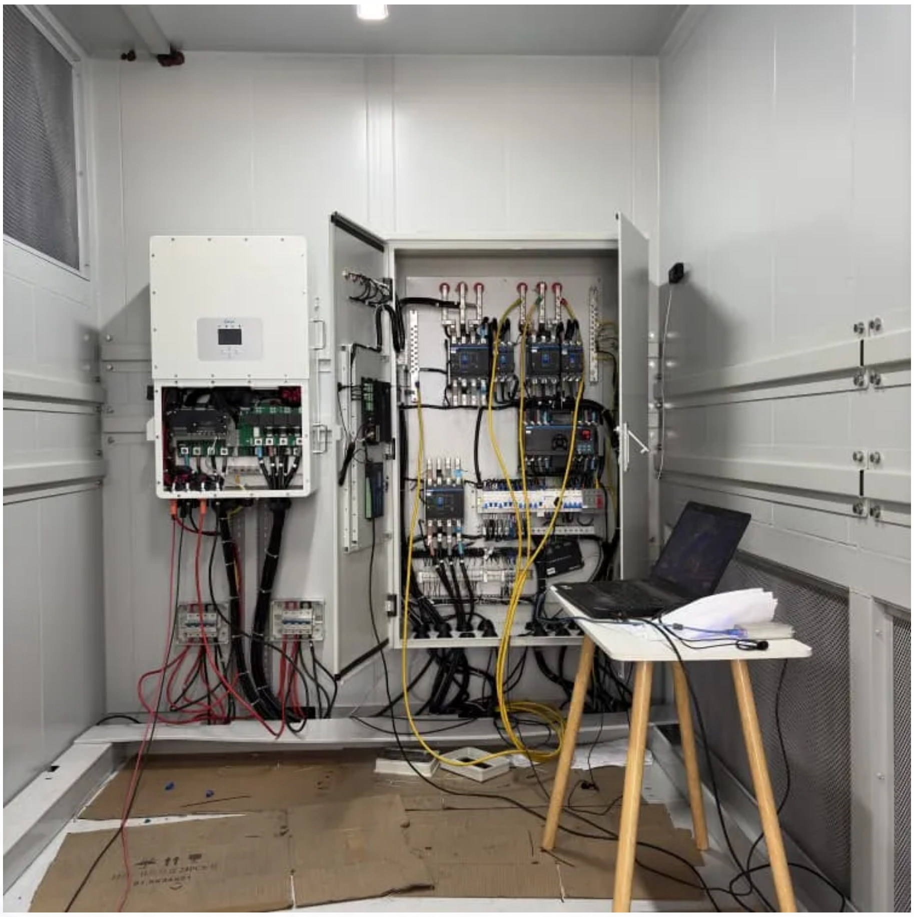
Kongres Container

Lithium battery power generation



Overview

Due to the rapidly increasing demand for electric vehicles, the need for battery cells is also increasing considerably. However, the production of battery cells requires enormous amounts of energy, which is expensive and produces greenho. Due to the rapidly increasing demand for electric vehicles, the need for battery cells is also increasing considerably. However, the production of battery cells requires enormous amounts of energy, which is expensive and produces greenhouse gas emissions. Here, by combining data from literature and from own research, we analyse how much energy lith.

Global warming is a serious threat to our society1. Thus, policymakers are increasingly addressing environmental and social sustainability. In Europe, the European Commission plans to reduce greenhouse gas (GHG) emissions substantially by 2030 (ref. 2) and to be GHG emission neutral by 2050 (ref. 3). A major enabler for achieving this goal is the transition from cars with internal combustion engines to electric vehicles4. Many global car companies already have declared that they will no longer produce internal combustion engine cars in the mid-term5,6. As a result, the demand for battery cells is increasing markedly. The World Economic Forum predicted that the global battery demand will be 2,600 GWh in 2030 (ref. 7). Figure 1 shows the expected global battery demand from 2021 to 2040 (refs. 7.

In the first step, we analysed how the energy consumption of a current battery cell production changes when PLIB cells are produced instead of LIB cells. As a reference, an existing LIB factory model was used31,34, which is provided in Supplementary Fig. 1 and Supplementary Table 1. How future PLIB production technology routes might look and which technology routes we used as references in this study are shown in Supplementary Fig. 2. However, to be able to quantify the percentage of the change in energy consumption between LIB and PLIB cell production, we conducted workshops in which experts rated each single production step. Details about this work are provided in Methods and in Supplementary Note 1. The results that were obtained are shown in Fig. 2.

Based on the numbers in Fig. 2, the energy consumption of PLIB cell production is calculated. Figure 3 shows the energy consumption for each production step of all relevant LIB14 and PLIB cells likely to be commercially relevant from now until 2040 (ref. 26). The energy necessary to produce 1 kWhcell of cell energy for nickel-cathode-based LIB cells ranges between 20 kWhprod and 29 kWhprod. The energy consumption of LIB cell production decreases as the energy density increases. NMC900 cells with carbon-based and silicon anodes have the lowest energy demand in LIB cell production, with approximately 20.3 kWhprod. Notably, LFP cells, with 37.5 kWhprod, have the highest production energy demand of all of the battery cells that were analysed. Furthermore, in LIB cell production today.

There are natural uncertainties in any market forecasts and energy modelling, which so far have not been considered. In addition, it can be assumed that the production of battery cells will be improved in the future through new technologies. Therefore, in this analysis, we calculated the impact of new production and material technologies on the future energy consumption of production as shown in Table 1. In particular, we selected those technologies that have notable impacts on the main energy consumers in the production of battery cells, for example, drying, dry room, formation and sintering/tempering and might be industrialized and used extensively by 2040. The calculations for this are available in Source Data Table 1. Further information can be found in Supplementary Note 2. It.

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