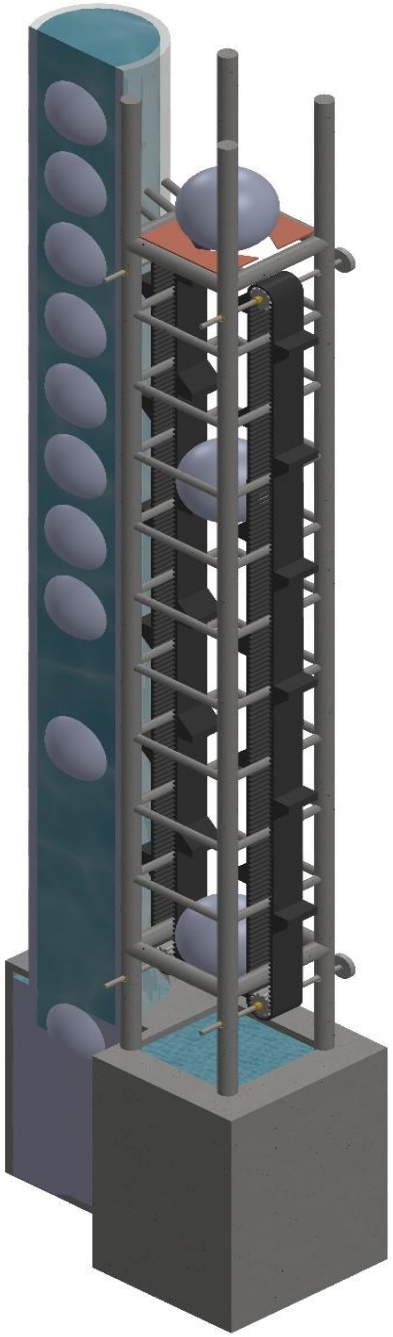


Renew Joule
generating a fresh future

Cheapest green renewable electricity 24x7 anywhere in world.

First time introduced

by
Renew Joule LLC

Close Loop Vertical Hydro Tower (“CLVHT”)

Hydroelectric Power Generation

Spheres Falling Down & Floating Up In Closed Chambers – Gravity & Buoyancy

Profile

RENEW JOULE LLC is a USA legal entity formed in Wyoming, a US state known for being tax free and exceptionally friendly to business (continued ease of operation is certain).
RENEW JOULE LLC is joint venture of India based Rachana Global Group and Pacific Rim Energy Inc, Texas USA.
Rachana Global was established in 1996 which is mainly engaged in mining of coal in Africa and Australia AND power generation and manufacturing of FMCG products like Detergent, Shampoo, Toilet soap and other hygienic products in India. Total group turnover of Rachana Global is 1 Billion US Dollar.
Pacific Rim Energy ("PRE") is an energy development business based in Austin, Texas, with additional offices in Del Mar, California, Las Vegas, Nevada, Vancouver, British Columbia, Moscow, Russia, and Shenzhen, China. Pacific Rim Energy has been serving since 1998.
Pacific Rim Energy plans, funds, and executes energy projects around the world. Pacific Rim Energy focuses on environmentally friendly projects, even including fossil fuel projects, done in the most environmentally friendly ways. Pacific Rim Energy has developed oil & gas, hydroelectric, wind, and solar projects, including innovative technology and energy storage aspects. Pacific Rim Energy has served as well in addressing urgent metropolitan issues such as water, sewage, and transportation.

Pacific Rim Energy's team has over 100 years of experience in energy and project finance. In regard to development, Pacific Rim Energy has served in over one billion USD in projects.

Profile

In storage, Pacific Rim Energy has over 14 years of experience in batteries. In transportation, PRE participated in re-evaluating the city of San Francisco's public transport system. In regard to funding, Pacific Rim Energy has placed over two billion USD into development.

RENEW JOULE LLC was formed over a year ago at the time we were requested to provide expertise in renewable energy projects (Ukraine solar at that time) and the time that our own, proprietary technology as described in our Closed Loop Vertical Hydro Tower ("CLVHT") documentation. RENEW JOULE LLC is a private, closely held company, taxed as a US corporation. RENEW JOULE LLC is in complete compliance with regulatory matters.
In regard to the CLVHT technology, we have had it reviewed by US-based experts who have found it to be extraordinary – fast construction, quick to operation, freedom in location, open to site, low maintenance, low cost operation, 24/7/365 reliability, and completely environmentally promotive. Our extensive, thorough development was completed in Summer 2007. We had immediate positive interest (see Meghalaya project documentation https://www.telegraphindia.com/states/north-east/pact-boost-to-power-sector-in-meghalaya-195058). Given its attributes, all markets will be accessible.
In regard to operation for the US, RENEW JOULE LLC has satisfied the initial contact and clearance for construction and operation in both of the states of Texas and Wyoming. Sites have been determined in both states. Both states have "open grids" and high demand for green energy. CLVHT has experienced tremendous demand from major individual users which will spread rapidly beyond our "starter" states across the US.
RENEW JOULE LLC is open to partners who understand the response that our technology will enjoy.

About Us

Our proprietary design started in our engineers' minds years ago, years filled with designing, testing and costing. We achieved the fully operational, efficient, economically sensible design that is available to the world today.

