**Motivation**

- Exploring the renewable energy potential of the Atlantic Ocean
- Proposing a solution to improve North Carolina’s islands communities grid resiliency to withstand potentially disruptive events

**Research objectives**

The study aims are to determine:

- The most cost-effective solution between offshore wind turbines and tidal power plants
- The most favorable location for the implementation of the tidal and current turbines (MHK) or offshore wind turbines
- How to use the electricity produced to generate hydrogen, for what purpose and what are the associated costs

The following figure shows the electrical output power of the MHK depending on the ocean current speed:

**Method**

- Data are gathered from the NREL (Wind Toolkit), and NOAA databases.
- Wind, Tidal and current speeds are then analyzed for Eastern US Coast to determine the optimal plant location.
- Finally, the CAPEX and OPEX are calculated to determine the LCOE from the specifications of the location.

The equation used to calculate the LCOE is as follows:

\[
LCOE = \frac{\text{Turbine capital cost} + \text{Fixed operating costs}}{\text{Annual Energy Production}}
\]

**Results**

The results of our study are summarized in the following tables, where the LCOE in $/kW is calculated using the System Advisory Model. Boxes that are yellow indicate price points where the price of MHK and Wind are Equal for the given location resource.

**Future work**

Both LCOE will be used to calculate the leveled cost of hydrogen to know if it would be interesting to produce hydrogen from the generated electricity. Two cases of application will be studied: 

- Hydrogen as fuel for NC Coastal ferry fleet
- Hydrogen as a means of electrical storage for grid resilience

**Acknowledgement**

This project is funded by the Coastal Study institute and realized by EPIC researchers and students. Special thanks to Dr. Cox, Dr. Sockeel, and Dr. Khan for making this study progress.