

Deliverable Report

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¹ PU = Public
PP = Restricted to other programme participants (including the Commission Services)
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Technical References

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Summary

Main Points Addressed in this deliverable are:

- **Evaluation of Legislative Frameworks:** The report critically assesses the alignment of the CRMA and the ELV Regulation with SALEMA's strategic goals. It identifies areas where current legislative measures support or hinder the project's objectives, focusing on aspects such as recycling targets, domestic sourcing, and regulatory clarity.
- **Recommendations for Legislative Enhancements:** Based on the evaluation, the report proposes adjustments or enhancements to legislative frameworks to better support the integration and reutilisation of critical raw materials within the SALEMA project. This includes suggestions for refining permitting rules, introducing financial mechanisms to support strategic raw material projects, and enhancing technological means for material recovery.
- **Removing Financial Barriers and Advancing Green Technologies:** Incentivising investment in green products and technologies within regulatory frameworks, such as tax reliefs and subsidies, can encourage sustainable practices. Additionally, increasing funding for pilot projects, fostering public-private partnerships, and developing financial tools to facilitate broader implementation of innovative technologies are essential. By removing financial



barriers and advancing green technologies, SALEMA aims to accelerate the adoption of sustainable solutions, contributing to Europe's circular economy goals.

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Abbreviations

Abbreviation / Acronyms	Description
CAPEX	Capital expenditures
CRM	Critical Raw Material
CRMA	Critical Raw Materials Act
ELV	End of life vehicle
EC	European Commission
EU	European Union
OPEX	Operating Expenditure



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1. Introduction and Background

This document serves as the second report within the SALEMA EU project, focusing on how recent legislative developments might support or hinder the project's objectives. It builds on the first report from April 2023, which provided a comprehensive overview of critical raw materials (CRMs) and Europe's efforts to enhance resilience in CRM supply chains.

Since the initial report, there have been modest changes in the policy landscape. Notably, the End-of-Life Vehicle (ELV) directive has evolved into a regulation, and the Critical Raw Material Act (CRMA) has further defined the strategic framework for managing and utilising CRMs. A year later, this report aims to critically assess these developments, particularly the newly revised ELV regulation, for which an initial proposal has been made public as of April 2024. This evaluation focuses on how these legislative changes might affect the exploitation of SALEMA's results.

Moreover, this report will review the increased clarity provided by the CRMA since March 2023, which has helped specify the project's requirements more distinctly. Despite this progress, several ambiguities persist that need further exploration.

Additionally, this report will discuss the policy recommendations from the final SALEMA event, where stakeholders engaged in a policy debate. These recommendations, derived from a diverse group of participants, are crucial for shaping future strategic directions. This analysis will assist stakeholders in understanding and navigating the evolving regulatory environment.

Objectives of task and deliverable

- **Assessing the alignment of the Critical Raw Materials Act (CRMA) and the End-of-Life Vehicles (ELV) Regulation with the strategic goals of the SALEMA project.**
- **Identifying areas where current legislative measures support or hinder the project's objectives.**
- **Proposing adjustments or enhancements to these legislative frameworks to better support the integration and reutilization of critical raw materials within the SALEMA project.**

2. The European legislative framework

Legislation plays a pivotal role in shaping the industrial and economic landscapes of regions, particularly in sectors reliant on strategic resources like critical raw materials (CRMs). In the European Union, targeted legislative actions are crafted to ensure that projects like SALEMA not only thrive but also align with broader socio-economic goals such as sustainability, resource efficiency, and economic resilience. By establishing regulations that dictate the sourcing, utilization, and recycling of materials, the EU provides a structured and supportive environment that enhances project outcomes.

