Background

The CEO of Edison Cars AG was very satisfied with your process model. Thanks to your process model, the Edison Cars AG figured out the importance of the method for evaporating the electrolyte of the battery. The electrolyte is a liquid that conducts ions between the positive and negative electrodes within the battery. It is typically composed of lithium salts dissolved in a solvent, which is commonly flammable and volatile. Removing the electrolyte is necessary to prevent interference with the recycling of other battery components and materials. The development team identified three methods for evaporation called heat evaporation, vacuum evaporation, and distillation, which all lead to the same result. As you became an expert for battery recycling, management wants you to compare the three methods and recommend one of them for the new facility.

Task

To succeed in this task, you must understand how the methods work and gather information on their ecological, economic, and social sustainability. Decide on the importance of the three sustainability factors and implement weighting to compare the results. Then, use the attributes of the three methods and the weighting of the sustainability factors to calculate overall scores for each method. Based on your calculation, prepare a recommendation and a presentation including the justification of your results. Prepare to discuss the results with management.

Input

For this task, you are provided with the summary of the development team. The head of development asked the teams to provide sustainability scores, with 1 being the least sustainable and 5 being the most sustainable. Further, the head CEO wants you to decide based on a twenty year horizon.
The head of heat evaporation development provides you with the following statement:
“We calculated that heat evaporation leads to rather high usage of energy. Regarding carbon emissions, we rate heat evaporation at 2. Regarding water usage, we decided on 3 and emission of hazardous substances is ranked at 2. However, we figured out that the initial setup costs for heat evaporation are 200,000€ followed by operational yearly costs of 50,000€. We expect to gain revenue from recovered materials of approximately 90,000€. However, thanks to lower complexity, we expect to use the machine for ten years before setting up a new one. At last, we figured out that we would need around five skilled workers to handle the evaporation process. Those workers are provided with average job training opportunities. Due to its high usage of energy and risk of pollution, we expect a rather low acceptance of the community.”

The head of vacuum evaporation development states:
“Vacuum evaporation is way more innovative than heat evaporation. Our score for carbon emissions should be twice as good as the one of heat evaporation. Also, we use a bit less water and a contribute to slightly lower emissions of hazardous substances. Setup should be around 300,000€, operational costs are 35,000€ per year and we strive by generating 100,000€ revenue yearly. We would need seven skilled workers with above average job training opportunities. Thanks to its great attributes, we should achieve rather high acceptance of the community. Unfortunately, the technology is rather complex, which is why we expect to buy a new machine after five years.”

The head of distillation development summarizes:
“Our technology shows average carbon emissions. Our water usage is slightly higher than the other technologies. Unfortunately, the emission of hazardous substances is also as high as heat evaporation. On the other hand, we only need 80,000€ to build our distillation setup. The setup will generate yearly revenue of 90,000€ with costs of 55,000€. We expect the machine to last four years

before buying a new one. We need eight skilled workers for the machine with average job training opportunities. Based on ecological sustainability, we expect rather low community acceptance."

Submission

One PowerPoint presentation must be emailed to s3g@fim-rc.de by 02:00 PM on 01.07.2024 including:

- Slide(s) about your calculation of sustainability scores. Remember that the slides should be comprehensible but addressed to management. Tip: Bring Backup slides with which you could provide complex explanations to specific questions
- Slide(s) about your weighting
- Slide(s) about your results, decision, recommendation, and justification of the recommendation

Be prepared for critical questions by your colleagues as well as members of management.

Keep in mind

The following aspects are important for the assessment of your submission:

- Your presentation should be comprehensive and understandable and provide a clear recommendation to management.
- Your presentation should be structured and contain only relevant information.
- Your results should be justified and presented in an appealing manner
    - To save time, try PowerPoint plugins like Efficient-Elements or Power-User, which are free in the academic context