The many hours and skills we invested in the Closed Loop Vertical Hydrotower Turbine was by many talented engineers who, while unnamed here, were critical to bringing this concept to operation. This team continues for implementation. And ours is cross-continental venture (USA, India, Africa, Australia).

We are an aspiring renewable energy generation company. We have sophisticated energy generation methodology. We started in India. We have offices in India and USA.

Our goal is to provide power which is economical, sustainable and nature friendly.

Our vision for the future includes creating a better micro-grid infrastructure for Electric Vehicles' charging stations.

Some of our team

Mr. Ishit Sompura: Mr. Sompura brought his engineering creativity and design to fruition in the CLVHT. In years of leading innovative techniques, Mr. Sompura learned how to make the impossible possible, and economically feasible.

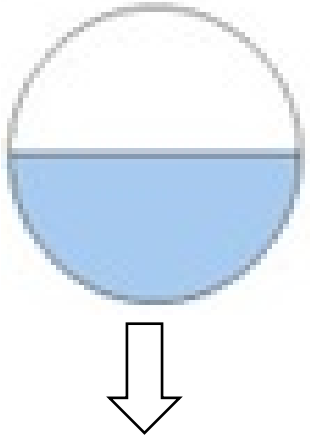
Mr. Jim Quinlan: Mr. Quinlan applied his years of experience in innovative financial and structural solutions to business issues – securities compliance, fund raising, and taxes – in start-ups and funds, Mr. Quinlan has fueled the impact that CLVHT will bring to the market.

Mr. Dhruv Gajjar: A young dynamic mechanical engineer working as executive engineer to make project working on ground and serving society by cheap and 24x7 electricity and drinking water from Air with AWG technology.

Technology

Principle:

This machine is based on a simple principle – i.e., when an object is placed on a higher level, gravitational force pulls to lower level and thereby gains kinetic energy on its way down. This kinetic energy can be transformed into electrical energy. Like water reservoir dam hydro-power electricity generation system.



Formula of **Free fall**, for terminal velocity and time to travel.

$$v_f = \sqrt{v_i^2 + 2 * a * d}$$

Where,

v_i	=	Initial Velocity	m/s
v_f	=	Final Velocity	m/s
a	=	Acceleration	m/s^2
		In this case Gravitational Constant	
d	=	distance	m

$$d = v_i * t + \frac{1}{2} * a * t^2$$

$$d = \frac{v_i + v_f}{2} * t$$

Where,

v_i	=	Initial Velocity	m/s
v_f	=	Final Velocity	m/s
d	=	Distance	m
a	=	Acceleration (Gravitational)	m/s^2
t	=	Time	s

Values:

v_i	=	0	m/s
g	=	9.80665	m/s^2

Height (m)	Final Velocity (m/s)	Time to travel (s)
50	31.31557121	3.193299568
60	34.3044895	3.498084412
70	37.05308354	3.778363003
80	39.6114125	4.039239954
90	42.01424758	4.284260944
100	44.28690551	4.516007558
110	46.44849836	4.736428685
120	48.5138743	4.947038418

Buoyancy principle of Archimedes

Buoyancy:

The ability of an object to float is described as its buoyancy. An object that floats in water is said to be positively buoyant.

An object that sinks is negatively buoyant. To determine an object's buoyancy, both its mass and volume must be taken into consideration.

The relationship between object's volume and mass is called its density. Density is defined as the mass of an object per unit volume.

Mathematically, this relationship is described using the following equation

$$density = mass / volume$$

$$\rho = \frac{m}{V}$$

In order to explain how an object's density influences its buoyancy, the behaviour of an object placed in water must be understood.

When an object is placed in water, even a floating object displaces some of that water. The amount of water displaced is a function of the objects mass.

The object sinks into the water until it displaces an amount of water equal to its own mass.

A 1 kg object will sink until it displaces 1 kg of water. This is independent of its size or shape.

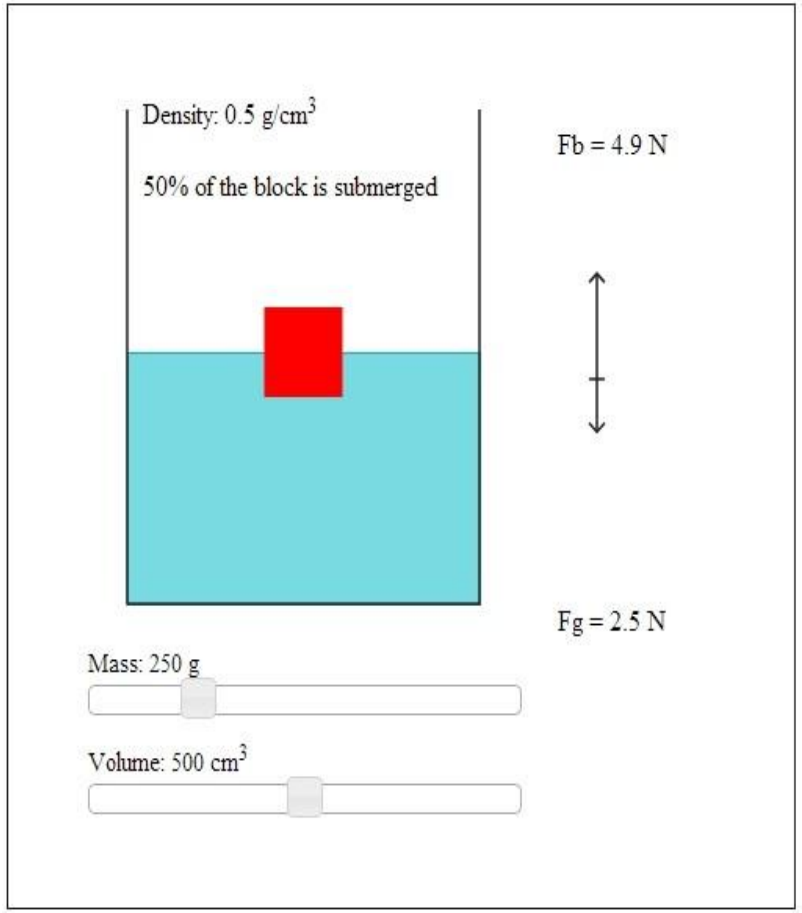
Since water has a density of 1000 kg/m^3, a 1000 kg object will displace 1 m^3 of water.

