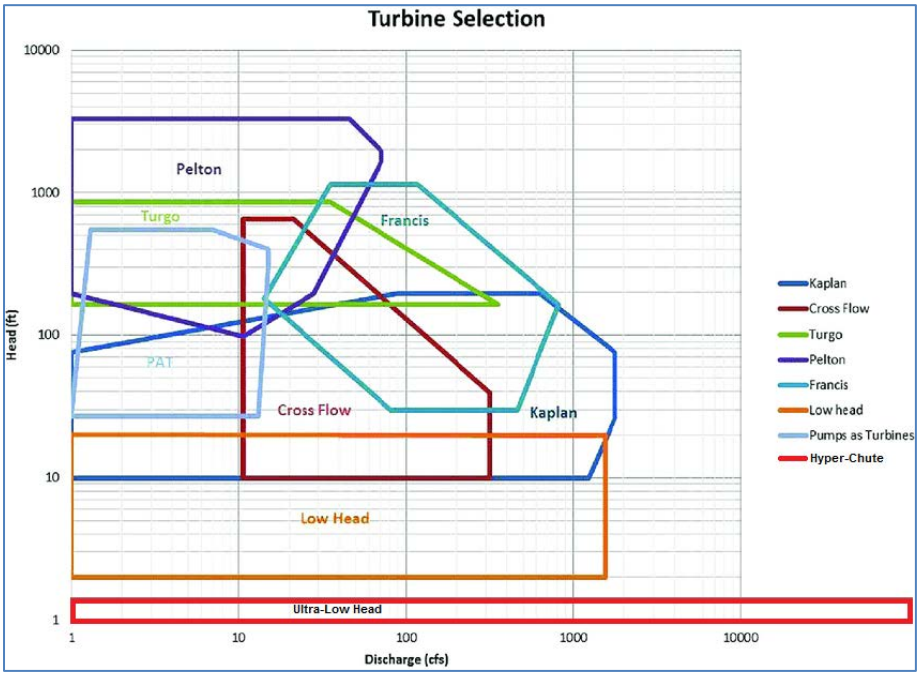

Fig 1.

Instead of converting the flow to adapt to a proven technology (hydro-turbines), a different approach is to adapt technologies to the characteristics of periodic, slow flows, whereby the decreased efficiency is more than balanced by the considerably smaller requirements in terms of infrastructures and by a better scalability.

Hyper-Chute Systems (HCS) has developed a technology based on lightweight sails that can capture energy from a wide spectrum of flow speeds without significant variations in efficiency. A patented reciprocating system allows the specially designed HCS chutes to automatically open and close in the flow and approximate the power cycle of water pistons. See Fig 2.

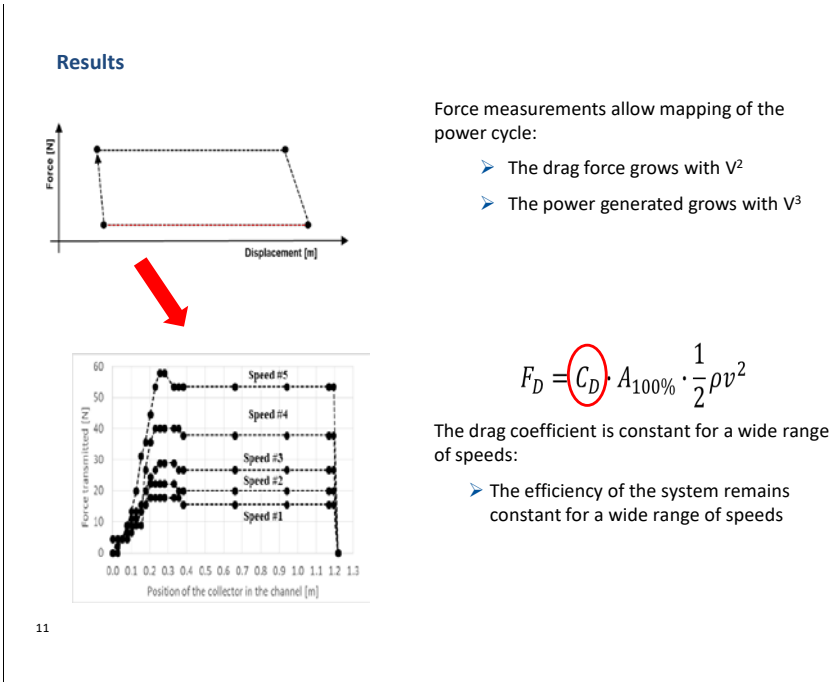

Fig 2.

The simplicity of the design allows it to seamlessly scale from a portable, personal unit to a community-sized network of devices that requires a bare-bone infrastructure. Prototypes tested at HCS' proprietary test facility demonstrated the ability of generating around 400W with a 36' parachute[1].

[1] Santos, Joseph and Valsecchi, Pietro. "Using drogue chutes as a low-cost alternative for energy extraction from tides and low-speed flows." AIAA Scitech Forum, 2019, 10.2514/6.2019-1274.

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