

Intelligent Self-Consumption System:

Heating homes for free, recycling waste energy, and improving solar system ROI - 2/05/2022

A case study by SEANZ^[1] of 21 homes around NZ with solar power systems had shown that each home on average:

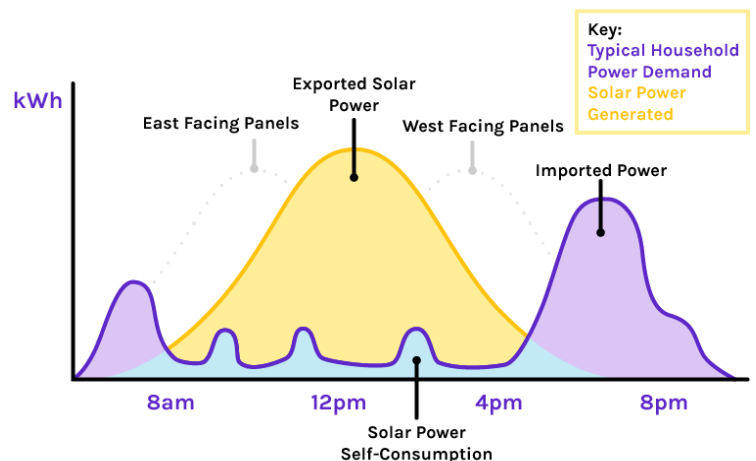
- Had a solar system payback period of **11.6 years** ⌚
- Spend **\$11k** on their system 💰
- Purchase electricity at 30c per kWh whilst earning 12c for every kWh they sell, **60% less** than market rate 🗑️

Self-consumption unlocks greater returns

To improve the ROI of these solar systems, we must increase self consumption of solar power because using solar power is more valuable than exporting solar power to the grid. To do this many people use appliance timers and battery chargers during the day to shift power demands to periods of maximum solar power generation, using less power at night, saving money instead of buying from the grid.

The more self-consumption a home can achieve, the better their returns and ROI will be over time.

SOLAR POWER SELF-CONSUMPTION



Intelligent self-consumption

Water and space heating typically consume 42% of all domestic electricity in NZ^[2]. These applications make for good use as energy sinks during periods of excess production, which is why smart solar home owners set timers on their hot water cylinders. Another way to monetise excess energy is to use ASIC mining computers which earn a revenue whilst they run. A highly important fact regarding these computers is that a 1000W ASIC mining computer outputs the same amount of heat as a 1000W electric space heater. If we were able to capture the wasted heat output by these computers and reuse this heat, we would then be generating value from the waste, while earning money for running the computer.

These computers can be used as heaters that essentially earn a revenue that can be used to subsidise its heating operation - therefore it is possible to heat a home for a net cost of \$0.

The technology

Liquid cooling of computers is an old practice used in high end home PC's since the 90s. It is often used to improve the cooling efficiency of very hot computing components. Many enterprise scale cryptocurrency mines are beginning to become completely liquid cooled^[3] because the more they can save on cooling costs, the greater their profits will be. Special dielectric fluids have been created for electronics to be cooled by submerged within. These fluids are often then pumped to radiators to remove heat from the system. However, if we take the unwanted heat from these systems and divert it to somewhere where heat would be useful; eg. a swimming pool, we would improve cooling efficiency even further.

[1]: https://uploads.mysolarquotes.co.nz/seanz_residential_case_studies.pdf

[2]: Energy End Use Database, ECCA 2018, <https://www.nzcompare.com/n/power/average-household-electricity-usage-new-zealand>

[3]: devdass.com - What the largest USA miner uses to cool their ASICs, devdass.com/posts/whinstone