This means whether or not an object will float or sink depends on its own density and the density of the liquid it is placed in.

In the case of water, an object with a density less than 1 gm/cm3 will float. The closer its density is to 1 gm/cm3, the more of it will sit below the water level.

An object with a density of 0.5 kg/m^3 will sit half in and half out of the water

Three quarters of an object with a density of 0.75 kg/m^3 will be submerged.



An object with a mass of 10 gm (0.01 kg) and a volume of 20 cm^3 (2 x 10^{-5} m^3) will have an Fg and Fb of:

$$Fg = 0.01kg\ x\ 9.8\ ms-2 = 0.098\ kg\ m\ s-2 = 0.098\ N$$
$$Fb = 20\ cm3\ water = 20\ gm\ water = 0.02\ kg\ x\ 9.8\ ms-2$$
$$= 1.96\ kg\ m\ s-2 = 0.196\ N$$

Fg < Fb → the object will float.

For buoyancy acceleration,

BUOYANCY FORCE:

$$F)_{Buoyancy} = \rho * g * V$$

Where,

$\rho = Density\ of\ Water\ \left(1000 \frac{kg}{m^3}\right)$

$g = Gravitational\ Acceleration\ \left(9.80665 \frac{m}{s^2}\right)$

$V = Displaced\ Volume\ (m^3) = 65.45\ m^3$

$$F)_B = 1000 * 9.80665 * 65.45$$
$$F)_B = 641845.2425\ N$$

MASS SELF WEIGHT:

$$Weight = m * g$$

Where,

$m = Mass\ (kg) = 52360\ kg$

$g = Gravitational\ Acceleration\ \left(9.80665 \frac{m}{s^2}\right)$

$$Weight = 52360 * 9.80665$$
$$Weight = 513476.194\ N$$

DRAG FORCE:

For calculating drag force, by experiments for different types of geometry drag co-efficient (C_d) were derived.

Drag co-efficient for different geometries are given in the figure.

$$F)_{Drag} = \frac{1}{2} * C_d * \rho * u^2 * A$$

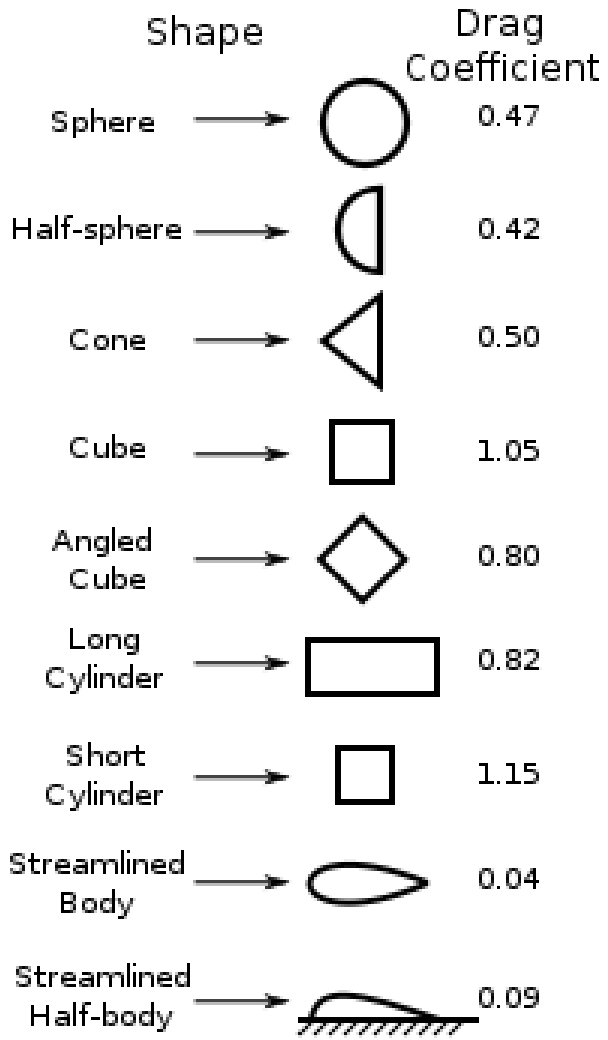
Where,

$C_d = Drag\ Co-efficient$

$\rho = Density\ of\ Fluid = Water = 1000\ kg/m^3$

$u = Flow\ Speed\ of\ object\ relative\ to\ fluid\ \left(\frac{m}{s}\right)$

$A = Reference\ Area\ (m^2) = Area\ of\ Circle = \frac{\pi}{4} * d^2$



Measured Drag Coefficients

According to Newton's 2nd Law of Motion,

$$F)_{net} = m * a$$

$$F)_{Buoyancy} - Weight - F)_{Drag} = m * a$$

Now, buoyancy force is acting in upwards direction, we considering +ve and Weight and Drag force acting downwards, considering -ve.

