Life Cycle assessment of very low-level radioactive waste from decommissioning of the Fessenheim nuclear power plant: The logistics and hypothetical recycling

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1 Context and objectives

In the context of the decommissioning of Fessenheim's nuclear power plant (NPP), the ACYVI-TREFA project is launched in order to study the environmental impacts of very low-level radioactive wastes (VLLW) from this plant, as a previous study focusing on the impacts of the decommissioning in itself suggested that a large part of the environmental impacts are allocated to the VLLW, even if they only represent 3% of the wastes, they may be responsible for half of the environmental impacts.

Moreover, taking into account the evolution of the French laws concerning the valorization of the VLLW, whose discussions are still ongoing. The objective of this study is to present the environmental impacts of the VLLW in two scenarios using the life cycle assessment method. The first one involves the current method of treatment of the VLLW, which consists in storing them on the CIRES site of ANDRA; and the second scenario, which is for the moment hypothetical, the treatment method that consist of decontamination and recycling on the future techno-center site of Fessenheim.

2 Methods & Tools

To study those impacts and compare both scenarios, the life cycle assessment (LCA) method is applied following ISO 14040 standard with the support of SIMAPRO software, currently we are at the inventory analysis phase.

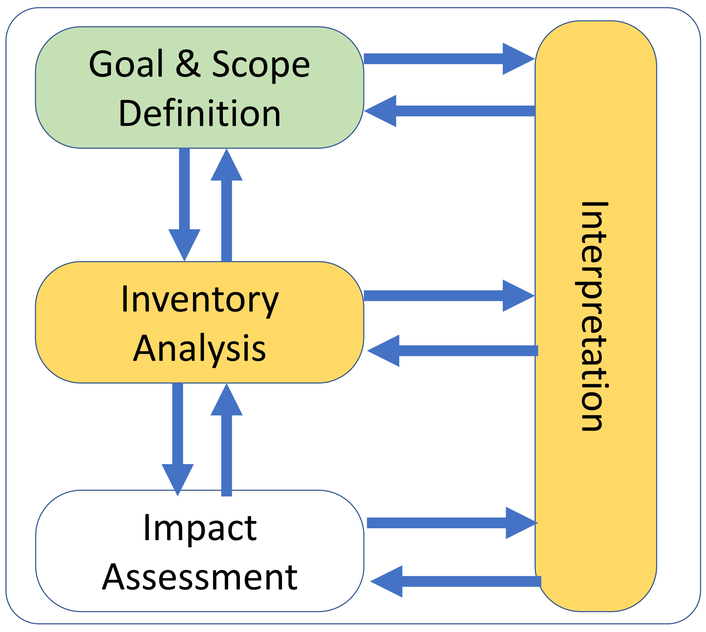

Figure 1: LCA methodology framework

3 System definition

Here are the two diagrams representing the system studied per scenario.

