7th European Recycling Conference

ERC
EUROPEAN RECYCLING CONFERENCE

Recycling Europe

1 OCTOBER 2025
Hamburg, Germany

7th European Recycling Conference

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KEYNOTE OPENING

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OPENING PRESENTATION

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BAM!

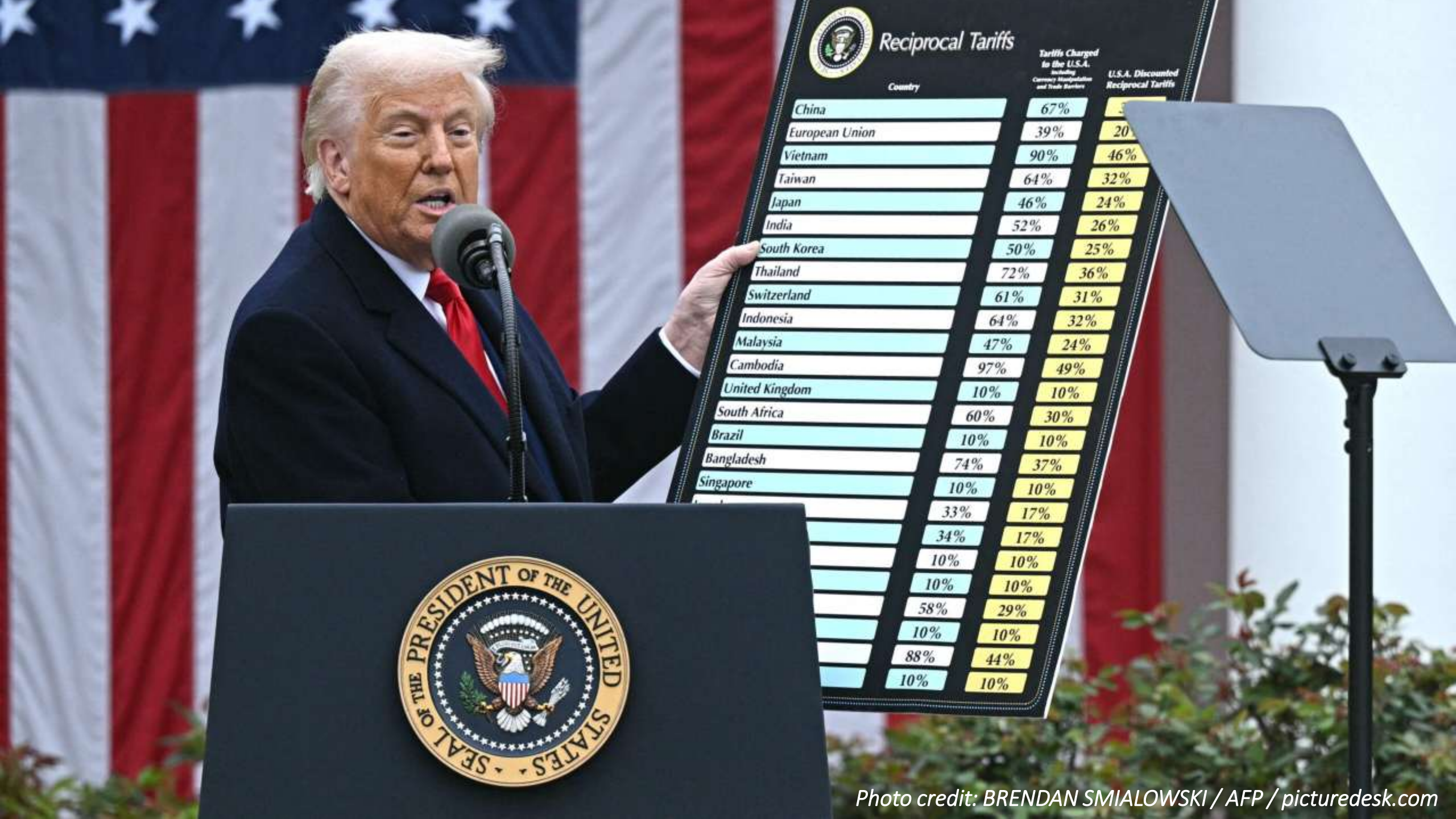

Photo credit: BRENDAN SMIALOWSKI / AFP / picturedesk.com


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CONSIDERATIONS

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Preserving EU competitiveness and global trade for recycled materials amidst geopolitical uncertainties and energy shocks

PANEL DISCUSSION I

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7th European Recycling Conference

Recycling Europe

SPEAKER

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Are export barriers on recycled steel economically and ecologically justified?

Frank Pothen

7th European Recycling Conference (ERC) 2025
01.10.2025

Motivation

The European Steel and Metals Action Plan discusses **barriers to exports of recycled steel** motivated by **environmental** as well as **competitiveness arguments**:

> »The revised Waste Shipment Regulation provides new tools ensuring that the export of waste, including metal scrap, does not cause damages to the environment and human health in third countries, and the Commission will make use of such tools for metals scrap waste«

> »a trade measure if necessary to ensure sufficient availability of scrap in the EU, and in that process it will also assess the rationale and possibility of introducing a reciprocity rule that would be compliant with the EU's international obligations« (European Commission, 2025)

Are export barriers a suitable instrument to support the steel sector's competitiveness?