$$F)_{Drag} = 0.5 * 0.47 * 1000 * (u)^2 * \frac{\pi}{4} * (5)^2$$

By putting this equation in earlier equation will be maximum velocity can be achieved by sphere due to buoyancy. (considering maximum drag)

$$641845.2425 - 513476.134 - 0.5 * 0.47 * 1000 * (u)^2 * \frac{\pi}{4} * (5)^2 = 0$$

Solving,

$$u = 5.27450109 \frac{m}{s}$$

Maximum velocity sphere can achieve until drag force becomes maximum. It can't attain more than 5.28 m/s velocity.

For +ve acceleration and ease of calculation we are considering maximum velocity 5 m/s.

Now, similarly distance at which different velocity can be achieved and required time can be found by kinematic equations as mentioned below.

According to equations of falling object, Kinematic equations may applied to calculate velocity and distance.

$$v_f{}^2 = v_i^2 + 2 * a * d$$

$$d = \frac{(v_f^2 - v_i^2)}{2 * a}$$

By this equation, distance travelled by sphere can be found with respect to final velocity.

$$v_f = v_i + a * t$$

$$t = \frac{v_f - v_i}{a}$$

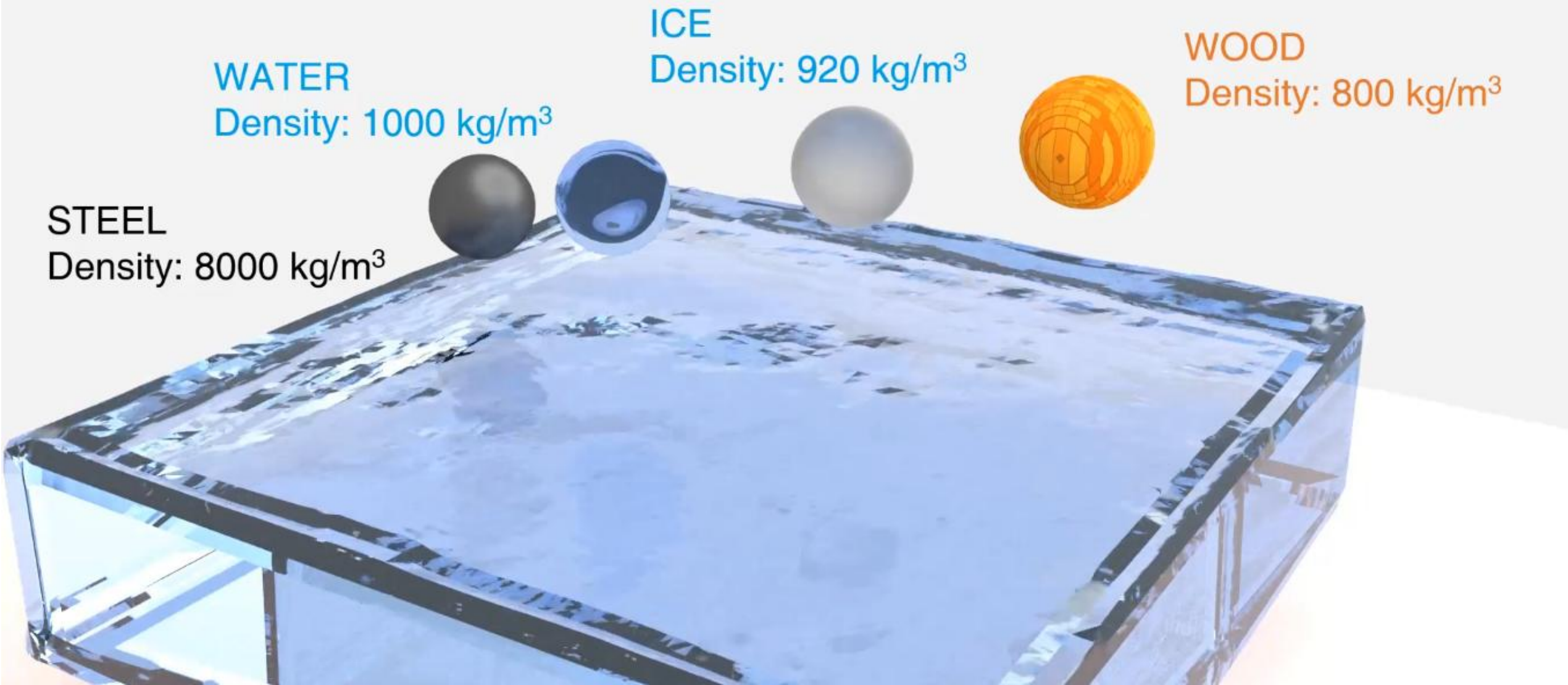
By this equation, elapsed time can be found with respect to final velocity.

