

Wind Energy

Gordon Peabody

Safe Harbor

safeharborenv.com

Doesburger Windmill



The Netherlands

Modern Rural Windmill



Germany

Wind Turbine



Denmark

Are there any wind energy choices besides horizontal axis?

Vertical Axis Wind Turbines



Lift-based
(cup anemometer)[]

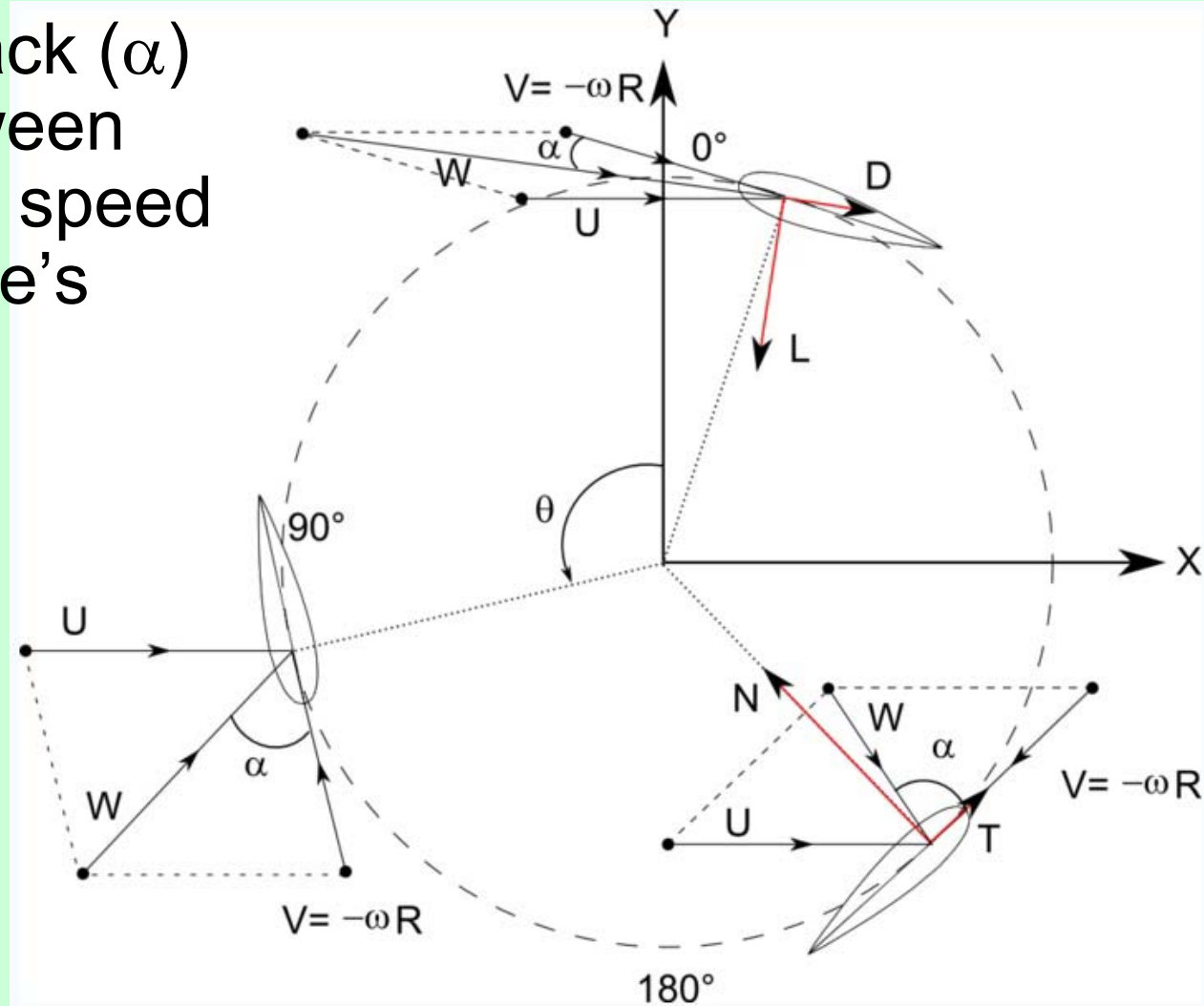
Two types:



Drag-based
(Savonius rotor)[]

V.A.W.T. Aerodynamics

- The angle of attack (α) is the angle between the oncoming air speed (W) and the blade's chord.
- The resultant airflow creates a varying, positive angle of attack to the blade in the upstream zone of the machine



Windspire - Turbine For Your Backyard



- 30' tall × 2' wide
- Propeller-less
- Bird-safe
- Relatively quiet
- ~\$4,000



PacWind V.A.W.T.

