The Potential of Tidal Energy for Small Island Developing States (and other states, as well)

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The Potential of Tidal Energy for SIDS

There are four basic questions you may have about Tidal Energy:

The Potential of Tidal Energy for SIDS

There are four basic questions you may have about Tidal Energy:

1. Does my country have Tide-Energy potential?
2. Can Tidal Energy be captured in a simple, inexpensive way?
3. How can we evaluate our Tide-Energy potential?
4. Can we get technical assistance to make an initial evaluation?

1. Does my country have Tide-Energy potential?

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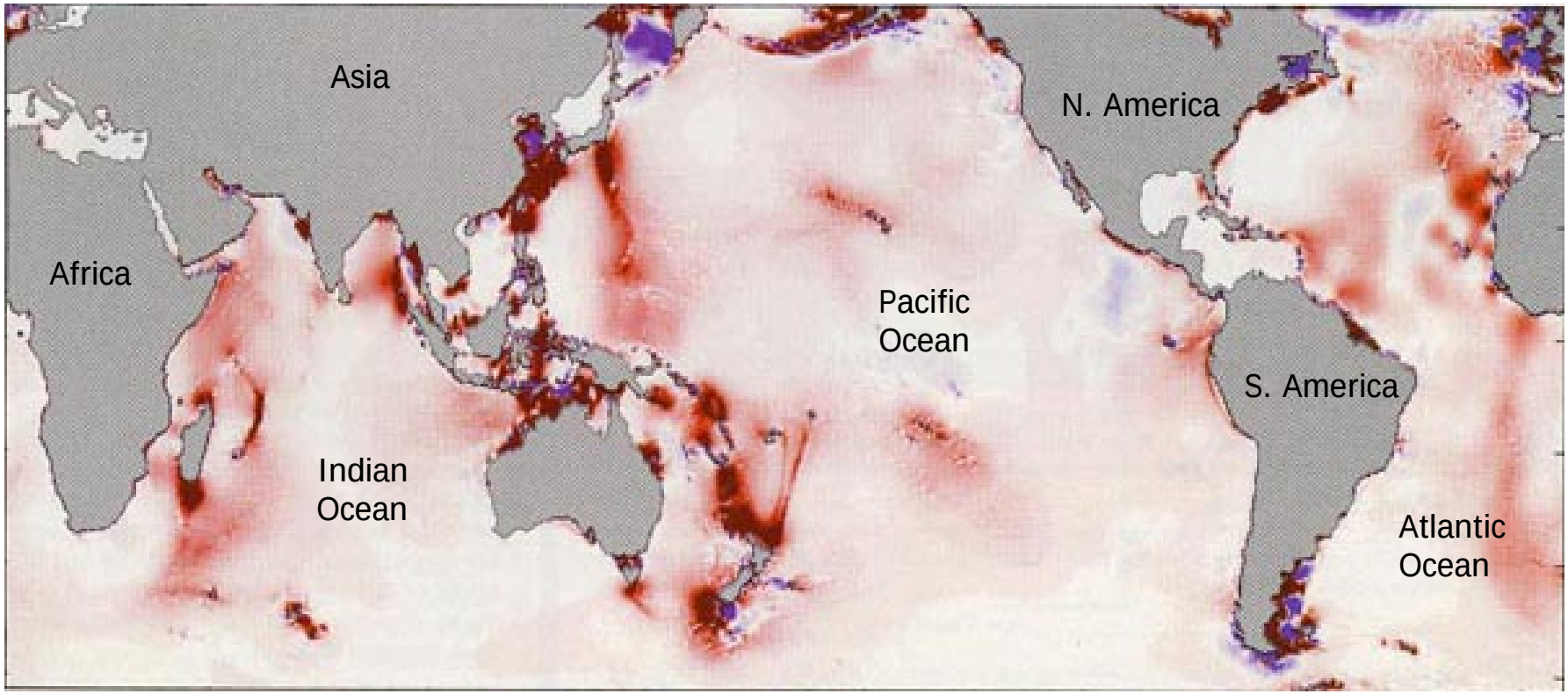
Examine the following map

and determine if your country is in a red area

with more intense Tidal Energy.

