Solar Ignition Water Vaporizer [Rev. 20180517]

by J — Latest revision: http://allis.foundation/Solar_Ignition_Water_Vaporizer.pdf

Introduction

This paper addresses a growing concern for mankind: that of limited fresh water resources in the face of a growing population with growing water needs as a consequence of modernization.

A simple, elegant, and scalable solution will be offered, which when distributed at industrial scale, may be able to greatly ameliorate many of the issues being faced by clean water shortage.

But rather than focus on satisfying a modern person's water use, est. ~80 gallons per day, to instead focus on meeting realistic needs of persons without clean water, est. ~2 gallons/day.

Ideally, such a device would have a per unit cost of ~$100 (cleanly maintained lasting 40 years), and be immediately affordable by individuals over collectively taxed infrastructure developments.

Thus perhaps, living's more basic needs can be readily met with a much simpler, less complex, and infinitely more accessible solution than previously pursued through centralized utilities alone.

Problems

- Less than 1% of the Earth's water is fresh water in liquid form (implies that 99% of it isn't consumable or easily accessible). And given Earth's population growth and existing supply limitations, this fact would lead to conclude "humanity is headed for an eventual disaster."
- So "the world is running out of ..." clean water. In following that thought, a mind's fearful reasoning may panic because it believes or has witnessed evidence that: rivers are being polluted; aquifers and reservoirs are being drained or not replenished, or polluted by fracking and pesticide use; global warming is accelerating the melting of glaciers (2-3%) and turning fresh water into sea water; wells are now producing salt water or drying out; etc.
- The Earth's greatest resource (71%) of vast oceans, hold 97% of the Earth's water that isn't potable (safe to drink), for it contains too much salt, which leads to death by dehydration.
- "According to the World Health Organization, 80% of all diseases in the developing world are water related. By 2025, the United Nation estimates that 30% of the world's population residing in 50 countries will face water shortage." [*1]
- "Agriculture alone can consume 75 to 90% of a region's available freshwater. Did you know that 1 ton of grain requires 1000 tons of water? The steak you eat requires 1,232 gallons." [*1]

From the above, one may reach a simple, preliminary conclusion that: "If only seawater could be quickly/cheaply desalinated, humanity's growing clean water needs would easily be met."

These are broad examples of the potential problems facing humanity and water consumption. At a local level, access to any supply of water (salt/dirty), may yet remain the major hindering factor (without investment in pipelines). However, the issue of access is beyond the scope of this paper.

Current Desalination Methods and Technologies (small scale from individual to regional use — Wikipedia) [*2]

All of these methods have advantages and disadvantages, but this author doesn't believe (and may be wrong) are truly designed for scalability (by multiplying units in clusters), as explained in Model Limitations (below).

Vacuum distillation
The traditional process used in these operations is vacuum distillation—essentially boiling it to leave impurities behind. In desalination, atmospheric pressure is reduced, thus lowering the required temperature needed. Liquids boil when the vapor pressure equals the ambient pressure and vapor pressure increases with temperature. Effectively, liquids boil at a lower temperature, when the ambient atmospheric pressure is less than usual atmospheric pressure. Thus, because of the reduced pressure, low-temperature "waste" heat from electrical power generation or industrial processes can be employed.

Multi-stage flash distillation
Water is evaporated and separated from sea water through multi-stage flash distillation, which is a series of flash evaporations. Each subsequent flash process utilizes energy released from the condensation of the water vapor from the previous step.

Multiple-effect distillation
Multiple-effect distillation (MED) works through a series of steps called "effects". Incoming water is sprayed onto pipes which are then heated to generate steam. The steam is then used to heat the next batch of incoming sea water. To increase efficiency, the steam used to heat the sea water can be taken from nearby power plants. Although this method is the most thermodynamically efficient among methods powered by heat, a few limitations exist such as a max temperature and max number of effects.

Vapor-compression distillation
Vapor-compression evaporation involves using either a mechanical compressor or a jet stream to compress the vapor present above the liquid. The compressed vapor is then used to provide the heat needed for the evaporation of the rest of the sea water. Since this system only requires power, it is more cost effective if kept at a small scale.

Reverse osmosis
The leading process for desalination in terms of installed capacity and yearly growth is reverse osmosis (RO). The RO membrane processes use semipermeable membranes and applied pressure (on the membrane feed side) to preferentially induce water permeation through the membrane while rejecting salts. Reverse osmosis plant membrane systems typically use less energy than thermal desalination processes. Desalination processes are driven by either thermal (e.g., distillation) or electrical (e.g., RO) as the primary energy types. Energy cost in desalination processes varies considerably depending on water salinity, plant size and process type. At present the cost of seawater desalination, for example, is higher than traditional water sources, but it is expected that costs will continue to decrease with technology improvements that include, but are not limited to, improved efficiency, reduction in plants footprint, improvements to plant operation and optimization, more effective feed pretreatment, and lower cost energy sources.

