

# Electric Vehicles & Batteries Recycling

José Amaral  
2024 MIECF  
29-03-2024



- *An initiative by*



- *Established in 2004*

- *Limited liability company; Non profit*

- *2 PRO licences from Portuguese MoEnv & MoEcon:*



**End of Life Vehicles  
ELV**



**Used batteries**

***Ensuring the responsibility of vehicle (98) and battery (450) producers/importers for the management of these products in EoL:***

- ***Collection network;***
- ***Ensure collection and recycling targets;***

	Collection	Recycling (Recovery)
ELV	100%	85% (95%)
Used Batteries	98%	Lead-acid: 65% Li-ion: 50%

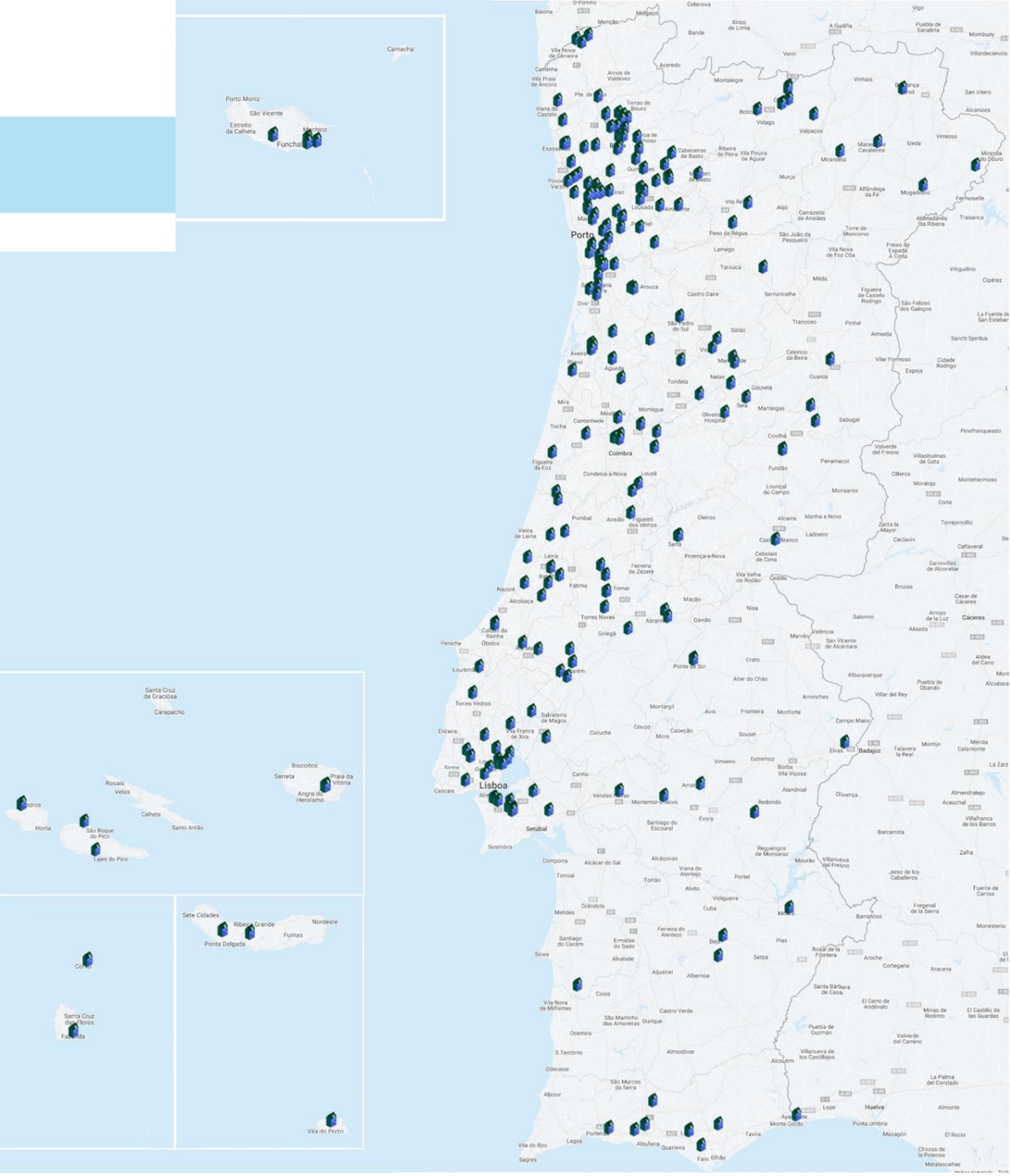


# VALORCAR NETWORK

## Authorised treatment facilities

~ 320 ELV

~ 390 ELB



# I&T DEREGISTRATION SYSTEM

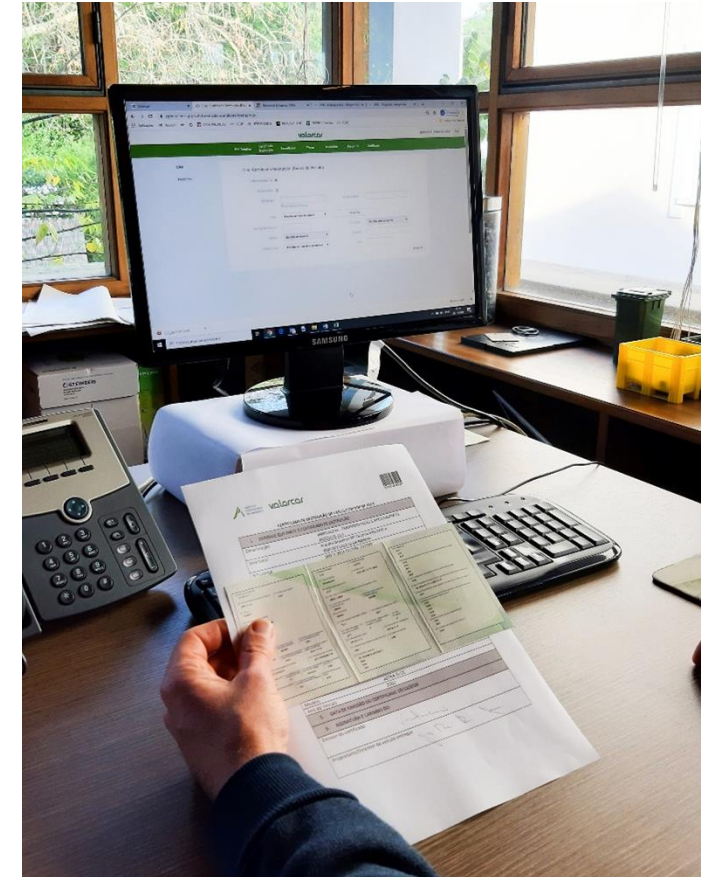
- Online platform CoD emission
