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ROOF MOUNTED SEA WATER DISTILATION PLANT

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Abstract : This study has been undertaken to investigate the determinants of stock returns in Karachi Stock Exchange (KSE) using two assets pricing models the classical Capital Asset Pricing Model and Arbitrage Pricing Theory model. To test the CAPM market return is used and macroeconomic variables are used to test the APT. The macroeconomic variables include inflation, oil prices, interest rate and exchange rate. For the very purpose monthly time series data has been arranged from Jan 2010 to Dec 2014. The analytical framework contains.

1. INTRODUCTION

Around the world, coastal regions are becoming increasingly concerned about freshwater scarcity. Conventional desalination techniques frequently use a lot of energy and necessitate large investments in infrastructure and land. By incorporating desalination capabilities into already existing urban structures and harnessing electrical energy from salty water, the suggested roof-mounted seawater distillation plant provides an inventive alternative.

2. NEED OF THE STUDY

The plant, which is part of the roof structure, heats seawater kept in a shallow basin by absorbing solar energy. Water vapor is caught and cooled on condensation surfaces when the seawater evaporates, resulting in the collection of freshwater. energy yield through salt water electrolysis by passing an electric current through a substance known as an electrolyte (in this case, a NaCl solution), electrolysis is a chemical process that breaks it down. Two electrodes (a cathode and an anode) submerged in molten salt or electrolyte solution make up an electrolytic cell, where this process takes place. These limit the demand for artificial lighting by directing natural sunlight indoors through reflective surfaces. These use less energy to provide natural illumination by capturing sunlight and sending it indoors via fiber optics.

3. ACTUAL MODEL DIAGRAM

Figure no 1.roof mounted sea water distillation plant

4. METHODOLGY

Roof-mounted seawater distillation plants are compact desalination systems designed to be installed on rooftops, making them ideal for locations with limited space and a need for fresh water. These plants typically utilize solar or other renewable energy sources to power the distillation process, making them an eco-friendly and sustainable solution.How They Work These plants employ various distillation techniques, such as multi-stage flash (MSF) or multiple-effect distillation (MED), to convert seawater into freshwater. The process involves heating seawater to its boiling point, causing it to evaporate. The resulting vapor is then condensed back into liquid form, leaving behind the salts and other impurities.

4.1 Working principle of roof mounted sea water distillation plant

The seawater is first heated by sun radiation, which causes it to evaporate. After rising, the produced vapor comes into contact with a cooled surface and condenses back into liquid. After that, the freshwater is gathered, and the concentrated brine that remains is either released or processed further. Conversely, the copper electrodes submerged in salt water and kept in a zinc vessel function as a salt cell and generate electricity through the electrolysis process.

5. FEATURE SCOPE AND RECOMMENDATIONS

5.1 Large-Scale Implementation and Urban Planning

Government policies and incentives can promote the installation of rooftop desalination plants to lower municipal water demand. This system can be modified for use in big commercial buildings, hotels, and apartment complexes in coastal areas. By incorporating these systems into new building, future urban planning can guarantee self-sufficient water supply models. Large-scale energy production using seawater

5.2 Water Quality Enhancement and Mineralization

Distilled water is pure, yet it is deficient in vital minerals. To enhance flavor and health advantages, essential ions like calcium and magnesium can be reintroduced through a post treatment mineralization procedure. Without the use of chemical disinfectants, microbiological safety can be improved via UV sterilization or silver-ion infusion.

6. ENVIRONMENTAL AND SOCIAL IMPACT

6.1 Reduced Marine Environmental Impact

- This technique reduces brine waste, which lessens the impact to marine life, in contrast to large-scale desalination plants that release high-salinity brine into the ocean.
- Ecosystem damage is minimized by the system's passive solar-driven process, which doesn't require chemicals or excessive energy.

6.2 Energy Savings and Carbon Footprint Reduction.

- Decreased reliance on desalination facilities fueled by fossil fuels aids in the fight against climate change worldwide.