Initial velocity, $v_i = 0$

$Acceleration \quad a = g = 9.80665 \frac{m}{s^2}$

Final velocity (m/s)	Distance at which final velocity can be achieved (m)	Time required to achieve final velocity as well as to travel distance (second)
5	1.274645	0.509858
4	0.815773	0.407886
3	0.458872	0.305915
2	0.203943	0.203943
1	0.050986	0.101972

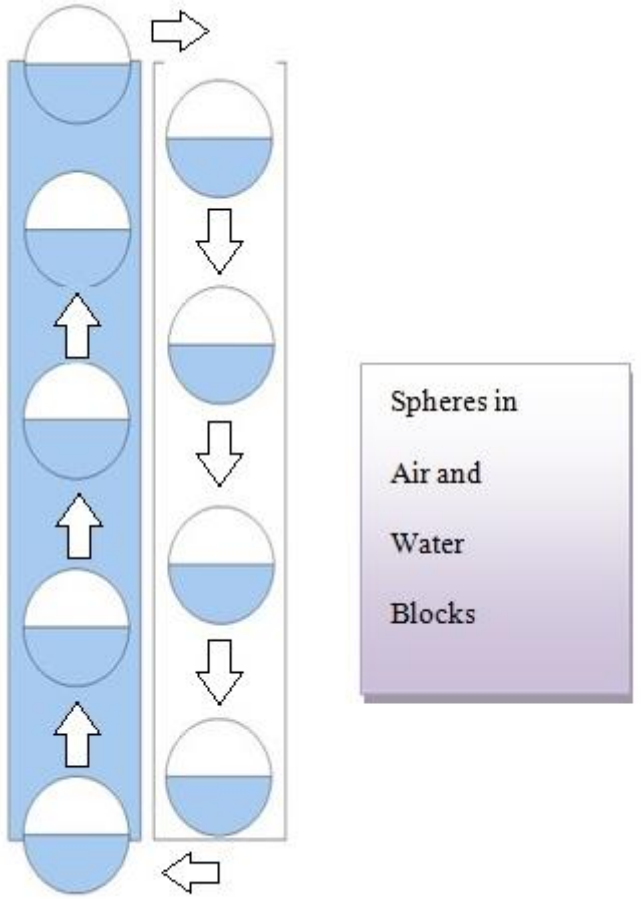
For comparison, if we take Spheres of same volume but, of different materials. Say,



This is a continuous endless cycle (not perpetual) utilizing minimal energy in the transfer.

The velocity of the object in air is 10 meters per second. The lifting and lowering of the object is done in a precise manner (via proprietary design).

For this operation, the timing pulley and timing belt rotate precisely to harvest electrical energy from kinetic energy in a defined period of time.



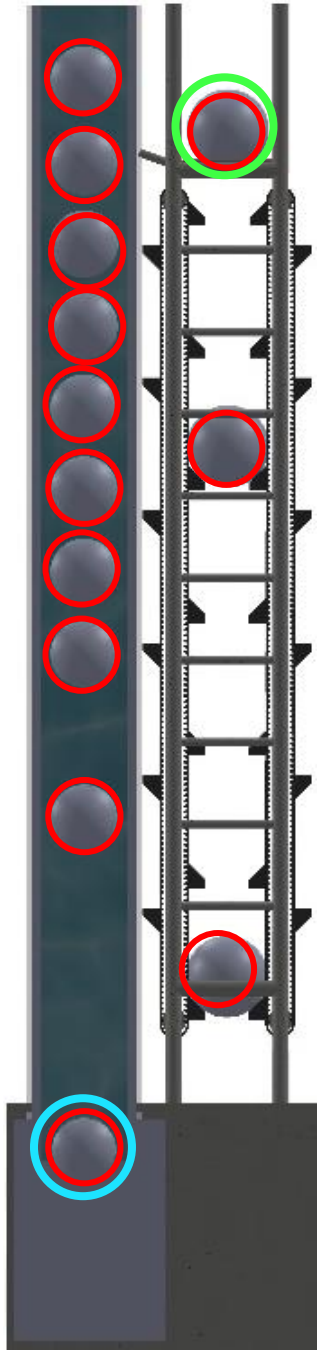
Technology

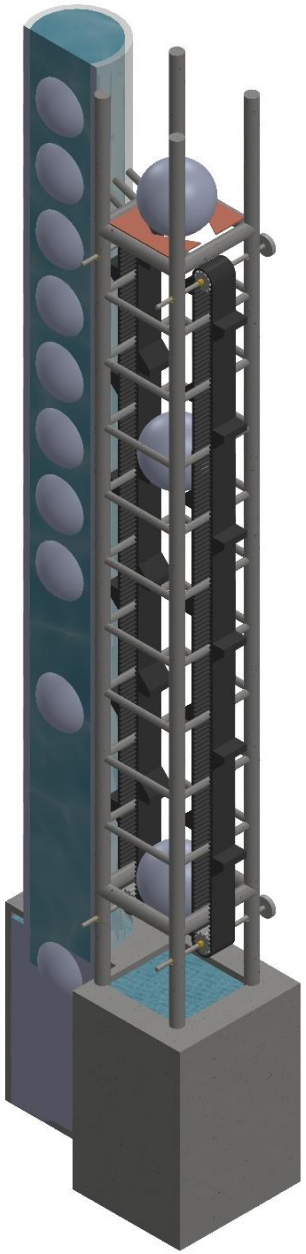
At Work:

Thirteen spheres of same weights with density of <0.80 placed in air block and water block as shown in Figure.