- Digital communication with National Traffic Authority
- Automatic de-registration & annual road tax cancelation



AGÊNCIA PORTUGUESA DO AMBIENTE **valorcar** 0062215302

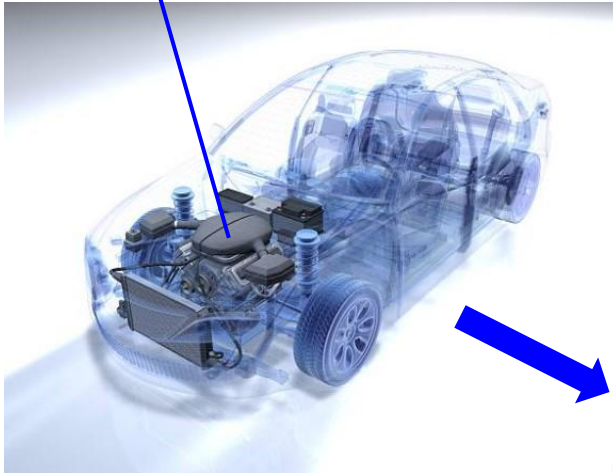
**CERTIFICADO DE DESTRUIÇÃO DE VEÍCULO EM FIM DE VIDA**

<b>1. ENTIDADE QUE EMITE O CERTIFICADO DE DESTRUIÇÃO</b>
Denominação
Sede Social
N.º Licença
N.º Contribuinte
<b>2. AUTORIDADE COMPETENTE RESPONSÁVEL PELA LICENÇA CONCEDIDA À ENTIDADE QUE EMITE O CERTIFICADO DE DESTRUIÇÃO:</b>
Denominação
Sede
<b>3. PROPRIETÁRIO/DETENTOR DO VEÍCULO</b>
Nome
Endereço
N.º Contribuinte
Nacionalidade
<b>4. VEÍCULO EM FIM DE VIDA</b>
Matrícula
N.º de chassis
Categoria
Marca
Modelo
Ano do Veículo
<b>5. DATA DE EMISSÃO DO CERTIFICADO 19/12/2018</b>
<b>6. ASSINATURA E CARIMBO DO:</b>
Emissor do certificado
Proprietário/Dono do veículo entregue



