Clean Energy Production from the Kinetic Energy of Water

Egypt Grand Challenge:

- Improve the use of alternative energies.
- Students can address different Egyptian Grand Challenges in addition to the previous mentioned challenges.

Theme: Energy, force, and power.

Capstone Big Idea:

The concept of this system is to produce renewable and clean energy by converting water's kinetic energy into electrical energy. This system can be used in arid areas, for example in the new agricultural projects to supplement conventional sources, electrical grids that require transmission infrastructure, or diesel generators which produce harmful emissions. This system can be utilized to power water pumping and/or irrigation systems and to provide the power needed for the housing of workers in these projects. Also, it can be used inside urban cities and residential areas to provide electricity for street lighting and to power buildings and homes, especially in arid areas. There are numerous innovative designs for generating electrical energy from water's kinetic energy. The students are asked to explore this kind of system and the innovative ideas to come up with effective designs that can also be produced locally.

Create stories for this setup - Using a canal, a river, a faluka, tides of a sea, waves of a sea

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Essential Questions:

How can we harness the power of water's kinetic energy?

Design Challenge:

Student teams will design a system and build a prototype that generates electrical energy from the kinetic energy of water in any context (E.g. river current, waves, tides, etc.). Students are encouraged to focus on a regionally relevant opportunity and to use locally sourced, recyclable materials for your solution.

Our solutions can have social and environmental impacts. Take note of Egypt's regulatory requirements for river flows, for example. You may still design such a system, but you must be able to discuss the ramifications of this design on such social agreements.

Design Requirements:

You must choose at least one measurable design requirement regarding the performance of your system that will allow you to test your prototype and record a large amount of data …

Examples include (but are not limited to) power output from the generator, calculated efficiency (output electrical power divided by input kinetic power of the water), change in output power versus size of the turbine blades, etc.

do not use cost

(choosing more than one design requirement will not result in a higher grade)

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Constraints:

You will have the following constraints:

- You may not use a simple, large-scale hydroelectric dam model for this project.
- You may not use cost as a design requirement.
- You must follow ALL school safety rules and document your work in your Capstone portfolio.
- No equipment or materials that belong to the laboratories can be removed from the laboratories at any time. You must conduct those tests that require this equipment in the labs.