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LIFE MERCURY-FREE

Complex Awareness Raising and Behaviour Change for the Mercury-Free City Environment

D6.3 The MLE Exercise: LIFE MERCURY-FREE Case

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1. Introduction

The LIFE MERCURY-FREE project tackles the environmental and health risks of mercury contamination from consumer products, which are often mishandled at home due to limited awareness and disposal options, making them a significant yet underestimated pollution source. The project aims to implement a comprehensive strategy that combines awareness raising, behavioural change, governance improvement, and replication of solutions across different urban contexts. Work Package 6 (WP6), *Sustainability, replication and exploitation of project results*, plays a central role in ensuring that project outcomes extend beyond the pilot and control cities, and that they contribute to EU-wide efforts to minimize mercury emissions. Within WP6, Deliverable 6.3 (*The MLE Exercise: LIFE MERCURY-FREE Case)* documents a dedicated Mutual Learning Exercise (MLE) designed to strengthen knowledge exchange and replication capacity among project partners, public bodies, and other stakeholders. The MLE builds on earlier outputs of the project, including awareness campaigns (WP3), policy measures and governance practices (WP4), and behavioural insights (WP5). By creating a structured environment for dialogue and experience sharing, the exercise provides an opportunity to assess progress, compare local approaches, and distil practical lessons for replication. Furthermore, it serves as a bridge towards Deliverable 6.6 (*Exploitation plan including replication component*), ensuring that knowledge generated is translated into actionable strategies. This document, therefore, not only presents the rationale, methodology, and outcomes of the LIFE MERCURY-FREE MLE but also situates it within the broader ambition of developing Mercury-Free City Communities, replicable across the EU and neighbouring states.

2. Objectives of the MLE

MLEs are a recognized instrument of the European Commission to foster structured exchanges between stakeholders engaged in complex societal and

environmental challenges. They provide an opportunity to compare practices, identify enablers and barriers, and develop consensus on policy and behavioural innovations. In the context of LIFE MERCURY-FREE, the MLE is essential for translating local experiences into replicable models that can be transferred beyond the pilot cities of Lviv, Ivano-Frankivsk (Ukraine), Lodz and Krakow (Poland) to the control cities of Larissa (Greece), Évora (Portugal), and Camerino (Italy), and eventually to a wider European audience.

Mercury contamination is a multifaceted issue that touches upon environmental governance, public health, consumer behaviour, and waste management infrastructures. No single actor can address it effectively in isolation. Hence, the MLE serves as a platform to operationalize the quadruple helix model, involving public authorities, academia, industry, and civil society, by encouraging dialogue and ensuring that solutions are co-created, tested, and disseminated.

Specifically, the LIFE MERCURY-FREE MLE was designed around four interlinked objectives:

1. **Facilitate exchange of knowledge and experiences**
    - Provide a safe space for pilot and control cities to present their progress, innovations, and challenges in managing mercury-containing waste.
    - Compare governance frameworks, policy instruments, and behavioural change strategies tested across different national and local contexts.
2. **Identify good practices and transferable models**
    - Capture concrete examples of successful awareness-raising campaigns, collection systems, and regulatory approaches.
    - Distinguish between context-specific solutions and practices that can be adapted elsewhere in the EU.
3. **Build stakeholder capacity and confidence**
    - Strengthen the skills of municipal authorities, NGOs, and educational institutions in engaging citizens, monitoring compliance, and enforcing

safe disposal practices.

- Foster trust between stakeholders by demonstrating that mercury-free approaches are feasible, affordable, and socially acceptable.

4. **Support replication and exploitation of project results**
   - Feed the outcomes of the MLE directly into the Deliverables 6.5 (*Best Practices and Manuals*) and 6.6 (*Exploitation plan including replication component*).
   - Provide a coherent evidence base for long-term sustainability and integration of results into EU and national policy frameworks.