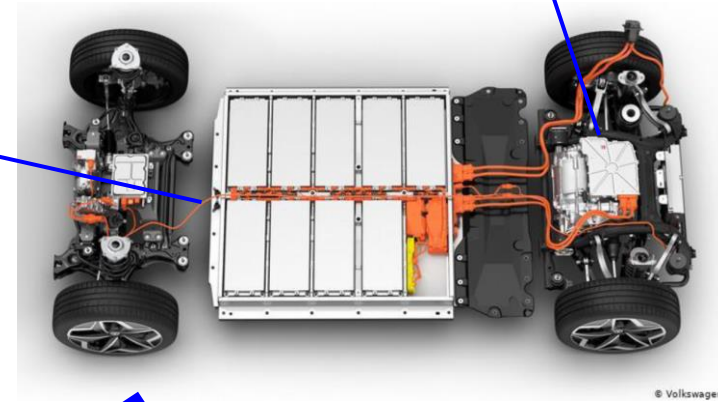
## ICE

**Combustion Engine**



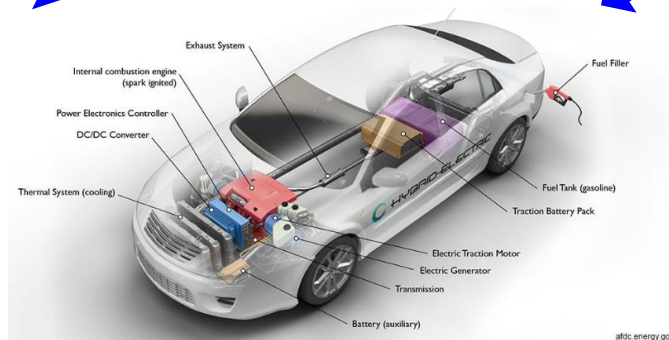
## EV

**Electric engine**



**Traction battery (high voltage)**

## Hybrid





# EQUIPMENT (ICE ELV)



# EQUIPMENT (ELECTRIC ELV)





# ICE ELV: TREATMENT



Battery



Líquids



Oil filter



Airbags



Fluid AC



Spare parts



Bumpers



Glass



Tires



Catalytic



Hulk



Metals

# ELECTRIC ELV: TREATMENT



**Battery**



**Traction  
battery**



**Líquids**



**Airbags**



**Fluid AC**



**Spare parts**



**Bumpers**



**Glass**



**Tires**



**Hulk**



**Metals**

- 40,7 kg/ELV





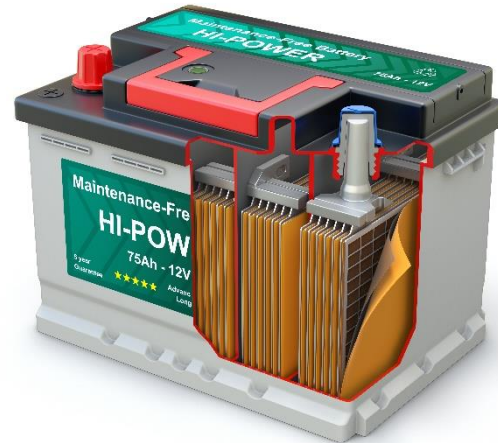
- 26 kg/ELV



- 6,0 kg/ELV
- Bumpers (PP)



# LEAD BATTERY



- 15 kg/ELV

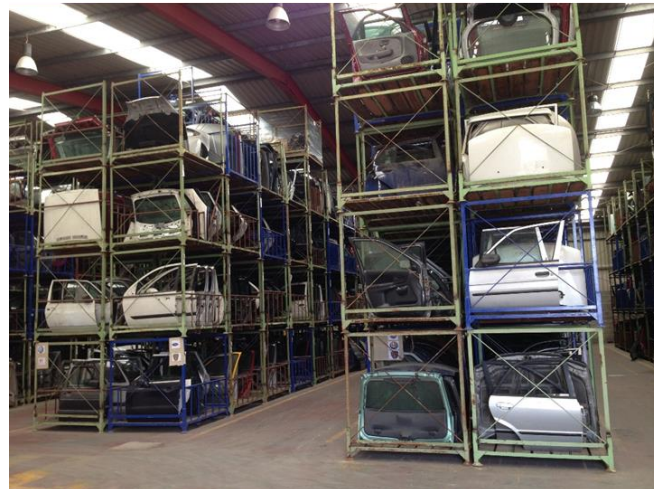


# SPARE PARTS

MAIN COMPONENT:

ICE – THERMAL  
ENGINE

EV – TRACTION  
BATTERY

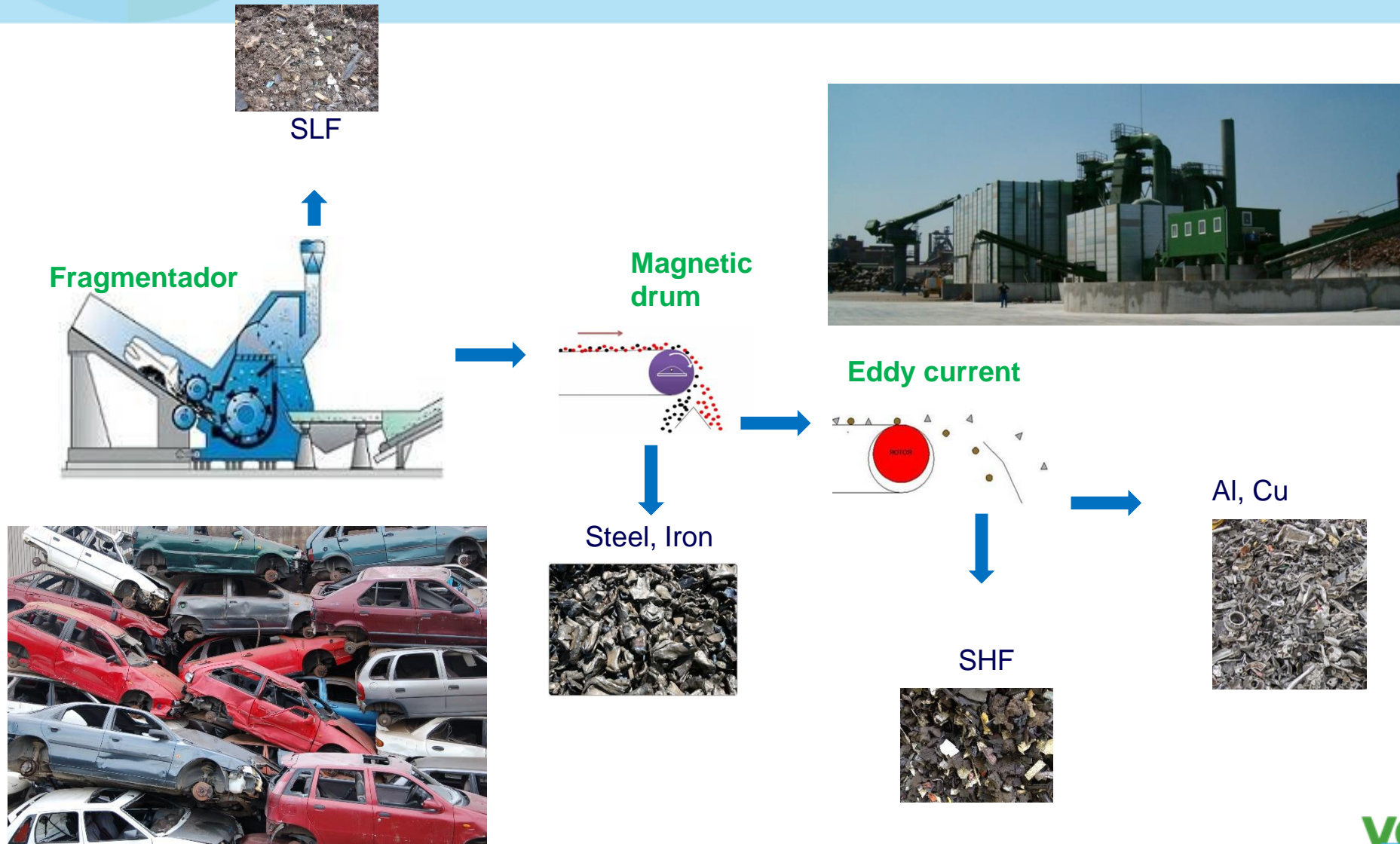


# SHREDDING





# SHREDDING



# MATERIAL COMPOSITION & METAL SEPARATION

## ICE vs EV

MATERIAL	(As a % of vehicle mass)		Evolution BEV vs thermal vehicle
	VW Golf (thermal)	Chevrolet Bolt (BEV)	
Ferrous metals	61.7 %	43.4 %	- 14 %
Aluminium	7.3 %	11.1 %	+ 85 %
Copper	3.5 %	5.2 %	+ 80 %
Rubber	1.9 %	1.1 %	- 29 %
Other	25.5 %	39.3 %	Up sharply, thanks in particular to the mobility battery