For SALEMA, which focuses on reducing the dependency on primary sources of magnesium (Mg) and silicon (Si) by innovating in the use of recycled materials within aluminium alloys, legislation becomes a critical tool. It can facilitate the exploitation of these innovations by:



- **Creating a stable supply chain:** Legislation can stabilize supply chains by reducing dependency on external sources and promoting local resource development.
- **Encouraging sustainable practices:** Regulations often incorporate environmental considerations, pushing projects to adopt more sustainable and less wasteful practices.
- **Providing economic incentives:** Legislative frameworks can offer financial or policy-based incentives for projects that align with national or regional goals, such as reducing import dependencies or enhancing recycling rates.
- **Ensuring quality and compliance:** By setting standards for materials and processes, legislation ensures that the outputs of projects like SALEMA meet industry requirements and are competitive on the market.

As already mentioned in the Deliverable 8.1, the main legislations that are relevant for SALEMA are the Critical Raw Materials Act and the End of Life Vehicle regulation.

2.1. Critical Raw Materials Act (CRMA) and SALEMA

The President of the European Commission, Ursula von der Leyen, announced the Critical Raw Materials Act in her 2022 State of the Union address, aiming to reduce EU dependency on imported critical raw materials (1). This aligns with the Versailles Declaration and the European Parliament's resolution to develop an EU critical raw materials strategy. The Act aims to secure a sustainable supply chain for clean energy to meet the EU's climate goals. Since 2011, the Commission has assessed raw materials for criticality every three years, with the most recent study conducted in 2023 evaluating 87 materials. The EU has identified 34 minerals and metals as critical and/or of strategic importance for European society and welfare. These critical raw materials (CRMs) are essential ingredients in key technologies necessary for securing the green transition, digitalisation, the space industry, and defence capabilities. They are considered critical due to their economic importance and the risk of supply interruption. The 2023 list also includes a group of 17 so-called strategic raw materials (SRMs) of even greater priority.

Table 1 and *Table 2* list the critical and strategic raw materials as updated in the most recent (2) amendment of the list. Where materials are further specified as "metal" or "battery grade," this designation excludes alloys. However, entries listed simply as, for example, "tungsten" without further specification, may include metal, ferro-alloy, ore, or chemical compound.

The SALEMA project, designed to lessen reliance on primary sources of magnesium (Mg) and silicon (Si), is developing new alloys with reduced content of these materials and increasing the use of recycled content. This initiative aligns closely with the goals of the CRMA, which seeks to bolster recycling capabilities within the EU and diminish import dependency by nurturing a robust internal market for critical raw materials.

CRMA sets forth ambitious benchmarks intended to transform the raw materials sector by 2030:

- At least 10% of the EU's annual consumption of critical raw materials must be sourced domestically.
- At least 40% of these materials' processing should occur within the Union.
- At least 25% of the EU's raw materials consumption should be from recycled sources.



- No single third country should supply more than 65% of any critical material required by the EU annually.

Table 1 List of Critical Raw Materials Identified in the 2023 Assessment for the European Union's Raw Materials Strategy

Antimony	Arsenic	Bauxite/Alumina/Aluminium	Baryte
Beryllium	Bismuth	Boron	Cobalt
Coking Coal	Copper	Feldspar	Fluorspar
Gallium	Germanium	Hafnium	Helium
Heavy Rare Earth Elements	Light Rare Earth Elements	Lithium	Magnesium
Manganese	Graphite	Nickel – battery grade	Niobium
Phosphate rock	Phosphorus	Platinum Group Metals	Scandium
Silicon metal	Strontium	Tantalum	Titanium metal
Tungsten	Vanadium		

Table 2 List of Strategic Raw Materials Identified in the 2023 Assessment for the European Union's Raw Materials Strategy

Bauxite/Alumina/Aluminium	Bismuth	Boron - metallurgy grade	Cobalt
Copper	Gallium	Germanium	Lithium - battery grade
Magnesium metal	Manganese battery grade	- Graphite - battery grade	Nickel - battery grade
Platinum Group Metals	Rare Elements for magnets	Earth for Silicon metal	Titanium metal
Tungsten			