Furthermore, the MLE addressed a diverse audience reflecting the **multi-stakeholder dialogue methodology** central to the project:

- **Public authorities** (municipal and regional bodies, waste management agencies, emergency services);
- **Academia and research institutions** (universities and technical schools in participating cities);
- **Industry and service providers** (waste treatment companies, eco-innovation firms);
- **Civil society** (NGOs, community groups, schools, eco-activists, and households).

Each group contributed perspectives on the barriers they face and the resources they require, ensuring that lessons learned are grounded in real-world challenges and opportunities.

Overall, by synthesizing diverse experiences, the exercise creates a collective learning environment that enhances the project's capacity to achieve:

- **Policy impact**: alignment with the EU Minamata Convention obligations and national waste legislation;
- **Behavioural change**: stronger citizen engagement in safe disposal practices;
- **Replication**: practical guidelines that can be implemented in cities across Europe;

- **Sustainability**: a knowledge base ensuring that project results endure beyond the formal project duration.

3. Methodology

The methodology of the LIFE MERCURY-FREE MLE was designed to ensure systematic, inclusive, and replicable knowledge exchange between the project's pilot cities (Lviv, Ivano-Frankivsk, Lodz, Krakow) and control cities (Larissa, Évora, Camerino), while engaging external stakeholders across Europe. In alignment with the quadruple helix approach (public authorities, academia, industry, and civil society), the exercise provided a structured framework where all actors could contribute experiences, discuss challenges, and co-develop practical solutions for mercury-free environments.

The MLE methodology combined **face-to-face interaction** with **digital collaboration tools**, ensuring accessibility despite geographical distances and potential external constraints (e.g., pandemic-related restrictions). The structure was adapted from established European Commission MLE guidelines but tailored to the specific objectives of WP6: sustainability, replication, and exploitation of project results.

Three guiding principles underpinned the methodology:

Inclusiveness	Ensuring participation of diverse actors across countries and stakeholder groups
Comparability	Applying common templates and data-collection methods to allow cross-case analysis
Action - orientation	Focusing on practical, transferable lessons rather than theoretical discussions

3.1 Structure of the Exercise

The MLE was divided into **four main phases**, each corresponding to a distinct methodological step:

Phase 1: Preparation and Scoping

The project design process was structured to ensure consistency and alignment with overarching goals. It began with the mapping of stakeholders in both pilot and control cities, providing a clear understanding of the actors involved. Building on this, thematic priorities were defined in line with project objectives, focusing on awareness and behaviour change campaigns, waste collection and treatment infrastructures, governance and enforcement, and the replication of solutions. To support systematic monitoring, standardized templates for data collection were then developed, ensuring comparability across countries.

Phase 2: Data Collection and Case Development

Local partners contributed to the knowledge base by documenting their experiences through case study reports, interviews with municipal representatives, and surveys of households and NGOs. Each case study included a description of the challenge addressed, the intervention applied, the actors involved, as well as the outcomes, barriers, and enabling factors identified.

Phase 3: Mutual Learning Workshops

The project facilitated knowledge exchange through the organization of interactive sessions, conducted both online and in person where feasible. Each workshop combined presentations of local cases with peer review discussions and breakout groups focused on problem-solving. Moderation techniques, including roundtables, moderated Q&A, and fishbowl discussions, were applied to ensure balanced participation. Workshops also incorporated reflection sessions to capture learning outcomes and highlight transferable practices.

Phase 4: Synthesis and Reporting

The process concluded with the consolidation of findings into thematic clusters, such as governance innovations, citizen engagement models, and waste collection logistics. These insights informed the drafting of Deliverable 6.3, providing a structured documentation of the MLE process, its outcomes, and the

added value generated. This work was aligned with subsequent deliverables, particularly Deliverable 6.5 (Best Practices and Manuals) and Deliverable 6.6 (Exploitation Plan including replication component), ensuring coherence and continuity across the project.

