



BEYOND THE TIPPING POINT: FUTURE ENERGY STORAGE

Reforming our energy system is one of the most important measures to mitigate climate change. An important aspect of this is energy storage. Globally, only 3 per cent of our power capacity is being stored. To limit global warming to below 2°C, energy storage capacity needs to triple by 2050. Numerous options for energy storage already exist but common misconceptions affect the implementation of energy storage technologies.

Should we wait for the perfect battery? Is geothermal storage too expensive? Is portable hydrogen storage too dangerous to ever consider? The answers are no. If we have to wait for a perfect solution we might be waiting for a long time, wasting time that could be used for climate change mitigation. Now is the time to act. There is no “one-size-fits-all solution”, which is why we need a combination of day-to day and seasonal storage consisting, for example, of battery, geothermal and hydrogen storage.

WHAT MIGHT THE FUTURE STORAGE CITY AND COMMUNITY LOOK LIKE?

The future city is a storage city: a smart city where energy is needed on the go, a city where a large share of energy comes from renewable sources. It is a city where the internet-of-things allows communication between appliances and infrastructure enabling us to use energy efficiently and achieve high quality services. Sweco energy experts have identified the following future trends and opportunities for achieving storage cities:

- **Communities coming together to invest in energy storage**

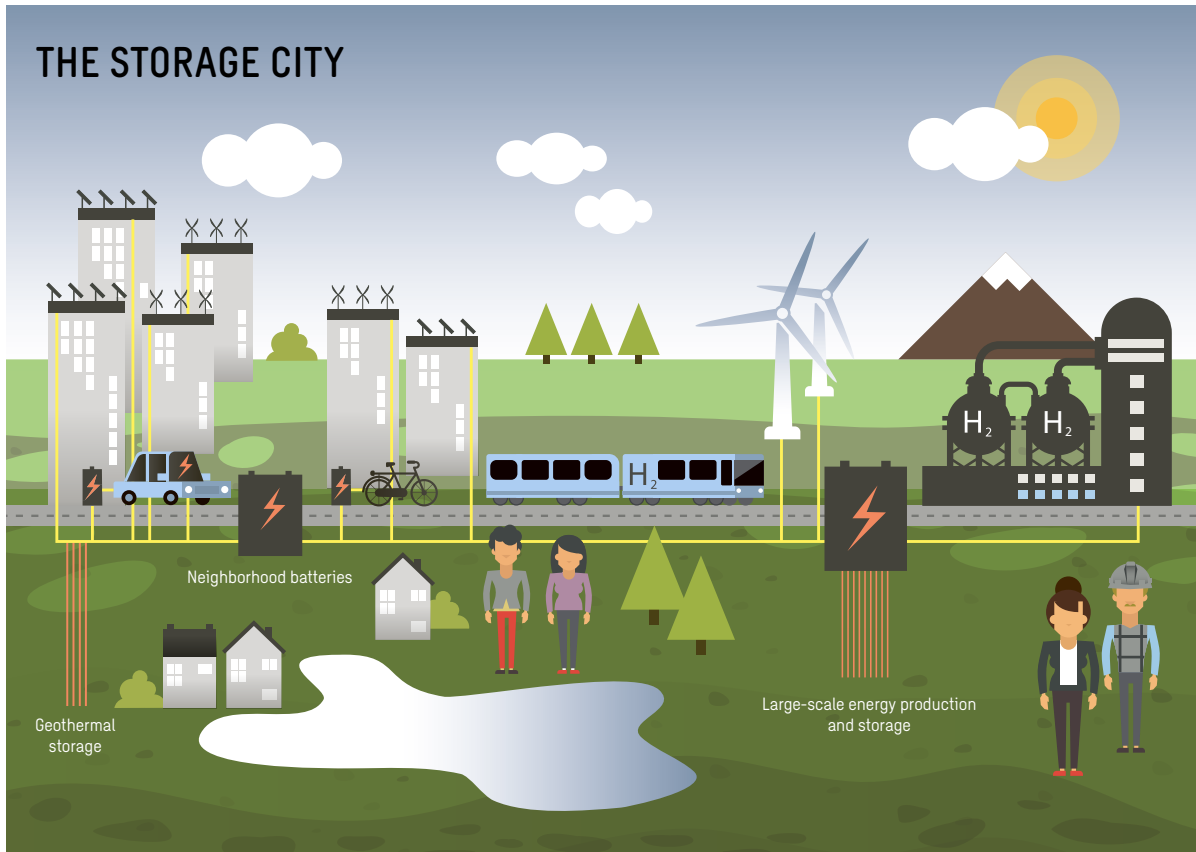
To maximise the system’s effectiveness and reduce investment risk, residents of a building or an entire building complex could come together and invest in a neighbourhood battery or a heating system using geothermal energy. This would entail lower installation and maintenance costs per household.

- **Energy-storage-as-a-service**

Why not a subscription for energy storage? In the energy storage-as-a-service model, energy becomes available to the customer as a service, in the same way as subscriptions for food, accessories, films or music. Energy-storage-as-a-service can curb the barrier of high upfront investment costs, help aggregate multiple storage revenue sources, and give the public the opportunity to test a solution without committing to a long-term investment.

- **E-mobility, portable storage and the virtual power plant**

E-mobility is expanding and may soon be joined by more and more vehicles running on hydrogen. These vehicles will charge when renewable energy is abundant in the system and feed energy back to the system when needed, forming “virtual power plants” of aggregated storage components. Portable storage with solid-state batteries and hydrogen bottles might mean our phones never again run out of battery in the middle of the day.



NEW TECHNOLOGIES MORE VULNERABLE TO VARIOUS MISCONCEPTIONS

Decisions regarding energy consumption and choice of technologies are influenced by behavioural aspects and are not purely driven by financial incentives. New technologies are more vulnerable to various misconceptions than well-established technologies.

Are we close to the tipping point for an energy storage breakthrough? There is certainly a long way to go, but we are working on it. Strong support in the form of incentives, as well as cross-sectoral collaboration, is needed to continue the positive trend. If it took 40 years for electricity to become a household staple and smartphones took around 10 years, how much time is needed for our cities to become storage cities?

DID YOU KNOW?

- If the current mobile device battery stock was recycled at its end-of-life, almost 31 million electric cars could have batteries with mobile phone-recycled cobalt.

- Although the initial investment cost for geothermal energy systems is typically high, a large part of the energy used is free from the ground. This generally leads to lower energy bills.
- At the Oslo airport around 100,000 cubic metres of clean snow is collected during the winter and stored until the summer season. During summer, when there is a cooling demand, cold water from melted snow is used to cool the airport buildings.
- Only 5 kg of hydrogen could provide an entire week's electricity for a three-person family.

Beginning with sharing data, facts and insights about the potential of energy storage, more and more clean energy can be efficiently used in our cities.

Help us to address common misconceptions about energy storage. Discover more about energy storage in the Urban Insight report [Beyond the Tipping Point: Future Energy Storage](#).