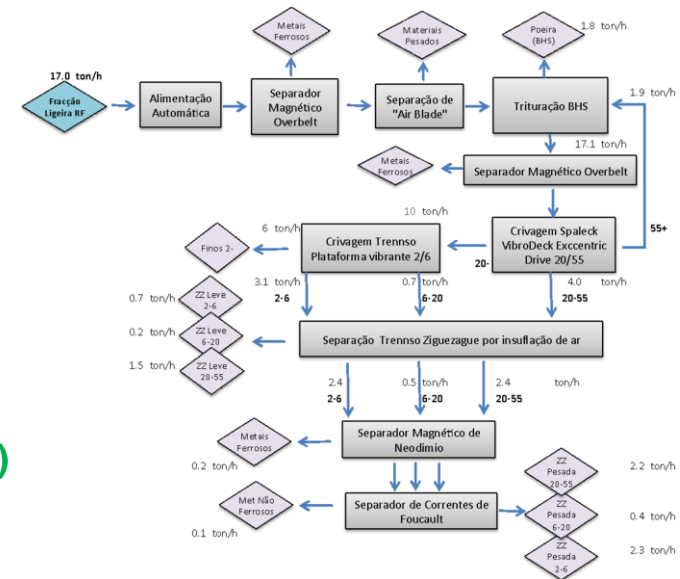
Total weight (kg):            1385                    1616

# POST SHREDDING TECH

Shredder residue  
(light & heavy fraction)



**Neodymium magnet**  
**Eddy current**  
**Screening**  
**Air separator (density, shape)**  
**Granulator**  
**Densimetric table (density)**  
**Heavy media (density)**  
**Sensor based separator (shape, colour, induction, NIR)**



# POST SHREDDING TECH

**Metals**



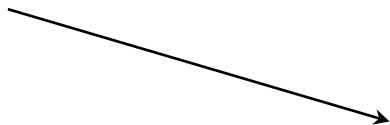
**Inerts**



**Plastics (PP, PE, ABS)**

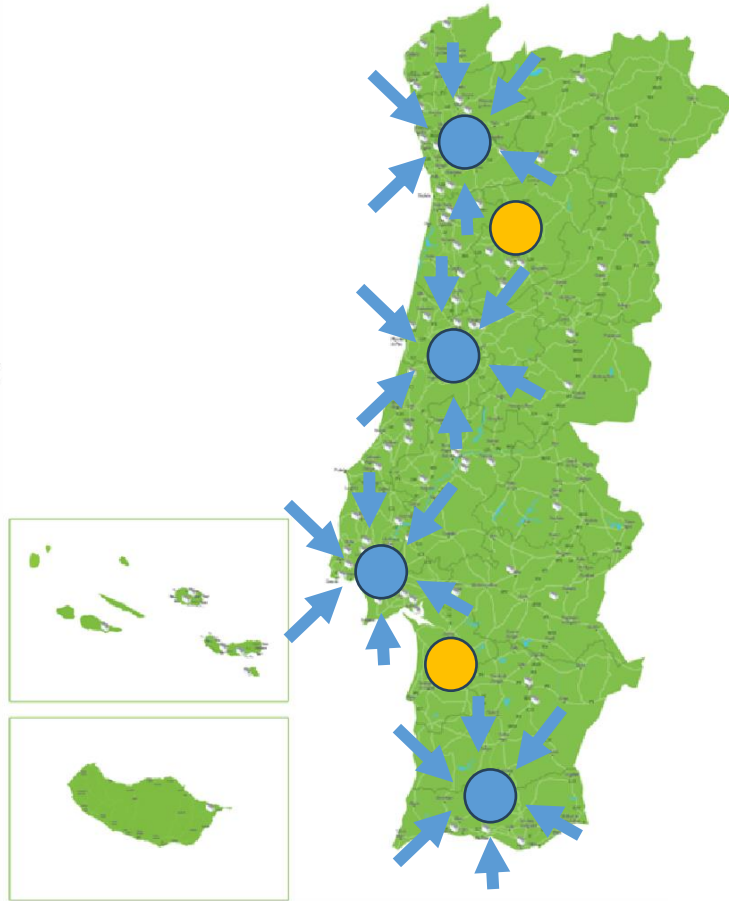


**Rubber, fabrics, PUR**



**CO-PROCESSING IN CEMENT KILNS**

# Li-Ion Battery - Collection



Dismantler/dealer/workshop



● Transport, Storage and Disassembly by certified centres



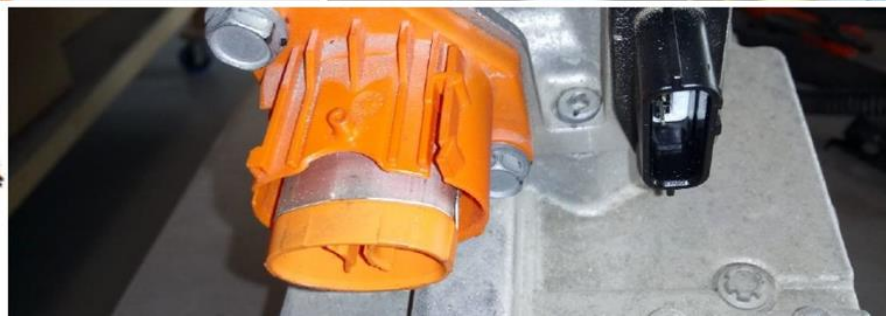
RECYCLER  
(future)



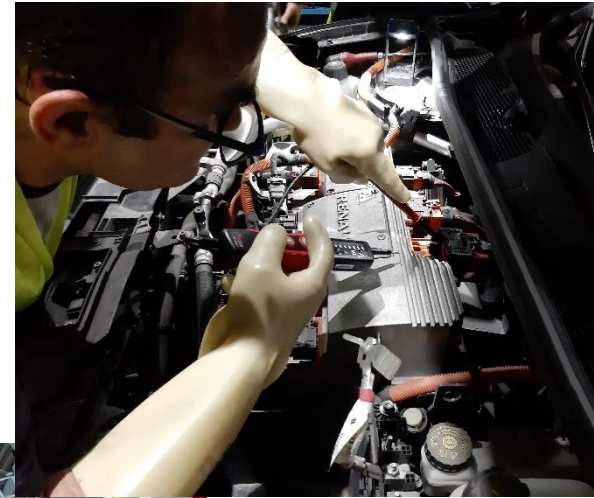
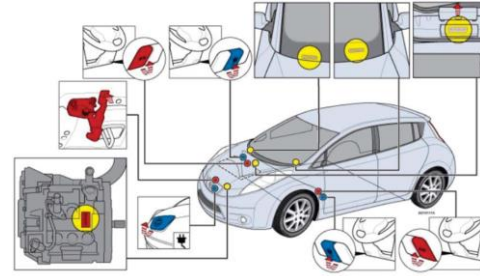
## BATERIAS 16 06 05



- High voltage (~ 400 V); Fire hazard



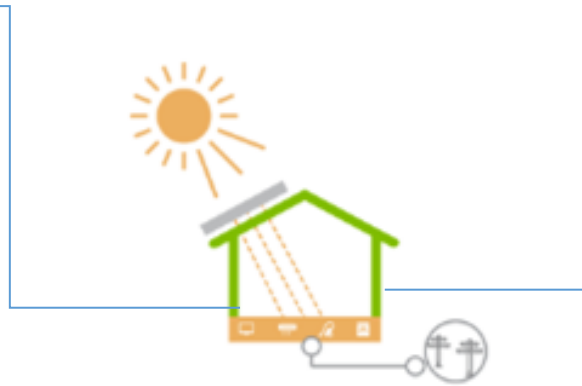
- Protection Equipment
- Specific tools
- Training in battery removal
- Training in battery disassembly