The sphere moves from the higher level to the lower level due to the gravitational force and gains kinetic energy. This kinetic energy is utilized by transforming it into electrical energy.

At the lower level, the sphere enters water block via mechanism employed. The density of object is lower than water <0.80, which causes it to travel upward and rise up on top of water block. From water block, the object moves to air block via mechanism as shown in Figure.





In air block, due to the gravitational pull of our Earth, the sphere moves downward and hence builds up kinetic energy. Again, the sphere enter the water block and rises due to buoyant force.

This is a continuous endless cycle, but not perpetual as it requires energy to make the transfer.

[Thermodynamic Laws are satisfied as 70% of the energy moves the spheres from water to air and from air to water.]

Renew Joule
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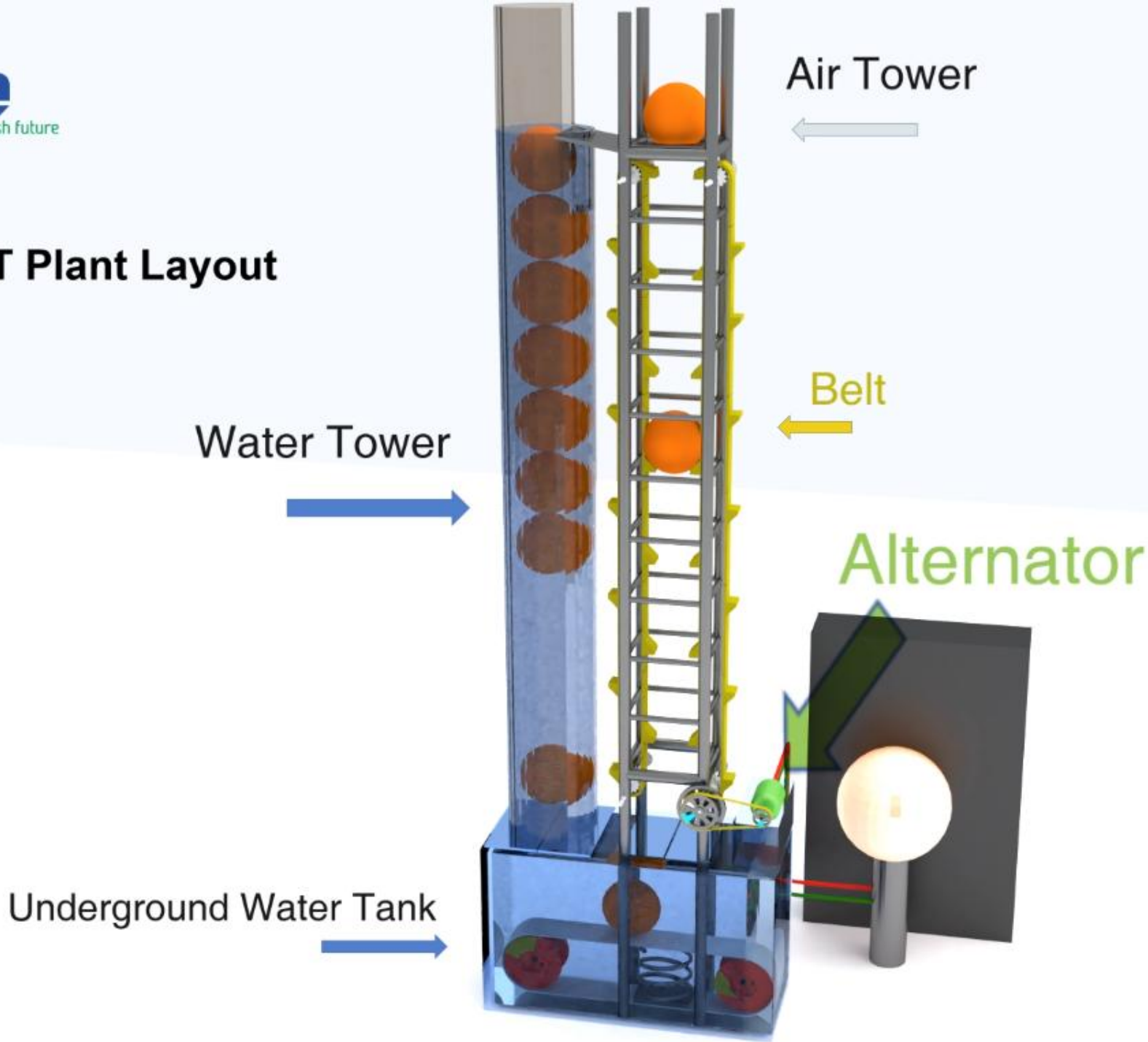
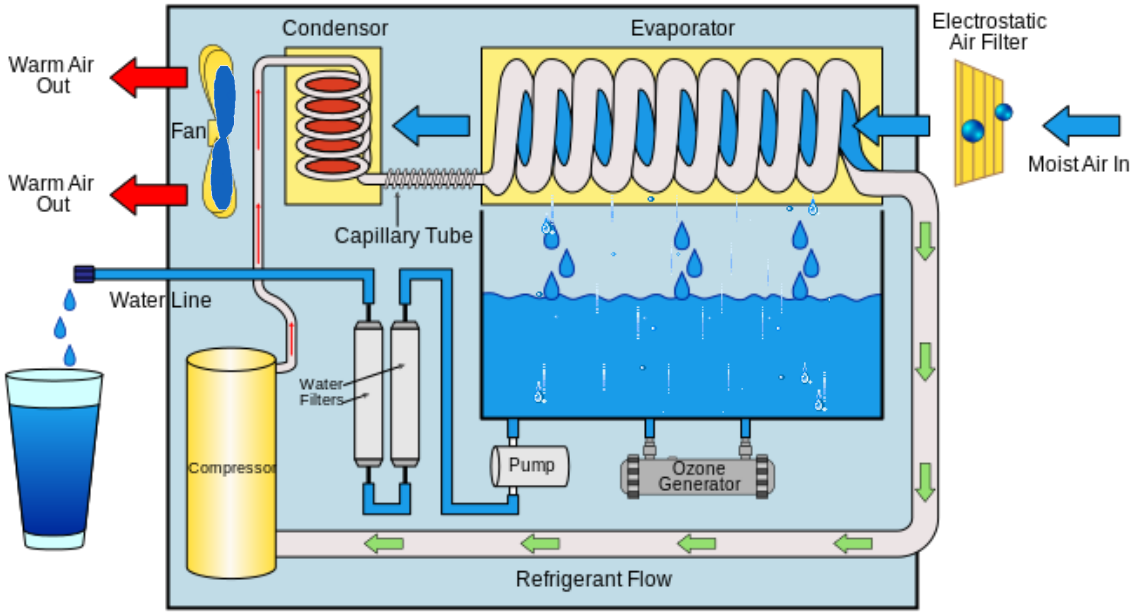
This is CLVHT Plant Layout