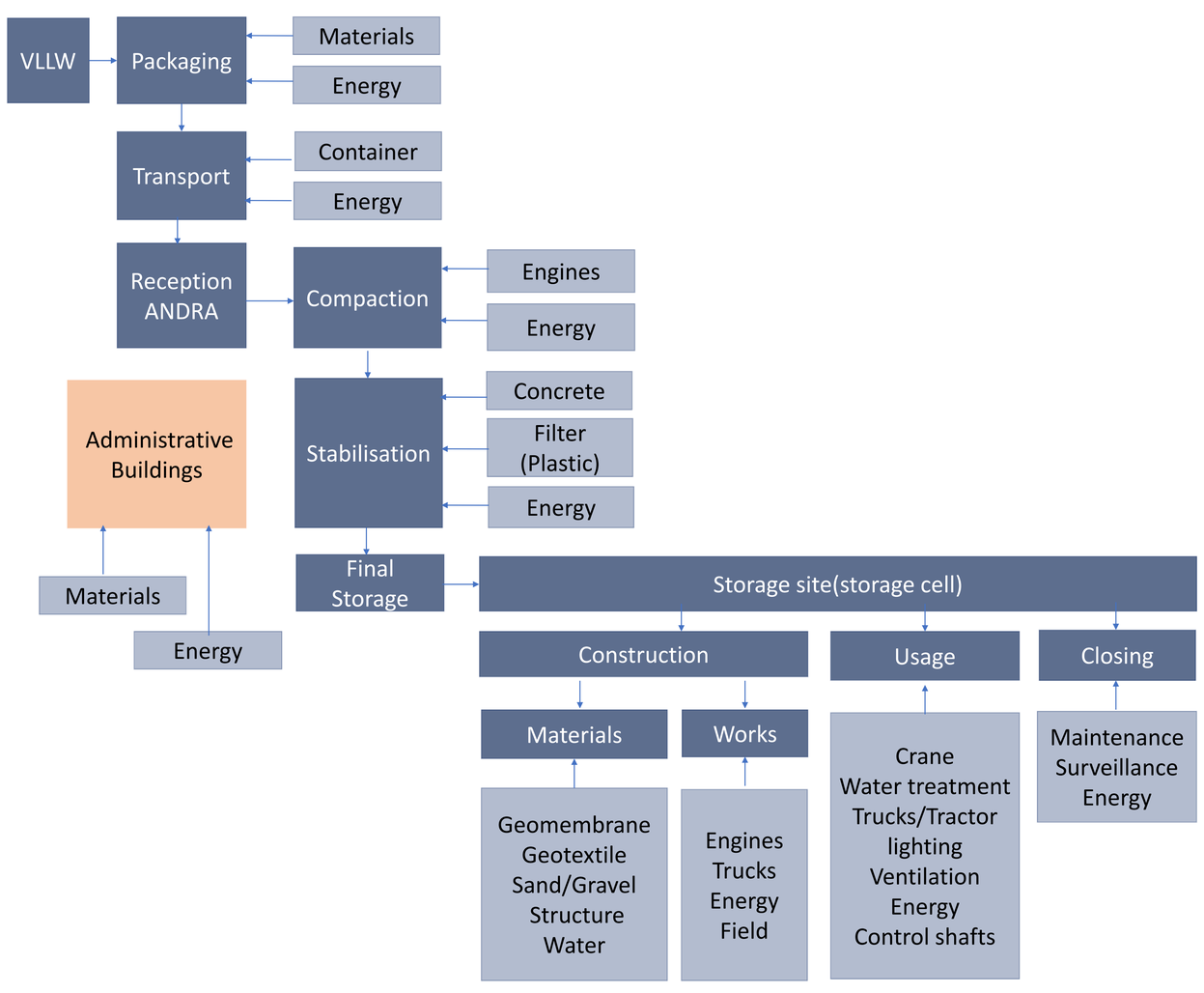

Figure 2 : System boundary diagram representing the storage scenario made by Zineb GUENDOUZ

