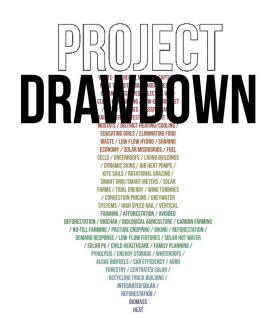


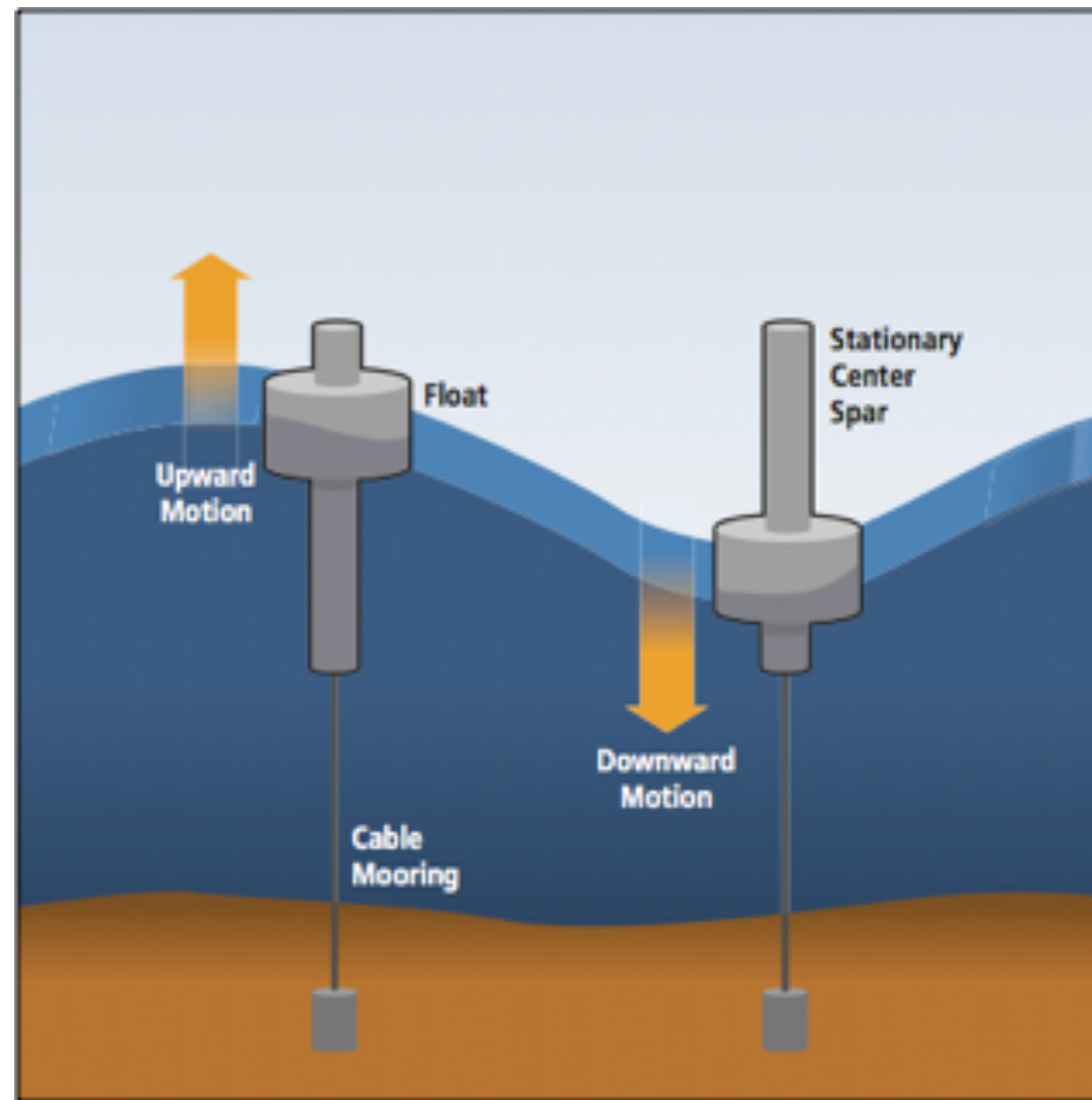
Wave & Tidal Energy (WTE)