Technology for Air-to-Water

CVLHT, being suited to microgrids, can be applied at sites where power is critical, such as:

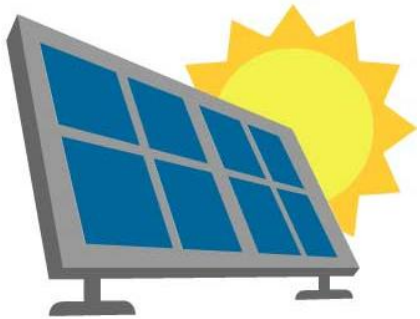


Where water is lacking, an **atmospheric water generator** (**AWG**), a device that extracts water from humid ambient air, can be employed. Water vapor in the air is condensed by cooling the air below its dew point, exposing the air to desiccants, or pressurizing the air. Unlike a dehumidifier, an AWG is designed to render the water potable. AWGs are useful where pure drinking water is difficult or impossible to obtain, because there is almost always a small amount of water in the air that can be extracted. The two primary techniques in use are cooling and desiccants.

The extraction of atmospheric water may cost because it may require significant. Certain traditional AWG methods are completely passive, relying on natural temperature differences, and requiring no external energy source. Research has also developed AWG technologies to produce useful yields of water at a reduced (but non-zero) energy cost. **Costing per litre is $ 0.023 (INR 1.60)**

DATA	VALUES
Sphere's Size in meter (diameter)	Φ 5 m
Volume of Sphere in meter^3	65.45 m^3
Mass of Sphere	52,360 kg
Height of Tower in meter	70 - 125 m
Underground tank depth	17 m
Terminal velocity of sphere controlled after 1 second	10-20 m/s
Potential Energy $= m\,g\,h$	64145297.65
Kinetic Energy $= \frac{1}{2}mv^2$	2616400
Gross Watt Generated	2616400
Net Watt Generated 91.66667 %	2398366.667 W
Watt to kW	2398.3667 kW
kW to MW	2.39836667 MW – 10 MW
Number of sphere connected to power generating system all times	1
Number of towers	According to Plant Capacity
Land Required for 1 MW net Power Generation	550 m^2

Comparison to Other Renewables



10mw's solar PV power plant generate 18000mws per year, which is 2054.79kwh. Only 20.55% output of installed capacity. LCOE is Rs.3.4 per kw

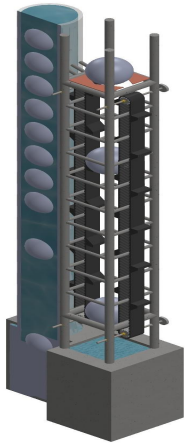
10mw's solar PV power plant requires minimum 67000 square meters land.

To generate 9000kwh solar energy required 153.30 crore investment (3.5crore per mw). It mean installed capacity should be 43.8mw

10mw's onshore wind turbine farm generates 22800mws to 30000mws per year, which is 3424kwh.
Only 34.24% output of installed capacity. LCOE is Rs.2 per kw

10mw's wind farm required 2 acres to 30 acres land per mw, depends on various factors.