- Self-starting
- Self-regulating
- Captures very low-speed winds
- Maintains peak power output in high winds without over spinning



Quiet Revolution

- Virtually silent and vibration-free
- Ideally suited to both urban sites and exposed locations
- Simple, robust design has just one moving part

Helyx Wind Generator



- Composed to two twisted wings of fiberglass that rotate around a vertical axis
- Designed to take advantage of low wind speeds
- Will be tested on the rooftops at Portland State University to see if they adequately harvest energy in an urban environment

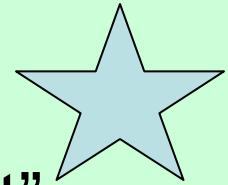
New Turbine Design Wins Sustainability Award



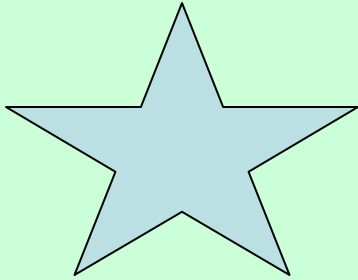
- Ben Storan's affordable personal wind turbine is suited to the urban environment
- Vertical rotation allows the turbine to capture three times more energy than current models

Mag-Wind V.A.T. For Your Home

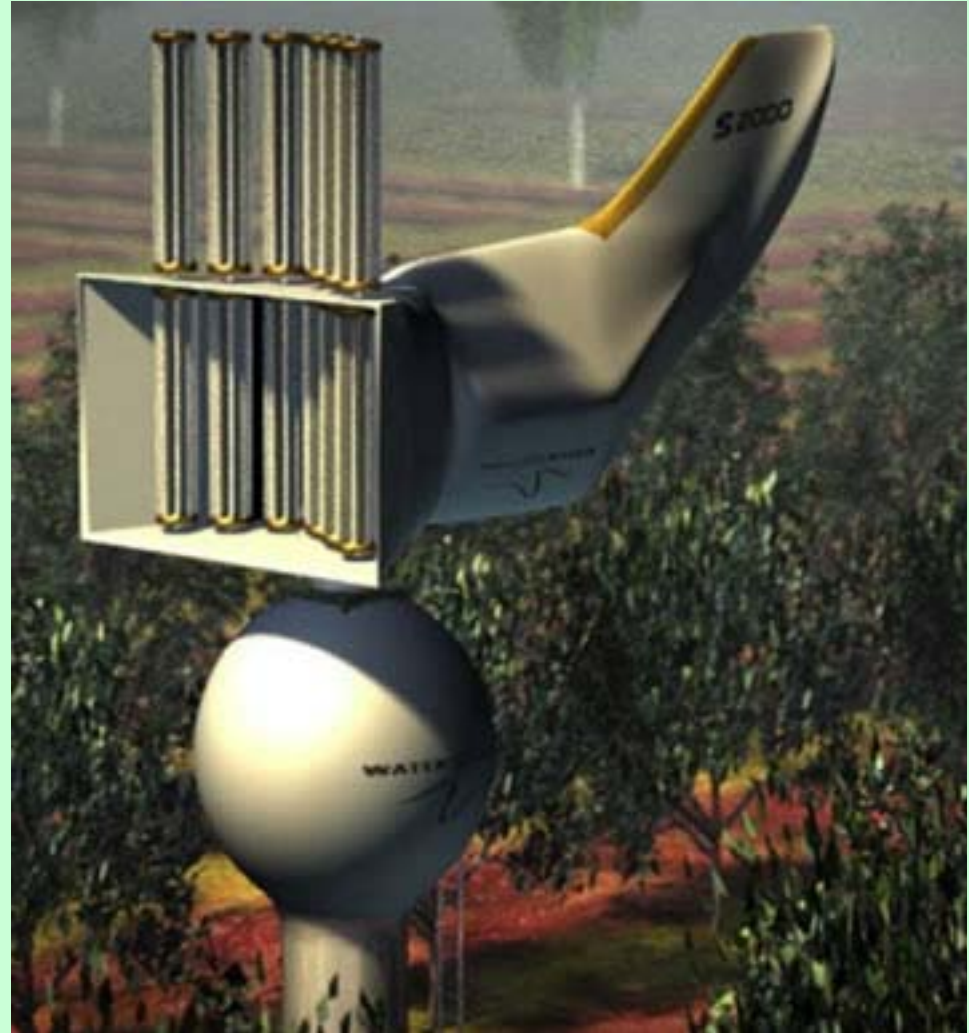
- Works well in developed areas
- Gets an extra kick from the “roof effect”
 - A roof with a 10’ vertical rise and a 30% angle will provide nearly a 200% increase in the amount of wind energy that is available to be turned into electricity