These targets hold significance for two reasons. Although the SALEMA project strives to reduce the amounts of silicon (Si) and magnesium (Mg) in aluminium alloys, these elements will inevitably remain integral due to their essential properties in aluminium. As mentioned in the deliverable 8.1, a major concern is the supply risk of Mg, predominantly sourced from China, and the overcapacity of Si in China, which poses a threat to existing European Si production. The CRMA seeks to enhance Mg production within Europe where it currently lacks—illustrated by initiatives like the "Magnesium for Europe (3)" project presented at the SALEMA final event. Additionally, SALEMA aims to augment the recycling content, and the CRMA targets can facilitate this endeavour. However, it's crucial to



acknowledge that recycling efficacy is highly dependent on the specific end product. Thus, regulations targeting the product, such as the ELV regulation in the SALEMA context, are likely to exert a greater influence than the broader CRMA goals. Nonetheless, establishing such targets is vital for shaping effective legislation and promoting a sustainable management approach to critical raw materials within the EU.



Figure 1 Mark Pohlmann, Managing Director of Magnesium for Europe, presenting at the SALEMA final event on March 21st.

2.2. End of Life Vehicle regulation (proposal) and SALEMA

The European Union has long recognized the environmental impact of end-of-life vehicles (ELVs) and the importance of their efficient and environmentally responsible disposal. In response, the EU implemented the End-of-Life Vehicles Directive (4), aimed at minimizing waste from vehicles at the end of their life cycle and promoting their reuse, recovery, and recycling. As vehicles evolve and the challenges associated with their disposal grow more complex, the European Commission has proposed significant updates to this directive. This proposal (5) is a critical step towards enhancing the sustainability of the automotive industry and aligning with the broader goals of the EU's Green Deal, which seeks to make Europe climate-neutral by 2050.

The revised proposal for the end-of-life vehicle (ELV) directive, now advancing toward becoming a regulation, encapsulates a transformative approach aimed at modernizing and enhancing sustainability within the automotive and recycling sectors. This proposal is set to replace the existing 3R type-approval and ELV directives with a single, more comprehensive legal framework that directly affects all EU member states.

Some Key Proposed Changes:

- **Expansion of Regulatory Scope:** The regulation extends to include lorries, buses, trailers, and various motor vehicles, broadening the impact and increasing the availability of materials for recovery and recycling.



- **Handling of Unknown Whereabouts:** The proposal addresses the issue of vehicles of unknown whereabouts with stricter tracking and reporting requirements, aiming to reduce the number of vehicles that escape the regulated recycling process.
- **Mandatory Dismantling:** To improve the quality of scrap materials, the proposal mandates the dismantling of certain vehicle components before shredding. This process is crucial for preserving the integrity of recyclable materials, particularly metals like aluminium, ensuring they retain their high value for recycling. If an authorized treatment facility can demonstrate that its post-shredder technologies can separate materials from the parts and components (as listed in Part C, entries 13 to 19 of Annex VII) just as effectively as manual or semi-automated dismantling processes, then mandatory dismantling of these components may not be required.
- **Circularity and Design:** A new requirement for manufacturers to develop a circularity strategy for each vehicle type, coupled with the implementation of a circularity vehicle passport, aims to ensure comprehensive tracking and management of vehicle materials throughout their lifecycle.
- **Extended Producer Responsibility (EPR):** Manufacturers will bear greater responsibility for the end-of-life processing of vehicles, which includes ensuring vehicles are collected and treated in accordance with EU standards.

The revision of the end-of-life vehicle (ELV) regulation represents a significant opportunity for the SALEMA project, which focuses on enhancing the utilisation of scrap in aluminium alloys. This regulatory update is poised to directly benefit SALEMA's innovative approach by ensuring a higher quality and increased availability of aluminium scrap.