6.3 Affordable and Decentralized Water Solutions

- This system's implementation in low-income towns or developing nations can lessen dependency on costly bottled water or municipal pipelines.
- In areas with limited water resources, governments and non-governmental organizations might fund these systems to supply potable water, thereby enhancing public health.

6.4 Economic Feasibility and Job Creation

- The widespread adoption of rooftop desalination systems can create new manufacturing, installation, and maintenance job opportunities in the green technology sector.
- According to cost research, the system can be 50–60% less expensive than traditional desalination when scaled, making it a wise long-term investment.

7. MULTI-SOURCE WATER PURIFICATION

- This system's adaptability allows it to filter not only seawater but also brackish water, rainwater, and greywater.
- To guarantee that water satisfies drinking standards free of chemical contaminants, UV and ozone-based sterilization can be added.

8. CHALLENGES AND FUTURE RESEARCH DIRECTIONS

8.1 Durability and Maintenance

Salt buildup on heating surfaces is still a problem; self-cleaning coatings and recurring flushing systems require improvement. To extend the system's lifespan in extremely salinized conditions, corrosion-resistant materials ought to be investigated.

8.2 Comparative Analysis with Existing Technologies

The best deployment scenarios will be identified with the aid of a thorough cost-benefit analysis that contrasts this system with conventional desalination techniques. Life cycle assessment (LCA) should be the main focus of future research in order to examine the impact and sustainability of materials over the long term.

8.3 Integration with Smart Cities and Sustainable Architecture

Working with architects and urban planners can result in new construction designs that seamlessly integrate desalination technology onto rooftops. This technology can be incorporated into smart city initiatives, where buildings are outfitted with real-time water and energy monitoring systems to optimize resource usage. Green building designs can incorporate this technology to create self-sufficient structures, reducing dependence on external water supply.

9. MODULAR AND SCALABLE DESIGN FOR EASY INSTALLATION

In order to provide easy expansion or reduction in response to water demand, the plant should be constructed as a modular system. Prefabricated parts can speed up construction and make installation easier. Customization for various roof types, such as flat, sloped, and industrial roofs, should be possible with this design.

9.1 Lightweight and Durable Construction Materials

To guard against damage from saline air, the structure should be made of lightweight, corrosion-resistant materials like stainless steel, aluminum, or UV-resistant polymers. Acrylic composites can be utilized to increase durability and save weight. It is best to apply anti-corrosive coatings to stop damage from exposure to seawater.

10. CONCLUSION

For the production of freshwater in coastal areas, the seawater distillation plant installed on the roof offers a scalable, sustainable, and energy-efficient option. This technology has the potential to completely transform decentralized water supply paradigms because to developments in material science, AI-based automation, and hybrid energy integration. Its widespread acceptance for both urban and rural applications will require more field testing, optimization, and policy assistance.

11. REFERENCES

1. M. Ahmed et al., “Solar Desalination Systems: A Review,” Journal of Renewable Energy, 2023.
2. J. Smith and L. Kumar, “Innovative Roof-Integrated Water Harvesting Solutions,” Desalination Technology, 2022. [3] P. Gupta, “Sustainable Methods for Freshwater Production.
3. "Performance Test of a Sea Water Multi-Stage Flash Distillation Plant: Case Study"* by A.M.K. El-Ghonemy.
4. "A Review of the Water Desalination Systems Integrated with Renewable Energy"* by S.F. Aly and O.M. Aly.
5. "Direct-Drive Ocean Wave-Powered Batch Reverse Osmosis"* by Katie M. Brodersen, Emily A. By water, Alec M. Lanter, Hayden H. Sternum, Kumansh N. Furia, Maulee K. Sheth, Nathaniel S. Kiefer, Brittany K. Cafferty, Akshay K. Rao, Jose M. Garcia, and David M. Warsinger.