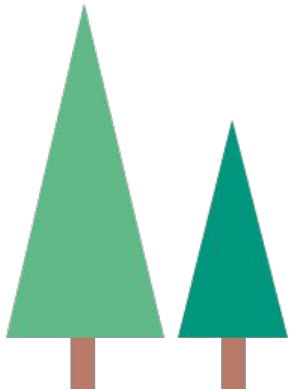
Kinowave



Sustainable Energy Storage

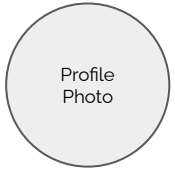
Theme: **Design for Renewable Energy**

Rebuild and heal the world with design

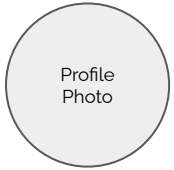
<06/08/2022 and INDIA>

Image Source: TOI

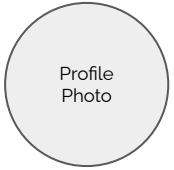
Team



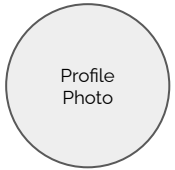
Janarthanan Venkatachalam
Lead



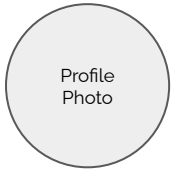
Brathikan V M
CAE Engineer



S M Suresh
Mechanical Design Engineer



Sivakeerthana S
Power Electronic Design Engineer

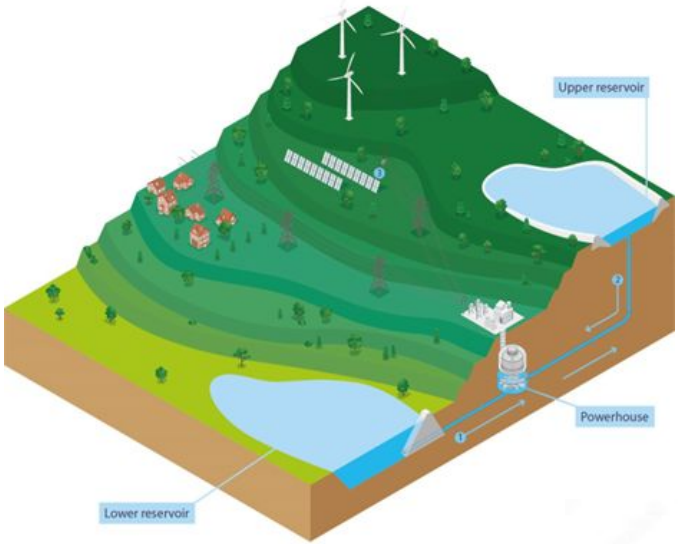


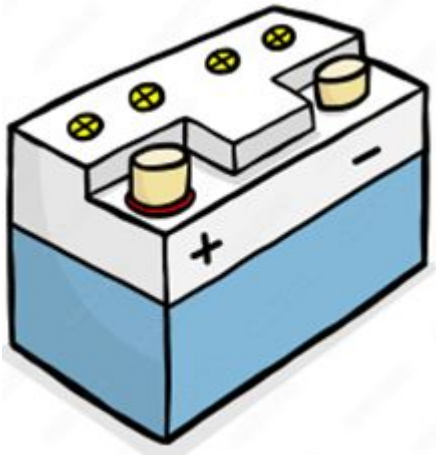
Abiya Primency
Electro MEchanical System Designer

MENTOR's Name (Optional)
Title

Problem Identified

Global energy Demand is 23,900 TWh of which only 29% is obtained through renewables. This is mainly due to a **shortage of storage devices**. Currently, we have 150 GW capacity storage, which is not a scale to face the requirement.
Current Chemical energy storage causes pollution and is **neither recyclable nor scalable**.
A mechanical storage system does not give constant power and has a **lower energy density**., i.e., they are very large in size, making it **geographically constrained**.