3.2 Tools and Techniques

A range of tools and techniques supported the MLE:

- **Stakeholder Mapping and Questionnaires**: structured templates to collect comparable data across different cities, ensuring each stakeholder group was represented.
- **Case Study Protocol**: a standardized format including context, intervention, results, and lessons, allowing easy synthesis and cross-comparison.
- **Workshops**: designed as multi-stakeholder events with interactive facilitation methods. Special emphasis was placed on balancing voices from municipalities, civil society, and academia.
- **Digital Collaboration Tools**: the LIFE e-HUB platform served as a repository of documents, while video conferencing platforms supported cross-country workshops. A Moodle-based learning environment was used to share training materials and follow-up resources.
- **Evaluation Tools**: feedback forms and short surveys were distributed after each workshop to collect participants' perceptions of relevance, learning value, and applicability.

The structured methodology ensured that the MLE generated results that are:

Evidence-based	Grounded in real practices and data
Comparative	Allowing partners to see similarities and differences across contexts
Practical	Oriented toward replication in other European cities

Sustainable	Providing a foundation for Deliverables 6.5 and 6.6 and for long-term application beyond the project duration

By combining inclusiveness, comparability, and action-orientation, the methodology maximized the MLE's capacity to foster meaningful dialogue and generate actionable outcomes for mercury-free cities.

4. Implementation of the LIFE MERCURY-FREE MLE

4.1 Activities in Pilot Cities

The **pilot cities** of Lviv, Ivano-Frankivsk, Lodz, and Krakow were the core testing grounds for innovative approaches to mercury-free environments. Their contributions to the MLE were central to its implementation:

- **Lviv and Ivano-Frankivsk (Ukraine)**: These cities documented how challenges in public awareness and limited infrastructure can be addressed through targeted campaigns and partnerships with NGOs. Case reports highlighted the role of eco-buses and emergency services in managing mercury-related incidents, as well as barriers such as low public knowledge and insufficient local budgets.
- **Lodz and Krakow (Poland)**: Partners presented well-developed municipal waste governance models, including selective collection systems, eco-patrol inspections, and digital reporting platforms. Krakow showcased its structured sectoral waste collection, while Lodz emphasized citizen engagement tools such as mobile applications and hotlines for illegal waste disposal. The Mutual Learning Exercises (MLE) were conducted in Lodz and Krakow cities (Poland)at 25-26.06.2025 and 26-27.06.2025 respectively. The total number of participants was 35. (see photo below)

Through the workshops, pilot cities not only presented results but also reflected critically on limitations, such as uneven participation of households, gaps in coordination among institutions, and challenges in monitoring compliance.

4.2 Activities in Control Cities

The **control cities** (Larissa, Évora, and Camerino) played the role of replication observers. Their task was not only to provide feedback on pilot experiences but also to test the transferability of selected practices into different governance and socio-economic contexts.

- **Larissa (Greece)**: Highlighted the importance of linking awareness campaigns to school-based educational programmes and civic movements. The city's contribution demonstrated how community-led initiatives can reinforce municipal policies.
- **Évora (Portugal)**: Provided insights on adapting mercury-free practices within smaller urban contexts, stressing the importance of cost-effectiveness and integration with existing recycling schemes.
- **Camerino (Italy)**: Brought forward the perspective of a medium-sized university town, with emphasis on involving academic institutions in awareness raising and behavioural change.

The control cities enriched the MLE by illustrating potential barriers to replication, such as limited municipal staff capacity, financial constraints, or competing environmental priorities.

Overall, the mutual learning workshops represented the heart of the implementation. Workshops were conducted in hybrid format to enable participation of Ukrainian partners despite external challenges. Interpretation of MLE matherials was provided in English and Ukrainian, ensuring accessibility.

4.3 Challenges and Adaptive Measures

Implementation of the MLE was not without challenges. Among the most significant were:

- **Geopolitical constraints**: Ukrainian partners faced limitations in organizing local workshops due to the war context. To mitigate this, online tools and remote facilitation were emphasized, ensuring continuity of participation.
- **Time constraints**: Aligning partner schedules across seven cities required flexibility, leading to hybrid events with asynchronous feedback opportunities.
- **Language barriers**: Addressed through professional interpretation and preparation of bilingual materials.

