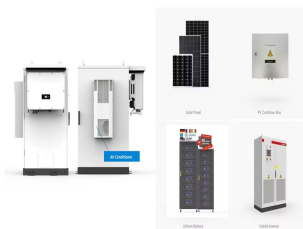
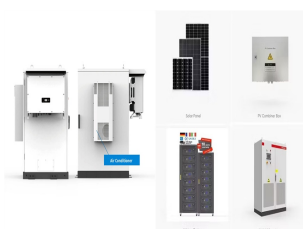


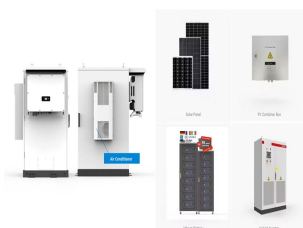
# SECOND-LIFE ENERGY STORAGE BATTERY



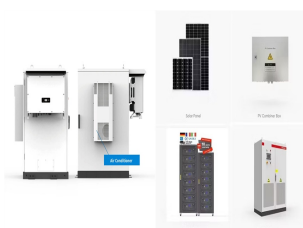
What is a second-life battery used for? Potential uses for second-life batteries include CBS, EV charging stations, mobile energy storage, streetlamps, uninterruptible power systems, and residential energy storage.



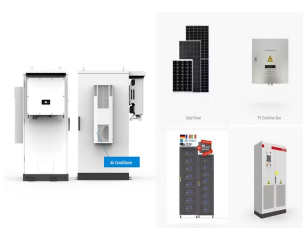
Can EV batteries be used as second-life energy storage? Since retired electric vehicle batteries (EVBs) are expected to retain 70%???80% of their initial energy capacity, they can find second-life use in energy storage applications which require lower performance than EVs. 1,2,3,4,5



What does a second-life battery study entail? Detailed review of key technological and economic aspects of second-life batteries. Analysis of battery degradation models for second-life applications. Overview of processes, challenges, and standards in battery retirement assessment. Scrutiny of economic feasibility and profitable uses for second-life batteries.

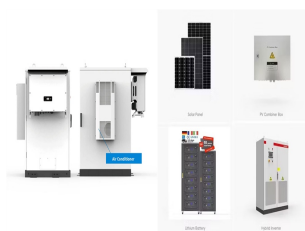


Are second-life batteries profitable? Scrutiny of economic feasibility and profitable uses for second-life batteries. Examination and comparison of power electronics for second-life battery performance. Due to the increasing volume of electric vehicles in automotive markets and the limited lifetime of onboard lithium-ion batteries, the large-scale retirement of batteries is imminent.

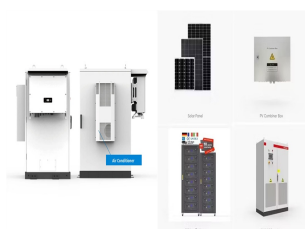


Could a second life battery be the future of stationary storage? As electric-vehicle penetration grows, a market for second life batteries could emerge. This new connection to the power sector could have big implications when it comes to stationary storage.

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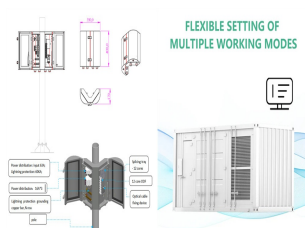
What is a second-life energy storage idea? The second-life energy storage idea is in theory simple. As EV batteries' capacity falls below 80%-85% after eight-to-10 years of use, the theory goes, they will be repurposed to power buildings or even balance local and national energy grids.



Understanding the Decline of EV Batteries and Their Second Life Potential. An EV battery typically loses efficiency after several years of use in an electric vehicle, with many experiencing a decline in storage capacity to around 70-80%. Lower Costs and Increased Access to Energy Storage; Second-life EV batteries offer a more affordable



Steckel, T., Kendall, A. & Ambrose, H. Applying levelized cost of storage methodology to utility-scale second-life lithium-ion battery energy storage systems. Appl. Energy 300, 117309.



Battery storage systems are a key element in the energy transition, since they can store excess renewable energy and make it available when it is needed most. As a battery storage pioneer, RWE develops, builds and operates innovative and competitive large battery storage systems as well as onshore and solar-hybrid projects in Europe, Australia



A second-life battery storage system refers to the repurposing of EV batteries. During the lifespan of an electric vehicle, the battery gradually loses its capacity over the years and many charging cycles. The energy storage capacity or condition of a battery, also known as its "state of health", is influenced by its cyclic and calendar



The concept of second life (SL) refers to the repurposing of a used product or material for a different application other than the one for which it was originally designed. In the context of batteries, SL refers to the practice of repurposing used

# SECOND-LIFE ENERGY STORAGE BATTERY



RePurpose Energy is focused on reusing EV batteries to create reliable, low-cost "second-life" energy storage systems. In doing so, we maximize the value of these batteries, strengthen the resilience and sustainability of battery supply chains, and support the global transition to renewable energy.



usable energy capacity remaining at its vehicle-application end of life. While the LIB may no longer meet the power and energy demands of a vehicle, it may still be capable of significant energy storage and have up to 10 years of life remaining in different applications.<sup>1</sup> WHAT TYPES OF SECOND-LIFE APPLICATIONS ARE AVAILABLE TO THESE BATTERIES?



