CHEESECAKE ENERGY LTD

Cheesecake Energy The world's greenest battery



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Cheesecake Energy





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About us

Coming together initially around a body of research at the University of Nottingham, we're an experienced team with a background in industry, business and academia, on a mission to accelerate the decarbonisation of the supply of energy around the world by making energy storage more affordable.

Cheesecake Energy Ltd (CEL) has developed the world's most sustainable energy storage technology for local renewable energy networks (microgrids) and electric vehicle (EV) fleet charging. We use off-theshelf industrial hardware in a proprietary system configuration to deliver an energy storage technology 30-40% cheaper than the market-leading alternative, lithium-ion batteries

Mission

Our mission is to unlock a fast and affordable transition to a low-carbon energy future.

Vision

To be the supplier of choice globally for medium-scale medium-duration energy storage systems by 2025.

<u>The problem</u>

California will require

55GW

of long-duration storage to meet Its 2045 Carbon-Free Grid Goal

500,000

gallons of water required to make one tonne of Lithium

Great Britain will need

1,400GWh

of electrical and thermal storage to meet its 2050 net zero carbon targets Across the globe, the need for energy storage is set to soar as more renewables such as wind and solar power, connect to the grid in efforts to meet the Net Zero carbon targets required to address the climate emergency.

Together with fossil generation, electrochemical storage and pumped hydro have been deployed to solve balancing challenges at current penetrations, with lithium-ion batteries taking the lead among electrochemical options, offering energy, capacity, and ancillary services benefits.

However, lithium-ion batteries have a short lifetime and production involves mining, using significant water and energy as well as advanced engineering skills for production and maintenance, undermining their use in global green energy applications.

For heavy lifting, it's not the answer. When we're shifting renewables in bulk, we need something that's cheap, long-lasting, and clean.



Our solution

Cheesecake Energy's *eTanker* is a stationary, medium - long-duration energy storage solution which delivers cheap, reliable, efficient energy storage in a modular, containerised package.

The technology stores energy in the form of heat and pressurised air, re-tasking exservice truck engines to become zero-emission electrical power-conversion machines for putting energy into storage and recovering it from storage.

The system is safe, straightforward to operate, has a lifetime of up to 25 years and can deliver turnaround efficiencies of 65 - 70%.

eTanker can discharge at full power for up to 20 hours at 30 - 40% lower cost than lithium-ion batteries and can be deployed flexibly as power and energy are scaled separately from one another. The system is portable and does not require any specific geological conditions other than firm flat land to be sited. The system can be cycled over 10,000 times and charged and discharged from 100% to 0% and back, without suffering any significant degradation.





How it works

Our core product, *eTanker*, repurposes ex-service diesel engines from trucks into air compressors, with the pistons driven by electric motors instead of burning fuel. As the air is compressed, it heats up to temperatures of around 550 °C. The heat is extracted in a heat exchanger and stored in an insulated tank of gravel. The pressurised air is stored separately in tanks from the compressed natural gas industry. When electricity is needed, the air passes through the heat exchanger where it is heated by the hot gravel. The hot air is then expanded in the cylinders of the same modified truck engine, driving a generator to produce electricity.

The resulting modular solution is a basic building block of 150kW, 750kWh energy stores, enough to power around 200 homes for 5 hours, or completely charge around 20 electric cars. It is 30-40% cheaper than an equivalent lithium-ion system and has more than double the lifetime at 25 years.



During charging, electricity is used to turn an electric motor which drives the engines as compressors, producing heat and high-pressure air.

To discharge, the pressurised air is reheated and used to drive the engines "in reverse" as expanders, turning a generator and producing electricity.

CEL in action

Nottinghamshire County Council is working with CEL and has committed to making a test site available at its property in Bilsthorpe for live testing of its first prototype system.

The project will demonstrate the benefits of energy storage for the rapid charging of electric vehicles, making use of on-site solar electricity, and paving the way for further reductions through the future expansion of solar generation capacity at the site.

The CEL *eTanker* system will capture solar energy from a 50kW photovoltaic array on the rooftop of one of the site's buildings and use that to charge the electric vehicles while they are parked at night, so that they are ready for their duty during the day.



Why CEL?

At CEL, we believe that future-proofing our energy systems requires longer duration, long term solutions that don't cost the earth.

Our flagship *eTanker* storage system is built around a commitment to sustainability, ensuring a minimal environmental footprint from design through manufacturing and recycling. By repurposing off the shelf hardware from the automotive and compressed natural gas industries, our technology ensures longer cycle-life, capital cost reductions, financial savings and, most of all, long-term sustainability.

Underpinned by a customer-first approach and a continued commitment to innovation, we are dedicated to helping clients to optimise their energy use and achieve their decarbonisation goals for a greener, cleaner planet.

The CEL advantage

- *eTanker* is the world's greenest energy storage technology. It has the lowest cradle to grave environmental footprint of any comparable system.
- The familiar, mechanical technology of *eTanker* ensures it can be operated and serviced locally in developing countries.
- The *eTanker* system is a thermo-mechanical energy storage system which stores energy as compressed air and heat. It has significantly lower capex than lithium-ion and other technologies.
- Power and energy capacity are scaled independently of one another, helping size projects efficiently and further reduce capex.



• *eTanker* can be cycled >10,000 times with negligible degradation.

Low-carbon grids need longer-duration storage



EV charging

Fleet depots and motorway service areas can see prohibitively high costs to upgrade their grid connections to meet the demands of EV charging at scale. These upgrades also take months to years to implement, causing uncertainty and unwanted delays. Energy storage can overcome these constraints by managing the capacity available from the existing grid connection, filling up the store when EV charging demand is low and making that energy available when needed by the vehicles. This can more than double the power available for charging, unlocking full electrification and giving fleet operators and individuals the ability to choose the zero-emission solution for their journeys.

Microgrids

Microgrids (sometimes also called mini-grids) are local energy networks that can be large or small but that have some of the characteristics of a "national" grid, in so far as they balance multiple sources of power and multiple loads. It is becoming increasingly common for microgrids to exist at different scales on an electricity system from a village in India to a factory in England to a US city. Medium - long-duration storage systems are a very powerful tool for microgrid developers to employ to balance renewable generation sources with variable loads.

Shifting solar

Many organisations require significant proportions of energy use outside of the peak solar production hours around either side of solar noon. In some cases their peak demand can coincide with peak electricity prices in the 4-7pm band. Industrial operations such as mines and cement works often have a need for 24 hour constant base load. Solar power is often far cheaper than conventional energy generation. In parts of the world where solar power is cheapest such as Chile, Australia and California, Power Purchase Agreements are becoming commonplace, where solar is combined with storage to provide cheap solar power precisely when needed.

Connect with us



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