European Commission (2025). A European Steel and Metals Action Plan. COM(2025) 125 final

Six Arguments for Free Trade in Recycled Steel

1) Raw materials from recycling are a »renewable resource«

- European Union is a net exporter of recycled steel (net export of 11.6 Mt in 2024, decrease of 22.2% compared to 2023; Eurofer, 2025) – like other industrialized regions (USA, UK, Japan)
- Reason: large stocks of steel circulating in the economy and become available for recycling
- But: recycled steel effectively a »**renewable resource**« that becomes **available constantly** and **cannot be left underground** like ores

2) Recycled steel saves CO_2 – no matter where it is used

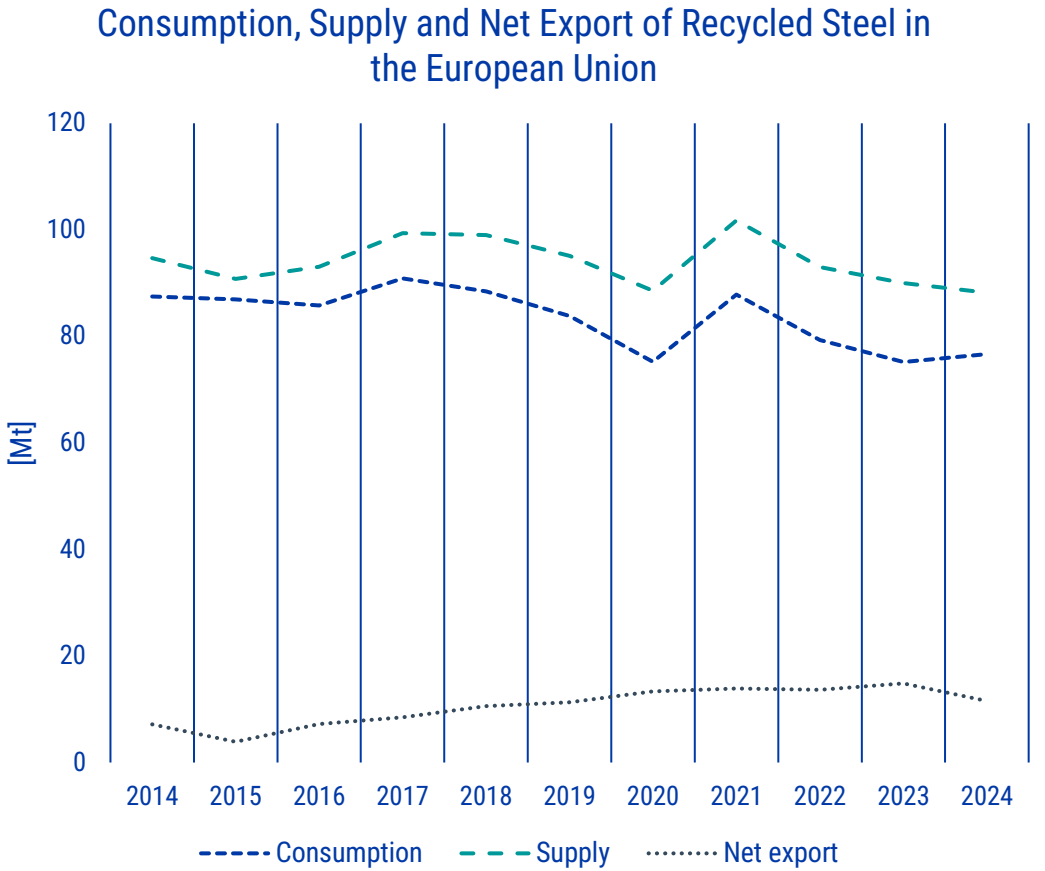
- Each re-melted ton of recycled steel saves approximately 1.66 t of CO_2 (World Steel Association, 2021)
- Greenhouse gases are a global pollutant: **savings are independent of where the recycled steel is used**

Eurofer (2025). European Steel in Figures 2025.
World Steel Association (2021). Life Cycle Inventory (LCI) Study. 2021 Data Release.

Six Arguments for Free Trade in Recycled Steel

3) Exports reflect insufficient demand

- Crude steel production in the EU fell from 157.1 Mt in 2014 to 129.6 Mt in 2024 (Eurofer, 2025)
- Consumption of recycled steel by European steelmakers decreased by 12.4% in this period
- A **roughly constant supply** of recycled steel has met with a **declining demand**. Exports allowed the remaining recycled steel to be used abroad.
- Recycled steel in oversupply before the current crisis: net export of 10.6 Mt in 2018 when steel production in the EU reached 160.1 Mt
- EU also imports substantial amounts of recycled steel (e.g. recycled stainless steel)



Eurofer (2025). European Steel in Figures 2025.

Six Arguments for Free Trade in Recycled Steel

4) Exports supply infrastructure build-up

- Recycled steel primarily delivered to Turkey, North Africa, South Asia (India, Pakistan)
- Practically no recycled steel exports to China in recent years
- Of those, only India, Turkey, and Egypt are among the top 10 origins of EU steel imports
- **Recycled steel exports used for infrastructure build-up in industrializing regions**

Main Destinations of European Recycled Steel Exports in 2024

Destination	Share of total EU exports
Turkey	62,8%
Egypt	10,1%
India	6,9%
Pakistan	4,1%
Morocco	3,1%
…	
USA	1,1%
…	
China	0,02%

Source: Own calculations based on Eurostat data

Six Arguments for Free Trade in Recycled Steel

5) Recycled steel quality will matter more in the future

- Current study by Hartung et al. (2025) suggests rising demand for recycled steel in Germany
- No quantitative shortage but disproportionate increase in demand for high-quality recycled steel
- **Incentives and investments** necessary to improve processing scrap into high-quality recycled steel

6) Risks of export barriers

- Risk of retaliation, countermeasures by affected trade partners (example: EU countervailing duties on imports of stainless steel from Indonesia)
- Risk of losing access to imported (high-quality) recycled steel
- How effective are barriers, esp. if used against individual countries (Hundt and Pothen, 2025)?

Hartung, M., Pothen, F., and Hundt, C. (2025). Szenarien für den Stahlschrottbedarf der deutschen Stahlindustrie. Wirtschaftswissenschaftliche Schriften der Ernst-Abbe-Hochschule Jena, 2025(2).
Pothen, F. and Hundt, C. (2025). The gravity of steel scrap. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=5349002. Accessed at: 14.07.2025.