The Reverse Osmosis process is not maintenance free. Various factors interfere with efficiency: ionic contamination (calcium, magnesium etc.); DOC; bacteria; viruses; colloids & insoluble particulates; biofouling and scaling. In extreme cases destroying the RO membranes. To mitigate damage, various pretreatment stages are introduced. Anti-scaling inhibitors include acids and other agents like the organic polymers Polyacrylamide and Polymaleic Acid), Phosphonates and Polyphosphates. Inhibitors for fouling are biocides (as oxidants against bacteria and viruses), like chlorine, ozone, sodium or calcium hypochlorite. At regular intervals, depending on the membrane contamination; fluctuating seawater conditions; or prompted by monitoring processes the membranes need to be cleaned, known as emergency or shock-flushing. Flushing is done with inhibitors in a fresh water solution. Thus the system needs to go offline. This procedure is environmental risky, since contaminated water is rejected into the ocean without treatment. Sensitive marine habitats can be irreversibly damaged.

Freeze-thaw
Freeze-thaw desalination uses freezing to remove fresh water from frozen seawater. One method, invented by Alexander Zarchin, used freezing and vacuuming of salt from seawater.

Solar evaporation
Solar evaporation mimics the natural water cycle, in which the sun heats the sea water enough for evaporation to occur. After evaporation, the water vapor is condensed onto a cool surface.

Electrodialysis reversal
Electrodialysis utilizes electric potential to move the salts through pairs of charged membranes, which trap salt in alternating channels.

Membrane distillation
Membrane distillation uses a temperature difference across a membrane to evaporate vapor from a salty brine solution and condense pure condensate on the colder side.

Wave-powered desalination
CETO is a wave power technology that desalinates seawater using submerged buoys. Wave-powered desalination plants began operating on Garden Island in Western Australia in 2013 and in Perth in 2015.

Current "Best" Technology Desalination Solution (large-scale centralized utility use) [*3]

- The Claude "Bud" Lewis Carlsbad Desalination Plant (Carlsbad) is a desalination plant that opened on December 14, 2015 in Carlsbad, California.
- "The San Diego County Water Authority (SDCWA), the recipient of the fresh water produced by the plant, calls it 'the nation's largest, most technologically advanced and energy-efficient seawater desalination plant.' The entire desalination project cost about $1 billion for the plant, pipelines, and upgrades to existing SDCWA facilities to use the water."
- "The plant took nearly 14 years to build. The total project cost was expected to reach near $1 billion; initial cost estimates were a quarter-billion in 2004, to six hundred ninety million in 2010. The cost of construction was funded by bond sales. In late-2012, Fitch Ratings gave the bonds the lowest investment grade rating. Upon completion, it became the largest desalination plant in the Western Hemisphere."

- “Up to 100,000,000 US gallons (380,000 m3) per day of cooling water from the Encina Power Plant is taken into the desalination plant. The water intake is filtered through gravel, sand, and other media to greatly reduce particulates before going through reverse osmosis filtration. Half of the saltwater taken into the plant is converted into pure potable water and the rest is discharged as concentrated brine. The outflow of the plant is put into the discharge from the Encina Power Plant for dilution, for a final salt concentration about 20% higher than seawater. Most desalination plants discharge water with about 50% extra salt, which can lead to dead spots in the ocean, because the super-saline brine doesn't mix well with seawater.”
- “The plant is expected to produce 50 million US gallons (190,000 m3) of water per day (0.069 cubic kilometres per annum) with energy use of ~3.6 kWh for 1 m3 fresh water, or ~38 MW of average continuous power. Another estimate has the plant requiring 40 MW to operate, and a cost of $49 million to $59 million a year. It will provide about 7% of the potable water needs for the San Diego region.”
- “The cost of water from the plant will be $100 to $200 more per acre-foot than recycled water, $1,000 to $1,100 more than reservoir water, but $100 to $200 less than importing water from outside the county. As of April 2015, San Diego County imports 90% of its water. A conglomerate of California-based environmentalist groups, the Desal Response Group, claims that the plant will cost San Diego County $108 million a year.”

Model Limitations of the current “Best” Solution

Beyond the extraordinary costs of building and operating such a facility, its power requirements, and impractical portability for export as a solution to meet a nation’s basic developing needs—a more straight-forward, direct approach may be proposed to support an undeveloped population.

Here an analogy may be of use, that of large and expensive, single purpose mainframe computers vs. swarms of personal computers for large scale industry demands of transaction processing.

In summary: While mainframes still maintain customers today, such as very large corporations (airlines), to handle vital, never-fail, demanding, reliable, and essential workloads concentrated around servicing hubs (cities)... The overwhelming trend, especially through the growth of the internet (which continues to surpass the potential of any singular use technology to provide its numerous needs), is to group any number of smaller sized machines, from minis to desktop and multi-processor server computers into swarms which can be located anywhere across the globe, that through millions of individual nodes, can effectively, reliably, and instantaneously provide for the needs of millions of users without location liability. In other words, rather than designing and purchasing single-use, large scale utility hardware, to meet the needs of as many users as possible using a single, centralized, and expensive platform, it can be far more effective, to allow regional needs to be met as demand grows, using many smaller, easily configurable single-task computers for individuals, grouped together where required, to provide for most user’s needs.