Worldwide distribution of Tidal Energy



Red areas in the ocean have the most intense Tidal Energy. //

2. Can Tidal Energy be captured in a simple, inexpensive way?

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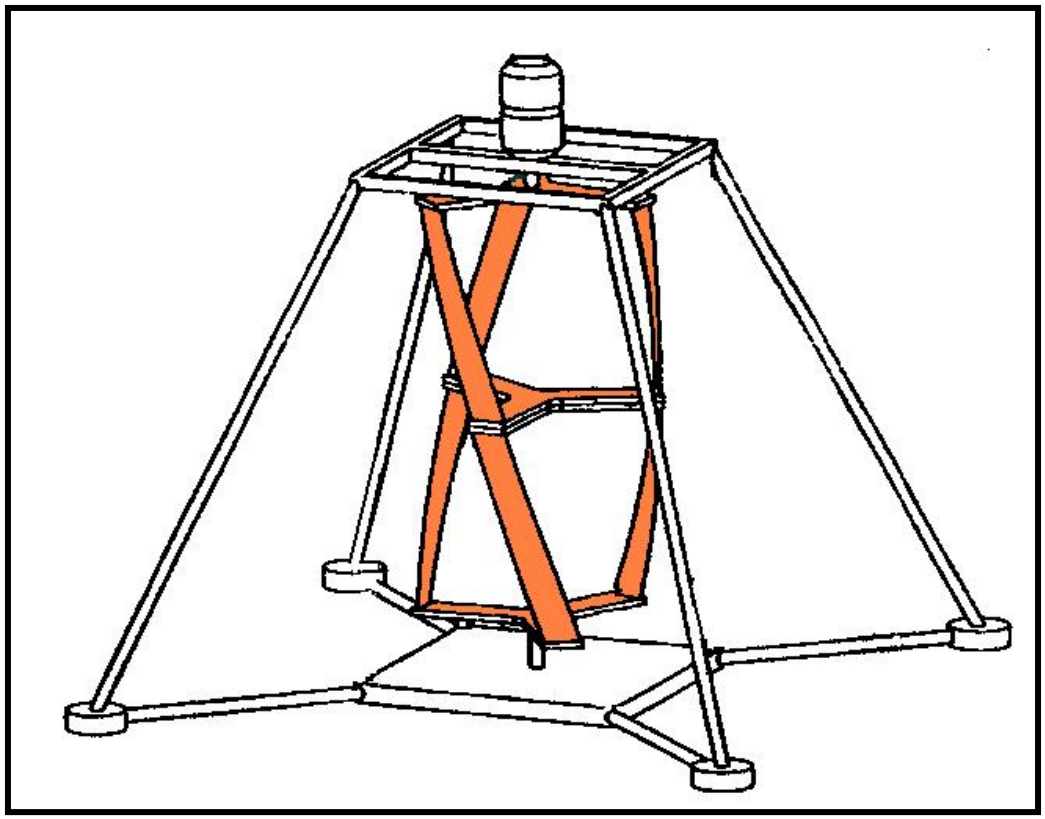
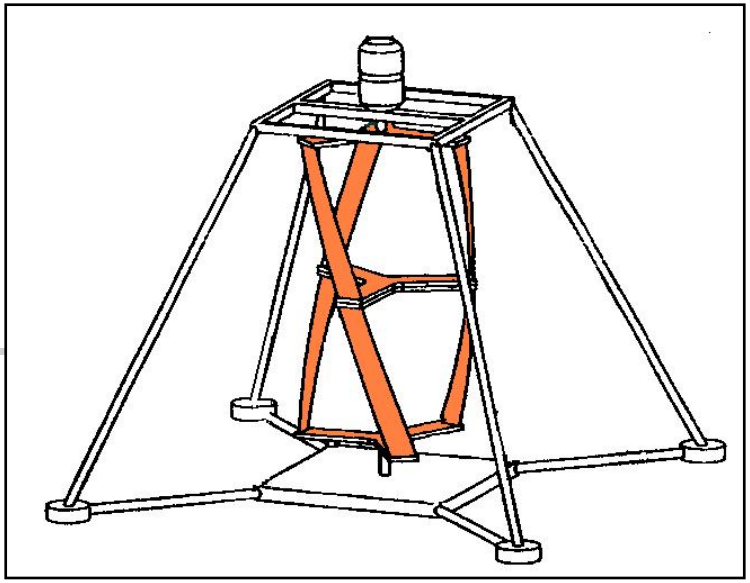
Yes, with a helical turbine