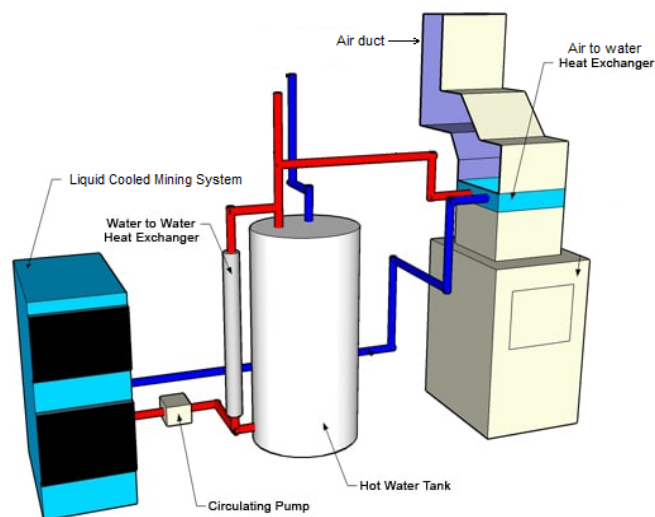
The problem with home mining

It is widely known that in most climates, ASIC mining computers run very hot and very loud (85dB, similar to a truck) which makes them virtually unsuitable for domestic environments without modification. On most models, industrial computer fans are used to blow air across hot components.



The solution

Liquid cooling ASIC mining computers eliminates the need for loud industrial computer fans. It also allows for great flexibility in efficiently re-directing heat.



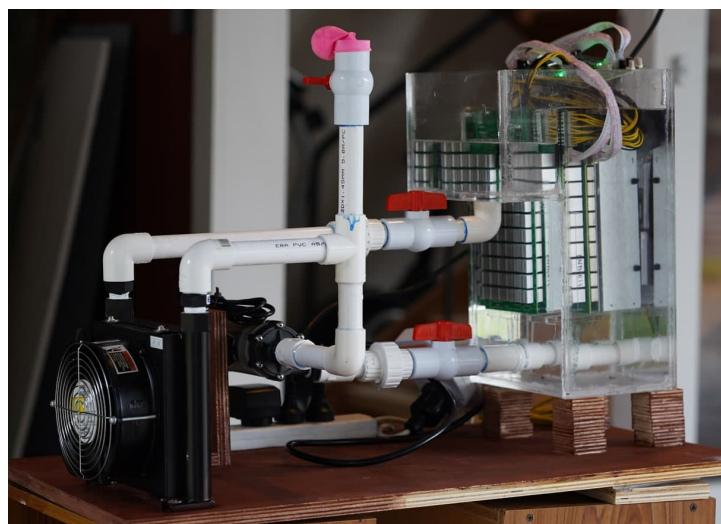
By integrating a liquid cooled ASIC mining computer into a home's heating system; we will be able to intelligently consume electricity in a way that is optimised to: improving the ROI on solar systems, subsidising heating expenses by capturing waste heat from the mining process, and unlocking monetisation opportunities for off-grid homes.

One of the best ways to create this integration is to use the ASIC mining computer to heat domestic hot water (DHW) as it will displace much of the expenses for a typical home's power bill. Homes with hydronic systems such as underfloor heating

and central heating will also benefit greatly from tapping into an ASIC mining DHW heating system.

Prototyping and beyond

I have constructed a single-loop immersion system prototype for a popular model ASIC mining computer (Antminer S9) and I have been testing and running the system everyday for 4 months now. I've used laser cut acrylic, pvc piping, brewing pump, oil radiator, and paraffin oil as the dielectric fluid. I've also added a PWM dimmer to control the DC radiator fan speed and a temperature probe shut-off relay for safety. I'm able to monitor the computer's temperature remotely as well as its hashrate and generated revenue.



Additional hardware additions and upgrades are required for this system to be integrated into a hot water system, however the novel liquid cooling method has been used to successfully reduce the noise output, making this system more user friendly within a domestic environment. The system can be used as a space heater without generating uncomfortable levels of noise.

Competitors

Concept boiler system wisemining.io

Concept space heater heatbit.com

Immersion tank cryptotherm.com

More examples of new immersion systems: devdass.com/posts/march2022



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