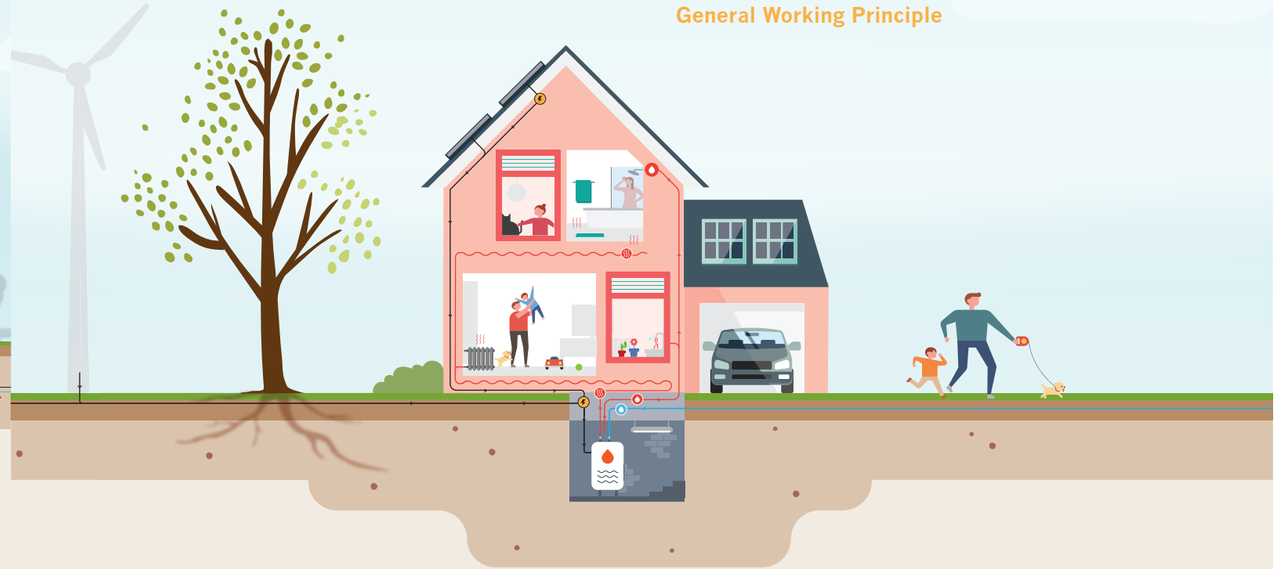
REDOX HEAT BATTERY

Energy storage solution

General Working Principle



REDOX Heat Technology Developed within the European Program SCORES
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Redox heat battery – energy storage solution

- One of the main challenges of the renewable energy sources such as solar and wind is their intermittency on daily and seasonal cycles. It is envisaged that a large deployment of these technologies will takes place in the following years as part of the energy transition. In the course of the energy transition, some of the renewable technologies are implemented into the market at a faster pace than others. This can cause imbalances in the energy grids and cause additional technological and commercial challenges which can ultimately restrict the use of renewables. In order to balance the energy systems and limit the effects of intermittency of renewable energy sources, various energy conversion and storage solutions need to be developed at relevant scale.

- REDOX heat technology is developed by TNO. The demonstration of the redox heat technology in the build environment is done in the SCORES project in in two relevant climate regions for Europe: south of France and Austria.

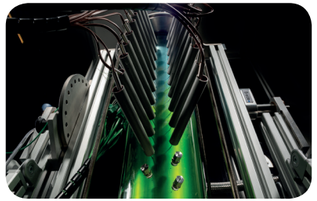
- A team of engineers and scientists from TNO are developing a Power to heat concept named REDOX HEAT based on redox reactions of metals. The advantage of using metals is their very high energy volume densities, even compared to traditional fossil fuels like diesel.

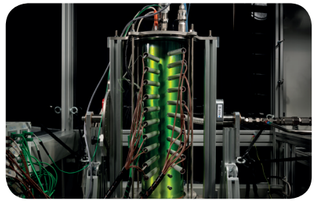
The reaction can be designed that the metal retains its solid state allowing for easy recovery and reuse of the metal. High energy volume density and recovery of the core material are two properties that make redox heat very suitable for an energy storage system.

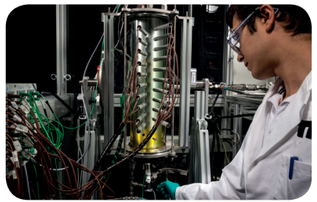
- REDOX heat battery uses the REDuction and OXidation reactions to store heat. In our REDOX heat battery the metal core is oxidized using air and the heat generated is used for supplying domestic hot water and space heating. After the reaction, the core is regenerated by supplying hydrogen produced by renewable electricity. This cyclic operation enables the use of this energy storage system in a similar way as we currently use standard rechargeable batteries at home, with the difference of storing heat rather than electricity.

- REDOX heat is a modular heat storage system. It can easily be implemented in a single family house, an apartment building or a neighborhood and scaled to the appropriate size.

- The system can be used in different scenarios optimized towards self-consumption or grid flexibility.







TNO engineer operating the REDOX heat bench scale setup.

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