To generate 9000kwh wind farm required 170.30 crore investment (6.5crore per mw). It mean installed capacity should be 26.20mw

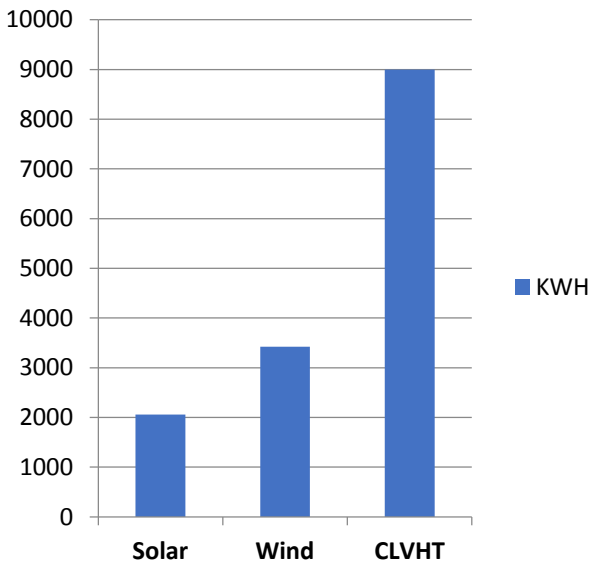


CLVHT generates 78840mws per year, which is 9000kwh exportable after all auxilary supply and O&M time per year. 90% output of installed capacity.
LCOE is Rs.1.50 per kw

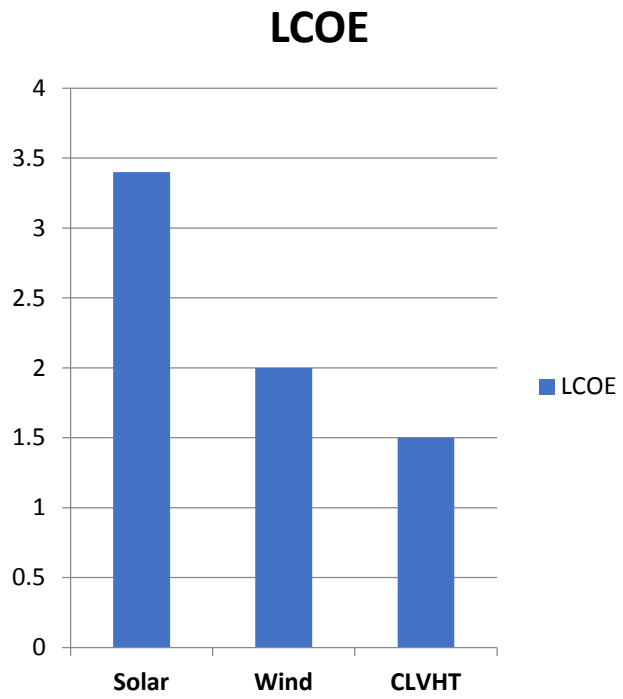
10mw's CLVHT requires less than 1 acre land. Less than 400 meters per mw.

To generate 9000kwh CLVHT required 131.8 crore investment (13.18crore per mw) It mean intalled capacity is 10mw

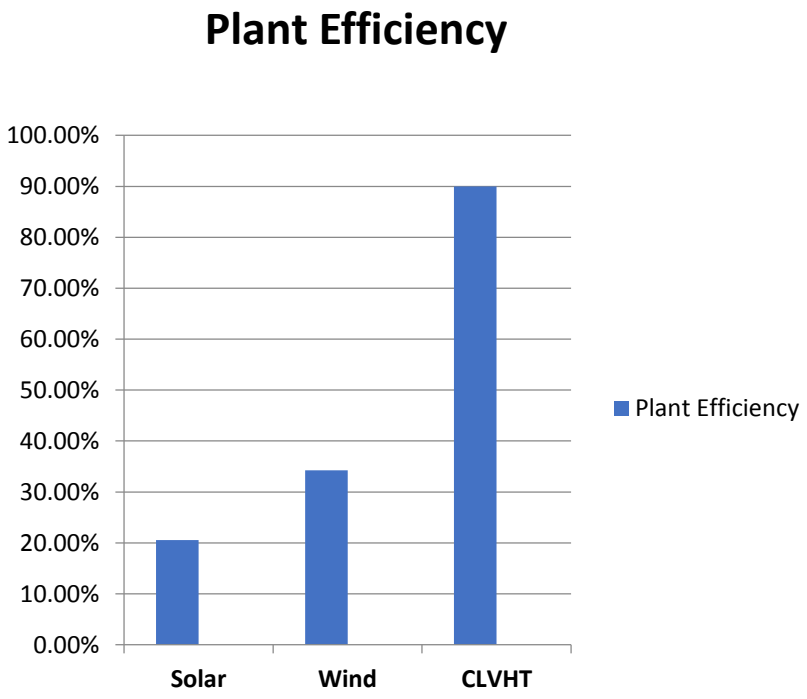
10 MW'S Comparison to Other Renewables



	KWH
Solar	2054.79
Wind	3424
CLVHT	9000



	LCOE
Solar	3.4
Wind	2
CLVHT	1.5



	Plant Efficiency
Solar	20.55%
Wind	34.24%
CLVHT	90%

Benefits

- Green energy, no fuel required, no carbon footprint.
- No impact on environment -- no harmful gases, no radiation, no forest removal, no noise pollution.
- Generates electricity 24 hrs (not dependent on outside source).
- Required very small land 500 sq. meter up to 10.4 Mw.
- Can setup plant at any place like Desert, Mountain, Urban area, Offshore, on board ships.
- No heavy transmission line required. We can setup plants at every 2 km or 5 km to avoid transmission cost & transmission loss.
- Plant will generate 11kV.
- Required water can be made by plant itself with air-to-water technology.
- Power factor above 85%.

Drawbacks

- Higher capital cost. 25% more cost compared to other non-conventional power (i.e. Wind & Solar) generation methods*(But, unlike wind & solar, this system operates independently, 24/7 anytime at any location.)*

Thanks

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