The ELV revision mandates the dismantling of specific vehicle components before shredding to preserve the quality of recyclable materials, such as aluminium. This step is crucial for maintaining the high value of recycled aluminium by limiting contamination with other materials, aligning perfectly with SALEMA's strategy of using advanced sorting techniques (such as PICK IT) to reduce contamination. This ensures that the recycled aluminium is less contaminated and more suitable for high-specification applications. Additionally, the new regulation aims to curb the export of non-roadworthy vehicles, which could increase the amount of scrap available within the European market. By reducing the export of ELVs, SALEMA can benefit from an increased availability of local scrap sources. This supports the project's need for a steady and predictable supply of aluminium scrap, essential for sustaining and scaling up its recycling activities.

The regulation also requires car manufacturers to adopt a circularity strategy that includes comprehensive vehicle design considerations aimed at enhancing the recyclability of vehicles. This would lead to vehicles being designed with dismantling and recycling in mind, simplifying the recycling process and improving the quality of the recovered aluminium. SALEMA's integration of scrap into new aluminium products would benefit from such enhanced design protocols, as they ensure the purity and suitability of aluminium for reuse. Moreover, the introduction of a circularity vehicle passport that includes detailed information on the material composition of vehicles would provide crucial data allowing SALEMA to precisely identify and segregate different aluminium alloys during the recycling process. Enhanced information flow helps in better targeting and utilisation of specific alloys, thus optimising the recycling process and reducing waste.



3. Sum up of the recommendations coming from the second stakeholder event

During the SALEMA final event which took place on March 21st at Autoworld, Brussels, a panel session titled *"Driving Sustainability: A Policy Dialogue on Challenges and Opportunities in Expanding Recycled Aluminium in Electric Vehicles"* took place. This policy session was dedicated to a comprehensive discussion of the challenges and opportunities related to policies aimed at promoting the integration of recycled aluminium alloys in electric vehicles. Additionally, it aims to ensure that critical raw materials (CRMs) essential for electric vehicle production remain readily available in Europe. By examining established frameworks such as the End-of-Life Vehicle Regulation and the Critical Raw Materials Act, this session served as a crucial platform for evaluating current initiatives and strategizing for further progress.

The focus extended beyond current considerations to encompass the identification of additional measures necessary for fostering European, sustainable, and equitable electric vehicle production. Through meticulous analysis of existing policies, the objective was to identify and address gaps that, if resolved, will not only optimise the outcomes of the SALEMA project but also enhance the effective utilisation of recycled materials, thereby mitigating concerns related to material criticality.



Figure 2 Panel discussion held on March 21st during the concluding event of the SALEMA project.

The panellists in the session included:

- Gaël de Rotalier, Policy Officer, DG Environment



- Martin Tauber, European Representative, International Magnesium Association & President Critical Raw Material Alliance (CRM-A)
- Chris Heron, Communication & Public Affairs Director, Eurometaux
- Francesca Cavezza, Innovation Project Manager, European Aluminium
- Giulia Forgnone, Director of Public Affairs and Communications, European Aluminium

Their recommendations were summarised in the table below. The integral video of the policy session can be found [here](#).

Table 3 Summary of Policy Recommendations from the panel discussion taking place during the final SALEMA event

Targeted Regulation	Addressing	Recommendation
General EU Legislative Framework	Policy Development	Move from a directive to a regulation format to ensure uniform application across EU states.
General EU Legislative Framework	Policy Development	Encourage active involvement of industry stakeholders in legislative processes.
General EU Legislative Framework	Policy Enhancement	Implement traceability measures for materials to ensure compliance and end-of-life quality
CRMA	Policy Enhancement	Ensure the Critical Raw Materials act aligns with broader EU industrial and environmental strategies.
CRMA	Policy Development	Call for comprehensive assessments of material availability and lifecycle.
CRMA	Permitting	Refine permitting rules to accelerate project approvals within the EU.
CRMA	Financial	Introduce financial mechanisms to support strategic raw material projects.
CRMA	Financial	Promote financial incentives to develop local processing capacities for critical raw materials.
CRMA	Financial	Advocate for financial support not only for primary processing but also for industrial recycling processes.
ELV Regulation	Technological	Push for design for circularity which translates into a design that makes recycling easier.
ELV Regulation	Technological	Improve segregation and quality of aluminium scrap recycling.
ELV Regulation	Technological	Enhance technological means to segregate different alloys during recycling processes.
ELV Regulation	Technological	Support the development of advanced treatment facilities for better material recovery.



