

Energy of Change

Our project, "Energy of Change," addresses the urgent need to mitigate and reverse the effects of climate change caused by fossil fuels. The project will highlight innovative ways of generating power that does not emit greenhouse gases or pollutants. Aligned with Sustainable Development Goals, SDG #7, SDG #9, SDG #11 and SDG #13 our initiative aims to harness wasted potential energy in existing solutions while exploring the possibility of tapping into tidal energy, specifically in South Africa (Fourie & Johnson, 2017).

Alignment with Brief and SDGs

Our project aligns with the Design Your Climate Action competition to address climate change across various aspects of our lives. We have chosen the "Energy Transformation," category, which seeks solutions to mitigate climate change caused by fossil fuel combustion. By exploring tidal energy potential in South Africa, our project addresses SDGs #7 (Affordable and Clean Energy), #9 (Industry, Innovation, and Infrastructure), #11 (Sustainable Cities and Communities), and #13 (Climate Action) (Design your Climate Action, [sp]).

Research and Opportunities

Our research has revealed significant potential for harnessing energy that is wasted in our day-to-day lives, such as vibrational energy, kinetic energy, and heat (Cicchella, 2023). We identified a gap in the market for micro-energy generation and explored alternative forms of energy beyond conventional sources like hydropower, solar power, and wind power, which have their limitations (Ang et al., 2022)

Setbacks and Efforts to Address

While conventional energy solutions contribute to climate change, our project proposes innovative approaches to overcome setbacks (Liu et al., 2022). For example, by repurposing wasted energy from data farms or implementing energy harnessing infrastructure in urban environments such as wind turbines alongside roadways or energy floors in public spaces, we will be able to mitigate environmental impacts (Liu et al., 2022).

Methodology and Aims

The methodology involves researching the feasibility of creating systems for harnessing wasted energy, designing product solutions, and speculating on future implementation scenarios (Kumar & Tewary, 2023). Our approach includes identifying existing solutions using wasted potential energy, researching alternative materials and fuels, and understanding public willingness to adopt renewable energy solutions (Kumar & Tewary, 2023).

Potential of Tidal Energy in South Africa:

Our project explores the viability of tidal energy in South Africa's energy landscape. With significant wave energy potential along our coastline, tidal energy offers a sustainable, predictable, and environmentally friendly source of power. One innovative technology that holds promise in this regard is the Wave Line Magnet (Fourie & Johnson, 2017).

Wave Line Magnet Technology

Wave Line Magnet technology utilises the motion of waves. It consists of floating or submerged structures strategically placed along the coastline (Fourie & Johnson, 2017). As waves pass through these structures, they induce motion that is converted into mechanical energy through magnetic generators (Fourie & Johnson, 2017). This mechanical energy is subsequently converted into electricity, ready for grid integration (Fourie & Johnson, 2017).

Viability in South Africa

In South Africa, where tidal ranges are substantial, Wave Line Magnet technology holds significant promise (Fourie & Johnson, 2017). Along the country's 2 800km coastline, waves could generate between 25 and 50 MW/km of energy (Fourie & Johnson, 2017). The total wave power potential along the entire South African coast is estimated to be around 56,800 MW, which could contribute 8 -10 GW towards the country's electricity supply (Fourie & Johnson, 2017).

Advantages

Wave Line Magnet technology offers several advantages:

- Environmentally friendly: It produces no air, water, or thermal pollution, aligning with SDG #13 (Edi Weekly, 2018).
- Free energy production: Once infrastructure is in place, it harnesses the natural power of tides without ongoing fuel costs (Edi Weekly, 2018).
- Predictable output: Tides are predictable and stable, ensuring a steady stream of electricity (Edi Weekly, 2018).

- Sustainability: The energy derived from lunar and solar cycles ensures long-term sustainability (Edi Weekly, 2018).

Renewable Energy Policies in South Africa

Despite challenges, South Africa has implemented renewable energy policies such as the Renewable Independent Power Producer Programme and Renewable Energy Development Zones (2017 State of Renewable Energy in South Africa 2018).

However, policy uncertainty, financial constraints, and grid integration issues hinder widespread adoption (2017 State of Renewable Energy in South Africa 2018).

Solutions and Recommendations

To combat these challenges, our project proposes solutions such as ensuring policy stability, providing financial support and incentives, upgrading infrastructure, streamlining procurement processes, investing in capacity building, and training, and fostering international collaboration (Public procurement in South Africa: Issues and reform options 2023)

Conclusion

"Energy of Change" offers a holistic approach to addressing climate change through innovative energy solutions, specifically focusing on harnessing tidal energy potential in South Africa. By aligning with the SDGs, overcoming setbacks, and proposing actionable recommendations, our project contributes to a sustainable and efficient future for generations to come.

Sources

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