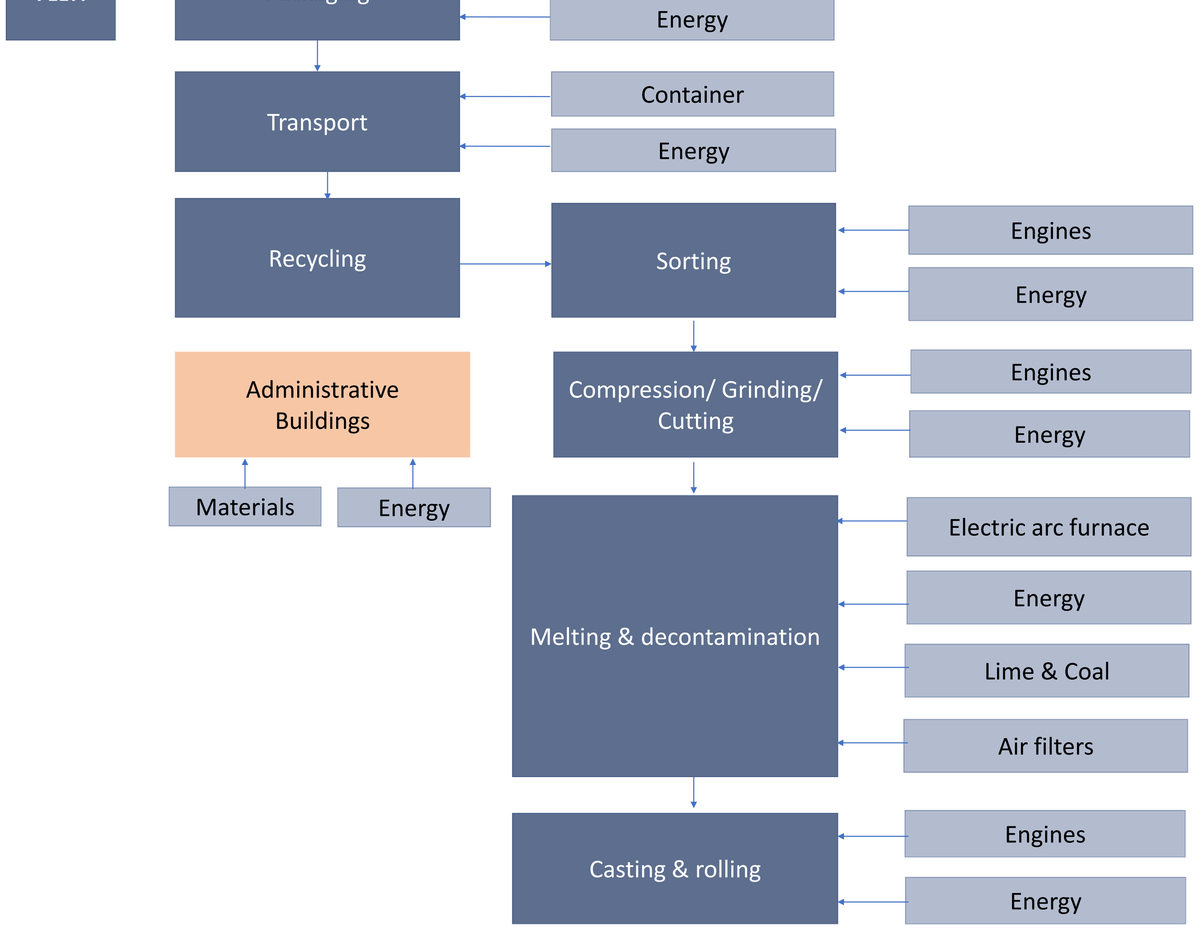

Figure 3 : System boundary diagram representing the recycling scenario

The functional unit that we are going to use for this study is: **1 Ton of metallic VLLW treated out of Fessenheim.**
It allows us firstly to quantify the performance of each system secondly it gives a common reference to compare each system and finally it brings down all the study in to it so the results can be reused for wastes coming from other NPP.

4 Interprétation

This project is still at its state of modeling, we do not have enough data yet to make a proper inventory and to make a decent impact assessment on each system.

Still, the system boundary for the storage scenario is reliable knowing that most of the information were communicated by ANDRA. The recycling scenario is mostly based on literature, knowing that the technology isn't developed yet in France. Major stakeholders in this country are studying this possibilities as EDF and ORANO so my actual system is also based on their pre-studies and estimations.

5 Conclusion

The crucial phase to determine the system boundaries and the functional unit is finished (even though it may change after the impact assessment).

We are now freely focusing on collecting and analyzing data knowing that our systems boundaries are relevant with the information we already gathered and from our visit to the ANDRA's site of the VLLW disposal: CIRES.

At this point we can estimate that for 1 ton of VLLW, 1 ton of material is needed for the storage (mainly metal and concrete for the conditioning) so we can assume that the comparison with the recycling scenario will show us interesting results and knowledge that may be used into the decision making.