Conclusions

- European Union, member states should **strengthen the competitiveness of Europe‘s steel industry**
- **Interfering in recycled steel trade is not the right instrument** to achieve this goal
- Policies should **tackle the industry‘s fundamental challenges**
  - High energy prices
  - Bureaucratic burdens
  - Foreign trade barriers and subsidies

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Q & A

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Lithium-ion Batteries Fire Risk

1st October 2025

dss+

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Lithium-ion batteries are seeing exponential growth in the next 5-10 years, with fast evolving supply chains, regulations and changing risk profile

EV and Li-ion batteries European context

	2018	2030
EVs on the road	> 4 M	50 to 200 M
Lithium-ion battery cell sales	> 77 GWh	250 to 1,100 GWh
Share of EU-based global cell manufacturing	3%	7 to 25%
Share of demand of Li/Co/CRM to be fulfilled by recycling		> 25%

- By 2030 the EU **annual demand** for EVs and Energy storage is expected to be **10x higher** than today.
- **Batteries** are becoming more and more **ubiquitous**.
- **Increase** of **EU-based production** and the need to **secure materials trough recycling**, as per CRM Act obligations, will further stimulate the local supply chains (forward and reverse).
- **Risks** associated will thus **increase** in likelihood and so will the potential **hotspots.**

Recyclers, Logistics providers and sometimes collection points have been facing **increased challenges regarding batteries**, such as:

- **Increased number** of devices with batteries
- **Miniaturization** of batteries
- **Complicated mounting** of batteries
- Numerous **thermal events**
- Several **severe fire incidents**

Batteries are now present in multitude of products not perceived as electronics, sometimes with combustible material:

- Textiles/wearables (textile)
- Books/Cards (paper)
- Shoes (textile/unsorted)
- ….

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Fire risk exposure is becoming critical. Multiple incidents and losses have been incurred worldwide, not only at EOL stage, globally…

SK Battery America Plant, US	Gateway Energy Storage Facility, US	Aricell Plant, South Korea	E-Parisara plant, Karnataka, India	Eco-Recycling Limited, Vasai, India
Oct, 2023	May, 2024	Jun,2024	May 2024	Jan,2024
				
Lithium fire	Long-duration fire	Battery explosion	Fire	Long-duration Fire
Multiple injuries OSHA has imposed fines over $77,000	No fatalities Operational disruption	8 injured, 22 fatalities	No reported injuries	No reported injuries
• Workers exposed to toxic fumes during a lithium fire suffered respiratory damage. • OSHA identified safety violations and mandated compliance training.	• A lithium-ion battery fire burned for five days at a massive energy storage facility. • Call for improved fire mitigation and containment technologies.	• A series of lithium battery explosions led to a massive fire. • Significant loss of life; prompted investigations into battery safety and emergency response protocols.	• Significant damage to the facility which specializes in the safe processing of electronic waste and batteries. • Exact cause of the blaze remains undetermined	• A significant fire erupted, engulfing the two-story facility, rendering it completely gutted. • Company has since lodged a claim and had various assessments done.

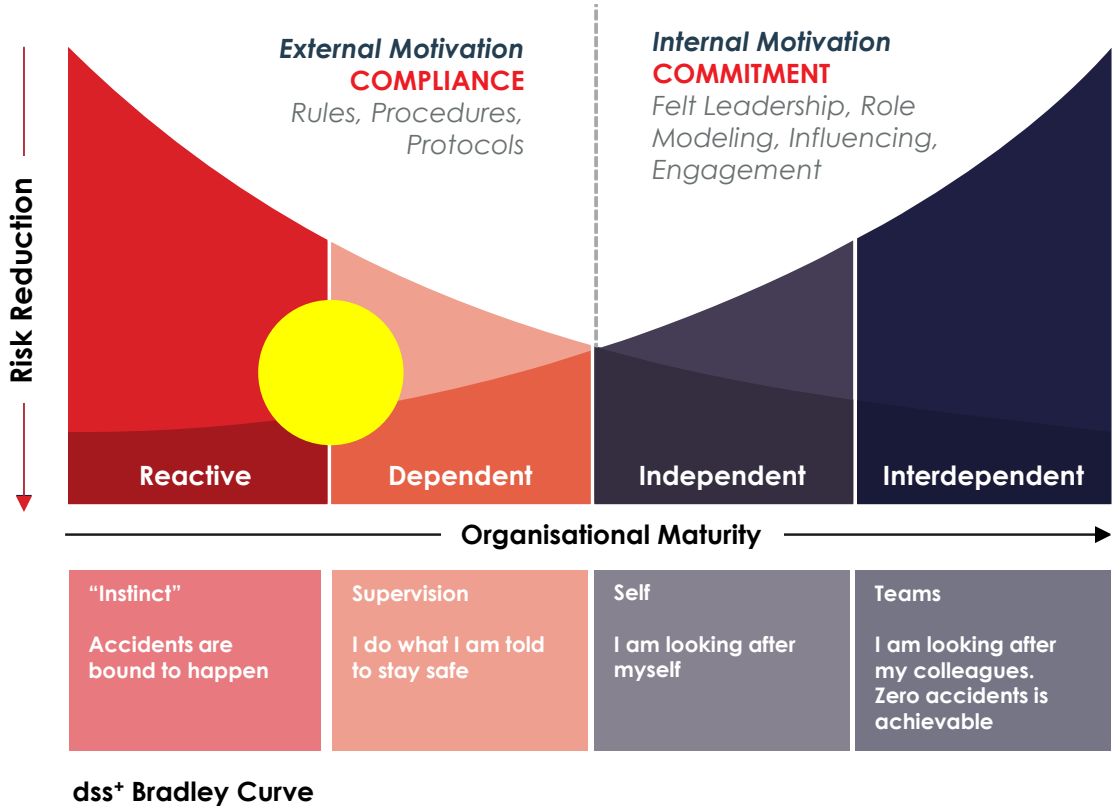
Key Systemic Challenges

- **Long, complex and articulated supply chain** with numerous players across sectors
- **Physical operational risk** (e.g. fire risk) **"ownership" moves along the various players** (i.e. from battery producers, to downstream recyclers)
- **Gaps/vacuum** or **different expectations and requirements**
- **New business models are fast emerging/expanding** (e.g. second life battery re-use/re-purpose for energy storage, etc.)
- The **risk/return of handling Li-ion batteries doesn't not distribute yet adequately across the supply chain** players
- In some segments of supply chain (e.g. collection/recycling) the **hierarchy of risk controls is still too unbalanced/dependent on administrative controls vs. engineering/technical.**