ELV Regulation	Technological	Enhance technologies and processes for dismantling end-of-life vehicles to recover valuable materials.
ELV Regulation	Financial	Secure funding for advancing recycling practices and technologies.
NA	Supply Chain	Stress test European supply chains for resilience against disruptions.

Alongside a policy session that explored the potential of the CRMs Act and the ELV Regulation to optimise SALEMA outcomes, a final panel session took place during the SALEMA final event. The panel, titled 'Navigating the Future of EU Innovations and Sustainable Technologies,' focused on actions to ensure the best possible implementation of EU projects on a broad scale.

The panel session included:

- Garbine Guiu Etxeberria, Research Programme Officer, DG Research and Innovation
- Angels Orduna, Executive Director, A.Spire,
- Christian Leroy, Director Innovation, European Aluminium
- Claudio Mus Technical & R&D Director, Endurance Overseas and representing the SALEMA’s consortium
- George Karkampasis, Director – Circular Economy & Raw Materials, European Aluminium *as moderator*

The discussion focused on how important Operational Expenditure (OPEX) and Capital Expenditure (CAPEX) are in managing and funding big projects, especially within the EU's rules for research and innovation. The panel talked about the difficulties in matching spending with immediate financial goals and the need to develop clever ways to fund projects to help them move from early experiments to being ready for the market. They also discussed whether it would be possible to charge more for environmentally friendly products, questioning if customers would be willing to pay extra for greener, more advanced products from Horizon projects.

In the table below there are listed recommendations that came out from the panel discussion.

Table 4 : Recommendations from the Final Panel Session 'Navigating the Future of EU Innovations and Sustainable Technologies' at the SALEMA Final Event

Action Item	Stakeholder	Expected Impact
Increase Funding for Pilot (TRL 7) to Market Transition, potentially through instruments like the Innovation Fund	EU Commission	Facilitates smoother transition of Horizon projects to market readiness.



Foster Public-Private Partnerships	Companies	Increases project effectiveness and innovation by pooling resources and expertise.
Develop financial tools that incentivize investments in projects that might have high risks but also high potential returns.	Member States	Creates a reliable initial market for new innovations, encouraging further investment and development.
Simplify regulations Make rules and requirements more consistent across all member states to facilitate the introduction and growth of new technologies.	EU & Member States	Lowers administrative barriers and accelerates the adoption of new technologies across the EU.

4. Strategic Recommendations for Enhancing SALEMA's Impact Through Legislative Support

In first policy report 8.1, recommendations for the better exploitation of SALEMA outcomes were made. These recommendations are documented in Table 5 Annex a) While the Critical Raw Materials Act (CRMA) and the revised End-of-Life Vehicles (ELV) Regulation have addressed most of these recommendations, some areas still require attention as evidenced in Table 3.

The CRMA has successfully enhanced the traceability and availability of critical raw materials like aluminium, but clearer financial support regulations are necessary to ensure adequate funding for both primary processing and recycling. Likewise, the updated ELV Regulation has improved recycling processes but needs stricter design and manufacturing standards to facilitate easier disassembly and higher purity in recycling streams.

Additional recommendations were provided to ensure that EU-funded projects, such as the Horizon Project SALEMA, are successfully implemented in the market, as shown in Table 4. Collaborating among industries and providing financial support to overcome the costs associated with bringing a technology from TRL 7 to market implementation is crucial. Furthermore, allocating resources to more risky projects with potentially higher returns is also essential.