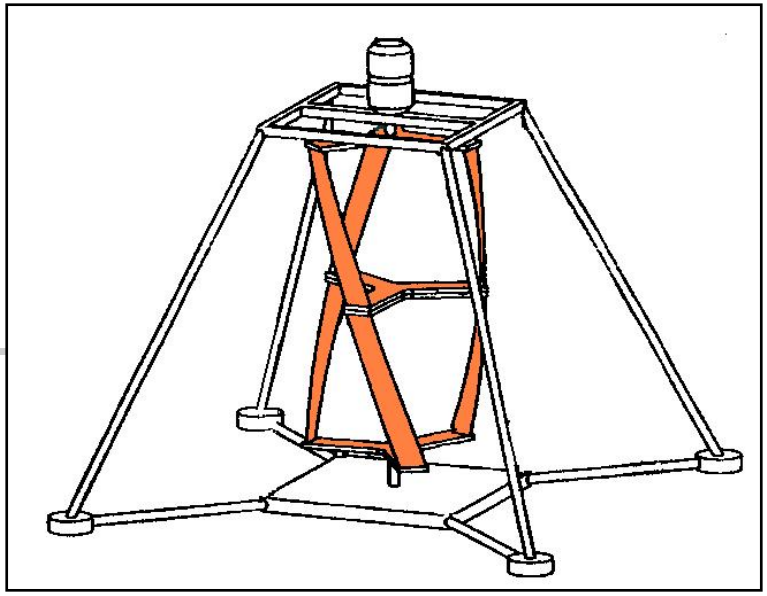
Features of the helical turbine



- designed for hydroelectric applications
  in free-flowing water

- does not require expensive dams
  that can harm the environment

Features of the helical turbine

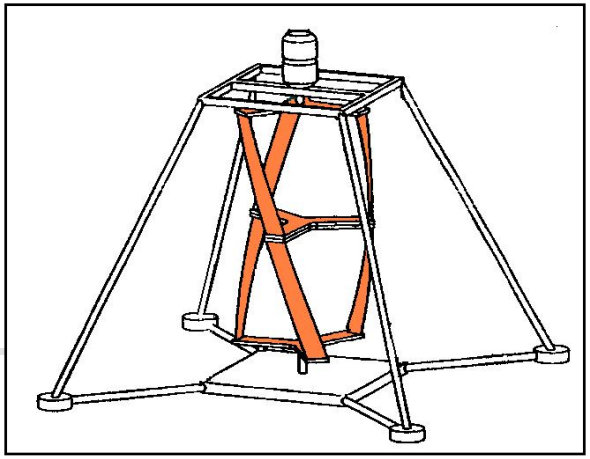


- operates in ocean, tidal, and river currents

- the faster the current,
  the more energy that can be captured

This is very important !