Source: online publicly available information

Waste treatment sector is facing changes in the waste streams and operational conditions

- The waste treatment/recycling sector has been historically **perceived as a medium-low hazard sector.**
- In the last decade, the **risk profile has been changing** as a result, for example, of exponential growth of Li-ion batteries in WEEE. **Risk of fire is material** for these types of operations, with **most sites having experienced multiple fires in recent years.**
- **The fire events and the losses incurred** in recent years and increase of insurance premium (up to 6x in some cases) by the various treatment facilities **have triggered the need to reduce risk exposure** through a range of technical, organizational and administrative measures.
- It is clear to the sites that **ISO certifications** (early-stage ISO 9001, 14001, 45001, etc.), and **other waste permit prescriptions are not sufficient to reduce the risk exposure**, but just foundational compliance elements.
- Prevailing safety culture maturity and risk management practices still show **symptoms of early-stage maturity** (reactive/dependent on the Bradley Curve) compared to other industrial sectors



dss+ Bradley Curve

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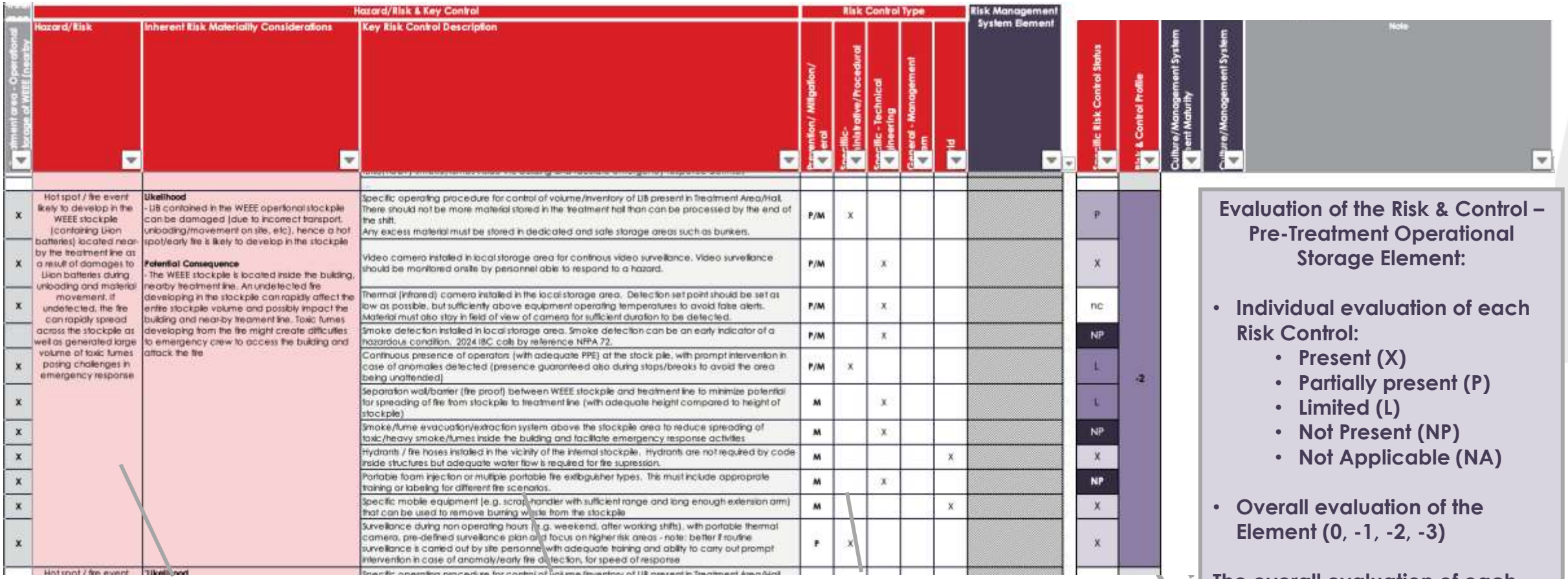
A holistic approach, centred on deep risk understanding, and addressing all dimensions (not just technical) is key to sustainably reduce risk exposure