While large scale, centralized solutions may work to meet specific customer requirements, on a global scale, it is much more efficient and practical, to deploy larger numbers of smaller, standardized, and compatible units (eg. based on Intel’s x86 architecture), to meet especially more localized and regional needs, independent of central authorities regulating their ‘software’.

For example, Google and Facebook both use thousands of bare-bones computers, to deliver instant and responsive content at speeds and efficiency unmatched by mainframe options.

In this analogy, the Carlsbad Desalination Plant would be the equivalent of mainframes: large, expensive, reliable but imposing, and limited to any adaptability beyond its immediate range.

Mainframe solutions, in contrast to reality of many people's daily water struggles, may also be incomprehensibly out-of-reach to any aspiring government or community (especially one living with poverty), whereas a simple cluster of multiple units connected to well water, could suffice.

A similar example can already be found in Africa, where most people can't afford computers to conduct their business—will afford mobile phones, by which they can transact and communicate, by texting short messages to one another—with only a minimal of infrastructure support required.

A Proposed Alternative to Existing Desalination Solutions: Solar Ignition

The concept of Solar Ignition is based on the idea that sufficient sunlight reflected and focused onto a point, could produce enough heat to 'instantly' vaporize almost any water into steam.

That during peak sunlight hours, it should be possible, using a small, single device, to distill enough water for a family to provide for its immediate water needs (hydration, cooking, etc).

The theory of its design potential, is evidenced by the use of satellite dishes, converted into reflectors, which can produce sufficient heat focused on a single point to quickly melt metal.

The simplicity of the design, should enable it to be used by single individuals in the most remote locations, be portable, simple 'for a child' to operate, and allow almost any water to be purified.

In more complex groupings, such as for neighborhood use, multiple units would be combinable (at reduced cost) to operate as a cluster, with large tanks providing scalable community needs.

By focusing on a simple, but powerful and functional unit design, able to be combined into larger clusters, even up to industry scale, overcomes the many limitations of 'mainframe centralization'.

Thus, for individuals, families, or groups or people requiring clean water daily, would provide a viable alternative and immediate solution to alleviate hardship, providing an option for one's self.

The current device concept:

- Is based on the simplest of all desalination methods, Solar evaporation, which mimics the natural water cycle of evaporation by sunlight energy, and natural distillation by the cooling vapor when it reaches lower temperatures a distance away from the heat source.
- Uses simple, affordable, and available (mass-produceable) technology to enable individuals or groups to operate small to industrial scale solutions (plexiglass, pumps, pipes, tanks, etc.).
- Designed to meet the daily water needs—not desires of modernization—to produce more than sufficient potable, clean water daily at low cost to promote life (for drink/cook, not flushing).
- Make use of Earth's most natural energy source, the sun, to 'turn a carboy into a boiler', by concentrating the sun's light to produce extreme heat and boil water until it near-instantly vaporizes a small body of water to steam, or a flowing stream directly for continuous flow.

- Make use of tanks to store seawater or dirty water, to provide an evenly distributed and reliable water source throughout the day to feed the boilers, which also act as pre-heaters in sunlight for increased boiler performance, before channeling the steam into a reservoir.
- Use simple and reliable, mostly mechanical devices, to enhance the sun's light capture capacity, by auto turning the boiler's reflector toward the sun as it moves throughout the day. This can easily be achieved using small solar panels and a DC motor.
- The most optimal design for a single cell unit, would likely require custom manufactured glass and reflectors, however, these ought-to-be mass-produceable locally at low cost for scalability.
- A reliable source of water 'pumped' (by minimal energy) from the ocean, stream, lake, or deep well to supply a feeding tank would be mandatory for continuous, higher volume operations.

The potential 'magic' of the device, would reflect the concentrated heat source directly into the water itself, allowing it to boil and vaporize by direct exposure without an intermediary conduit.

Theoretical Potential

As the research and development of a functional device has yet to be conducted, the potential for such a vaporizer system can only be theorized at this time, based on available data of similar components, which can be used as the basis for evaluating the solar concentration process:

- According to a listing for a 37" reflector by Green Power Science (in Florida), a 'deep dish' reflector can boil 6 oz of water in 45 secs, and reach spot temperatures up to 2250°f. [*4]

By textbook definition, water evaporates at 100°c or 212°f. Thus, a dish of a similar size/design, could likely produce a spot of heat in water 10x greater than required to boil it. (A 24" dish half.)

So to bring a gallon of water to boil might take ~16 minutes using an unoptimized configuration. That will bring the water to boil, but what about vaporizing it into steam?

Herein is the key to success of this Solar Ignition design—that the mirror used to reflect light be a custom precision shaped parabolic reflector, capable of concentrating very high temperatures by focusing the sun's light at the highest concentration ratio onto a single point, to heat the water from within itself—the hot spot would be in the water, and not by heating through a container!

So the question remains, how much vapor (clean water) could such a design produce, if exposed to for example, 2 hours of peak sunlight? If you can help answer that, please email this author.