[1/3] Zenobe's Founder Director Steven Meersman shows off one of the company's second-life battery energy storage units that contains part of a battery pack previously used on an electric bus at



The project will showcase Element's technology in a real-world grid application, and was one of five proposals using second life energy storage systems. Another project to receive DOE funding for second life demonstrations was one by Smartville, the president of which, Mike Ferry, was recently interviewed by Energy-Storage.news. RePurpose



The potential to use "second-life" batteries in stationary battery energy storage systems (BESS) is being explored by several startups, along with some grant programs and a few EV manufacturers.

# SECOND-LIFE ENERGY STORAGE BATTERY



Projection on the global battery demand as illustrated by Fig. 1 shows that with the rapid proliferation of EVs [12], [13], [14], the world will soon face a threat from the potential waste of EV batteries if such batteries are not considered for second-life applications before being discarded. According to Bloomberg New Energy Finance, it is also estimated that the ???



Demand for used batteries for storage is likely to soar as intermittent renewable energy takes on a bigger role. By 2030 global battery capacity for grid storage could grow to ???



An EV battery can embark on a second life as a stationary power source at this stage, potentially serving as grid-connected storage. Benefits and challenges of second-life batteries. Second-life batteries offer economic benefits beyond the environmental advantages???reducing landfill waste and the demand for new raw materials.



A second life battery project is meeting the energy needs of Melilla, Spain, a seaside town of 86,000 people. Enel X constructed an energy storage solution at its thermal power plant from 78 second life battery packs provided by auto manufacturer Nissan, which will reduce the risk of power cuts in the autonomous city. The system can deliver



Retired LIBs from EVs could be given a second-life in applications requiring lower power or lower specific energy. As early as 1998, researchers began to consider the technical feasibility of second-life traction batteries in stationary energy storage applications [10], [11]. With the shift towards LIBs, second life applications have been identified as a potential ???

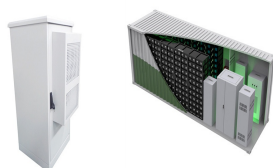
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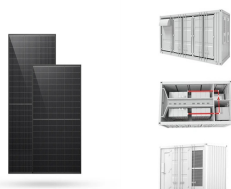
A battery energy storage system using EV batteries, from Sweden-based BatteryLoop, one of the companies interviewed for the article. Image: BatteryLoop. The boom in electric vehicles is set to see hundreds of GWh of used EV batteries hit the market over the 2030s, which can then be given a "second life" in stationary energy storage.



The technical specs of the stationary battery storage system are impressive: The total capacity is 5 megawatts with an energy content of 10 megawatt-hours. The storage system can be operated at up to 20 per cent ???



This places a significant barrier to adoption of SLBs and so predictive diagnostics must play a key part in the future development of viable second life grid storage applications. 2.4 Pack degradation grading. A standardized process for grading any EV battery for second-life applications does not yet exist in the UK or EU.



Hence, there is plenty of potential demand for a second-life battery system. The sustainability impact of EVs depends on mainly three factors: Impact of shared battery energy storage systems on photovoltaic self-consumption and electricity bills in apartment buildings. Appl Energy, 245 (2019), pp. 78-95, 10.1016/j.apenergy.2019.04.001.



We repurpose second-life batteries from former EVs and turn them into scalable, powerful energy storage systems. From commercial products to our own development sites, we capitalise on the growing availability of second life batteries, providing a future income stream for batteries whilst supporting the local and national grid.



Pioneers in the circular economy with our second life electric vehicle battery powered battery storage, Connected Energy is a global leader in sustainability. That's why all our battery energy storage systems use second life EV batteries. The carbon benefits of second life systems A

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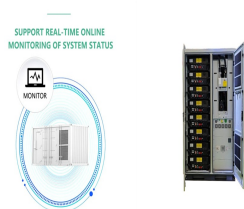
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recent study by Lancaster University showed a 450tonnes

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The second-life battery energy storage system (SLBESS) is built on 280 Nissan Leaf SLB that were installed. "The xStorage Buildings system can take energy from the grid by reusing batteries from previously utilized EV, giving companies greater control, greater quality, and a much more sustainable option for their energy usage."



Enel X is developing three projects in the second round of the European Union's "Important Project of Common European Interest" or IPCEI. These projects concern applications for charging electric vehicles; large stationary systems for energy storage; and for a sustainable management of the end-of-life of lithium batteries.



In 2020, Connected Energy conducted a collaboration with Groupe Renault, using the retired batteries from Renault Kangoo Z.E. to their second-life battery energy storage system E-STOR [12]. In China, the development of B2U is also rapid.



The SLBS 6kWh Energy Storage System is designed to be a long-life Battery reserve in use for 25+ years whose modules are serviced or replaced to maintain Security of Supply. 6kWh / 3kW 2nd Life Energy Storage System. This specification is for comparison purposes only. Limited Availability from end Q2 2024. Cell Type: