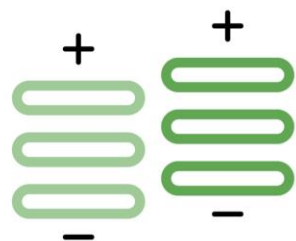


# Watt4Ever

Torino, 25/05/2024



**WATT4EVER**  
BATTERIES FOR LIFE

**GOLD AWARD WINNER**  
BELGIAN  
**BUSINESS AWARDS**  
FOR THE **ENVIRONMENT**  
2021-2022



The future of the  
**battery is circular.**  
We help you **power it.**





- **What we do**
- Post-vehicle EV battery management
- Manufacture of new battery systems

- **Facts about Watt4Ever**
- Founded in 2020
- Based in Brussels and Flanders
- Team of 12 people
- Growth of 150%/year
- Exports to 9 EU countries and the US
- 75% of 2023 turnover in exports



- Already profitable
- Best-in-class in battery sourcing
- Participating in 4 Horizon EU projects
- Top-tier reference clients
- Supported by strong & profitable partners
- Recognized & awarded brand



# Our solution: reuse EV batteries

## Battery Energy Storage Systems for C&I (BESS)

- → store green energy, provide backup, make money by helping the electricity operator

## Tested & certified EV battery modules

- → Stationary, e-mobility applications

All our systems require 85% less CO<sub>2</sub> to be made, and 100% less critical raw materials



# Our BESS products



## Model C battery packs

- Very high energy density
- Highly modular, stackable up to 14 packs
- The small size and weight can fit in many difficult places



## HV battery cabinets

- Very high energy density
- Competitive cost (up to 30% cheaper)
- Interior and exterior design, highly modular

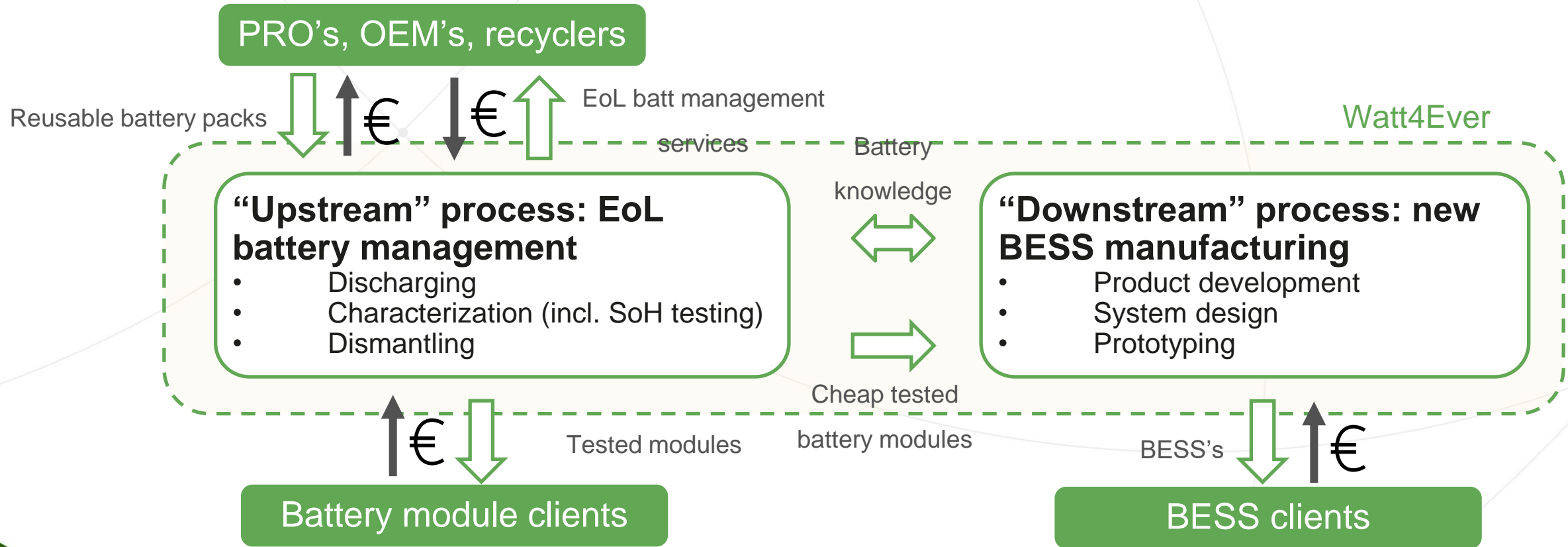


## Battery containers

- Tailor-made design, size, capacity and power
- Tailor-made for energy flexibility applications
- Competitive cost (up to 30% cheaper)



# W4E's business model



# Value creation in numbers

## Upstream process: EoL battery management

Testing, dismantling & take-over of producer responsibility allow to **transform a cost to a revenue**

**3x less handling costs** for EoL batteries

**2x less costs** for EoL battery storage

## Downstream process: new BESS manufacturing

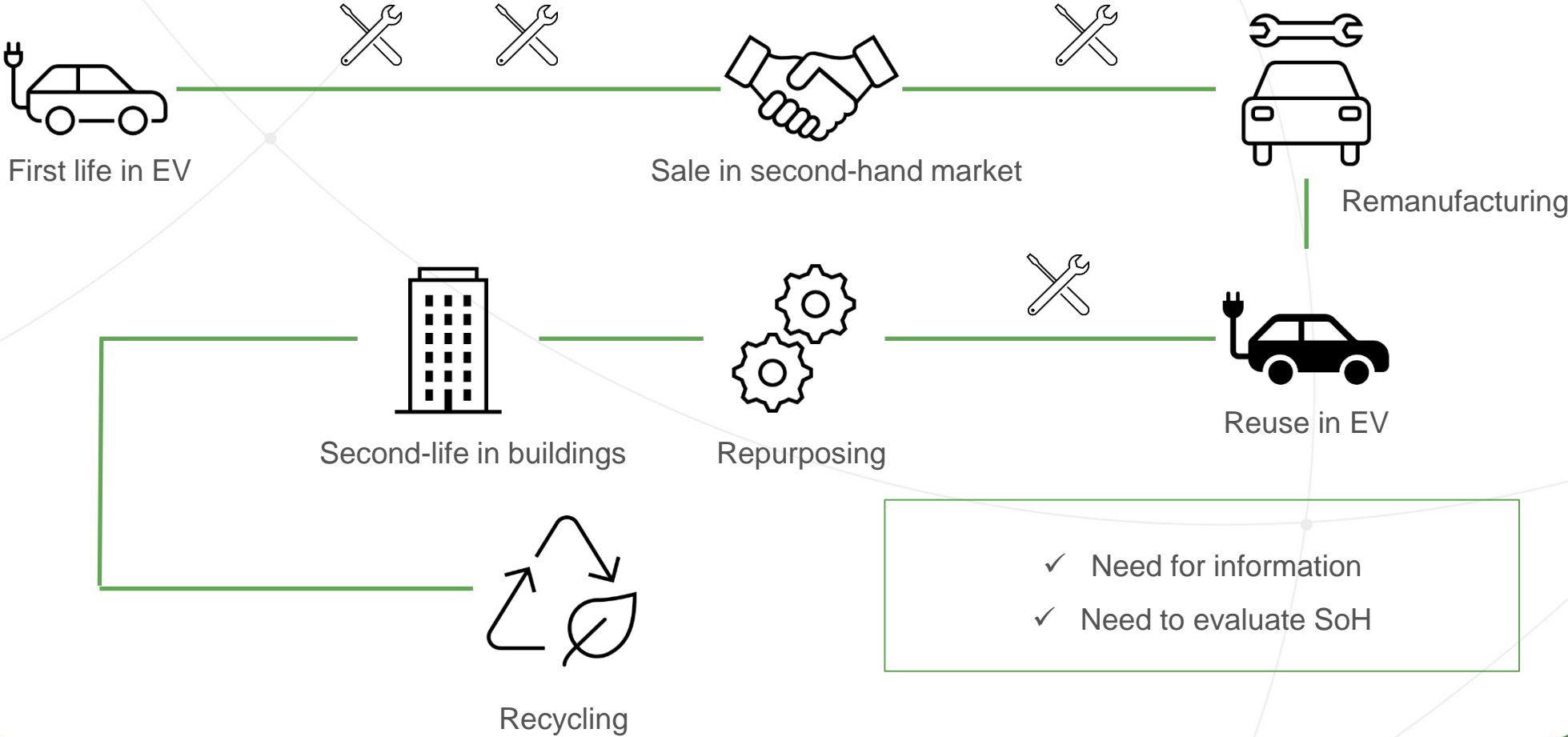
**3x lower battery module acquisition cost** to build BESS's