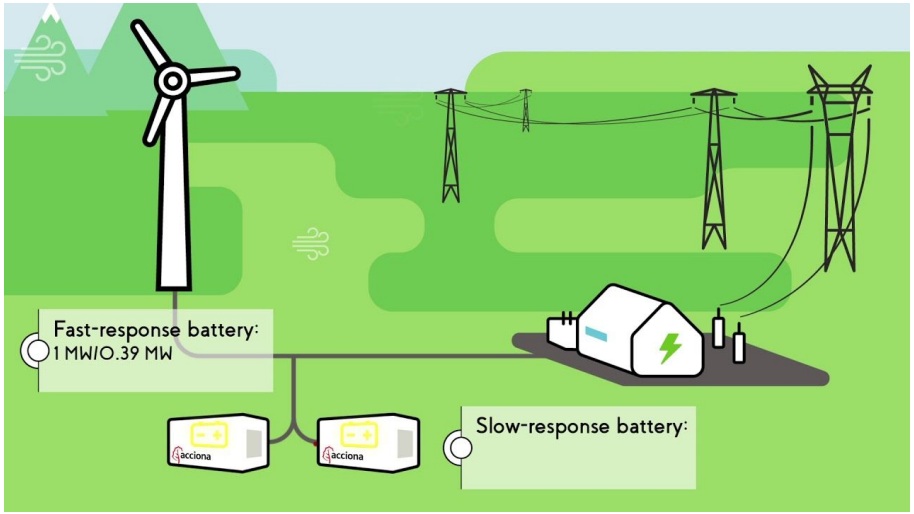


Importance

Usage of Renewables is essential to control Global warming. But renewables are both unstable in generation and controlality.

To overcome this, we need some solution that could store the unstable solution and give it back as a stable power. We need it in large scale to cope with the requirement.

Such solution can accelerate the adoption of renewables which is the prime requirement to fight against as energy market is one of the leading producer of CO_2.



Target User Persona

PROFILE & DEMOGRAPHICS

User: Renewable Energy Producer

FEELINGS

Worries: Can't provide stable electricity throughout the day.
Influences: Energy Storage will store the unstable electricity and give it back as stable source whenever the renewables can't handle the load.

GOALS & VALUES

Goals: To support renewables energy to be available throughout.
Values: This will create a new market for renewable adoption.
Motivations: To make energy as zero carbon producer.

PAIN POINTS

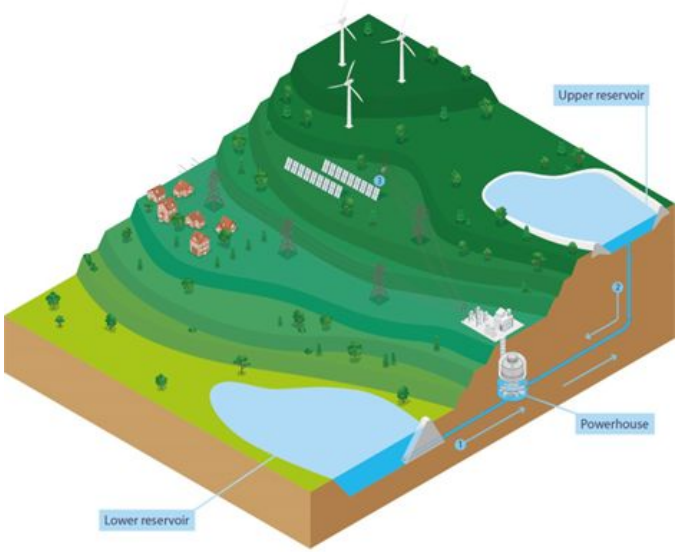
Fears: Adaptation to new technology by renewable energy producers
Challenges: Standardization of Technology on Global Standards

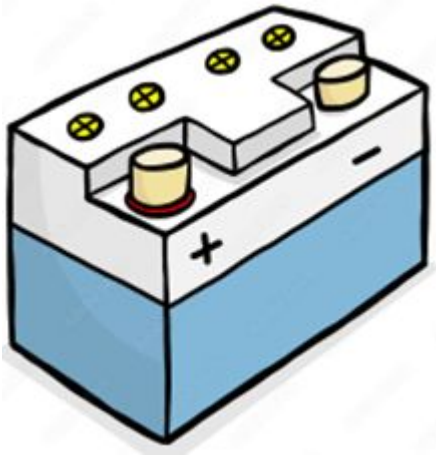
Explorations

SOLUTIONS & IDEAS

The problem is solved through using Pumped Hydro Storage system Predominantly. About 95% are pumped hydro. Balance storage is made over using Chemical batteries, Fly wheel.

Gravitational potential battery and Compressed Air Battery, Hydrogen Storage are under development for commercial deployment.