Without being able to currently substantiate any of the following, this author's feeling is that with sustainable high temperatures of concentrated solar power focused directly into water:

- With the right design, perhaps using a smaller reflector of 24" for practicality, it may be possible to achieve distillation of < 2 gallons of clean water per unit during peak/hot sunlight in a passive configuration, and considerably more using an active configuration model.
- Such an amount is sufficient for drinking needs of 1-2 people on any given a day, or enough for 1 person to drink, cook a meal (rice or pasta), brush their teeth, rinse or clean dishes, etc.
- Combining multiple units, would allow families/neighbors to provide for their basic, daily clean water needs, and any excess stored in tanks for later use (when sun doesn't shine).

- More efficient design through iterations and testing evaluation, to include improvements in steam generation (by flowing continuous preheated water), may increase the overall output.
- Auto-tracking of the sun (*see* [*7]), would also enable a Solar Ignition to boil water throughout the day, rather than passively only during peak hours, increasing output dramatically.
- The design should take into account, the variety of water sources available, and be able to 'self-clean' by continuously cycling the dirty water back to its source in the ocean/well.

The evaporation temperature can be reduced through compression, and efficiency of vaporization also greatly improved through factors such as airspeed over the water and pressurization of the water, heating of the water prior to boiling, and even spraying the water as mist into the unit's boiler. This would require further research.

In large scale desalination installations, the brine (higher slat content water) remaining may build up where its deposited, for it dissolves only with great difficulty. However, on small scale installations, such as a single home's well, this author presumes, it should prove less of an issue to cope with, if managed and planned for in the installation design. Reclaimed seawater salt, when completely dried out, may be used for cooking/sold.

Proof of Concept

FROM TOP LEFT TO RIGHT, BOTTOM LEFT TO RIGHT: A) VAPOR STREAMING FROM THE EVAPORATED SEA WATER. B) THE REFLECTOR'S HOT SPOT FOCUSED ON A SINGULAR HEATING POINT. C) CONDENSED WATER DRIPPING INTO A GLASS. D) DRINKING THE DESALINATED AND DISTILLED SEA WATER, WHICH REQUIRED NO ENERGY TO PRODUCE.

A video *5 is posted on YouTube, entitled “Drinking water from sea water without electricity only by Sun energy” in which its creator Rims Vaitkus, demonstrates the feasibility of pumping water using the ocean’s wave motion, and the purifying the water by vaporizing it using a large reflector, in a very similar manner to this author’s proposed concept. In the video, it can be seen that the device produces a continuous stream of steam, which when condensed, is instantly drinkable.

There are numerous improvements, this author believes, which can be made to his initial design, in order to improve flow rate, heat intensity, materials, procedure, etc. to achieve a far greater output than demonstrated in the short video, turning his proof of concept, into a viable utility. As also observed, it is also unclear how warm the temperature is, the time of day, geo location, etc.

Nevertheless, the proof is in the water, and this demonstrates its feasibility as a standalone unit.

A second proof of concept demonstrating the viability of a larger scale solar-tracking installation:

ABOVE: RIPASSO ENERGY’S DISH AUTO-TRACKS THE SUN, MAXIMIZING ENERGY OUTPUT FROM SUNLIGHT FOCUSED ONTO A SINGLE POINT.

Swedish company Ripasso Energy has created a new, state-of-the-art solar energy dish, which it believes is the most efficient in the world. One of the key elements of Ripasso’s system is an engine originally thought up nearly 200 years ago in 1816.

Ripasso’s CSP system works by combining a parabolic mirror with a Stirling engine. The 12 meter diameter mirror dish looks like a typical satellite dish, but its job is to focus the sun’s energy on a “tiny hot point” that then drives the Stirling engine.

Unlike other, similar systems, Ripasso’s uses no water to produce electricity. The Stirling engine is a closed-cycle regenerative heat engine that uses an enclosed gas to drive pistons and turn a flywheel. The large dish constantly turns to ensure optimal solar energy capture from the sun, the hot point powers the Stirling engine, and electricity is produced.

As for efficiency, it easily outperforms the photovoltaic panels in use today. Those panels typically convert 23% of the sun’s energy to electricity, however, making that usable on the grid means efficiency drops to just 15%. The Ripasso CSP system converts 34% of the sun’s energy to grid-ready electricity. Each dish can produce 85 megawatt hours of electricity every year, enough to power 24 homes for the same period of time. *6

Ripasso's system is designed to maximize electrical production, and doesn't use water to power the Stirling engine generating electricity. In this case using gases, rather than hot air. However, the system's essential design, could probably be adapted for water purification use, multiplying the volume flow of an individual-sized standalone water ignition unit, if expanded to such scale.

The importance is this evidence proves that Solar Ignition is a fundamentally sound concept.

Additional Considerations

Not discussed in this paper, but worth mentioning, is the use of other related proven techniques:

- Solar panels for practical power applications, such as powering a water hose pump to carry both salt/dirty and purified/clean/fresh water over long distances, where women otherwise carry it themselves in large containers, in some cases, up to several miles every day. Such a trek is not uncommon in rural Africa, for example, where the labor of fetching water daily replaces the ability of being productive in other capacities, such as pursuing an education.
- Solar ovens, used for cooking food in a tube or metal pot, also by concentrating the sun. These are becoming more common in parts of rural Africa and Asia, proving there may be a market opportunity for continuing development in this field into a potential new industry.
- Solar water heaters, as commonly seen on rooftops of many houses in Nepal, used to heat water for showers/baths by exposing a long pipe through a light concentrating collector. Combining these with a water filtering installation, could reduce water related illnesses.