Eminent area - Operational stage of WEEE (nearby)	Hazard/Risk	Inherent Risk Materiality Considerations	Key Risk Control Description	Prevention/ Mitigation/ General	Specific-Administrative/Procedural	Specific - Technical/Engineering	General - Management System	Aid	Risk Management System Element	Specific Risk Control Status	Risk & Control Profile	Culture/Management System Element Maturity	Culture/Management System	Note
x	Hot spot / fire event likely to develop in the WEEE stockpile (containing Lion batteries) located near-by the treatment line as a result of damages to Lion batteries during unloading and material movement. If undetected, the fire can rapidly spread across the stockpile as well as generated large volume of toxic fumes posing challenges in emergency response	**Likelihood** - LIB contained in the WEEE operional stockpile can be damaged (due to incorrect transport, unloading/movement on site, etc), hence a hot spot/early fire is likely to develop in the stockpile **Potential Consequence** - The WEEE stockpile is located inside the building, nearby treatment line. An undetected fire developing in the stockpile can rapidly affect the entire stockpile volume and possibly impact the building and near-by treament line. Toxic fumes developing from the fire might create difficulties to emergency crew to access the building and attack the fire	Specific operating procedure for control of volume/inventory of LIB present in Treatment Area/Hall. There should not be more material stored in the treatment hall than can be processed by the end of the shift. Any excess material must be stored in dedicated and safe storage areas such as bunkers.	P/M	X					P	-2			
x			Video camera installed in local storage area for continous video surveillance. Video surveillance should be monitored onsite by personnel able to respond to a hazard.	P/M		X				X				
x			Thermal (infrared) camera installed in the local storage area. Detection set point should be set as low as possible, but sufficiently above equipment operating temperatures to avoid false alerts. Material must also stay in field of view of camera for sufficient duration to be detected.	P/M		X				nc				
			Smoke detection installed in local storage area. Smoke detection can be an early indicator of a hazardous condition. 2024 IBC calls by reference NFPA 72.	P/M		X				NP				
x			Continuous presence of operators (with adequate PPE) at the stock pile, with prompt intervention in case of anomalies detected (presence guaranteed also during stops/breaks to avoid the area being unattended)	P/M	X					L				
x			Separation wall/barrier (fire proof) between WEEE stockpile and treatment line to minimize potential for spreading of fire from stockpile to treatment line (with adequate height compared to height of stockpile)	M		X				L				
x			Smoke/fume evacuation/extraction system above the stockpile area to reduce spreading of toxic/heavy smoke/fumes inside the building and facilitate emergency response activities	M		X				NP				
x			Hydrants / fire hoses installed in the vicinity of the internal stockpile. Hydrants are not required by code inside structures but adequate water flow is required for fire supression.	M				X		X				
x			Portable foam injection or multiple portable fire extinguisher types. This must include approprate training or labeling for different fire scenarios.	M		X				NP				
x			Specific mobile equipment (e.g. scrap handler with sufficient range and long enough extension arm) that can be used to remove burning waste from the stockpile	M				X		X				
x			Surveillance during non operating hours (e.g. weekend, after working shifts), with portable thermal camera, pre-defined surveillance plan and focus on higher risk areas - note: better if routine surveillance is carried out by site personnel with adequate training and ability to carry out prompt intervention in case of anomaly/early fire detection, for speed of response	P	X					X				
	Hot spot / fire event	Likelihood												

Short description of the fire hazard in this specific area

Specific Risk Controls/Measures typically adopted to prevent/mitigate the fire risk in this specific area

Characterization of the Specific Risk Controls/ Measures

Evaluation of the Risk & Control – Pre-Treatment Operational Storage Element:

- Individual evaluation of each Risk Control:
  - Present (X)
  - Partially present (P)
  - Limited (L)
  - Not Present (NP)
  - Not Applicable (NA)
- Overall evaluation of the Element (0, -1, -2, -3)

The overall evaluation of each Area will contribute to the definition of the total risk of the site (sum of…)

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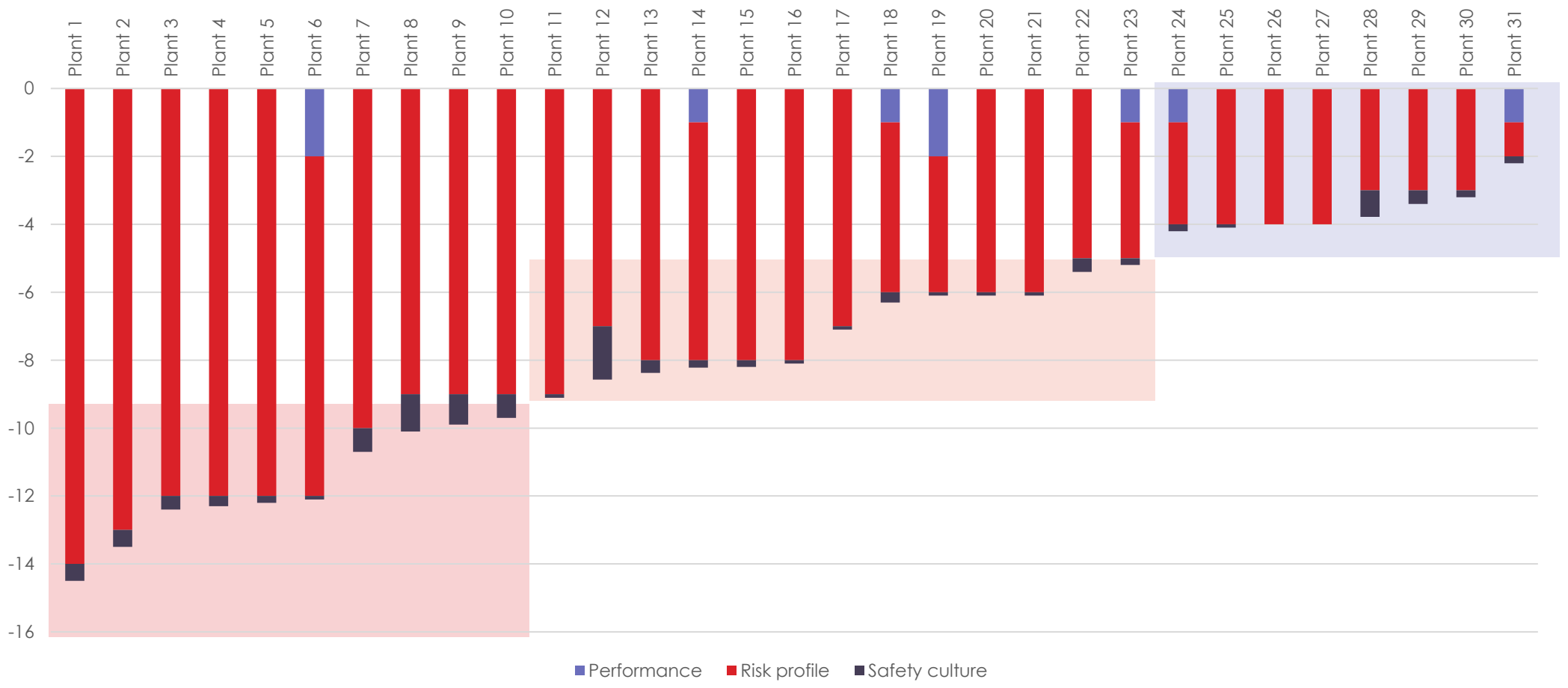
Multiple sites can be compared and clustered considering the risk tolerance and the controls/culture implemented