**5x turnover** from selling a complete BESS instead of a battery module

**Innovation & product differentiation potential**

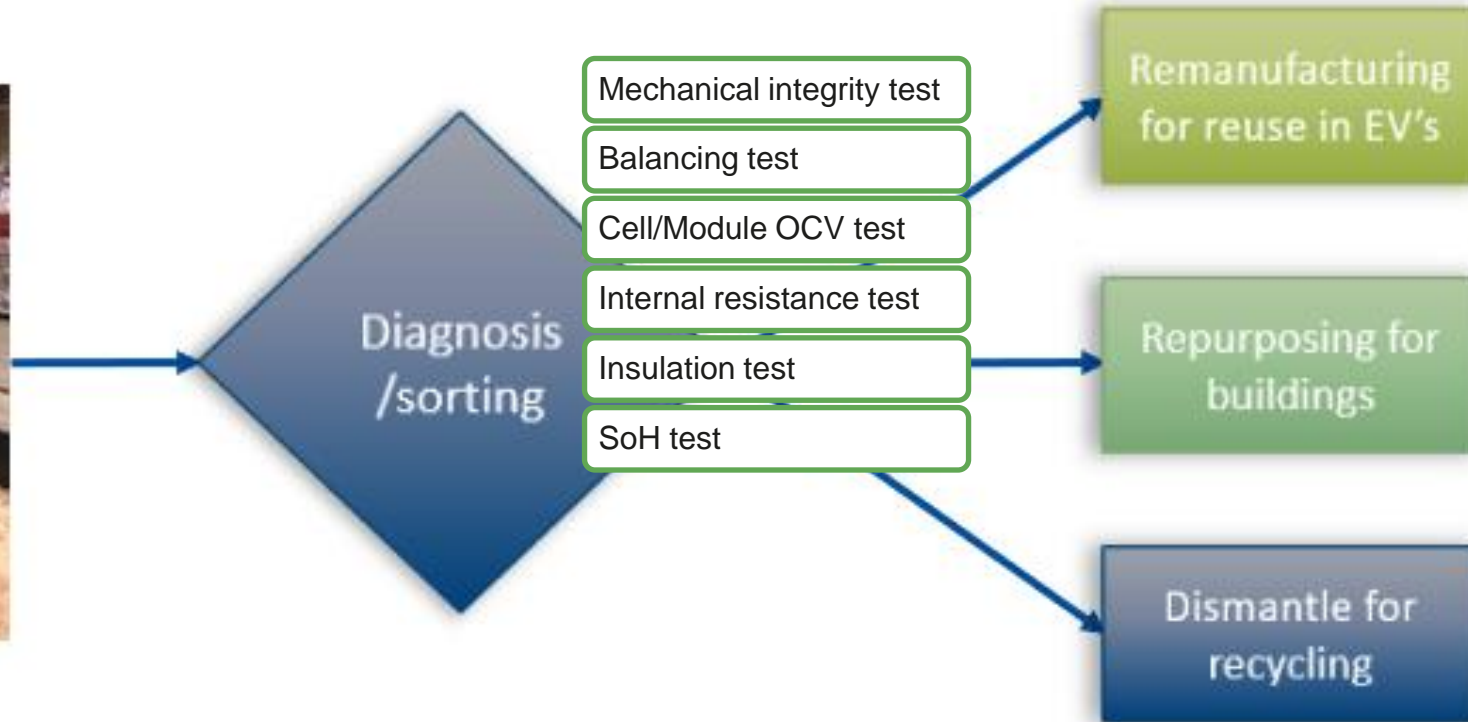


# Extended life cycle of a battery





# Sorting for reuse/repurposing/recycling



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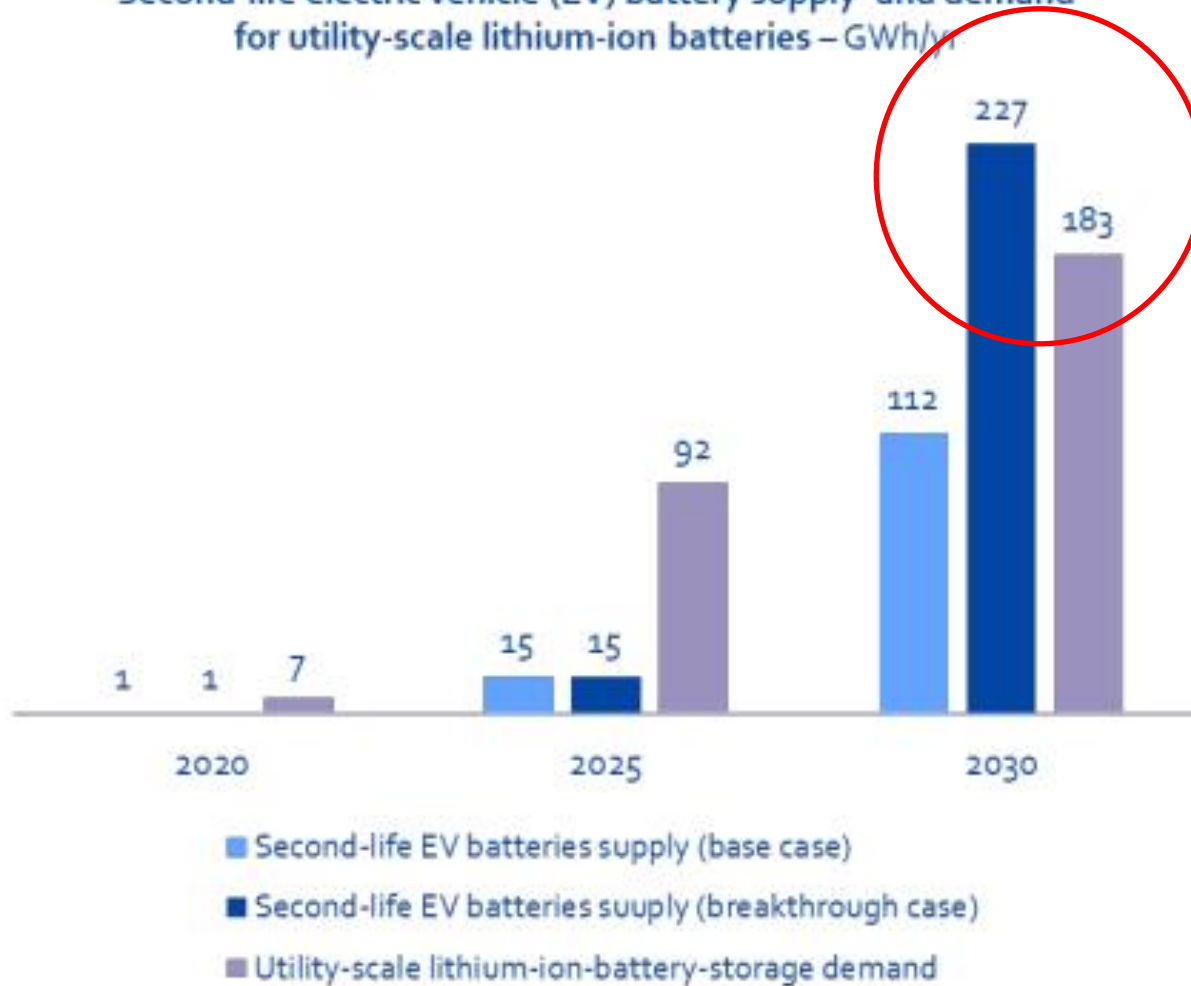
**Worst case scenario:**  
SoH evaluation through characterization/ageing tests, dismantling



**Best case scenario:**  
Retrieval of information from BMS, direct reuse

# Sourcing

Second-life electric vehicle (EV) battery supply<sup>1</sup> and demand for utility-scale lithium-ion batteries – GWh/yr



<sup>1</sup> Only for batteries originating from passenger vehicles.

- By 2030, there will be more **SL batteries** available than there is **total demand** for **stationary batteries** (left-side graph)

# ...and yet, mass arrival of EV batteries is a challenge as well as an opportunity



## A challenge...

Need for services to ensure sustainability  
(repair/reuse/recycle)



## And an opportunity

Need for batteries to ensure integration of renewables into the system





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With support from:



Co-funded by the  
European Union

# Repurposing use-cases

Used battery packs



Usable battery packs & components



## 1 Re-use of complete battery pack

The EV battery pack is basic element in 2nd life storage configuration  
Potential to repac