During discussions within the SALEMA consortium, it emerged that the Operational Expenditure (OPEX) and Capital Expenditure (CAPEX) costs associated with the marketization of SALEMA are significant barriers that need to be addressed. Proposed solutions include:

- **Introducing specific incentives like tax reliefs, subsidies for using recycled materials, and grants for developing recycling technologies to help companies adopt sustainable practices without significant financial strain.**
- **Creating a regulatory framework that offers rewards for meeting standards and penalties for failing to meet them, ensuring the system is both fair and effective.**
- **Launching advocacy campaigns to inform key policymakers about the economic and environmental benefits of the SALEMA project's outcomes and to push for changes in laws that support sustainable development.**



In conclusion, while existing regulations have laid a solid foundation for material recycling and sustainability, more refined legislative measures are needed to support recycling technologies, clarify financial structures, and deepen stakeholder engagement. Moreover, addressing the OPEX and CAPEX is essential, particularly as these costs can create significant barriers to transitioning technologies from TRL 7 to higher readiness levels. Overcoming these financial hurdles is crucial for enabling broader implementation and market adoption of innovative technologies. Implementing these strategies will help Europe maintain its leadership in sustainable material management and circular economy practices.

5. Conclusions and Outlook

This report has focused on examining the legislative landscape to determine how it can facilitate or hinder the exploitation of the SALEMA project's results. It has specifically considered two fundamental pieces of legislation: the Critical Raw Materials Act (CRMA) and the End-of-Life Vehicles (ELV) Regulation. These frameworks have undergone substantial review and revisions in recent years, with changes that have been largely positive for advancing the goals of the SALEMA project.

While the modifications to these legislations have generally supported the project's aims to enhance the sustainability and efficiency of material use within the EU, there is still room for further enhancements to make these frameworks even more effective. Future revisions could focus on fine-tuning the aspects that directly impact the recycling and reuse of critical raw materials used in SALEMA, particularly magnesium and silicon.

Moreover, engaging stakeholders in discussions about the legislation and its impact on SALEMA, similar to the approach taken during the final event of the SALEMA project, is crucial. These dialogues are fundamental for aligning legislative actions with the practical realities and technological advancements of the project. By continuing to involve a broad spectrum of stakeholders, we can ensure that the legislative environment evolves in a way that fully supports and enhances the innovative work being done by SALEMA, driving Europe closer to its sustainability and circular economy goals.

Moreover, recommendations from stakeholders and panel discussions highlight the importance of increasing funding for pilot projects, fostering public-private partnerships, developing financial tools to incentivize investments, and simplifying regulations. These measures are essential for overcoming barriers such as high operational and capital expenditures associated with bringing technologies from TRL 7 to market readiness.

Next steps

[Add plans for subsequent tasks and deliverables, further developments and adaptations, new collaborations etc.]

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 ...NA , end of the project



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Annex

a) Annex a

Table 5 Table of policy recommendations developed in April 2023 (Deliverable 8.1.)

Recommendation	Addressing	Legislation in EU
Improve the quality of the recycled material from ELVs (better sorting techniques and more dismantled components)	Technological	ELV directive
Improve the flow of information between dismantlers regarding the composition of various components	Technological	ELV directive
Address the issue of unknown whereabouts	Technological	WSR and ELV directive
Consider coherence between regulations	Legislative	Battery Regulation and ELV directive
Prioritize access to key metals and accelerate access to global and domestic supply	Societal	CRM act
Put pressure on miners to make more supply available, consider joint purchasing, and develop partnerships in resource-rich countries	Societal	CRM act
Develop own refining and recycling and the establishment of a centralized authority on the supply of critical metals	Societal	CRM act
Reduce CO2 emissions, such as reporting tonneCO2/tonne material and setting CO2 carbon limits	Societal	CRM act
Ensure responsible mining and ban in Europe materials that cannot guarantee transparent social and environmental due diligence	Societal	CRM act
Promote sustainable design alongside recycling	Technological and Societal	Eco Design for Sustainable product
Develop a legal framework for raw materials legislation	Legislative	CRM act