Water heating in particular, may be useful as an additional component of a Solar Ignition unit, to allow the ingesting water to be pumped automatically through heat/pressure changes, and, to pre-heat the water to a temperature requiring much less solar energy to vaporize, thus greatly increasing the potential to achieve a high-flow/maximum throughput rate through the device... And as a side-effect benefit, provide warm water for bathing in cold and mountainous climates.

To Meet Growing Needs: A One-Stop Water & Power Solution

Engineering an advanced unit design may solve multiple water and energy issues simultaneously:

- The multi-purpose device would pump water and produce both clean water and electricity.
- Pumping well, stream, or sea water by its own power (and manual 'start up' without power).
- Generate electricity by focusing the hot-spot onto a Stirling engine, or as a secondary stage by-product of water vaporization, by using pre-condensing steam power from heated water.
- Purify water by Solar Ignition, instantly vaporizing as much dirty water in a continuous burn.
- Auto-track sun throughout the day, and align in the morning, using 2-axis panels/motors.
- Store electricity produced in batteries overnight, or resell to grid to offset investment costs.
- Collect production excess purified water for storage, or in water towers to supply neighbors.
- Design to be multi-environment capable, simple to manufacture, quick to install/dismantle.

See Ripasso's design as a potential template from which to integrate Solar Ignition purification.

Potential Outcome

Can the theoretical output potential of a single unit, cluster or combined device be calculated?

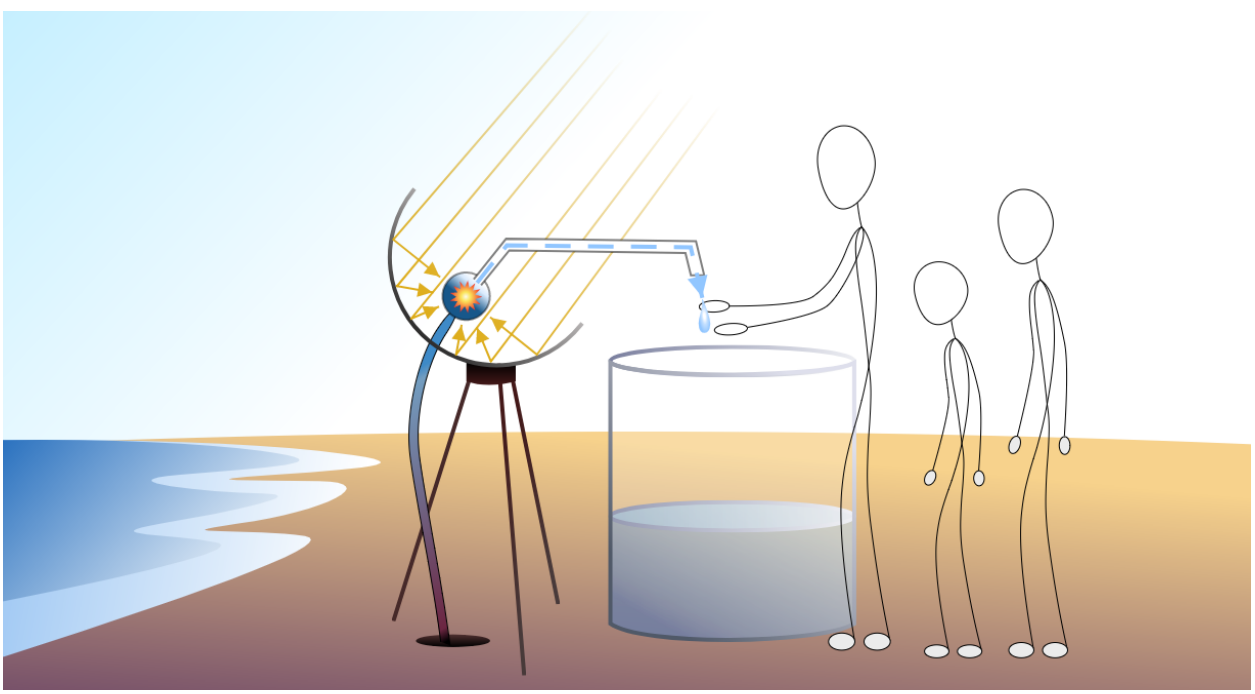
I don't know. There are too many factors, and the math is beyond this author's current abilities.

In simple, the ideal outcome will be to end up with a simple, mass-manufacturable device, able to purify water by distillation in almost any climate, though ideally suited to sunny/warmer latitudes.

The device would be scalable in a similar manner as networked computers in a cluster, easy to congregate, and infinitely scalable to meet the demands of most applications by increasing units.

From better tasting to purifying water, examples of energy-free practical Solar Ignition include:

- Disaster relief—providing the means of producing clean water when services are disrupted.
- Flood water reclamation following storms, purification into reservoirs, truck or home tanks.
- Home/camper well or sea water filtration into tank storage for tap water faucet availability.
- In the developing world—well, river, ocean or surface water filtration for an entire village.
- Marine—portable single units for small boats, clusters on top of barges serving as tanks.
- Desert—'greenification' through drilled wells, pumping sea water into units irrigates fields.
- Desert—utility scale, make abundant use of intense year-round sunlight for mega-clusters.
- Desert—replenishing of reservoirs (Hoover Dam), using accessible underground seawater.
- Remote (mountains, islands, beaches)—snow/stream/sea purification of parasites/salt.



