

2nd life battery storage projects in Europe

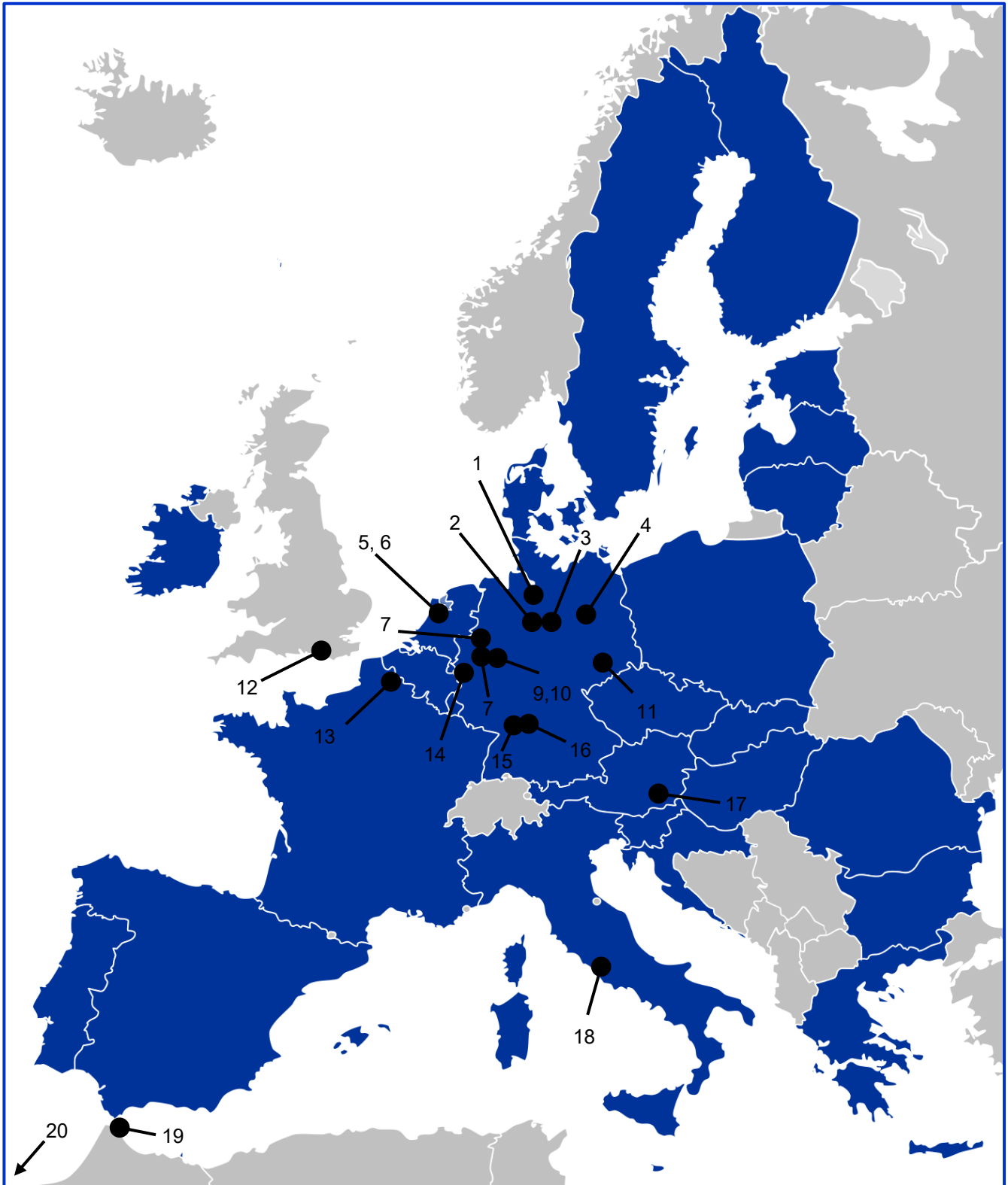


Figure 1: Map of Europe with EU member countries (blue). Source: © Kolja21 / commons.wikimedia.org [1].

Abstract:

Batteries from electric vehicles (BEVs) degrade over their service life, resulting in a reduced storage capacity, which in turn has a negative impact on the vehicle's range. The factors influencing aging are among others the operating temperature, number of charge/discharge cycles and the level of charge/discharge currents. In the electric car, this leads to a corresponding reduction in its range, and the accumulator will be replaced after a limit value (e.g. 80% of the nominal capacity) is exceeded. However, this does not have to be the end of the battery's life. At this point the battery can be used in less intensive environments like stationary storage applications. Depending on how they are used, the batteries still have up to ten years of remaining service life. This secondary use is expected to result in lower overall investment costs for the batteries. Due to their longer service life and the omission of the need for new cells, the environmental impact can also be reduced in the form of a shift of the CO₂ footprint.

In addition, batteries and cells from cars that were built e.g. for testing purposes can be reused in this way. Thus, it is possible that almost new batteries are used in a 2nd life storage system if they cannot be used for the vehicles for licensing reasons or similar.

Many 2nd Life storage facilities have already been put into operation throughout Europe. The capacity of these storages ranges from a few hundred kWh up to almost 100 MWh. The first 2nd Life storage facility has been in operation since 2013. In most cases, the projects relate to OEMs, which serve as suppliers for the batteries.

