



Name	ID	Dep.
HOSSAM HAFIZ	201920710	ME
HAZIM ALDUHAIM	201953910	ISE
ALBARAA FELEMBAN	201958130	ISE
ABDULAZIZ AL-JRAIYD	201733850	ARE
MOHAMMAD ALHARBI	201943630	CHE
HASSAN ALSADIQ	201832780	CHE



Introduction

ELEVATOR PITCH

Industry investors face a problem of limited environmental-friendly manufacturing plants. SO FOR investors, WHO want to invest in new technology and 4.0 industry, an autonomous factory IS A fully independent manufacturing plant with minimal impact on the environment THAT uses new technology and renewable energy. UNLIKE traditional factories, an autonomous factory does not dump polluted waste on to the environment, generates its own energy, and recycles its waste.

PROJECT OBJECTIVE

Design a waste management facility integrating renewable energy sources, solar panels and wind turbines. Conduct an analysis of waste management strategies, emphasizing recycling, and recommend an autonomous power system to ensure both profitability and sustainability.

PROJECT IMPACT

Economics:

- Stimulates investment in waste management technologies and related industries.

Society:

- Promotes a cleaner environment, encouraging community engagement in recycling.

Environment:

- Combats plastic pollution by recycling waste and reducing reliance on non-renewable resources.

CONSTRAINTS & SPECIFICATIONS

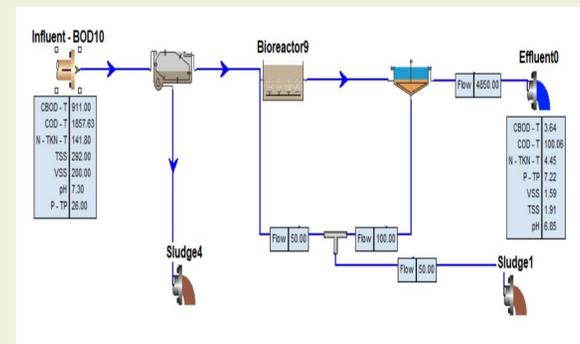
- The Renewable Energy Generation Capacity $\approx 550 \sim 610$ kW/h
- The energy consumption per ton of recycled material

$$\approx 0.41 - 0.75 \frac{KW}{h} / Kg$$

- The Production Capacity $\approx 120 - 220 \frac{Kg}{h}$

Prototype Design

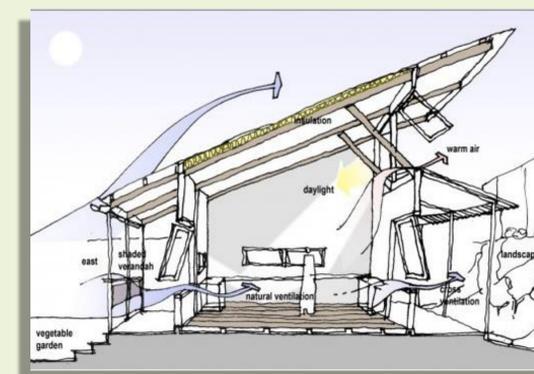
Wastewater Simulation



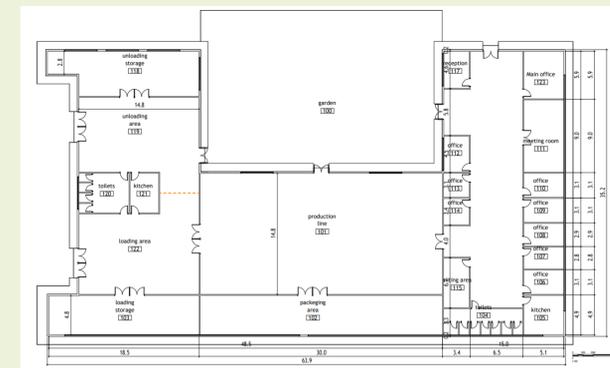
The effluent meets the standards for EPA blackwater reuse which are the following:

- Total Nitrogen: ≤ 10 mg/L
- Total Phosphorus: ≤ 10 mg/L
- Total BOD: ≤ 5 mg/L
- TSS (Total Suspended Solids): ≤ 10 mg/L
- recommended pH 6.0 to 9.0

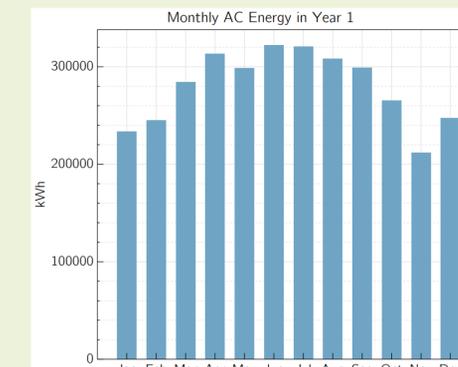
Stack Ventilation



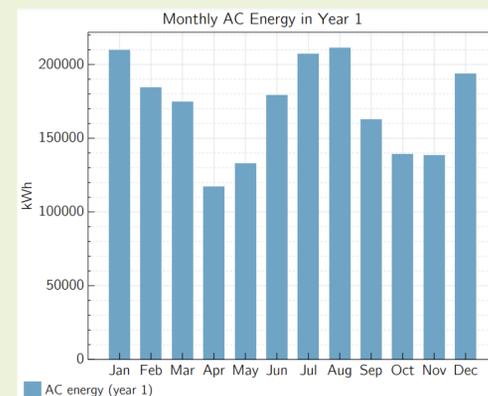
Floor Ventilation



Photovoltaic Simulation using NRELS

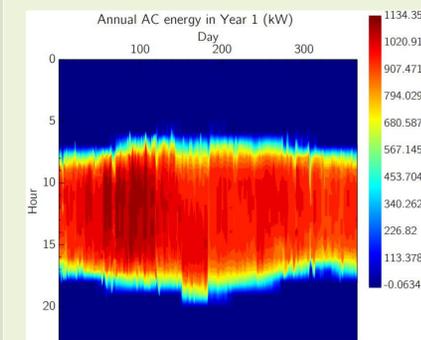


Wind Simulation using NRELS



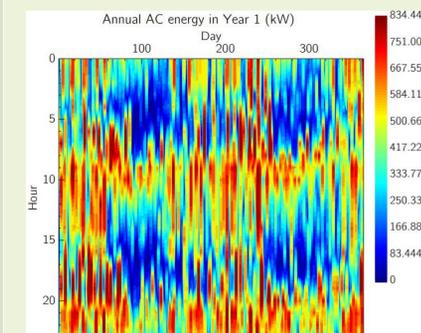
Tests and Validations

Tests of Wind Turbines



Metric	Value
Annual AC energy in Year 1	2,050,892 kWh
Capacity	1,000 kW
Capacity factor in Year 1	23.4%

Tests of Solar panels



Metric	Value
Annual AC energy in Year 1	3,350,952 kWh
DC capacity factor in Year 1	29.5%
Energy yield in Year 1	2,582 kWh/kW
Performance ratio in Year 1	0.77

Conclusion

Conclusively, our project introduces an innovative solution. We have managed to apply innovative ideas in manufacturing, enhancing the production industry by sustaining the energy resource. The factory is sustainable, efficient, and economically profitable. This initiative not only aligns with Saudi Arabia's renewable energy objectives but also addresses the pressing need to reduce emissions, marking a significant stride toward a sustainable future. To sum up, we have concluded that the energy generated from the wind turbines and solar panels is sufficient for the factory consumption.