A SIMPLE CONCEPT IN PRINCIPLE: PROVIDE A RELIABLE FRESH WATER SOURCE FROM WELL OR SEA, WITHOUT DEVELOPMENT LIMITATIONS.

What About Scale?

This section's entirely theoretical and speculative, not in fact, but it doesn't hurt to imagine "what if?"

Let's say, for the sake of fantasy, that a device 6 ft wide (~2 meters) was already manufactured, designed to track the sun over the course of ~ 6 hours/day average using a simple mechanical gear/motor system powered by an attached own solar panel, tested and proven in desert harsh conditions of the Southwestern USA, to be capable of providing ~ 10 gallons of clean water/day.

Now let's suppose, it being possible to tap into an underground saltwater basin, and through a pipe, pump sufficient water to feed as many of these solar units as required for an installation of any scale, including the infrastructure to distribute the seawater through each device and return, including a third pipe to carry thick brine/salt to storage deposit for later transportation/sale.

In other words, let's calculate what it would take to provide for the basic water needs of a State.

Nevada has a population of ~ 3,000,000 (ignoring all the tourists visiting Las Vegas each year), which if each person required an average of 3 gallons of water/day, would mean producing at least 10,000,000 gallons/day (adding an extra 1,000,000 as a buffer for later reserved usage).

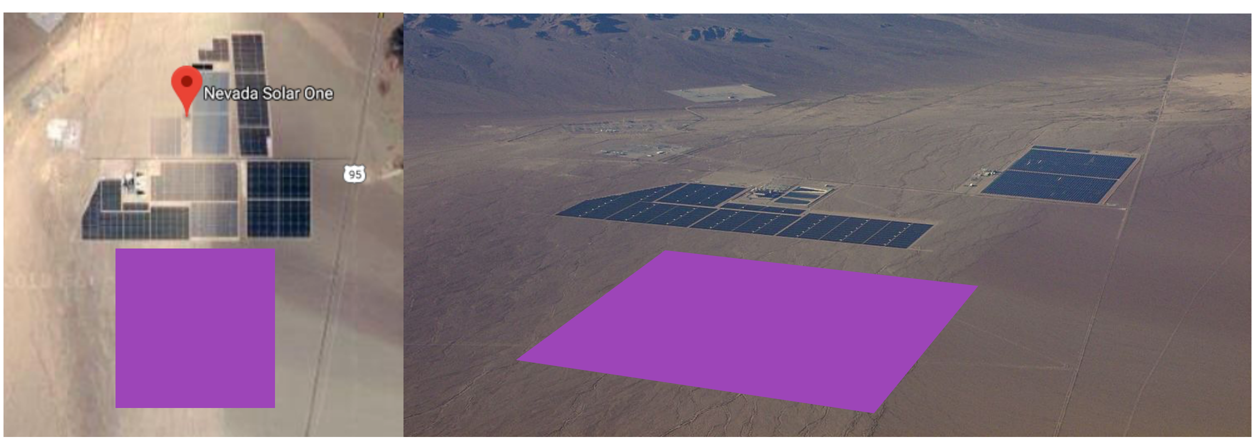
So, to produce 10M gal/day, would require 1M of the working 6ft devices. How scalable is that?

If each device is +4 ft apart from each other (so 1 device every 10 feet), you would need a field of devices 100,000,000ft^2 (1M = 1,000*1,000, *10*10 ft apart = 10,000*10,000, or 100M ft^2).

That number sounds huge! But is it really? A field that size is 1.89 $miles^2$ (~ 3 kms^2). Nevada is 110,577 $miles^2$ in total. So to permanently provide for all Nevadans' basic water needs, would require a square field of Solar Ignition devices covering a mere 0.000017% of the State's land.

Double the field's size would provide water for 12,000,000 residents, quadruple for 48,000,000.