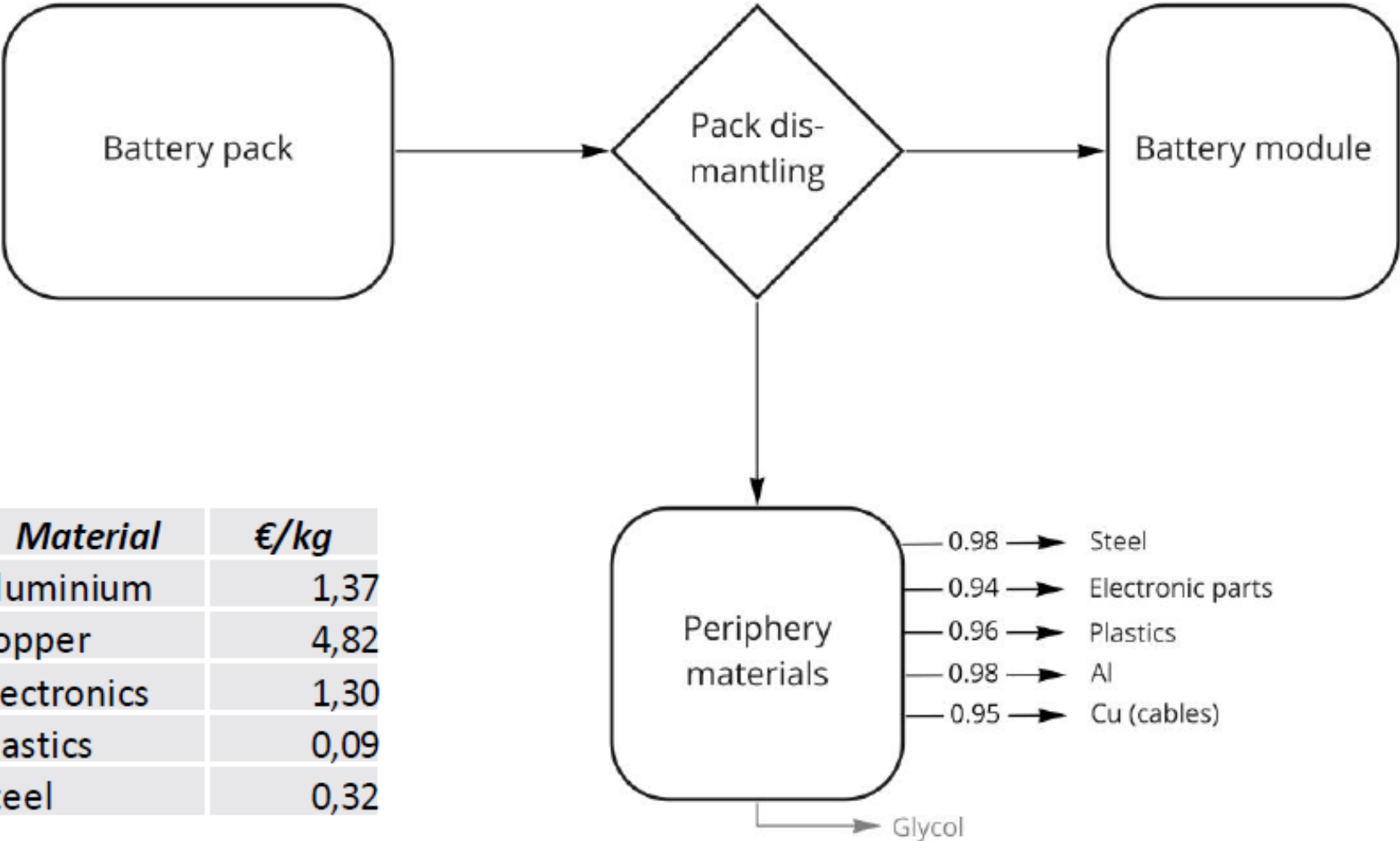
## 2 Re-use of battery modules

- A. With re-use of BMS
- B. Without re-use of BMS

## ~~3 Re-use of battery cells~~

~~Complete re-integration of used battery cells~~

# Recovery of non-battery materials



Material	€/kg
Aluminium	1,37
Copper	4,82
Electronics	1,30
Plastics	0,09
Steel	0,32

(negative: to be paid to recycler)

