

Could Hot Rocks be Part of the Solution to Decarbonization?

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Today's world is becoming ever more cognizant of the need to reduce carbon emissions and produce carbon free energy. Renewable energy such as wind and solar have been getting most of the attention, yet they have several drawbacks. The biggest one being, they cannot store energy and their production is dependent on inconsistent climatic conditions. If there were an efficient way to store their energy, it would mean more people could rely on renewables. However, our current energy storage technology is mostly based on chemical batteries that are expensive and are energy intensive to produce themselves. These chemical batteries are also composed of chemicals and heavy metals that if released into the environment, would cause many detrimental effects. However, several researchers think they have found a solution to this problem, and it is a very simple one. Their solution is using hot rocks.¹

Researchers have realized that certain rocks have the remarkable ability to store large amounts of energy as heat and slowly release that energy over time.² The energy that is released over time could be used to power a generator and produce carbon free electricity. This would make these rocks function similar to batteries, except these rock "batteries" would be much cheaper to produce and operate and would have much longer lifespans.³ Two types of rocks in particular are coveted for their durability and thermal storage potential, granite and soapstone.⁴ Luckily, these are among the cheapest and most abundant rocks in the world.⁵ While using rocks as a form of a battery sounds like an out of the box idea, rocks have been used in certain industries as thermal batteries in certain industries for a long time now.⁶ However, researchers are proposing an entire new use. Instead of using rocks to just absorb and redistribute heat that is a byproduct of production as they have historically been used, researchers are proposing using photovoltaic cells to absorb the sun's energy and store it in the rocks.⁷ The rocks would then release their heat when to a generator and would heat up water into steam to power a turbine and produce electricity.⁸

There is one company that is at the front lines of this new technology, Antora Energy.⁹ Antora has developed a thermal battery using rocks that is about the size of a house where the rocks are heated to as high as 1,600 degrees Celsius.¹⁰ Antora Energy believes they can best capitalize by powering large factories at night, even when most renewable energy does not work.¹¹ Antora Energy points to the fact that in California during the day, energy is often nearly free because of the abundance of renewable energy.¹² Antora's model is that companies can use

¹ Prachi Patel, *Hot rocks could be the next big energy storage technology*, ANTHROPOCENE (June 8, 2023), <https://www.anthropocenemagazine.org/2023/06/hot-rocks-could-be-the-next-big-energy-storage-technology/>

² *Id.*

³ *Id.*

⁴ *Id.*

⁵ *Id.*

⁶ Bill Weir, *These hot rocks can glow brighter than the sun. They could also help spell the end of fossil fuels*, CNN (Dec. 18, 2023), <https://www.cnn.com/2023/12/16/climate/solution-hot-rocks-renewable-energy-battery/index.html>

⁷ *Id.*

⁸ *Id.*

⁹ *Id.*

¹⁰ *Id.*

¹¹ *Id.*

¹² *Id.*

this cheap electricity during the day to charge these rock batteries and then use the thermal energy at night to power their factories, which often run 24/7.¹³

Some researchers expect energy storage to become a multitrillion dollar industry.¹⁴ Researchers at Antora Energy believe their rock-based batteries will be the cheapest and easiest to operate on the market.¹⁵ This is partly due to the fact that existing battery technology is very expensive and current batteries are not environmentally friendly to produce.¹⁶ While proponents for these rock based thermal batteries point out the abundance of the granite and soapstone rocks that make up these batteries, it is worth noting that not all rocks of the same type have the same properties.¹⁷ While certain granite deposits have been identified as having superior thermal properties, others are known to not be as good.¹⁸ This could mean should these thermal batteries work and catch on, the cost for the rocks that do have adequate thermal properties could increase dramatically, thus making this technology more expensive than predicted.¹⁹ While sourcing the proper rocks at a cheap enough cost could be a potential hurdle for the industry, investors still believe this technology will be one of the breakthroughs needed to decarbonize the energy grid.²⁰ Antora Energy for example already has over \$80 million in funding from investors.²¹ This includes prominent investors like Bill Gates.²²

Rock based thermal batteries do have the potential to revolutionize the energy sector. They are a solution to the inconsistent production of renewable energy. This means the implementation of thermal batteries could allow for proponents of renewable energy to further advocate for renewables implementation, leading to a further decarbonized energy grid. Thermal batteries have a great advantage over their chemical battery counterparts as they can be produced much cheaper, are easier to operate and their production isn't as harmful to the environment.²³ So as it turns out, rocks very well may be a large part of the solution when it comes to decarbonizing the energy grid. These rocks would be the central component of a thermal battery, that could revolutionize the energy storage industry. These thermal batteries are relatively cheap to produce and not nearly as bad for the environment as their chemical counterparts. For these reasons, rock based thermal batteries have great potential to be one of the biggest pieces to the puzzle of decarbonizing the energy grid.

¹³ *Id.*

¹⁴ *Id.*

¹⁵ *Id.*

¹⁶ Thomas Bowmen, *Grid-Scale Battery Storage Frequently Asked Questions*, NATIONAL RENEWABLE ENERGY LABORATORY, <https://www.nrel.gov/docs/fy19osti/74426.pdf>

¹⁷ Patel *supra*, note 1.

¹⁸ *Id.*

¹⁹ *Id.*

²⁰ Weir *supra*, note 6.

²¹ *Id.*

²² *Id.*

²³ *Id.*