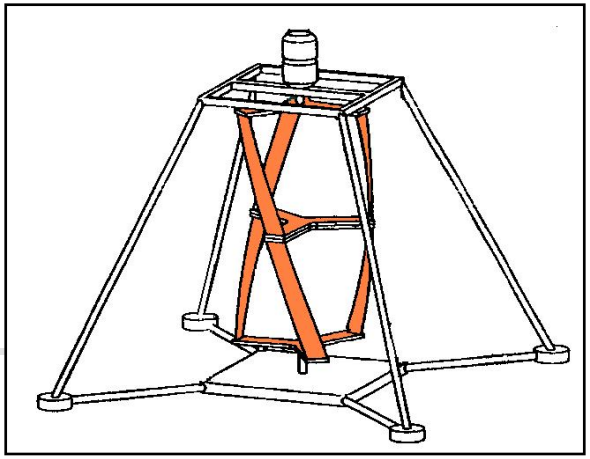
The helical turbine



But, how well does it work?

And how much does it cost?

Features of the helical turbine



- it is very efficient: 35%
- the blades are easy to manufacture:

  1 blade costs about US$ 100 x 6 blades per turbine

Note: the helical blades are manufactured by:
GCK Technology, Inc., San Antonio, Texas, USA

Disclaimer: the presenter has no financial interest whatsoever in this company or in the sale of these blades.

"If I can find a better technology, I will use it."

Features of the helical turbine

Easily built:

The skilled carpenter and mechanic (above) and a local welder built all of the equipment necessary to mount the blades and generate electricity.

Features of the helical turbine

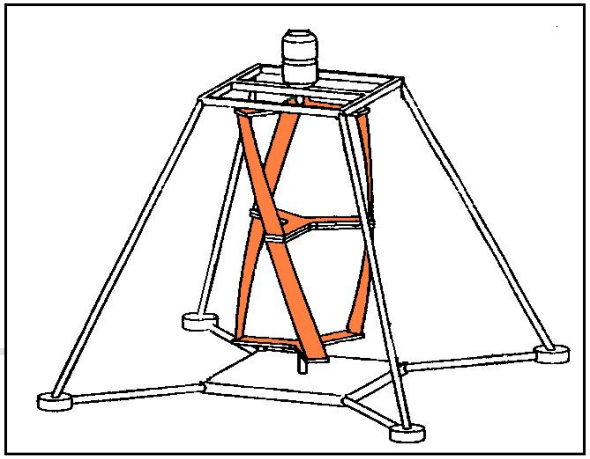
A complete generating system

(b) driveshaft, pulley, and belt

(c) automotive alternator to charge batteries

(a) 6-blade helical turbine

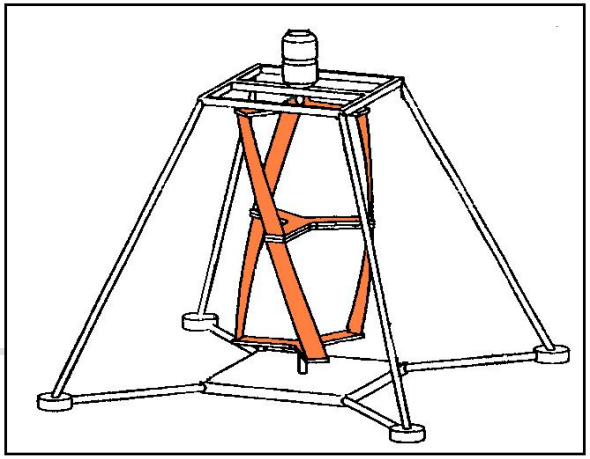
Features of the helical turbine



Locally built:

- About 80-90% of a Tide-Energy station can be built using locally available labor, materials, and equipment.
- Only the technically refined helical turbine blades are outside components.

Features of the helical turbine



Benefits:

- Energy production: 120 A-h/day
- Sufficient to meet basic needs of 10 households at World Bank and Brazilian government standards for rural, solar electrification projects. //

3. How can we evaluate our Tide-Energy potential?

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Using tidal energy is site-specific.

That is, the characteristics of each potential tide-energy site are probably different.

Therefore, each site should be evaluated individually.

