Supplementary Material A

Table S1. Legal guidelines on end-of-life strategies for batteries

Directive	Content
End-of life vehicles-Directive (2000/53/EG) [148]	• Determination of the reuse rate > 95% in relation to vehicle weight since 1 January 2015
Battery Directive (2006/66/EG) [149]	• Producer responsibility to take back and recycle batteries free of charge (extended producer responsibility) • Recyclate rate for lithium-ion batteries > 50% in relation to battery weight • Ban on the disposal of batteries in landfills and incineration • No information on refurbishment, repurpose or reuse
EU Battery Regulation (from 2023) [58]	• Consideration of companies for refurbishment, reuse or repurpose (Article 2) • Labelling requirement for the CO_2 footprint of batteries over the entire life cycle (Article 7) • Definition of minimum quantities of reused materials in new batteries (recyclate rate) (Article 8): From 2031: 16% cobalt, 85% lead, 6% lithium, 6% nickel From 2036: 26% cobalt, 85% lead, 12% lithium, 15% nickel • Every battery must be equipped with a BMS from 2024 (Article 14) • BMS information must be made available to everyone (Article 14) • B2U manufacturers must ensure that the performance verification, packaging, shipping, and all components in the process are components in the process are carried out in accordance with appropriate quality control and safety requirements (Article 44a) • Proof required that all product, environmental, health and transport safety requirements are fulfilled (Article 44a) • B2U manufacturers must provide information on battery suppliers and users of B2U storage systems on request (Article 45) • The B2U manufacturer is the manufacturer of the battery and therefore has extended producer responsibility (Article 38/47) • In each Member State where the batteries are sold, an authorized representative must be chosen by written proxy (Article 47)

• Determination of recycling efficiencies (Article 57):

From 2031: 95% cobalt, 95% copper, 95% lead, 80% lithium, 95% nickel

• The following documents are required to prove that the battery is no longer waste after preparation for reuse/repurpose (Article 59):

1.) Proof of verification of the battery's SoH and ability to fulfil its performance

2) Documentation of further use by means of an invoice or sales contract

3) Adequate protection against damage during transport, charging and discharging

• Obligation to have a digital battery passport from 2027 with information on battery model, capacity, durability and chemical composition (Article 65)

Supplementary Material B

Table S2. Current B2U projects

OEM	B2U partner	Capacity of storage system	Purpose of storage system	Location of storage system	Source
Audi	EnBW	0.9 MWh (12 Audi e-tron batteries)	Analysis for various application scenarios	Heilbronn	[150]
Audi	RWE	4.5 MWh (60 Audi e-tron batteries)	Analysis with regard to life-time, efficient use, and grid stabilization	Herdecke	[151]
Audi	The Mobility House, EUREF Campus	1.9 MWh (20 Audi e-tron batteries)	Analysis for various application scenarios	Berlin	[152]
BMW	Vatten-fall, Bosch	2.8 MWh (2600 BMW i3 battery modules)	Commercializa-tion of storage capacity	Hamburg	[153]
Jaguar Land Rover	Pramac	0.125 MWh (50 Jaguar i-Pace battery modules)	Mobile charging stations for BEVs	Johannes-burg (South Africa)	[154]
Mer-cedes-Benz	enercity	17.5 MWh (3240 Smart Fortwo battery modules)	Commercializa-tion of storage capacity, storage of new batteries as spare parts	Herren-hausen	[155]
Mer-cedes-Benz	The Mobility House, Getec, ACCU-MOTIVE	18 MWh (1363 Smart Fortwo battery modules)	Commercializa-tion of storage capacity, storage of new batteries as spare parts	Elver-lingsen	[156]
Nissan	Eaton, BAM, The Mobility House	2.8 MWh (148 Nissan Leaf batteries)	Efficient energy supply for the Johan Cruijff ArenA	Amster-dam (Nether-lands)	[157]

Renault	Nidec ASI, The Mobility House	4.7 MWh (112 Renault Zoe batteries)	Commercialization of storage capacity, storage of new batteries as spare parts	Douai (France)	[158]
Renault	The Mobility House, FENECON	3 MWh (72 Renault Zoe batteries)	Commercialization of storage capacity	Elverlingsen	[159]
Škoda	Pražská energetika	0.3 MWh (12 Skoda Enyaq iV batteries)	Energy storage for fast charging infrastructure	Prag (Czech Republic)	[160]
Toyota	JERA	1.26 MWh (Batteries from hybrid, fuel cell and electric vehicles)	Commercialization of storage capacity	Yokkaichi (Japan)	[161]
Volkswagen	AW Automotive	0.57 MWh (96 Volkswagen ID.3/ID.4 battery modules)	Energy storage for fast charging infrastructure	Zwickau	[162]

