



Technology Brief

New chapters on large and household hot water tanks

The Danish Energy Agency published an updated Technology Catalogue for Energy Storage. The revision aims to update the technology cost and recent developments for hot water tank thermal energy storages (TTES) for district heating and households. The update focuses particularly on the district heating TTES, which have increased in size with the introduction of increasingly larger heat pumps and the tighter integration with the electricity market.

This update therefore provides new descriptions and data sheets for large hot water tanks of 5.000 m³, 50.000m³ and household hot water tanks (90L).

Major changes in updated Technology Catalogue

Based on the latest publicly available data and newest projects, the updated chapters give an up-to-date perspective on technical and economic assumptions behind TTES of both types. The chapter on household hot water tanks has been updated with more detailed technical descriptions and up to date costs, not further described here. The changes for the chapters on the large TTES are highlighted below, due to the more extensive revisions.

Large hot water energy storage

The chapter was first published in November 2018, and included descriptions and costs for a 3.000 m³ TTES. This has now been updated to a 5.000 m³ storage, which represents the average installed TTES volume in Denmark since 2013 (Figure 1). The new cost data in the chapter is therefore updated to reflect the current market context, where the Danish market has gained experience in installing such storage sizes, which has had a positive effect on reducing investment cost, despite the general increase in the costs with materials and installation in the recent years.

Danish companies have acquired know-how for building storages up to 20.000 m³, but the deeper integration between the heating and electricity sectors using large heat pumps, has made the district heating companies look towards building even larger heat storages for making use of the low electricity prices at certain hours. Such large storages (over 40.000 m³) require advanced construction methods and workforce from abroad, ending up costing more per unit of storage capacity with less gains from the economy of scale compared to the systems below 20.000 m³. Therefore, technical and economic data for 50.000 m³ TTES is added to the chapter.

Danish Energy Agency

Carsten Niebuhrs Gade 43
1577 København V

T: +45 3392 6700
E: ens@ens.dk

www.ens.dk

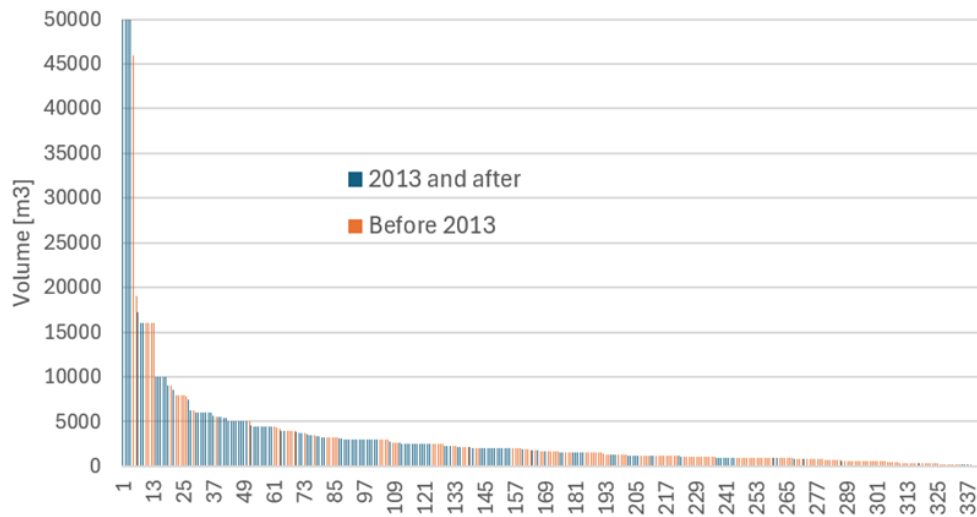


Figure 1: TTES for district heating commissioned in Denmark since 1975, ordered by storage volume (m³) and split between before 2013 and after 2013 (the year when a survey was made for all TTES in Denmark)

Perspectives for Denmark

TTES has been a widely used technology in Danish district heating systems since the early 1970s, initially due to sector-coupling efforts alongside Combined Heat and Power plants and more recently the integration of large heat pumps, with a focus on emissions reduction, transition away from fossil fuels and increased energy efficiency.

Recent years have generally shown a trend toward building larger TTES, and this is likely to continue in the coming years, in line with the goal of achieving greater flexibility and lower operational costs. Four 50.000 m³ storages were built for the Aalborg district heating company, while two more of the same size are also planned in Aarhus.