Source: [www.rolandberger.com](http://www.rolandberger.com): Everbatt model

# What is the impact of a 100kWh battery in numbers?



11tCO<sub>2</sub> of grey emissions<sup>1</sup>



1t of hazardous waste



Extraction of 22kg of cobalt, 79kg of nickel, 15kg of lithium



Impact on water reserves<sup>3</sup>



Incl. avoided grey emissions and expected life-cycle emissions over 10 years versus no battery scenario

Source 1: [EU Eco-design study for batteries](#) for NMC 111 chemistry

Source 2: [EU Joint Research Centre, Sibelga](#)

Source 3: [Coolproducts](#)

# What do energy consumers gain from second-life batteries?



Better  
integration of  
EV chargers



Additional PV  
capacity



Reliable,  
nuisance- and  
maintenance-  
free power  
backup

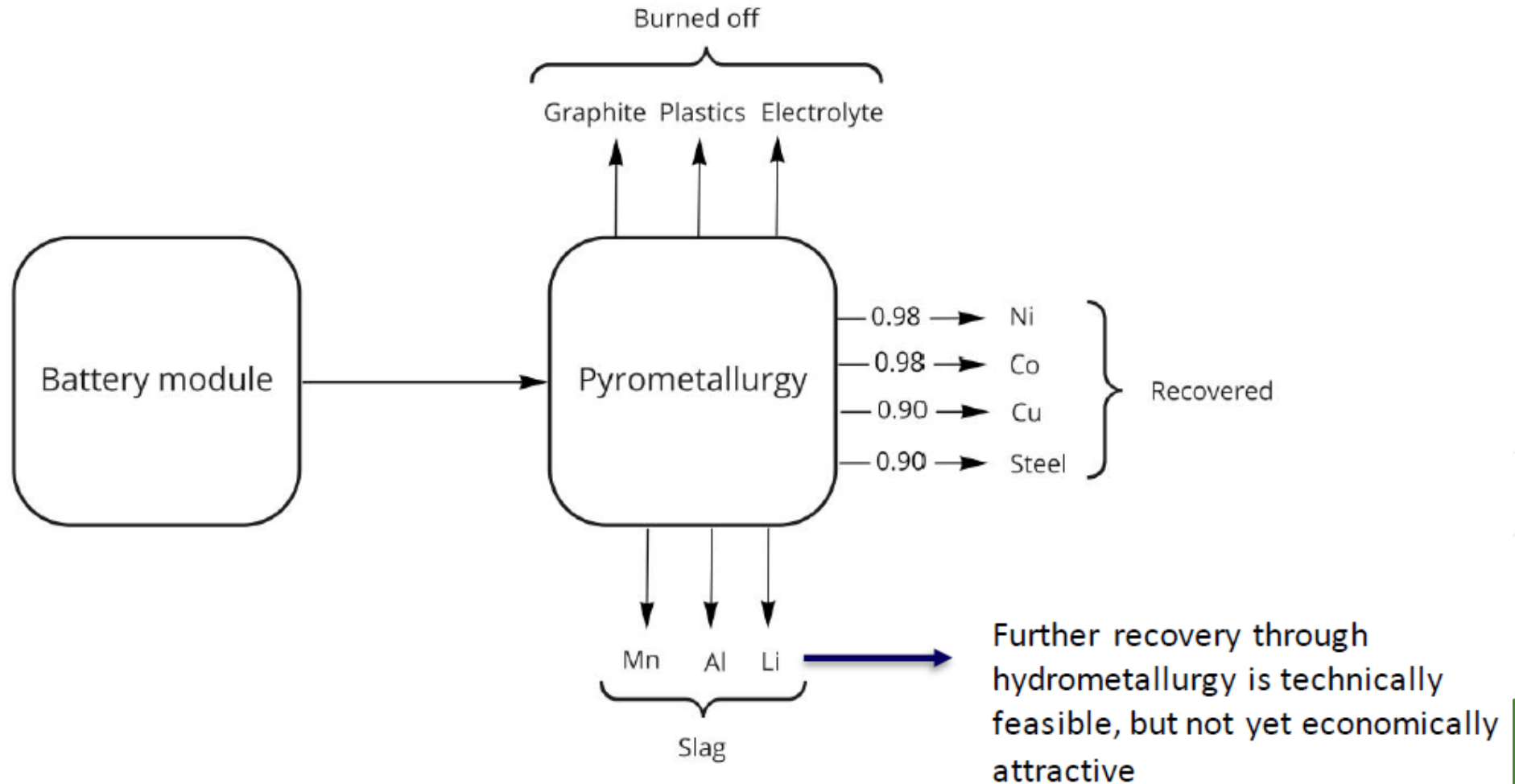


Savings on  
energy bill

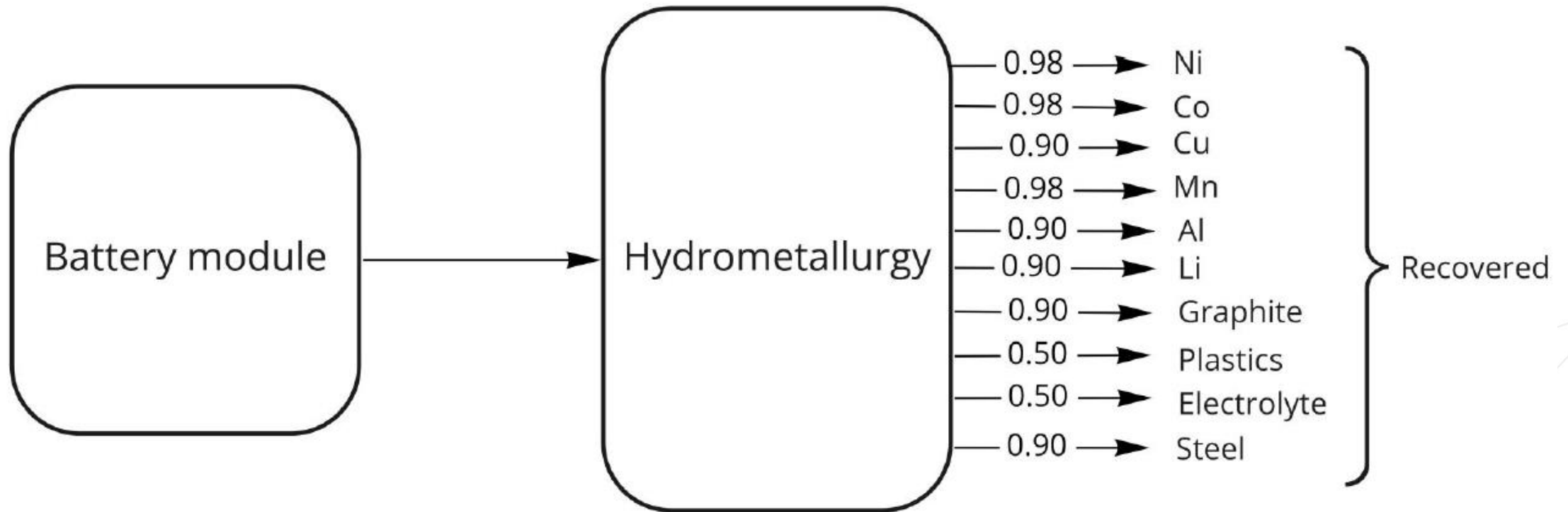




# Recovery of battery materials through pyrometallurgy



# Recovery of battery materials through hydrometallurgy



In practice, not all fractions are currently recovered

# Reuse VS Recycling

Like in all circular economy models, reuse is preferable than direct recycling.

However, for this to have an economic interest, a number of factors need to gather:

- 1) Regulatory framework & standards
- 2) Access to information
- 3) Consideration of supply chain emissions in product characterization

New EU Battery Regulation a great step in this direction! Now needs to be rightly implemented



