Response to Reviewer 2 Comments

First of all, we thank all the reviewers for their valuable time and constructive comments. We have thoroughly checked the English grammar and spelling in the manuscript. In the following, we would like to respond to each reviewer separately.

Reviewer #2

Point 1: Interesting paper. The reading is sometime difficult and the summary introduction provided for GA and PSO could be probably shortened. It seems quite evident that without incentives the remanufacturing has a small advantage and that quality plays a crucial role in the overall balancing. So investigating this aspect deserve attention. On the other side it would be interesting to stress more this complicate balance in the discussion and conclusions. Industrial sustainabilityneeds to be approached with consistent practices and cannot be sustained forever by incentives. Also the penalties should be carefully evaluated since they reduce the overall competitiveness of an industrial sector when not properly calibrated over a reasonable transition timeframe. I'd like to read these considerations after the experimental campaign since the focus of such papers isn't in the fancy application of GA/PSO but in the clarification of these very complex balances between the existing economic supply-chain players.

Response 1: Thank you very much for your valuable suggestions. We have indeed streamlined the summary descriptions of GA and PSO. Please refer to the following for the specific changes. For instance, 'The Genetic Algorithm (GA), a heuristic global optimization method, was developed by Professor Holland drawing upon biomimetics and the theory of variation. This versatile and efficient tool finds wide application in a range of fields, including economics and decision-making. To address optimization problems, the GA iteratively adapts a set of solutions, represented as 'genes' of individuals. This process modifies variables and conditions until an optimal fitness level is reached or remains unchanged, ultimately yielding a globally optimal solution.' Furthermore, 'The Particle Swarm Optimization (PSO) algorithm, based on R. C. Eberhart's research on bird foraging behavior, represents each individual in a flock as a particle. These particles, having only velocity and position, update their movement in n-dimensional space to approach the target solution, seeking the target value in complex environments through individual comparisons. Acknowledged for its characteristics such as few adjustable parameters, parallelism, and global convergence, the PSO is utilized in this study to continuously optimize the solution with the aim of minimizing the ATC^{E} or ATC^{N}, thereby ensuring global convergence.'

Response 2: Thank you for your insightful comments and suggestions. We agree that the discussion and conclusions could benefit from a stronger emphasis on the complex balancing act between incentives, penalties, and overall industrial sustainability. We acknowledge that sustainability in industry cannot be sustained forever merely by incentives and that penalties need to be carefully calibrated over a reasonable transition timeframe.

Therefore, we have added a relevant discussion in the summary and conclusion section of Section 7 as follows:"Industrial sustainability necessitates continuous and consistent practices, underpinned by enduring commitment. Firms should prioritize their social responsibility by implementing strategies focused on sustainable manufacturing and remanufacturing, rather than relying exclusively on incentives and penalties. While incentives can stimulate companies to adopt sustainable actions, an indefinite dependence on them is impractical. Companies can utilize the decision-making frameworks provided in this paper to guide their recycling and remanufacturing initiatives, thereby achieving a balance between environmental and economic benefits. Furthermore, the implications of penalties need to be meticulously assessed. Penalties that are not appropriately calibrated could adversely affect the broader competitiveness of the industrial sector. Consequently, any implementation of penalty measures should be done incrementally over a reasonable transition period. Decision-makers can draw from the carbon policy and reward-and-penalty framework outlined in this study for decision-making within an acceptable range. For instance, recycled products with a quality grade between 0.2 and 0.4 could be eligible for subsidies, while those with a quality grade exceeding 0.4 should face appropriate penalties."