	1. Risk managed and under control	2. Risk management to be improved	3. Critical risks
Performance	• Companies that have not had any accidents fall into this category. • Score of 0 or -1 (no or few events in the past years) • Scores of -2 (major event in the past years) may still result in low residual risk, but only in cases of significant transformation and changes in control measures.	• Found in companies that have recorded 1 serious accident in the last 4 years and have managed to intervene in their risk profile. • Also includes companies with excellent flow management but more than one accident.	• Companies that have had serious accidents in the last 4 years receive a score of -2, which unless substantial changes to the system are made - translate into critical issues in risk profiles
Risk control & safety culture	• Risk control systems are fully implemented, safety culture is well established, and leadership is actively involved	• Leadership shows attention to risk, but there are some gaps in control systems. • There is room for further improvement. • Control systems show serious deficiencies with multiple significant gaps. • Risk awareness is weak or absent at the organisational level.	• Control systems show serious deficiencies with multiple significant gaps. • Risk awareness is weak or absent at the organisational level.
	Risk is minimal and under full control thanks to robust systems and a consolidated security culture **Score 0 to 5**	The risk is present but containable, requiring attention and improvements in controls and leadership **Score 5.1 to 9**	The risk is high and requires urgent action to address serious gaps in security systems and management. **Score > 9**

Multiple sites be compared and clustered considering the risk tolerance and the controls/culture implemented: examples from 30+ sites



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Bedeutung der richtig on
batteriebetriebenen Elektr aten aus Sicht der
Recyclingwirtschaft

Structure

1. Introduction
2. Legal basis for the separate collection of battery-containing e-waste, ADR
3. Fires at recycling yards
4. Processing of battery-containing e-waste
5. Protective measures

Introduction

The number of battery-powered products is increasing

Introduction

Delivery examples:

ADR

Transport of battery-mixed e-waste

ADR Regulations:
P 909 includes various packaging options. For the transport of e-waste with lithium batteries or lithium cells, the options in paragraph 3 a) are particularly relevant:

The use of durable outer packaging

Outer packaging = containers with fully closed walls

Roll-off-ontainers are considered transport equipment and are not permitted according to ADR! Battery-powered devices must be transported in special transport units (e.g., mesh boxes with liners, cut-open IBCs) **and may contain a maximum of 333 kg of lithium cells.** In practice, this limit is observed with 7 mesh boxes with battery-containing e-waste.

A violation can quickly lead to the loss of reliability
(traffic manager and/or EfB)

Fires

For ADR-compliant transport, the consignor/loader and the carrier are equally responsible!

Transporting in bulk is not permitted (and also not recommended…)!

Quelle: www,feuerwehr-kerpen.de/2020/08/page/2/

Fires

Processing of battery-mixed e-waste

Damage events are existential threats

© Ralf Hettler

Quelle: WDR

The recycling industry is now assessed with almost twice the damage rate factor compared to the wood processing industry, which is also considered high-risk.

Affordable insurance coverage is hardly available anymore.

Fires

E-vapes: Self ignition with water

Processing

How to process batterie-containing weee?

1. Completely clean the facility and remove all fire loads.

How to process batterie-containing weee?

1. Completely clean the facility and remove all fire loads.
2. Post guards with water hoses at every transfer point

Processing

How to process batterie-containing weee?

1. Completely clean the facility and remove all fire loads.
2. Post guards with water hoses at every transfer point
3. Feed the processing line with battery-containing devices without prior mechanical stress (avoid using wheel loaders or excavators).

Processing

Wie können batteriehaltige Elektroaltgeräte verarbeitet werden?

1. Completely clean the facility and remove all fire loads.
2. Post guards with water hoses at every transfer point
3. Feed the processing line with battery-containing devices without prior mechanical stress (avoid using wheel loaders or excavators).
4. Soft-open up the material and keep it moist (no shredder with cutting knifes, better use a chain shredder)

Processing

Wie können batteriehaltige Elektroaltgeräte verarbeitet werden?

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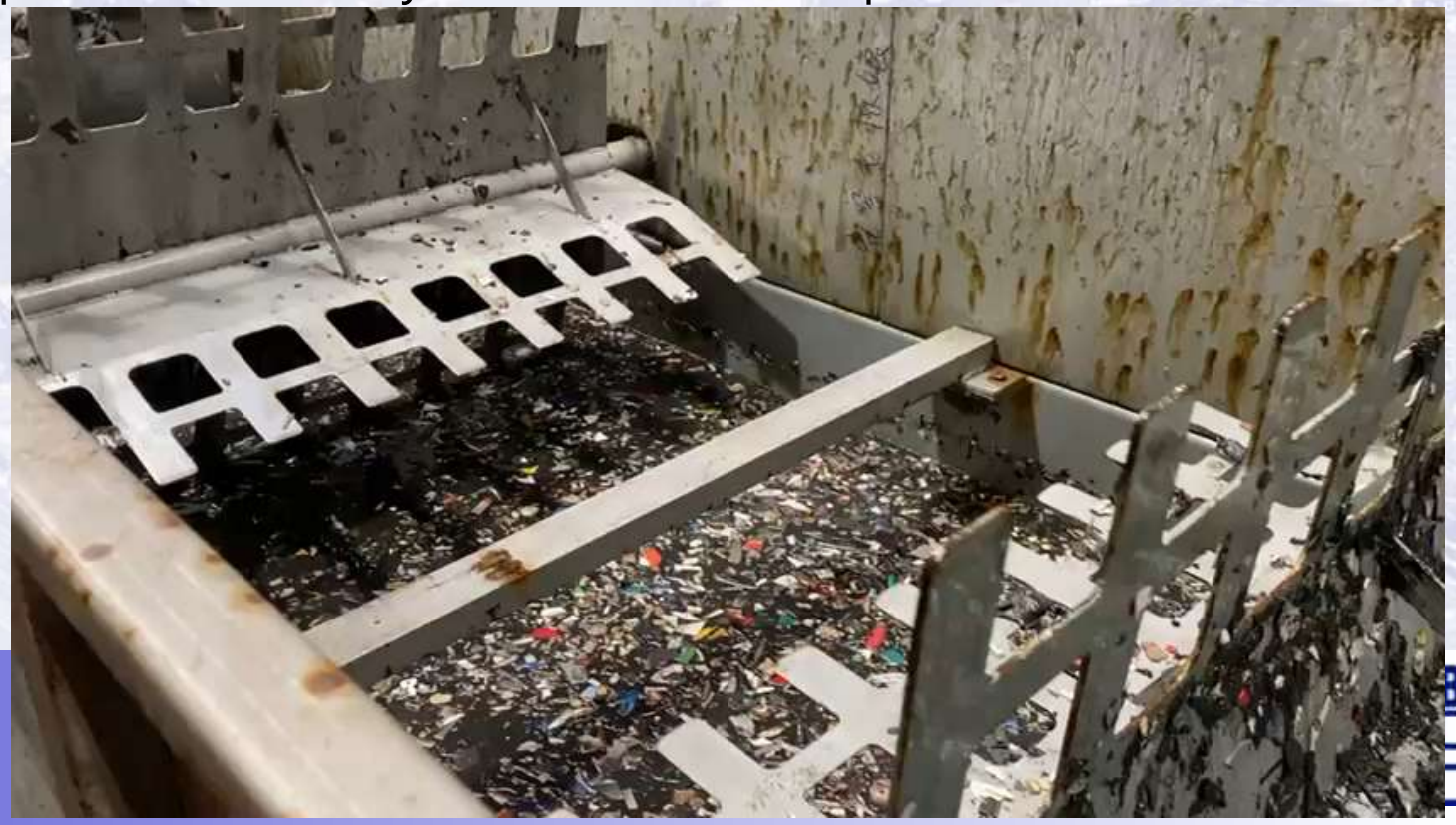

BEHRENDT

Precautions

Protective measures we have implemented:

1. **Reduction of fire loads**
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Precautions

Additional protective measures:

6. **Thermal imaging cameras with connection to a security service in outdoor areas**
7. **Thermal imaging cameras combined with extinguishing cannons or extinguishing turbines for wide areas**
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Quelle: https://zukos.de/de/leistungen.html#brandfrueherkennung-loeschsysteme

Quelle: https://www.emicontrols.com/de/fire/stationaere-produkte/ft40/

Quelle: Quanzhou Xiangrui Fire Technology Co., Ltd.

Thank you very much for your attention!

Dipl.-Wirtsch.-Ing. Tammo Behrendt
Behrendt Recycling GmbH
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Mit Quellen von Andreas Habel / bvse

Bedeutung der richtig on
batteriebetriebenen Elektr aten aus Sicht der
Recyclingwirtschaft

Structure

1. Introduction
2. Legal basis for the separate collection of battery-containing e-waste, ADR
3. Fires at recycling yards
4. Processing of battery-containing e-waste
5. Protective measures

Introduction

The number of battery-powered products is increasing

Introduction

Delivery examples:

ADR

Transport of battery-mixed e-waste

ADR Regulations:
P 909 includes various packaging options. For the transport of e-waste with lithium batteries or lithium cells, the options in paragraph 3 a) are particularly relevant:

The use of durable outer packaging

Outer packaging = containers with fully closed walls

Roll-off-ontainers are considered transport equipment and are not permitted according to ADR! Battery-powered devices must be transported in special transport units (e.g., mesh boxes with liners, cut-open IBCs) **and may contain a maximum of 333 kg of lithium cells.** In practice, this limit is observed with 7 mesh boxes with battery-containing e-waste.

A violation can quickly lead to the loss of reliability
(traffic manager and/or EfB)

Fires

For ADR-compliant transport, the consignor/loader and the carrier are equally responsible!

Transporting in bulk is not permitted (and also not recommended…)!

Quelle: www,feuerwehr-kerpen.de/2020/08/page/2/

Fires

Processing of battery-mixed e-waste

Damage events are existential threats

© Ralf Hettler

Quelle: WDR

The recycling industry is now assessed with almost twice the damage rate factor compared to the wood processing industry, which is also considered high-risk.

Affordable insurance coverage is hardly available anymore.

Fires

E-vapes: Self ignition with water

Processing

How to process batterie-containing weee?