Max Whisson's Gust Water Trap Apparatus



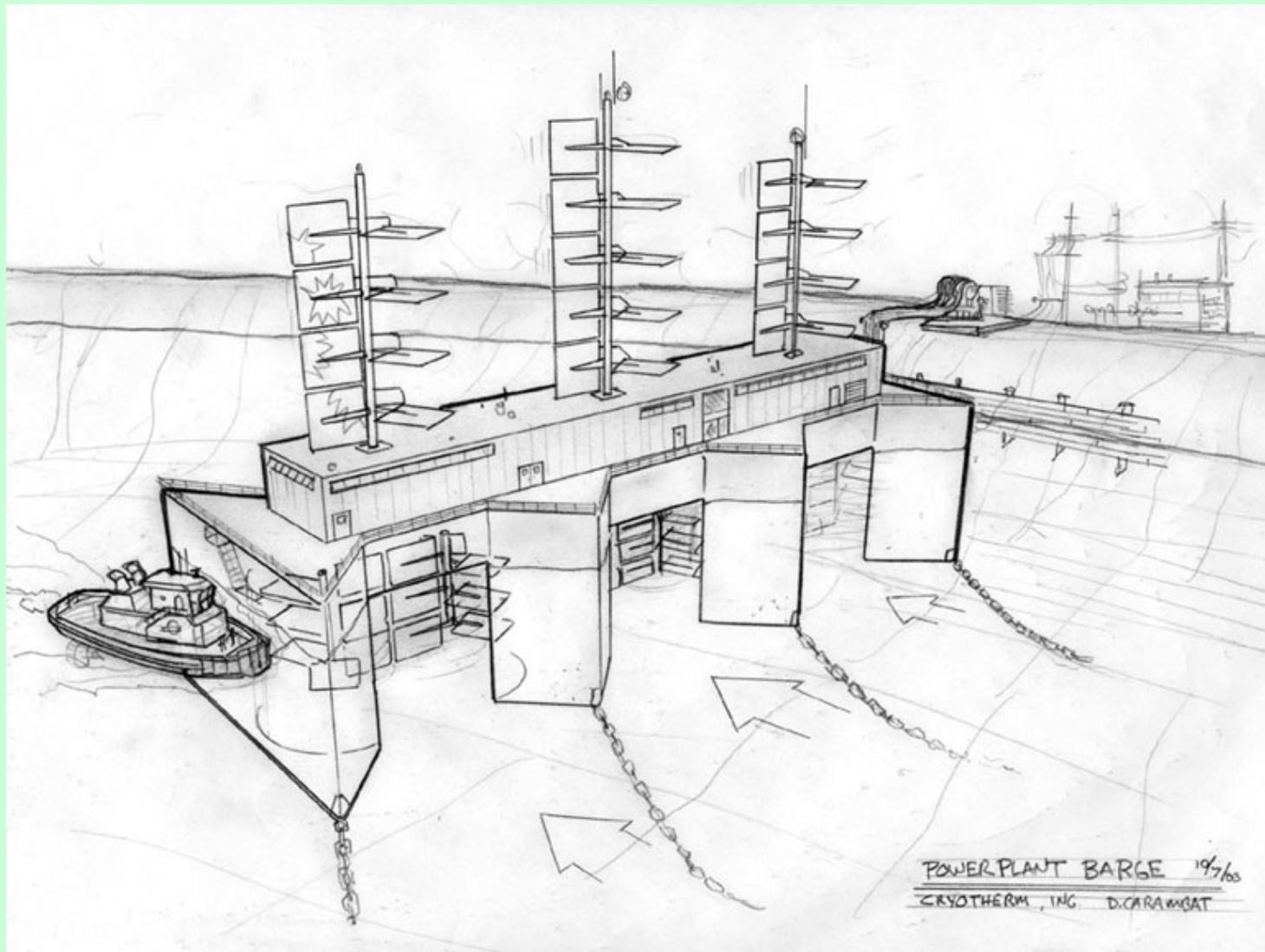
- Cools air passing through the whirling blades
- Collects condensate, yielding fresh water from air





GC Power

- Combine multiple turbines into structures called “WindWalls”
- Generate electricity in locations where current wind-farming technology is not feasible, such as off-shore platforms and tops of buildings



Artist rendering of power barge that has wind turbines above the barge and has “run-of-the-river” hydro-turbines below the barge (<http://www.fuellessflight.com>)