George Randolph

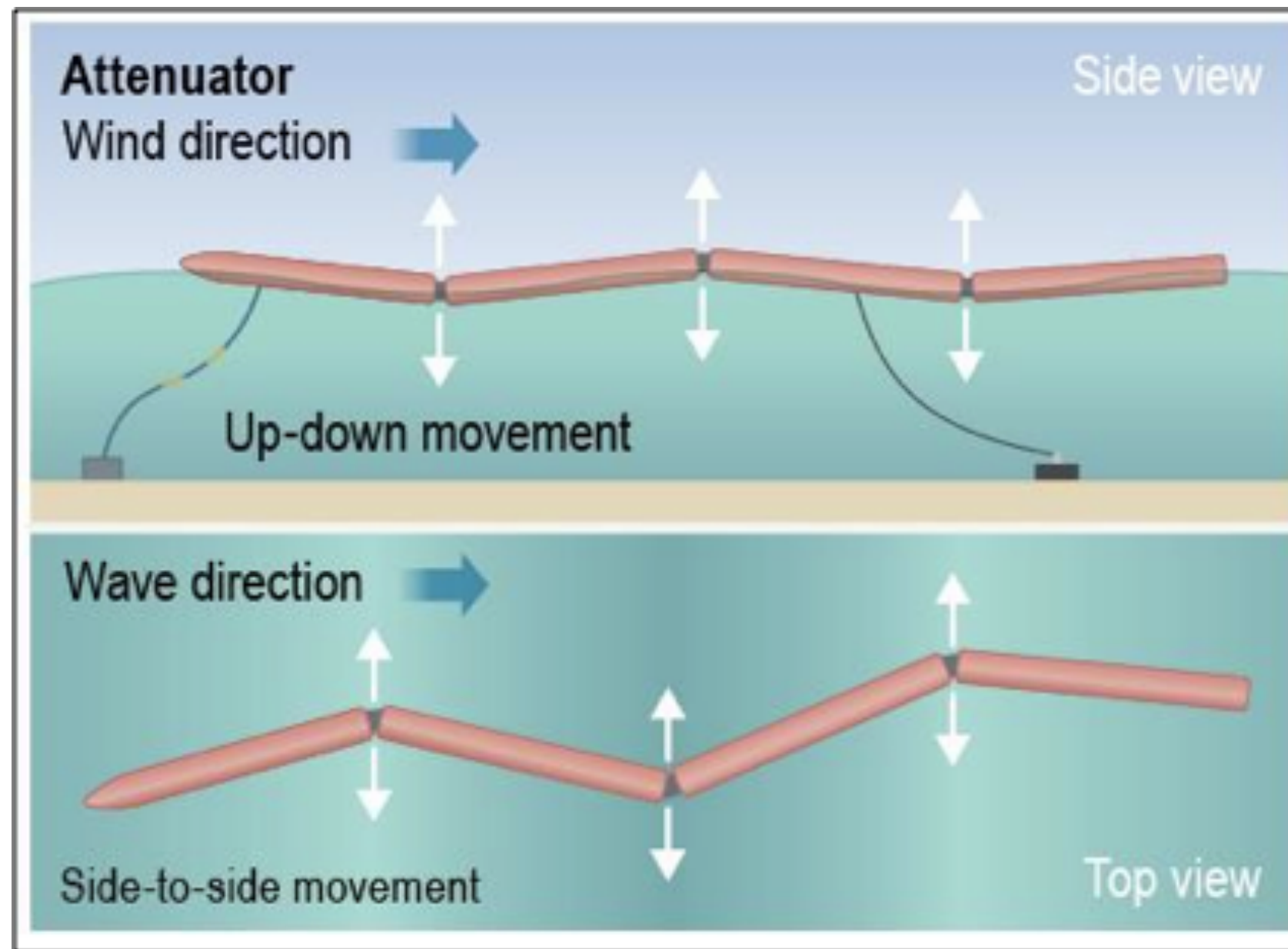
17 September 2015



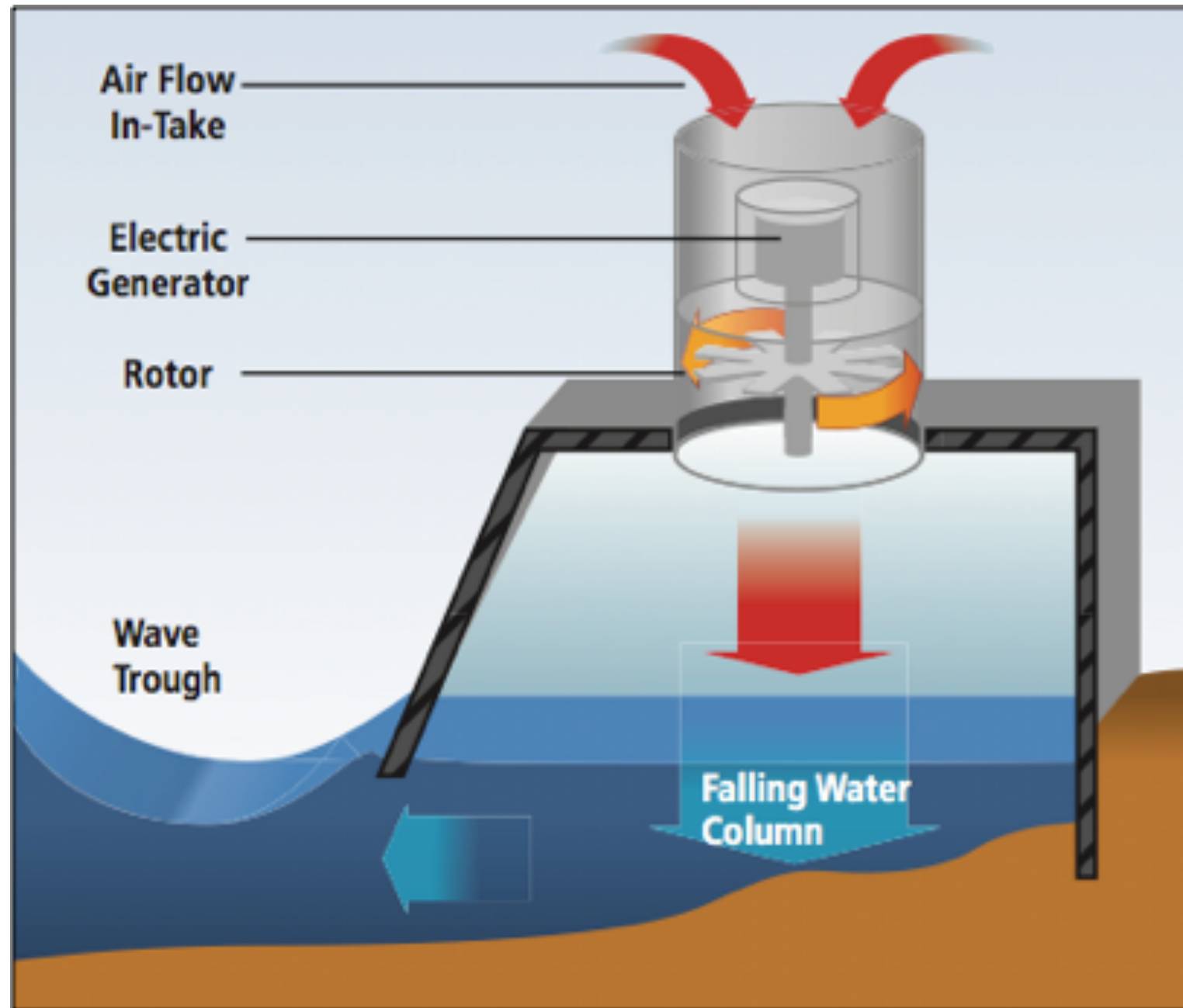
Point Absorber Buoys



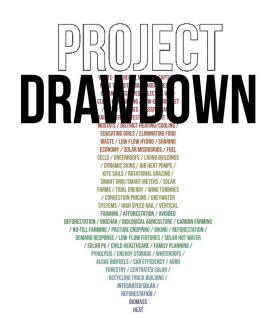
Surface Attenuators



Oscillating Water Columns



The diagram illustrates a tidal turbine system. A central reservoir is shown with water flowing into it from two red arrows at the top. A turbine is located at the bottom of the reservoir, with a red arrow pointing downwards from it, labeled 'Turbine Outlet'. A blue arrow at the top right indicates 'Overtopping' of the reservoir's rim. The entire system is supported by a brown base, likely representing the seabed or ground.



