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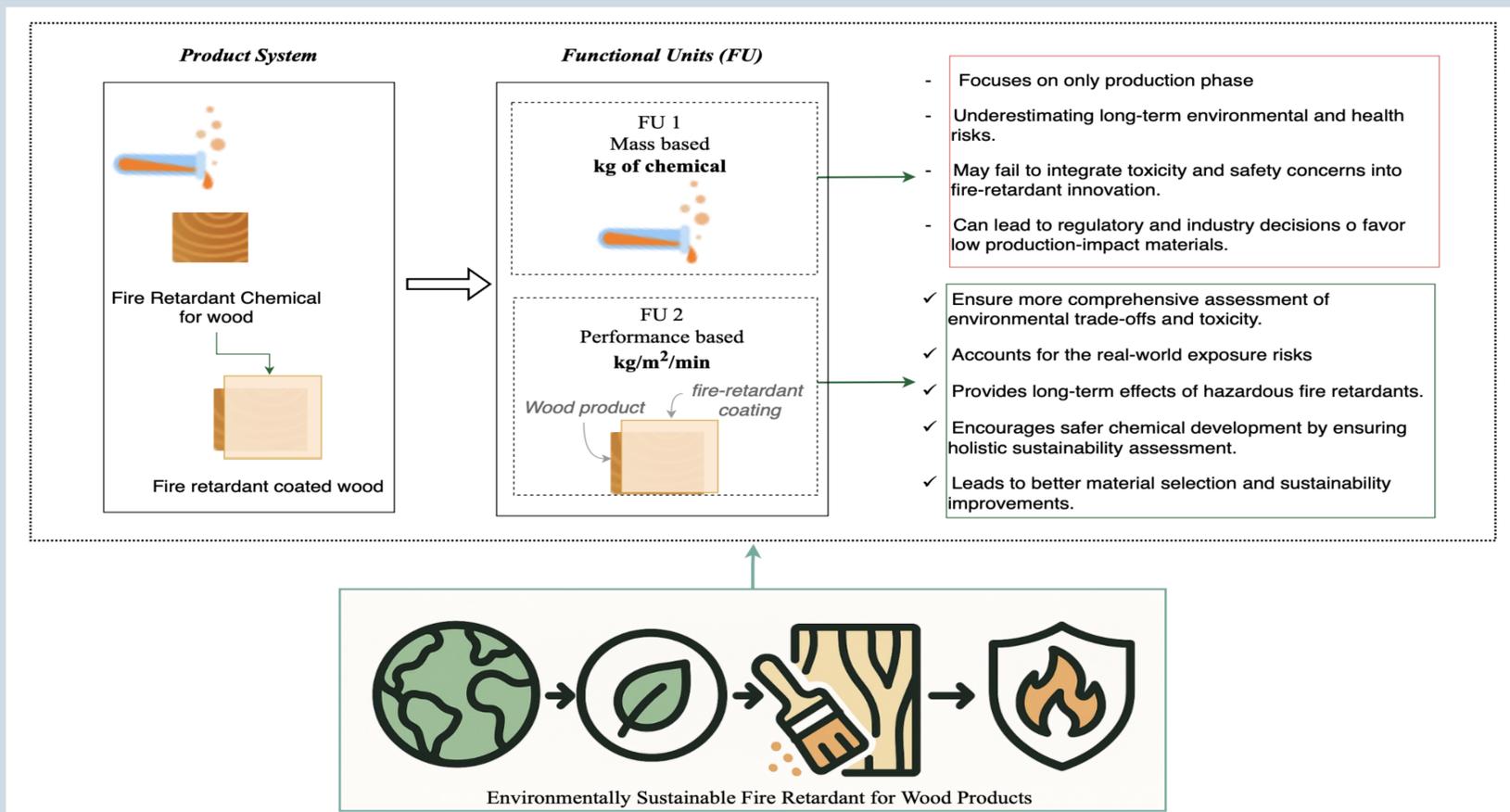
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## Introduction

Sustainability assessments of fire-retardants must consider toxicity, safety, and environmental impact. A key challenge is the choice of functional unit in Life Cycle Assessment (LCA).

Current methodologies primarily rely on Environmental Product Declarations (EPDs), which typically assess impacts per kilogram of fire-retardant, but this metric may misrepresent environmental burdens by neglecting treated surface area and fire performance requirements.

Alternatively, a functional unit aligned with European fire performance standards, such as EN 16755, which assesses fire-retardant-treated wood in real-world conditions, provides a more application-oriented perspective by considering the impact per square meter of treated wood.

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## Methodology

This study conducts a comparative LCA of business-as-usual (BAU) fire retardants using both functional units to demonstrate how the choice of functional unit can significantly impact environmental sustainability results and conclusions.

## Results

The results highlight that EPD-based assessments may underestimate environmental and health impacts, particularly for hazardous substances. In contrast, application-based functional units offer a more accurate representation of trade-offs, reducing the risk of favoring options with lower production impacts but greater long-term risks.