# Li-Ion Battery - Reuse



EV Charging station



Storage in used EV batteries



PHV Panels





# Li-Ion Battery - Recycling



Current

- Discharge
- Manual disassembly

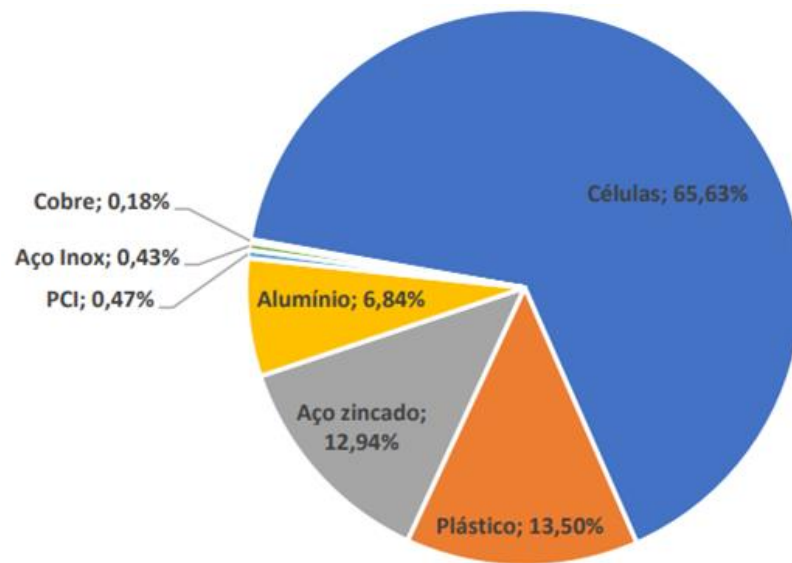
Near future

- Shredding
- Material separation: mechanical & hydro metallurgy

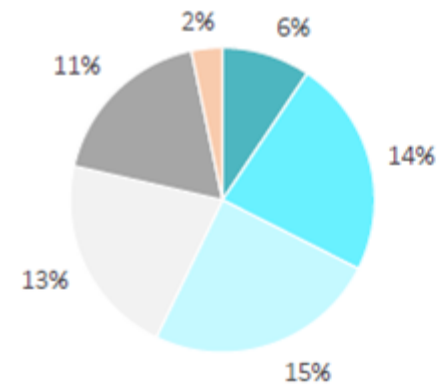


# Li-Ion Battery - Recycling

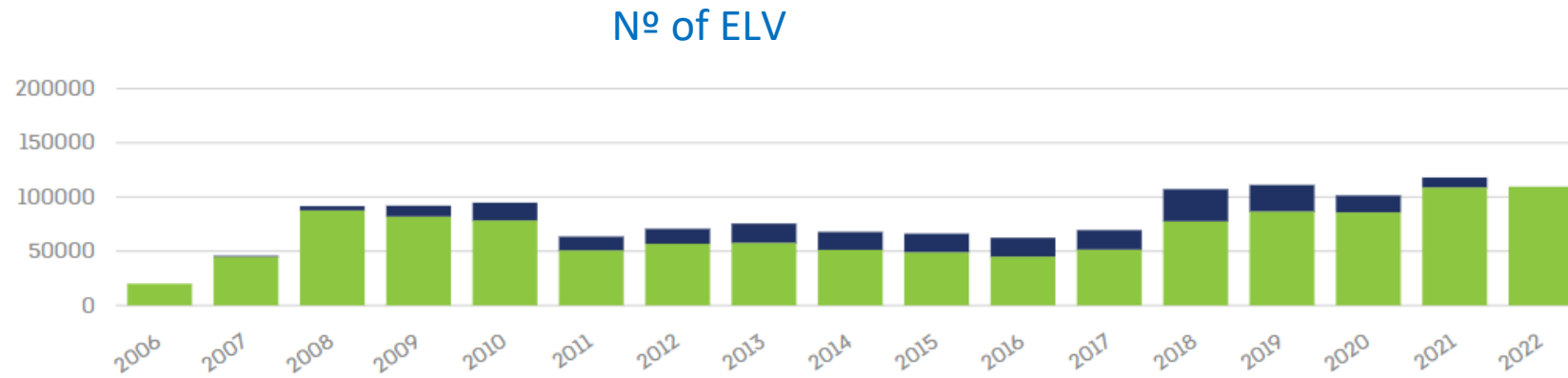
Li ion battery material composition



Black mass material composition



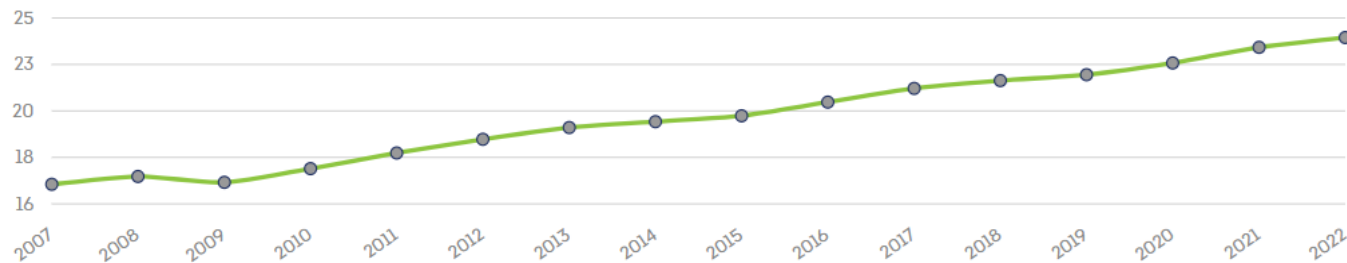
- Li ■ Lítio
- Ni ■ Níquel
- Co ■ Cobalto
- Mn ■ Manganês
- Cu ■ Cobre
- Al ■ Alumínio