OES OCEAN ENERGY SYSTEMS

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to the name of any
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Legend and metadata
information of layer "Wave
power"

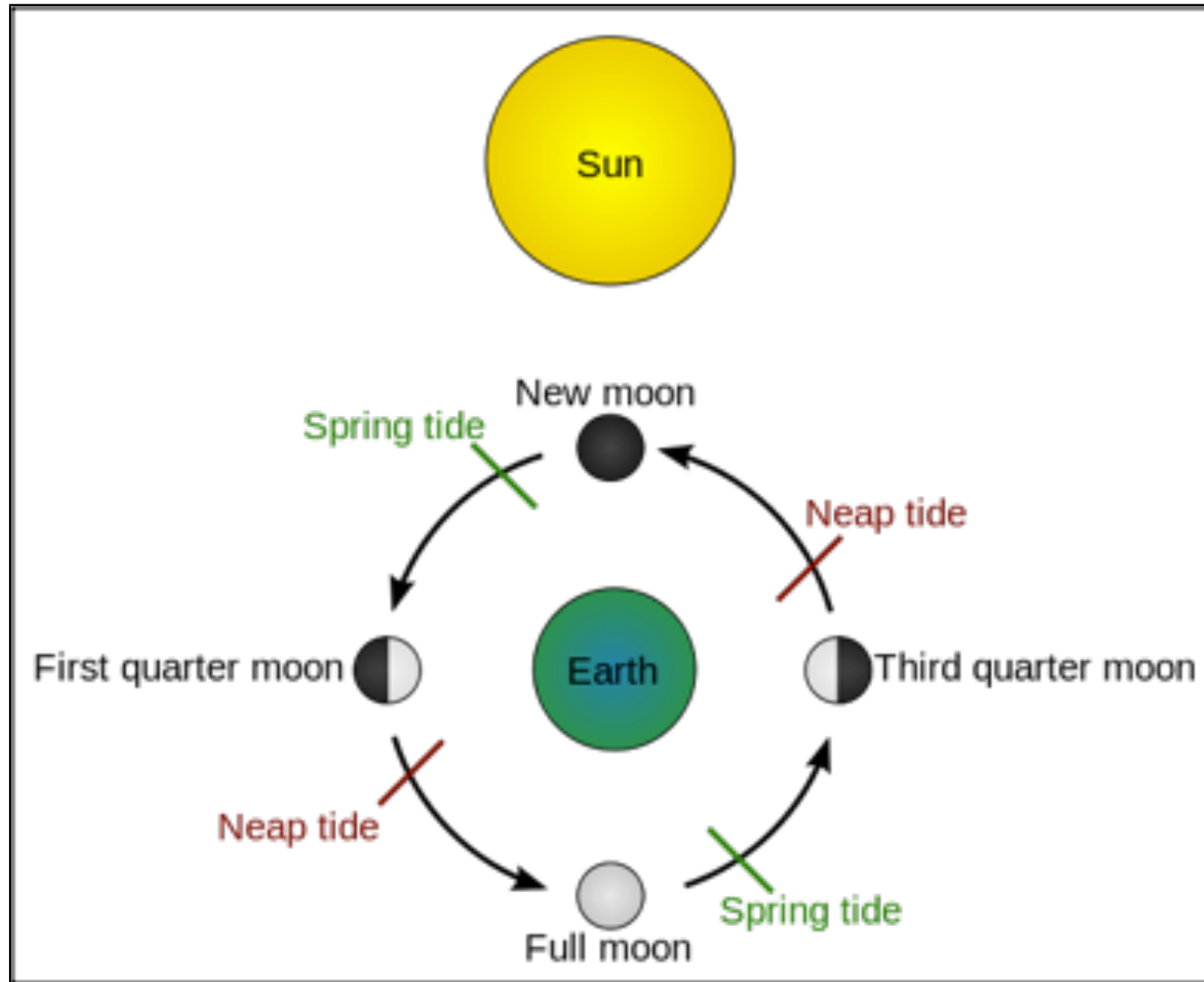
Legend Metadata

Wave power

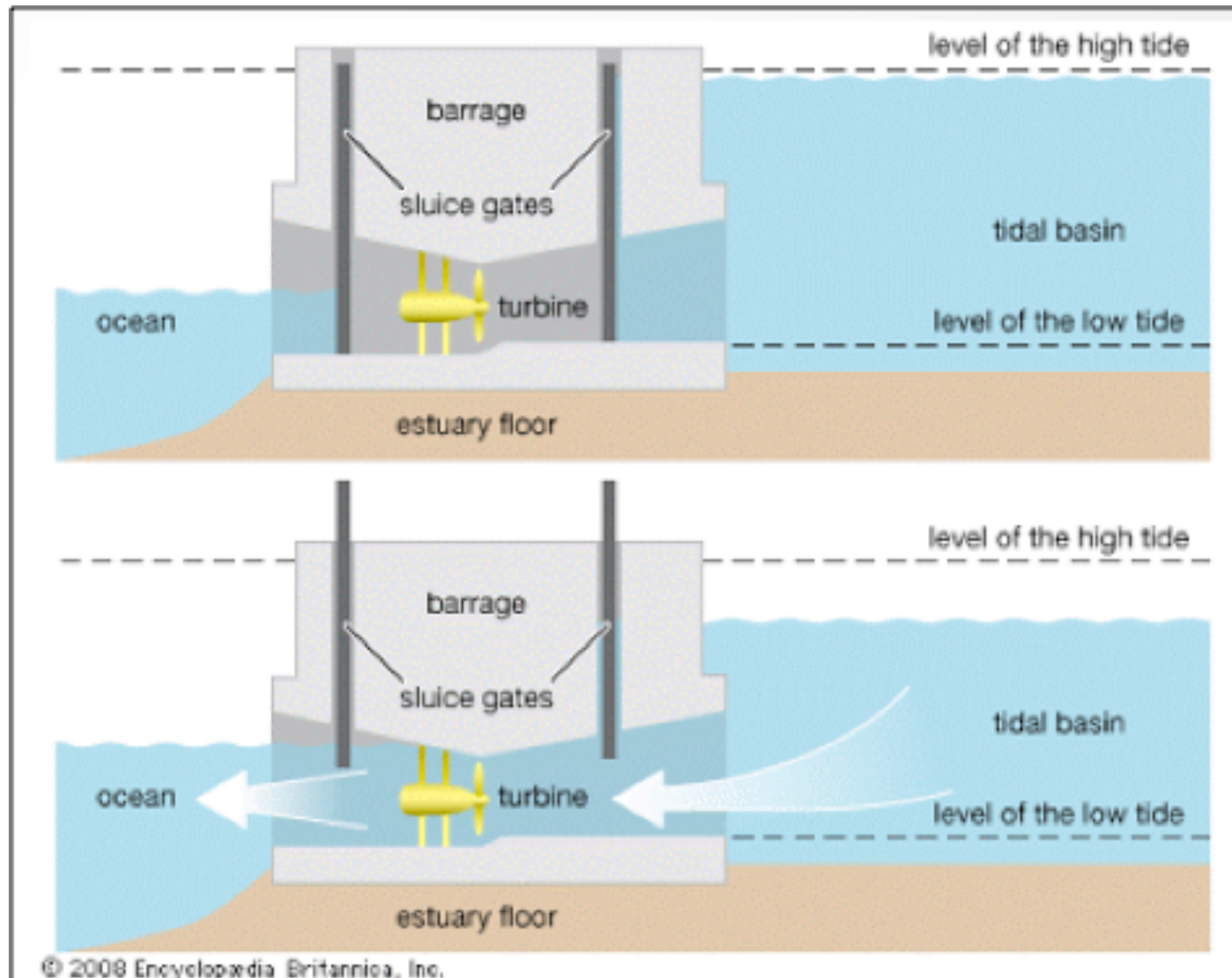
- 0 kW/m
- 10 kW/m
- 20 kW/m
- 30 kW/m
- 40 kW/m
- 50 kW/m
- 60 kW/m
- 70 kW/m
- 80 kW/m
- ≥ 90 kW/m

Name	Location	Capacity (MW)
Pico Wave Power Plant	Portugal (Atlantic Ocean)	0.4
Mutriku Wave Energy Plant	Spain	0.3
Perth Wave Energy Project	Australia	0.72
Wave Pendulum	China	0.03