1. Completely clean the facility and remove all fire loads.

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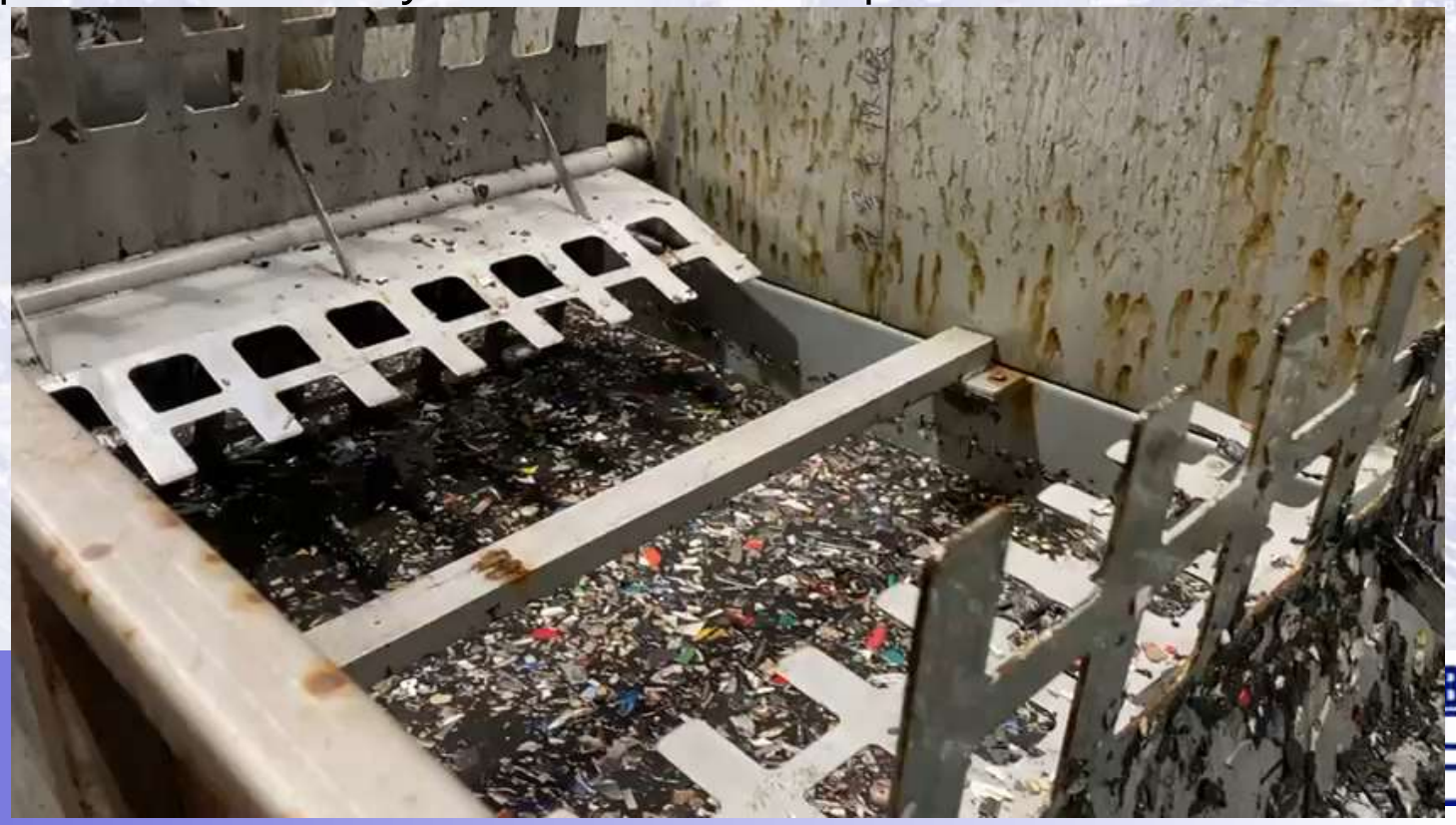

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Mit Quellen von Andreas Habel / bvse

Q & A

Recycling Europe

Establishing an EU single market and boosting demand for recycled materials

PANEL DISCUSSION II

Sven Saura

Vice-President of Solid Waste and Recycling Solutions, Veolia

Mariska Boer

Corporate Communications Executive, Boer Group

Pär Larshans

Sustainability Director, Ragn-Sells

Katharina Schlegel

Council Director for Circularity and End-of-Life, Plastics Europe

Florian Flachenecker

Taskforce Leader Circular Economy Act, DG ENV, European Commission

MODERATED BY:

Maria Vera Duran

Policy Director, Recycling Europe

Q & A

Recycling Europe

COFFEE BREAK
15:45 – 16:15

Recycling Europe

Enabling a circular automotive future

PANEL DISCUSSION III

Poul Steen Rasmussen
CEO, Genan

Marta Roche Díez
Sustainability and Environmental Regulations Manager, CLEPA

Umberto Eynard
Project Officer, EC Joint Research Centre – Ispra (IT)

Tess Pozzi
Head of Public Affairs, Derichebourg Environnement

Regina Kohlmeyer
Scientific Officer, German Environment Agency

MODERATED BY:

Emmanuel Katrakis
Director of Institutional and Regulatory Affairs, Galloo

Complementary measures to tackle unknown vehicle whereabouts

Pillar 2: Water-proof vehicle registration system

UBA: Minimum requirements to vehicle registration system

Definition of two distinct types of de-registration

Temporary deregistration
with remaining accountability
- Limited duration
- Recurring fee
- Traceability of ownership

Permanent cancellation
only in 3 cases with **official proof**
- Export
- ELV treat-ment
- Theft

ZOLL DOUANE | CoD | Poli ce

UBA-Paper

Proposal VRD

6(1)(e) | 6(1)(g)(ii)+(iii) | 6(1)(g)(i) | 6(1)(g)(iv)

possible sale → new owner

Loopholes: e.g. in case of (vii): no proof of whereabouts

6(1)(g)(vii) Other reasons (Examples)

Car trader | Museum | Garage | Abandoned | Scavenging illegal

Roadworthiness package

Pillar 1: ELV Regulation

Art. 24/ 26
- Vehicle owner of ELV shall deliver it to ATF without undue delay.

ATF

Art. 25 CoD
- ATF issues CoD

CoD

Art. 38-45: Export
- No export of non-roadworthy vehicles to third countries

Art. 37: Distinction used – waste vehicle
- Vehicle owner has to prove status of vehicle (waste/ non-waste), when transferring it.
- *Council (7/2025): Accidented vehicle: insurance company has to assess (ELV or not)*

Waste
Non-waste

Annex I: Binding criteria for ELV

Annex I A „Must“
- Assessment by independent expert
- *EP: dismantled for reuse of its parts or no longer used as a vehicle*
- total technical loss
- submerged in water above dashboard
- Vehicle' hull anc chassis irreparable

Annex I B „Indicative“ (case-by-case)
- No technical roadworthiness test or no insurance for 2 years
- total economic loss
- submerged in water below dashboard, and damaged the engine or electrical system;
- repair costs (to roadworthiness) plus current value > market value after repair
- operating liquids discharged

7th European Recycling Conference

Recycling Europe

CLOSING REMARKS

MARIA VERA DURAN

Policy Director,
Recycling Europe

NETWORKING GALA DINNER & PARTY

19:00 Penthouse Elb Panorama

BRING YOUR BADGE

BRING YOUR BADGE

SEE YOU AT ERC 2026!

MADRID

10 JUNE 2026