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Site 1:

Project name	<i>Battery 2nd Life</i> [2]
Partner	BMW Bosch Energy Storage Solutions Vattenfall
Location	Hamburg, Germany
Launch	2013
Capacity	2 MW / 2,8 MWh
Batteries	2600 modules from more than 100 cars

Site 3:

Project name	<i>flexible fast charging station VW Group Components</i> [3]
Partner	VW
Location	Wolfsburg, Germany
Launch	2020
Capacity	Up to 100 kW
Batteries	-

Site 2:

Project name	<i>GUW+</i> [4]
Partner	ALSTOM ELPRO Fraunhofer IVI M&P Motion Control & Power Electronics TU Dresden ÜSTRA
Location	Hannover, Germany
Launch	2019
Capacity	500 kWh
Batteries	Mercedes Benz batteries

Site 4:

Project name	<i>EUREF Campus</i> [5]
Partner	Audi The Mobility House EUREF Campus
Location	Berlin, Germany
Launch	2019
Capacity	1,25 MW / 1,9 MWh
Batteries	20 Batteries

Site 5:

Project name	<i>Amsterdam Arena</i> [6], [7]
Partner	Nissan Eaton The Mobility House BAM
Location	Amsterdam, Netherlands
Launch	2018
Capacity	3 MW / 2,8 MWh
Batteries	Approx. 148 Leaf Batteries

Site 6:

Project name	Anubis [9]
Partner	RWE VDL Bus & Coach
Location	Moerdijk, Netherlands
Launch	-
Capacity	7,5 MW
Batteries	43 Batteries from E-Busses

Site 7:

Project name	<i>Lünen</i> [8]
Partner	Daimler Remondis GETEC Mercedes – Benz Energy
Location	Lünen, Germany
Launch	2016
Capacity	12 MW / 13 MWh
Batteries	1024 Modules

Site 8:

Project name	<i>Pumped storage power plant at Hengsteysee</i> [10]
Partner	RWE Audi
Location	Herdecke, Germany
Launch	2021
Capacity	4,5 MWh
Batteries	60 Modules

Site 9:

Project name	<i>Smart Battery Storage</i> [11]
Partner	Renault The Mobility House Fenecon
Location	Elverlingsen, Germany
Launch	2020
Capacity	3 MWh
Batteries	72 Batteries

Site 10:

Project name	<i>Elverlingsen</i> [13]
Partner	Daimler GETEC Energie Mercedes – Benz Energy
Location	Elverlingsen, Germany
Launch	2018
Capacity	20 MW / 21 MWh
Batteries	1878 Modules

Site 11:

Project name	<i>JT Energy Systems</i> [12]
Partner	Jungheinrich Triathlon
Location	Freiberg (Saxony), Germany
Launch	Completion in autumn 2022
Capacity	25 MW
Batteries	From forklifts and automotive

Site 12:

Project name	<i>Smart Hubs</i> [14]
Partner	Renault Connected Energy Moixa Passive Systems ICAX Newcastle University West Sussex County Council Innovate UK
Location	West Sussex, UK
Launch	2019
Capacity	14,5 MWh
Batteries	1000 Batteries

Site 13:

Project name	<i>Advanced Battery Storage</i> [14]
Partner	Renault The Mobility House Nidec
Location	Douai, France
Launch	2019
Capacity	4,7 MWh
Batteries	-

Site 14:

Project name	<i>EMILAS</i> [16]
Partner	Fraunhofer ISE DSG Energiekonzepte Deer Beck Automation VDE Renewables
Location	Weinsberg, Germany
Launch	7/21
Capacity	81 kW / 194 kWh
Batteries	BMW i3 Batteries

Site 15:

Project name	<i>Fluxlicon</i> [15]
Partner	RWTH Aachen PEM Motion ConAC DEKRA
Location	2 Communities in Germany
Launch	Duration 09/21 - 09/24
Capacity	1 MWh
Batteries	-

Site 16:

Project name	<i>EnBW-Heizkraftwerk</i> [17]
Partner	Audi EnBW
Location	Heilbronn, Germany
Launch	2022
Capacity	1 MW
Batteries	12 e-tron Batteries

Site 17:

Project name	<i>SecondLifeBatteries4Storage</i> [18]
Partner	AVL List AVL DiTest Energie Steiermark Saubermacher Smart Power
Location	Premstätten, Austria
Launch	2020
Capacity	96 MWh
Batteries	Various OEMs

Site 18:

Project name	Smart Fossil Free Island [19]
Partner	Renault Empresa Electricidade da Madeira The Mobility House ABB
Location	Porto Santo, Portugal
Launch	2018
Capacity	132 kW
Batteries	11 Batteries

Site 19:

Project name	<i>Pioneer</i> [18]
Partner	Aeroporti di Roma Enel X Fraunhofer ISE
Location	Rome, Italy
Launch	2024
Capacity	5MW/10MWh
Batteries	Various OEMs

Site 20:

Project name	<i>Thermal Power Station</i> [20]
Partner	ENEL Group (Endesa) Nissan Loccioni
Location	Melilla, Spain
Launch	2019
Capacity	4 MW / 1,7 MWh
Batteries	78 Nissan Leaf Batteries

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