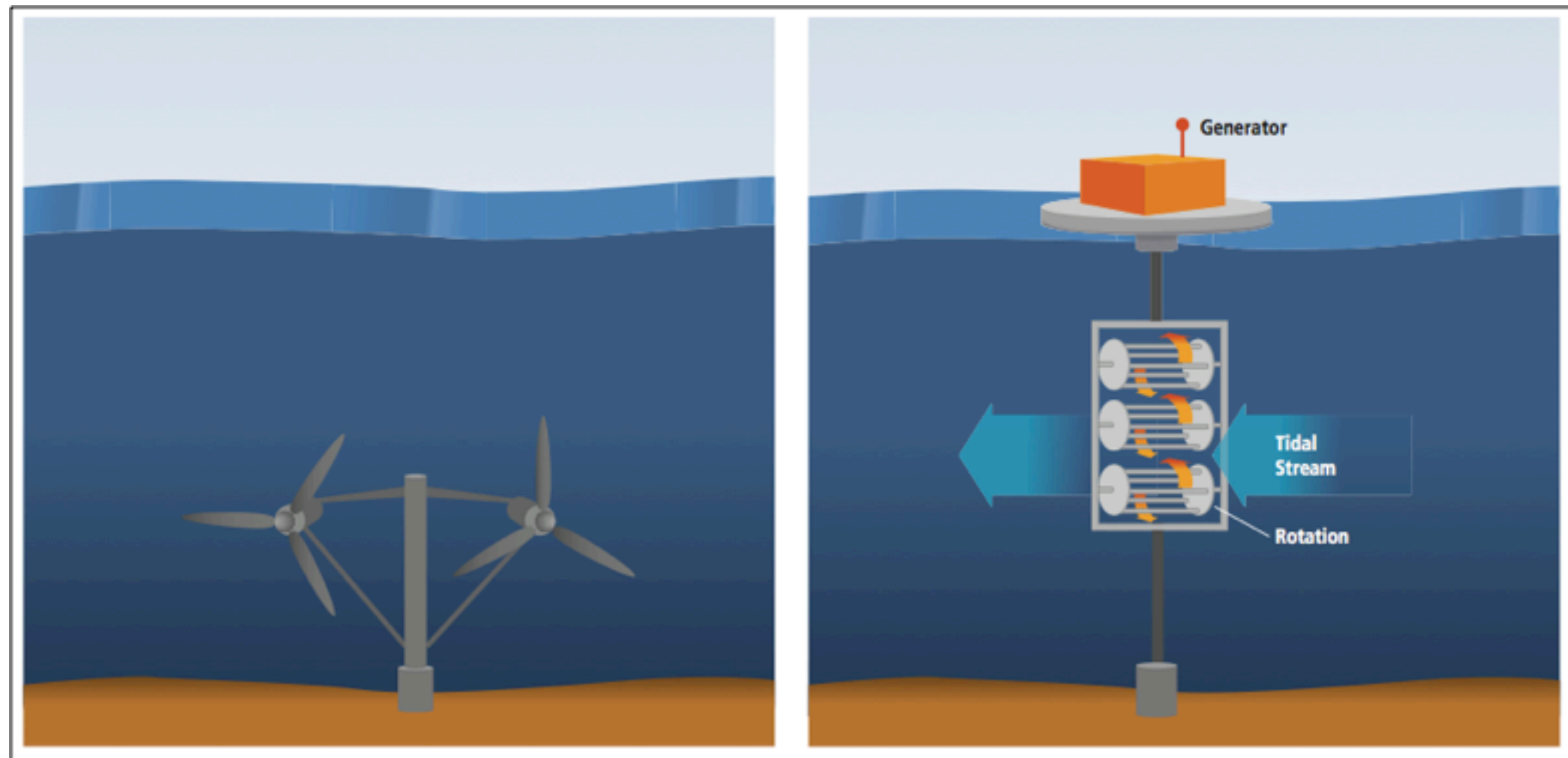
Tidal Energy

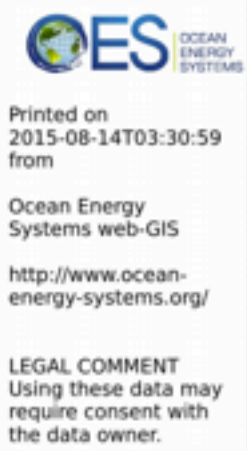