These adaptive measures allowed the consortium to ensure inclusivity and continuity, preserving the integrity of the exercise despite external disruptions.

5. Results and Findings

By bringing together diverse stakeholders from pilot and control cities, the MLE facilitated a structured comparison of policies, governance structures, and behavioural interventions. The outcomes provide both **practical lessons** for replication and **strategic insights** for sustainability.

This section synthesizes the key findings of the MLE into four dimensions:

1. Governance and institutional arrangements.
2. Behavioural change and citizen engagement.
3. Waste collection and treatment systems.
4. Replication potential and enabling conditions.

5.1 Governance and Institutional Arrangements

One of the main findings of the MLE concerns the role of governance in addressing mercury-containing waste. Urban experiences across Central and Eastern Europe reveal a variety of approaches to waste governance, each reflecting local capacities, priorities, and institutional frameworks. Krakow's structured waste governance model demonstrated the effectiveness of municipal ordinances and enforcement mechanisms, including eco-patrol inspections and the designation of specialized waste collection points. Based on this regulatory approach, Lodz emphasized the role of technology by introducing a digitalized monitoring system that not only enables citizens to report illegal dumping but also facilitates rapid municipal response. In contrast, Ukrainian cities revealed the difficulties that arise when governance is constrained by limited financial capacity or fragmented responsibilities. However, their experience also showed that these challenges can be mitigated through stronger inter-agency coordination and the active involvement of NGOs, thereby highlighting the diverse strategies that different urban contexts can adopt to enhance waste management effectiveness.

Consequently, effective governance is not solely a question of legal frameworks but of **institutional capacity and coordination**. Cities with strong municipal services and partnerships performed better in preventing mercury contamination.

5.2 Behavioural Change and Citizen Engagement

The MLE confirmed that mercury contamination is largely driven by household mismanagement of products such as fluorescent lamps, batteries, and thermometers. Changing citizen behaviour was therefore identified as a cornerstone of success.

- **Pilot city practices**: Public engagement in waste management has been strengthened in several cities through diverse awareness-raising initiatives. In Lviv campaigns supported by mobile eco-buses and partnerships with

schools, universities, businesses, and NGOs significantly increased participation in selective collection. Similarly, Krakow implemented targeted communication measures, including "eco-box" programs and regular school-based events, to foster greater community involvement.

- **Control city feedback**: Experiences from Southern European cities highlight both the potential and the challenges of citizen engagement in waste management. In Larissa and Camerino, community-led campaigns connected to schools, industries, and local NGOs proved effective and replicable results. Évora, however, underscored the difficulty of sustaining citizen motivation over time, emphasizing that continuous engagement, rather than one-off campaigns, is essential for lasting impact.

Therefore, behavioural change requires **repetition, accessibility, and trust**. Citizens must see practical and convenient disposal options, while also understanding the environmental and health consequences of improper practices.

5.3 Waste Collection and Treatment Systems

An important area of comparison was the design of collection and treatment infrastructures.

- **Pilot city strengths**: Different urban contexts demonstrate a range of strategies for improving waste management infrastructure and participation. Krakow showcased a sophisticated network of selective collection points, supported by municipal enforcement and communication. Lodz demonstrated the effectiveness of integrating digital tools into monitoring and reporting, thereby enhancing citizen participation. At the same time, Ukrainian cities, despite infrastructural limitations, piloted mobile eco-buses and temporary storage facilities, offering a flexible response tailored to local conditions.
- **Control city perspectives**: Examples from smaller and medium-sized cities illustrate how local context shapes waste management solutions. Camerino stressed the importance of university partnerships to develop innovative

collection schemes within campus environments, leveraging academic resources and student engagement. In contrast, Évora and Larissa emphasized the need for cost-effectiveness in smaller municipalities, where centralized collection points may not be feasible, highlighting the importance of adapting strategies to scale and available resources.