References

58. EU-Kommission. *Richtlinie 2000/53/EG des europäischen Parlamentes und des Rates vom 18. September 2000 über Altfahrzeuge;* Europäische Union: Brüssel, 2000.
148. EU-Kommission. *Richtlinie 2006/66/EG des europäischen Parlamentes und Rates vom 6. September 2006 über Batterien und Akkumulatoren sowie Altbatterien und Altakkumulatoren und zur Aufhebung der Richtlinie 91/157/EWG;* Europäische Union: Brüssel, 2006.
149. EU-Kommission. *Proposal for a Regulation of the European Parliament and of the Council concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) No 2019/1020;* Europäische Union: Brüssel, 2023.
150. EnBW AG. Second-Life-Batterien: Stromspeicher aus gebrauchten E-Auto-Akkus. Available online: https://www.enbw.com/unternehmen/eco-journal/second-life-batterien.html (accessed on 17 April 2023).
151. RWE AG. Second-Life-Batteriespeicher in Herdecke. Available online: https://www.rwe.com/forschung-und-entwicklung/batteriespeicher-projekte/second-life-batteriespeicher-herdecke/ (accessed on 17 April 2023).
152. The Mobility House GmbH. Audi eröffnet Batteriespeicher auf Berliner EUREF-Campus. Available online: https://www.mobilityhouse.com/de_de/magazin/pressemeldungen/audi-eroeffnet-batteriespeicher-berliner-euref-campus.html/ (accessed on 17 April 2023).
153. Vattenfall GmbH. Second Life Batterien: Potenzial für Energiespeicher. Available online: https://group.vattenfall.com/de/newsroom/blog/2018/september/second-life-batterien-energiespeicher (accessed on 17 April 2023).
154. Jaguar Land Rover Ltd. Jaguar Land Rover gibt Batterien des Jaguar I-PACE ein zweites Leben. Available online: https://www.jaguar.at/about-jaguar/presse/second-life-i-pace-batterien.html (accessed on 17 April 2023).
155. enercity AG. So funktioniert das Second Life alter E-Auto-Batterien. Available online: https://www.enercity.de/magazin/unsere-welt/second-life-e-auto-batterien (accessed on 17 April 2023).
156. The Mobility House GmbH. Elverlingsen: Ein Kohlekraftwerk wird zum Ersatzteilspeicher für Fahrzeugbatterien. Available online: https://www.mobilityhouse.com/de_de/unsere-referenzen/elverlingsen-kohlekraftwerk-wird-zum-ersatzteilspeicher-fuer-fahrzeugbatterien (accessed on 17 April 2023).
157. Nissan Motor Corporation. Europe's largest energy storage system now live at the Johan Cruijff Arena. Available online: https://global.nissannews.com/en/releases/europes-largest-energy-storage-system-now-live-at-the-johan-cruijff-arena (accessed on 17 April 2023).
158. Renault Group. Second Life für Elektroauto-Batterien: Groupe Renault stellt neue Projekte zur Energiespeicherung vor. Available online: https://media.renault.at/article/2071 (accessed on 17 April 2023).
159. Renault Group. Neuer stationärer Fahrzeug-Batteriespeicher geht in Elverlingsen in Betrieb. Available online: https://www.renault-presse.de/main-2494-1 (accessed on 17 April 2023).
160. Škoda Auto Deutschland GmbH. The second life of batteries. Available online: https://www.skoda-storyboard.com/en/emobility/the-second-life-of-batteries/ (accessed on 17 April 2023).
161. Toyota Motor Corporation. Toyota entwickelt mit Partnern großvolumige Energiespeicher. Available online: https://www.toyota-media.de/blog/unternehmen/artikel/toyota-entwickelt-mit-partnern-grossvolumigen-energiespeicher/text (accessed on 17 April 2023).
162. Volkswagen AG. 96 MEB cell modules reused: Volkswagen Sachsen couples fast-charging park with mega power bank. Available online: https://www.volkswagen-newsroom.com/en/press-releases/96-meb-cell-modules-reused-volkswagen-sachsen-couples-fast-charging-park-with-mega-power-bank-8059 (accessed on 17 April 2023).