**Nº ELV in 2023: 101.315 units**

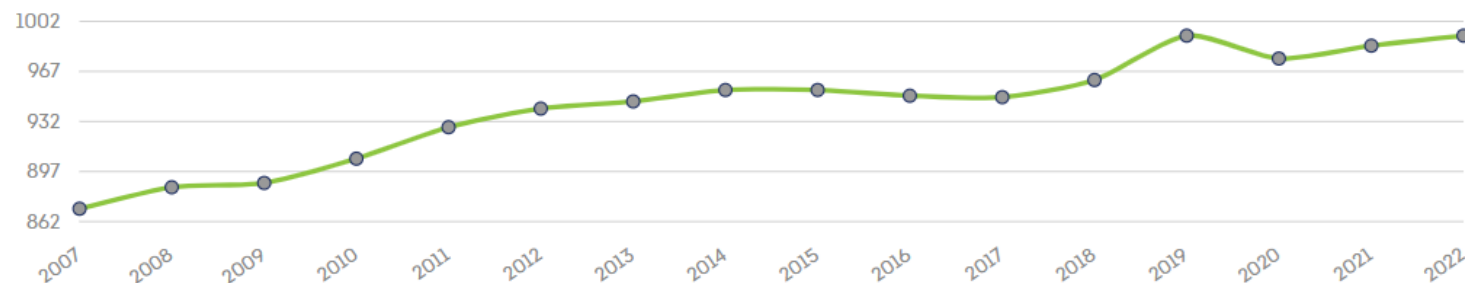
*EV: 85 (0,08%)*

*Hybrid: 42 (0,04%)*



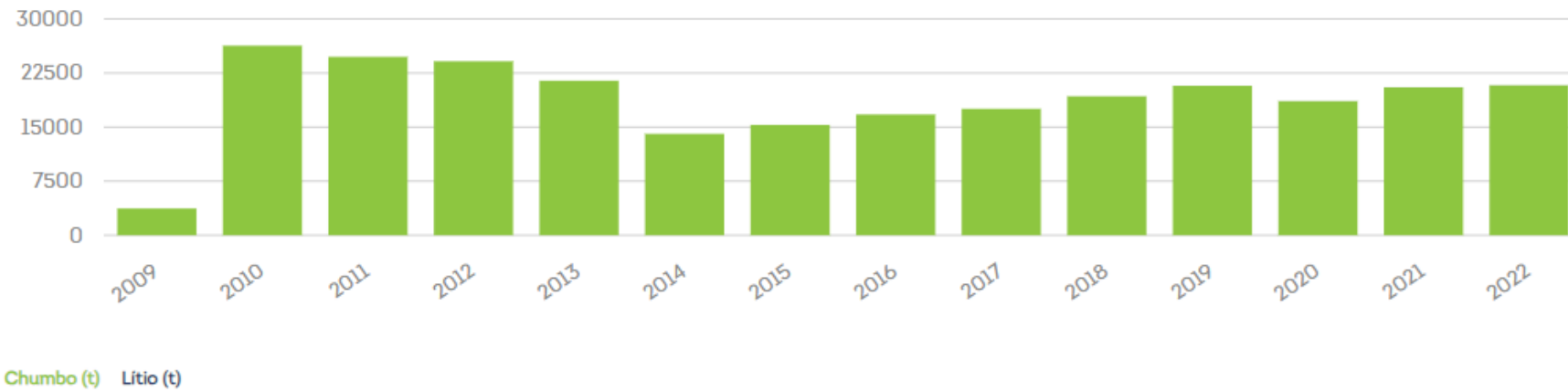
Idade média dos VGV abatidos na Rede valorcar (anos)

**AVERAGE AGE 2023: 24,3 years**



Peso médio dos VGV abatidos na Rede valorcar (kg)

**AVERAGE WEIGHT 2023: 997 kg**



**2023: ~ 20.000 t Lead batteries  
50 t of Li ion**

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