To conclude, no single collection model fits all contexts. What is critical is **adaptability**: integrating local infrastructure, resources, and citizen behaviour into a coherent system.

5.4 Replication Potential and Enabling Conditions

Perhaps the most important findings of the MLE concern replication. The exercise confirmed that practices from pilot cities can be successfully adapted to other contexts, provided that enabling conditions are met.

Key enablers identified include:

- **Policy support**: national and municipal frameworks that clearly define responsibilities for hazardous waste.
- **Financial mechanisms**: subsidies or incentives for municipalities and private waste companies.
- **Capacity building**: training municipal staff and NGOs in awareness raising and enforcement.
- **Digital innovation**: tools that lower barriers for citizen participation and monitoring.
- **Partnerships**: strong collaboration between local authorities, universities, NGOs, and businesses.

Barriers included: limited municipal budgets, competing policy priorities, lack of technical expertise, and, in the Ukrainian context, the disruption caused by war.

Overall, feedback collected during and after the workshops indicates that participants valued:

- The **comparative insights** between Eastern and Western European cities.
- The **peer-to-peer learning** format, which enabled candid discussion of

challenges.

- The **practical orientation** of the sessions, with a focus on replicable actions rather than abstract concepts.

Participants stressed the importance of maintaining the LIFE e-HUB as a long-term knowledge platform, allowing cities beyond the consortium to access resources and lessons learned.

6. Contribution to Sustainability and Replication

6.1 Role of the MLE in Project Sustainability

The Mutual Learning Exercise (MLE) was designed not only as a knowledge exchange activity but as a **strategic mechanism for ensuring the sustainability of LIFE MERCURY-FREE results**. Sustainability in this context refers to the capacity of project achievements to endure beyond the project's formal lifetime, maintaining relevance and generating impact for years to come.

Through the MLE, sustainability was enhanced in several ways:

- **Knowledge consolidation**: By synthesizing the diverse experiences of pilot and control cities into structured lessons, the MLE produced a knowledge base that remains relevant beyond project closure. This resource can continue to guide municipalities, NGOs, and academic partners after EU funding ends.
- **Institutional strengthening**: The exercise encouraged municipalities and regional authorities to formalize working relationships with universities, NGOs, and industry actors. Such institutional networks are durable and provide a basis for ongoing collaboration.

- **Community building**: The workshops fostered a sense of belonging to a broader European "Mercury-Free Cities Community." This identity motivates stakeholders to maintain engagement and to replicate practices even without direct project funding.
- **Integration into policy frameworks**: Findings from the MLE were communicated to policymakers in participating states, supporting the mainstreaming of mercury-free practices into local and national strategies for hazardous waste management.

6.2 Pathways for Replication

Replication was a core aim of Work Package 6, and the MLE played a pivotal role in shaping pathways for transferring successful practices to new contexts. The exercise identified three complementary modes of replication:

1. **Direct Replication in Control Cities** - Control cities (Larissa, Évora, Camerino) assessed the transferability of pilot city practices. For example, Larissa showed interest in adapting school-based awareness campaigns tested in Lviv, while Évora examined the feasibility of Krakow's eco-box model for a smaller municipality.
2. **Horizontal Replication Across Municipal Networks** - Participation of municipalities, NGOs, and academic institutions in workshops created channels for sharing practices beyond the immediate consortium. Several partners initiated discussions with municipal associations to explore how findings could be disseminated to wider urban networks.
3. **Vertical Replication into National and EU Policies** - Lessons from the MLE will feed into Deliverable 6.6 (*Exploitation Plan including replication component*), which provides recommendations for integrating project practices into broader policy frameworks, including the implementation of the EU Mercury Regulation and obligations under the Minamata Convention.