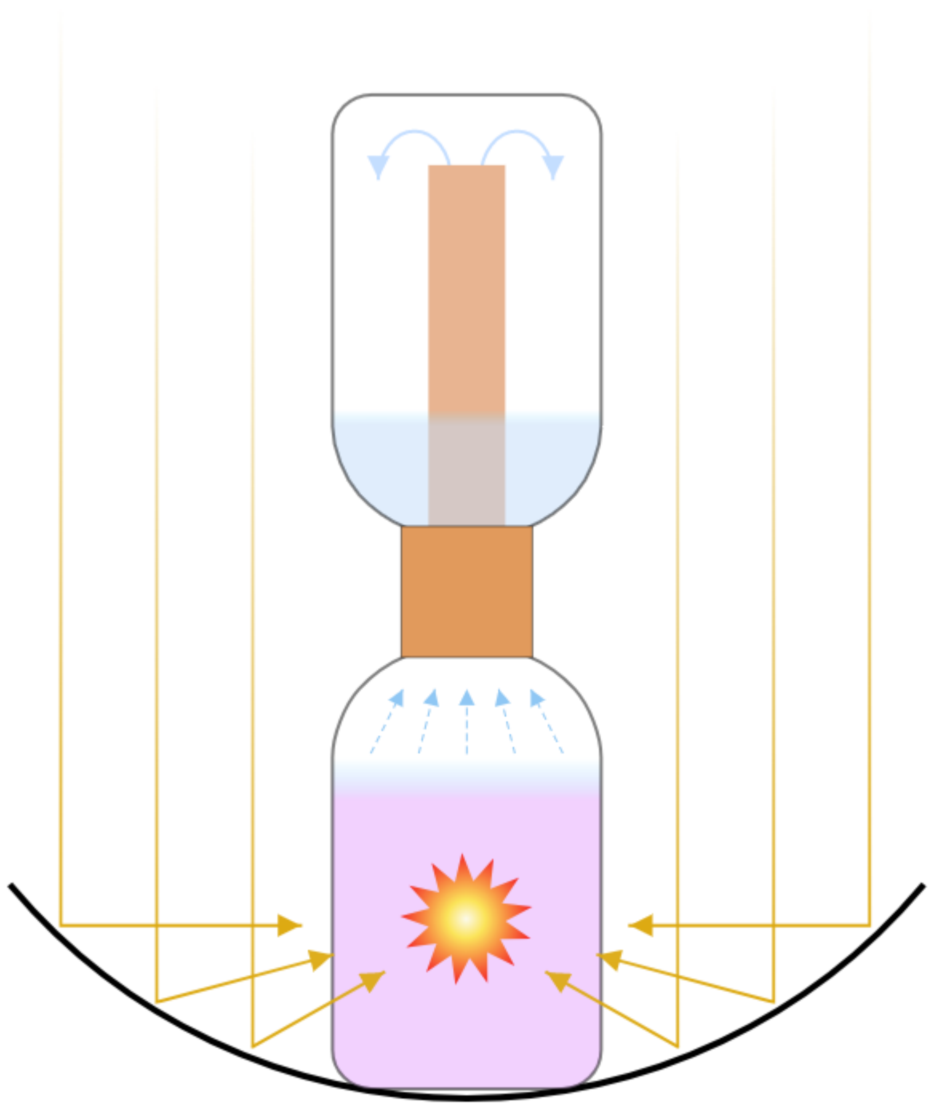
Did I mention it requires essentially no energy to operate? (Not including pumps, transport, etc.)



ABOVE LEFT, AN APPROXIMATION OF THE FIELD'S SIZE, NEXT TO NEVADA'S SOLAR ONE POWER PLANT, SCREENSHOT FROM GOOGLE MAPS.
ABOVE RIGHT, AN APPROXIMATION SUPERIMPOSED A PHOTO (CROP) BY MICHAEL ADAMS © https://creativecommons.org/licenses/by-sa/3.0