# Business models for second-life batteries

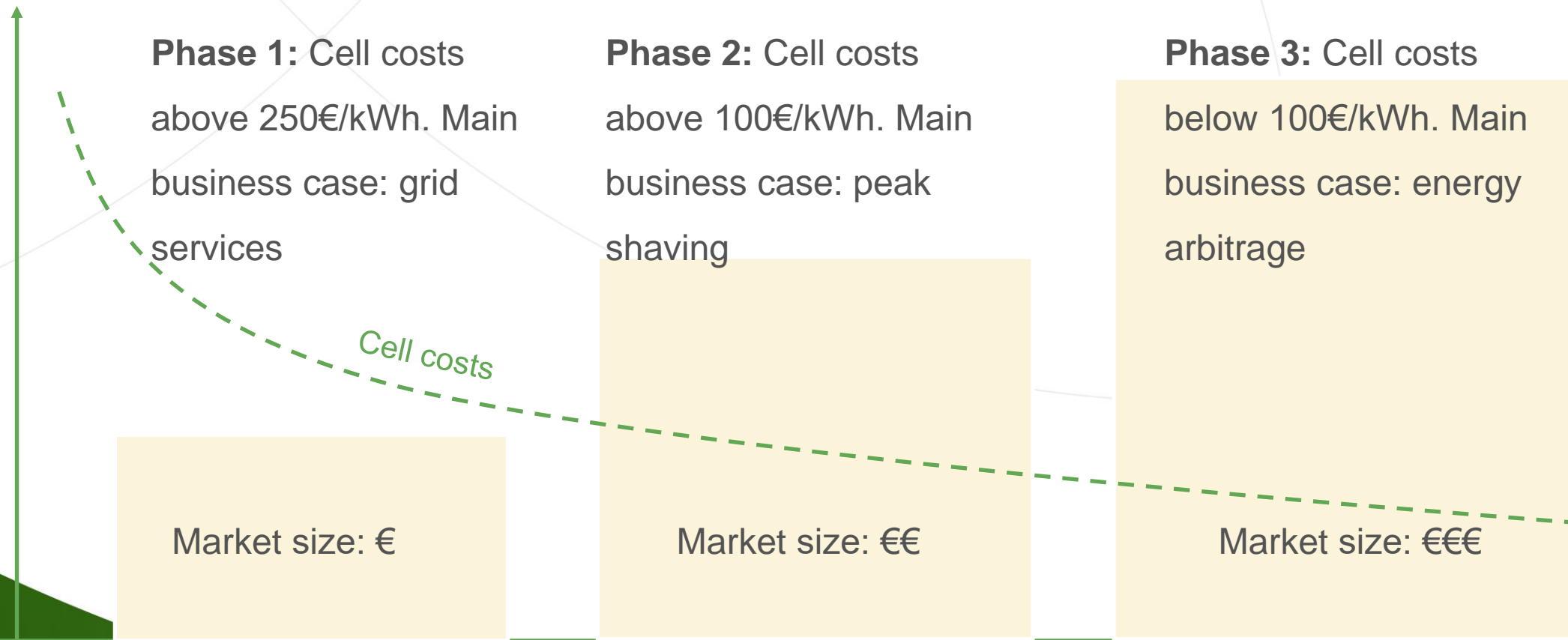


# Existing business cases for BESS

Business case	Description	Performance in 2022	Challenges	Perspectives
<b>1.Grid services</b>	Use large-scale BESS to provide balancing services to grid operator.	3-8 years ROI	Market volatility, highly technical product.	Unknown due to high market volatility. Grid grows more unstable due to renewables but forecasts go both ways.
<b>2.Replace diesel gensets &amp; UPS as backup</b>	Use li-ion battery instead of diesel genset & lead-acid UPS for backup	20% lower TCO than alternative	Safety design features, high cost.	Improving due to raising of awareness.
<b>3.Reducing consumption peaks (also for EV chargers)</b>	Reduce a building's consumption peaks by discharging the battery.	9-12 years ROI	High cost, low power prices.	Improving due to grid operator's policy to shift levies from energy to power.
<b>4.Storing PV-produced energy</b>	Increase a building's consumption of own-produced energy by storing.	9-12 years ROI	High cost, low energy prices	Quickly improving due to rapid increase of energy prices and state incentives.
<b>5.Energy arbitrage</b>	Store energy from the grid in low price hours, to consume in high price hours	No return on investment	High costs	Improving due to increasing intermittence of renewable production.

# Evolution of business models for energy storage in general

According to our market research, energy storage business models will greatly evolve in time in function of the reduction of its cost. As costs reduce, storage will jump from « niche » applications, to applications with much larger target markets, such as energy arbitrage.



# Watt4Ever in the press

[Kanaal Z](#)

[Agoria](#): “Re2LiVe-paneldebat over uitdagingen en kansen van afgedankte batterijen uit elektrische voertuigen”

[FEB/VBO](#): “Watt4Ever, gagnant des prestigieux Belgian Business Awards for the Environment”

[Trends](#): “Watt4Ever wint Belgian Business Award for the Environment”

[Vlaamse Ondernemers](#): “De energieopslagplaats van de toekomst: een gerecycleerde autobatterij”

[LN24](#): “La Belgique se relance, la transition économique en Flandre”

[Auto Recycling World](#): Watt4Ever wins the golden environmental BBAE award 2022 from the VBO-FEB

