Title: **Optimization Models for Hydrokinetic Energy Valorization**
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Topic: **Master Thesis Proposal**
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Solar and Wind resources have received a lot of attention as key ingredients for succeeding in the energy transition. On side of this, Tidal and River (hydrokinetic) energy offer promising complementary renewable resources, mainly because they are unaffected by short-term weather variations.

In this research, we will be considering three different technical solutions: the TidalKite sytem developed by SeaQurrent, the RivGen system developed by ORPC, and the HydroWing tidal system developed by Inyanga Hydrowing (see illustrations below).

The goal of this research is to develop models for assessing the potential of hydrokinetic energy: how to model, to size, to operate devices for harvesting fluvial or maritime hydrokinetic energy, as well as delivering it to serve a demand.
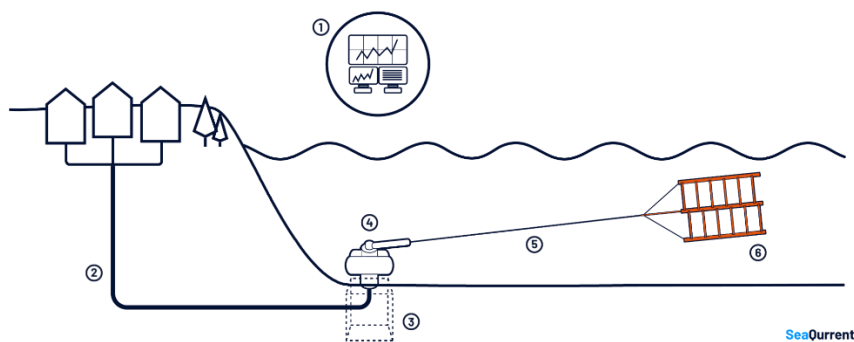

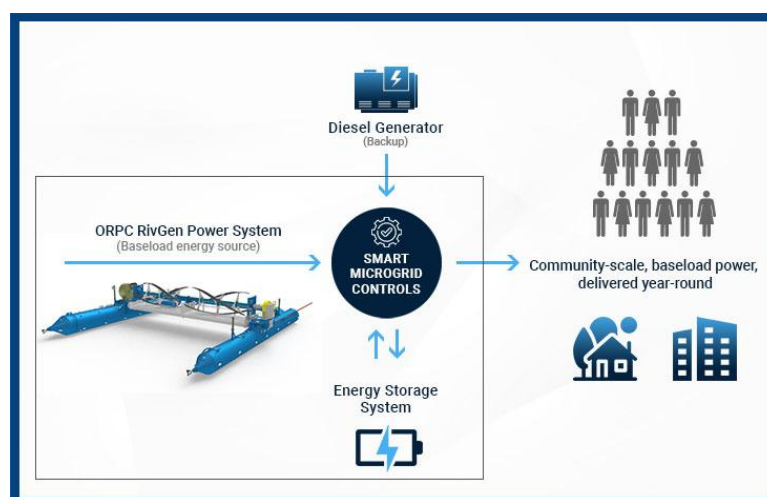*Figure 1 : The TIdalKite system developped by SeaQurrent – source : https://www.seaqurrent.com/tidalkite-system/*

Figure 2: The RivGen power system developped by ORPC - source: https://orpc.co/rivgen-power-system-integrated-microgrid-solutions-2/
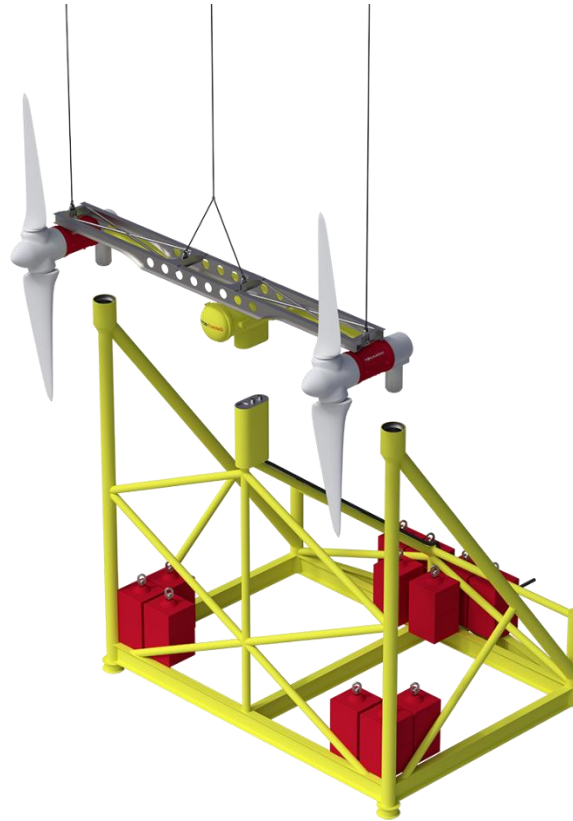
Figure 3: the HydroWing system - source: https://hydrowing.tech/hydrowing-technology/

Several additional questions should be explored: potential of hydrokinetic energy at a given location, types of technologies to be considered, optimal combination of hydrokinetic devices with other renewable energy generation units (wind turbines, solar PV devices), potential forecasting issues for predicting the generation, etc.

To answer these questions, several steps are required. A significant work will be dedicated to data collection and generation (characteristics of technologies, times series, etc). We will mainly rely on the use of the GBOML language to design models of each of the components of the overall resulting energy system, but we may possibility rely on machine learning techniques (e.g., forecasting methods).