Tidal Barrage System

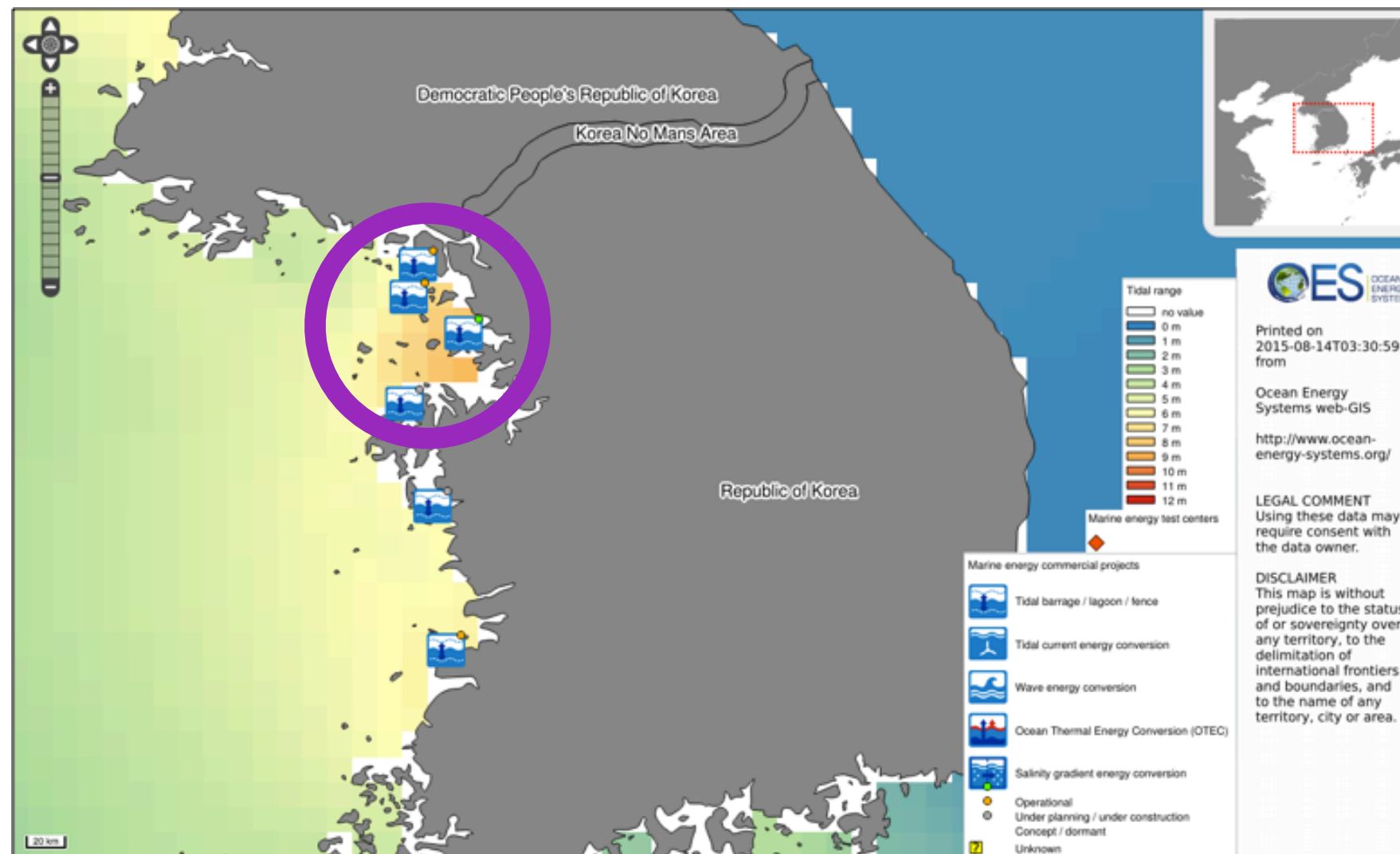


Tidal Currents



[illegible]

