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Decreasing the carbon footprint with geoenergy

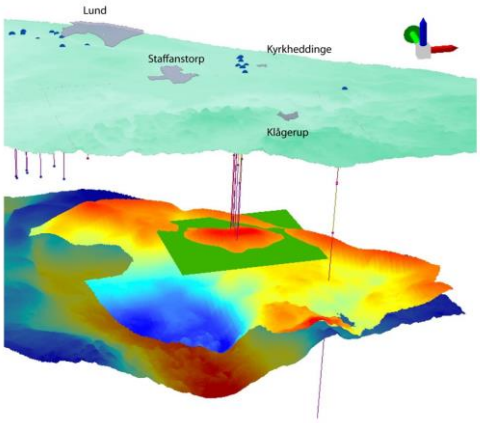
One problem with renewable energy sources is that they are not stable over time, the supply does not always match the demand and vice-versa. This means if we cannot store this energy in some way it will go to waste and at times of low supply rely on fossil fuels. Storing the energy under ground might be one of the best long-term solutions.

Investigating the subsurface is an expensive endeavor with seismic lines and drilling taking a lot of time and money. Older research is gathering dust in archives and basements. The data from these is still valuable and can be digitalized and used for new research in a modern way. The Kyrkheddinge area outside Lund was investigated for the possibility to store natural gas in 400 m deep Lund Sandstone. This data has now been used to create a digital 3D model to evaluate the possibilities for Compressed Air Energy Storage (CAES).

CAES is a method to compress excess energy from renewable energy sources such as wind and solar and pump it into an underground reservoir for storage. When energy is in high demand the air can be pumped back up to the surface where at expansion it drives a turbine to create electricity. The air can be stored in a porous rock formation such as sandstone with a tighter rock formation, a cap-rock, above it that does not allow the air to escape through it. It needs to be a dome-like structure so the air can't escape upwards or to the sides.

In Kyrkheddinge two structures were found with the 3D model that could possibly be used for this purpose. They both seem to have excellent reservoir properties that could balance the electricity from renewable sources in Lund. The problem seems to be keeping the air in. The largest of the two structures might not be as dome-like as it looks in the model, and air would not be kept in. The smaller structure might not have a thick enough cap-rock and air could escape upwards.

More research would be needed to determine if it is possible to use CAES outside Lund, but there are other possibilities to use this rock formation for renewable energy. On the other side of Lund there is a geothermal plant which uses warm water from the Lund Sandstone for district heating. The geology is similar in the Kyrkheddinge Area and could be a possibility here as well.



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