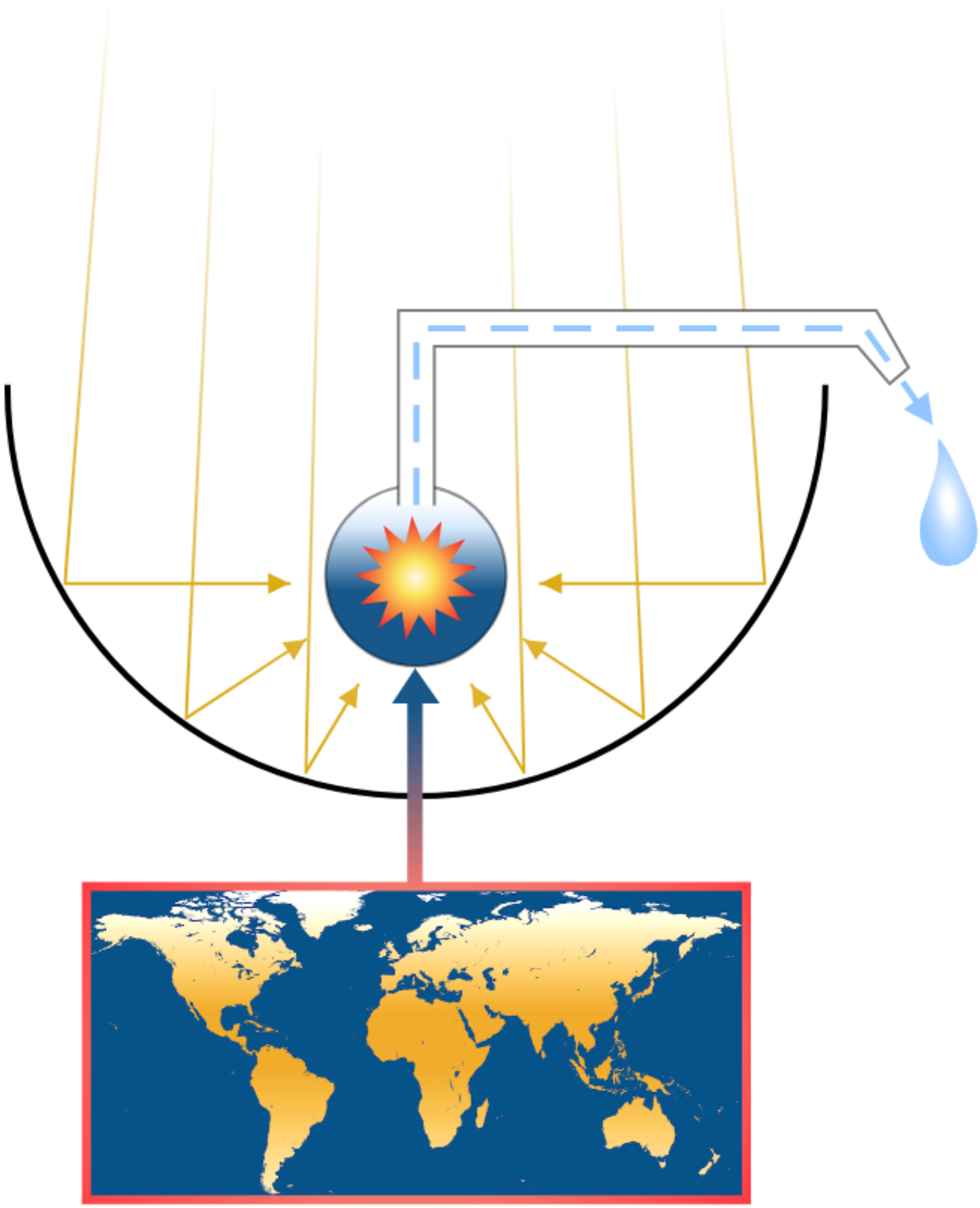
Design Principle

In a basic 'passive' implementation, a large solar 'dish' reflector would be placed on the ground, shaped in the appropriate angle to concentrate the sun to the center of a spherical glass carboy, boiling the salted/dirty water contained within it; reaching peak vaporization in the high-noon daylight hours (~11am-2pm), to produce a useful supply of fresh water daily. As water vaporizes, the steam rises, traveling through a tube, and is collected by condensation into a separated clean tank or vessel for storage or later use. It would produce a minimum of 2 gallons of water per day, but require daily maintenance of cleaning accumulated residue salt/dirt, and manually refilling the carboy or feed water tank, by pumping/carrying from a well, surface, river, or ocean source.



THIS 'PASSIVE' ILLUSTRATION IS NOT TO SCALE NOR PROPORTIONALLY CORRECT. USE ONLY AS A CONCEPTUAL GUIDE.

In a more advanced 'active' configuration, the solar 'dish' would automatically 'wake up' at first light, using a simple 2-axis sun tracking [*7] motor, orienting itself to follow the sun throughout the day, optimizing the available light for maximum fresh water production. It would require a feed tank to keep the beaker continuously refilled with a supply stream, and a larger storage tank to collect the fresh water for storage and later use. In larger installations, either using a single large dish, or a cluster of dishes mechanically bound, the supply would be automated and reliable with little human intervention or need for daily maintenance. By automating the flow using pumps and valves, and continuously cycling the residual water/brine/salt/dirt as it is produced, it should be possible to create a lasting weather-resistant installation, requiring part-time maintenance only.



THIS 'ACTIVE' ILLUSTRATION IS NOT TO SCALE NOR PROPORTIONALLY CORRECT. USE ONLY AS A CONCEPTUAL GUIDE.

The ‘biggest danger’ believed with such a design, is the potential to burn one’s self, or blindness by staring in the light for too long. These issues can be mitigated by placing the devices on roof tops, water towers, guarded/protected areas, deserts, vast empty spaces along coastlines, etc.

Sources

*1 = http://www.theworldcounts.com/stories/average-daily-water-usage
*2 = https://en.wikipedia.org/wiki/Desalination
*3 = https://en.wikipedia.org/wiki/Claude_%22Bud%22_Lewis_Carlsbad_Desalination_Plant
*4 = https://greenpowerscience.com/PARABOLICSHOP/37PARABOLICSALE.html
*5 = https://www.youtube.com/watch?v=nCtlqqFVjJg
*6 = https://www.geek.com/news/most-efficient-solar-energy-dish-in-the-world-uses-engine-developed-in-1816-1622697/
*7 = https://www.youtube.com/watch?v=HkhVomoD47g

Author

J is a Self Healing Guide, Mystic/Counselor, Founder of the All IS Foundation, Developer of the Light in Life™ self-healing reference/web app, Widespread Researcher, and finds ‘his element’ shining light upon simple creative solutions to seemingly impossible and challenging problems.

Contact

Email: **j@allis.foundation**

Masterdamus is a resource for light-inspired research created by **http://allis.foundation** (AISF).

All IS Foundation is dedicated to spiritual research to facilitate inner progress within individuals, by providing a home, tools, and guidance for one seeking to reach higher levels of consciousness.

Donate **Yearly**

AISF welcomes non-tax deductible donations to continue spiritual research and fund development of a Light in Life™ Online app, to enable guides and users to measure their Self-healing progress.

Donate via PayPal (when AISF/LiL™ helps you) or **Yearly** (contributing to the foundation’s future).

Copyright