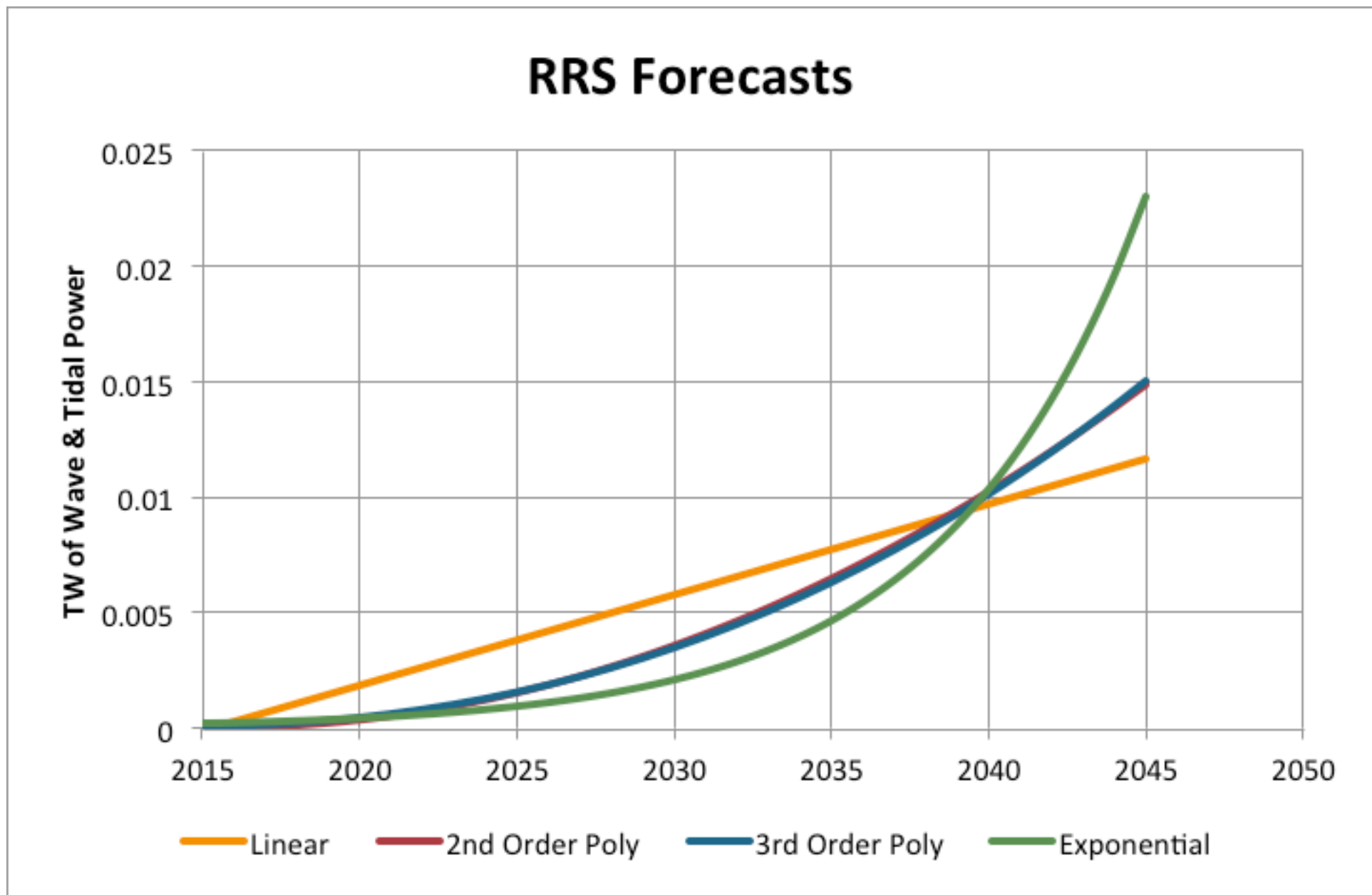
Tidal Resource



Name	Location	Capacity (MW)
Sihwa Lake Tidal Power Station	South Korea	254

- Determine percentage of electricity from WTE: 0.005%
- Derive BAU forecast from AMPERE database with the WTE percentage and capacity factor

[illegible]



Results

Metric	Value
Max Annual Emissions Reduction	0.22 Gt CO2/yr
Total Emissions Reduction (2015-2045)	1.7 Gt CO2
Approximate ppm equivalent (2045)	0.16 ppm CO2 eq
Approximate ppm Rate of Change in 2045	0.0192 ppm CO2-eq
Cumulative First Cost	\$601 B
Marginal First Cost	\$342 B
Cumulative Net Cost Savings	\$1.7 T
Global Units Installed by 2045	.154 TW
Lifetime Savings	\$5.4 T
Lifetime Savings NPV	\$210 B



Discussion

- More predictable than solar or wind
- Still in developmental stages
- High upfront capital cost
- Ecological impacts

[illegible]