Small scale battery storage

With the advancements in energy storage technologies, almost all storage technologies can be applied at small scale level. These technologies are identified in the aforementioned classification, with micro compress air storage and micro pumped hydro storage being included, instead of their large-scale forms. This section will provide an overview on current development and application of energy storage technologies for small scale systems, as displayed in Table 1. While the overview does not focus on the configuration of the technologies, their characteristics are presented in Table 2.

With significant improvements in energy technology field for the past decades, it is important to include level of technology maturity, as well as priorities in research and development (R& D) in the domain, when it comes to selecting storage technology for energy systems. This paper proposes a two-step evaluation for selecting suitable energy storage technology for small scale energy systems, as described in the following subsections.

In this step, by looking at technical requirements of the concerned system, possible technical options will be addressed. The technical characteristics of different storage technologies are compiled from available publications, including scientific papers, reports from established organizations. Table 2 summarizes technical and economic features of these technologies.

Techno-economic aspects mentioned in this section include methods to identify key driving factors and to illustrate technology maturity curve of the technologies, as well as sources for market forecast. By considering these assessments, a technology with suitable level of maturity or being one of the technology priorities can be chosen from the possible technical options.

Figure 1 illustrates current status of energy storage technologies based on evaluation of their TRLs and stages of market development. The fact that market development for a mature technology declines over time is displayed by the curve. Compare this curve with the report conducted by [30], almost all storage technologies analysed in this paper are ranked similarly; the curve in this paper added solar fuel, micro CAES, micro PHS, PCM, and TCM. Regarding PCM and TCM thermal storages, their levels of maturity presented here are almost identical to that in the work done by [22].

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