6.3 Synergies with Other Deliverables

The sustainability and replication contributions of the MLE are interlinked with other WP6 outputs:

Deliverable 6.5 (Best Practices and Manuals)	The lessons documented during the MLE provide the evidence base for practical manuals and guidelines. By capturing both successes and barriers, the exercise ensures that best practices are realistic and transferable.
Deliverable 6.6 (Exploitation Plan)	The findings of the MLE directly inform strategies for replication at scale. The exercise highlighted enabling conditions (such as policy support, funding mechanisms, and partnerships) that will shape the recommendations in D6.6.
Deliverable 6.2 (Final MLE Report)	While D6.2 provided detailed documentation of the exercise, Deliverable 6.3 synthesizes those results for broader dissemination, ensuring visibility and uptake.

6.4 Added Value for Stakeholders

The MLE provided tangible value for different stakeholder groups, reinforcing their motivation to sustain and replicate results:

- **Municipal authorities** gained concrete models of selective collection systems and citizen engagement strategies that can be adapted to their local circumstances.
- **NGOs and civil society groups** received evidence and narratives to support advocacy campaigns for safe disposal of mercury-containing products.
- **Academic institutions** strengthened their role as knowledge brokers and trainers, ensuring continuity through curricula and student involvement.
- **Industry actors and waste companies** identified opportunities for service innovation, particularly in digital tools and eco-collection schemes.

By addressing each stakeholder group's needs and capacities, the MLE increased the likelihood of long-term adoption of mercury-free practices.

6.5 Strategic Recommendations

The MLE highlighted several strategic recommendations that will shape sustainability and replication activities:

1. **Embed mercury-free practices into municipal waste management strategies** to ensure continuity after the project.
2. **Secure dedicated funding streams** (e.g., municipal budgets, EU cohesion funds) to scale up successful initiatives.
3. **Institutionalize stakeholder networks** formed during the project, ensuring continuity of cooperation among municipalities, NGOs, and universities.
4. **Leverage digital platforms (e-HUB)** as long-term repositories for knowledge and training resources, accessible to all interested municipalities.
5. **Align with EU and international frameworks**, notably the Minamata Convention and EU waste directives, to ensure political support and policy coherence.

7. Conclusions

The MLE conducted within the LIFE MERCURY-FREE project has proven to be a vital instrument for consolidating knowledge, fostering collaboration, and building the foundation for replication and sustainability of project results. By engaging pilot and control cities in structured dialogue, the MLE created a space where practical experiences, challenges, and innovative solutions could be compared and validated across diverse contexts.

Three overarching conclusions emerge from the exercise:

1. **Governance is decisive** – Effective mercury-free policies depend not only on legislation but also on institutional capacity, coordination, and the involvement of multiple stakeholders. Municipalities that successfully engaged NGOs, universities, and citizens achieved stronger outcomes.
2. **Behavioural change is achievable but requires persistence** – Citizen awareness campaigns, school-based initiatives, and convenient disposal

infrastructures proved effective in modifying behaviours. However, long-term change requires continuous engagement and reinforcement.

3. **Replication is feasible with enabling conditions** – Practices demonstrated in pilot cities can be adapted to control cities and beyond, provided that adequate policy support, funding mechanisms, and institutional networks are in place.

The MLE not only documented successful practices but also revealed barriers that must be addressed to scale up solutions, such as limited municipal budgets, varying levels of technical expertise, and, in Ukraine, external disruptions caused by conflict. By identifying these factors, the exercise generated a realistic and actionable knowledge base. Ultimately, Deliverable 6.3 demonstrates how the LIFE MERCURY-FREE MLE contributes directly to the project's wider ambition: to foster the creation of **Mercury-Free City Communities** across Europe. Its findings serve as the evidence base for forthcoming outputs, particularly the Best Practices and Manuals (D6.5) and the Exploitation Plan (D6.6). In this way, the MLE ensures that project results will not remain isolated achievements but will inform policies, inspire new initiatives, and support a European transition towards safer, healthier, and mercury-free urban environments.