3. How can we evaluate our Tide-Energy potential?

Two key factors about a site:

- the location of the site in relation to the user
- the speed, duration, and frequency of the tidal current at the site

These two factors should be studied in that order.

3. How can we evaluate our Tide-Energy potential?

<u>Step 1 – select the better Tide-Energy sites</u>

One key consideration regarding site location:

Energy stored in batteries

does not travel well or last long.

3. How can we evaluate our Tide-Energy potential?

So, the better Tide-Energy sites will be:

- close to users
- or convenient for them to reach.

3. How can we evaluate our Tide-Energy potential?

How can we select the better tide-energy sites?

- use local knowledge
- use maps and charts

3. How can we evaluate our Tide-Energy potential?

Persons with extensive knowledge
of the people and the waters in an area
may be able to select the best
potential tide-energy sites
merely with the aid of maps and charts.

If so, Step 1 can be completed quickly and inexpensively. //

3. How can we evaluate our Tide-Energy potential?

<u>Step 2 – measure the tidal current at the better sites</u>

Key features to evaluate the tidal current at a site:

- How fast? meters per second
- How long? hours per day
- How often? days per month

3. How can we evaluate our Tide-Energy potential?

In order to generate electricity effectively with the helical turbine, the flow of water at a site must be at least:

- 1.5 meters per second, or 3 knots.

A significant length of time with that minimum flow might be:

- on the order of 6 to 12 hours per day
- for more than 2 to 3 weeks per monthly tide cycle.

3. How can we evaluate our Tide-Energy potential?

How can we measure tidal current velocity, duration, and frequency?

With local labor and patience you can make an initial evaluation by using very simple equipment.

3. How can we evaluate our Tide-Energy potential?

Necessary equipment:

(1) bottle weighted so only the neck is visible floating above the water;

(2) a line to attach securely to the bottle;

(3) a tape to measure the length of the line; and

(4) an inexpensive digital watch with a stopwatch feature.

3. How can we evaluate our Tide-Energy potential?

How can we measure and calculate the speed of the tidal current?

From a fixed position, put the bottle in the current and count the number of seconds until the bottle reaches the end of the line.

Then calculate:

$$\frac{\text{Length of line in meters}}{\text{Number of seconds}} = \text{meters per second}$$

3. How can we evaluate our Tide-Energy potential?

How many measurements in the field are needed?

Because the speed of the tidal current varies by day, week, and month, a number of measurements will be necessary.

3. How can we evaluate our Tide-Energy potential?

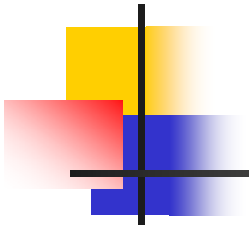
To make an initial evaluation of the tidal current at a site, the speed of the current should be measured at least:

every 15 minutes during a tide cycle (12 hours),
once a week, for three months.

That would mean 13 days of measuring, spread over 3 months.

Is that do-able for you?

This would conclude Step 2. //



3. How can we evaluate our Tide-Energy potential?

With this information it should be possible make an initial evaluation of the Tide-Energy potential of the site.

If the site has sufficient Tide-Energy potential, then it might be of interest to you to proceed on to the next stage, that of a pilot project. //

Three main points

1) The capture of Tidal Energy
   using helical turbine technology can be done
   in a simple, inexpensive way,
   using much local labor, material, and
   equipment.

Three main points

2) But, before implementing Tide-Energy technology, each Tide-Energy site must be evaluated in terms of:

- its location in relation to users
- the speed, duration, and frequency of tidal current at the site.

Three main points

3) This initial evaluation can be done inexpensively using local labor and resources in just a few months.

4. Can we get technical assistance to make an initial evaluation?

4. Can we get technical assistance to make an initial evaluation?

Yes. Insofar as my time allows, I would be pleased to assist (via e-mail) anyone interested in making initial Tide-Energy site evaluations.

There would be no charge for this. Good Luck.

Scott Anderson

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