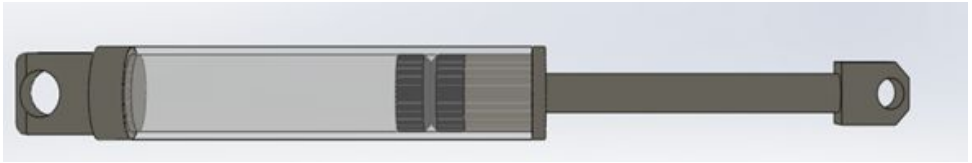




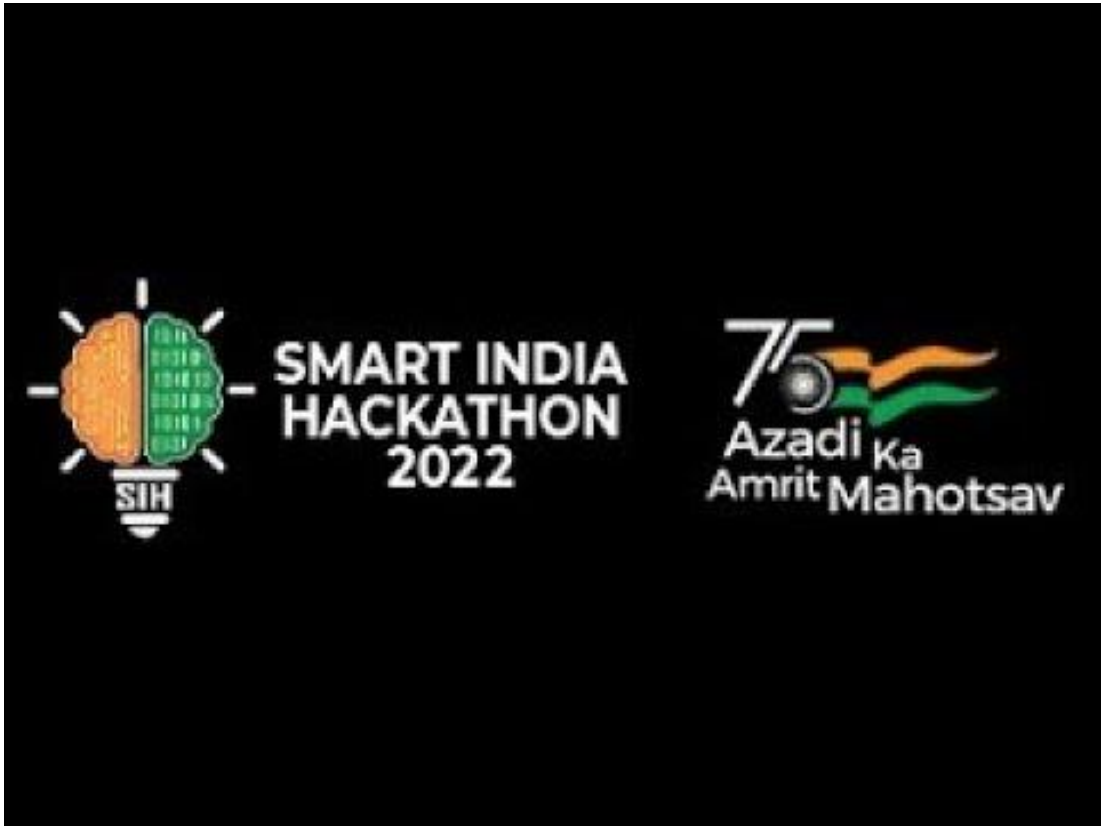
Final Solution & Innovation

Our solution will store energy when there is excess energy in the grid. Whenever the energy is lower than the requirement, the stored energy is given back to the grid by running the generator in the system.

HOW IS IT INNOVATIVE?



User Experience



Design Process

1) Understanding the pressure required for the maximum and minimum storage.
2) Understanding the energy density required for determining the dimension of the vessel and the power to be traversed by the components.
3) Designing the pressure component based on the pressure requirement and designing the power transmismitters based on the power that will be handled.
4) Redesigning the system based on the standard components available with maximum strength and minimum cost.
5) Making the system as Easy to manufacture system.

Impact on the Society

IMPACT OF YOUR SOLUTION

Renewable energy is the solution for utilising energy more sustainably. Storage is the only was to have renewable as a solution for renewable energy utilisation.

Pumped hydro and chemical batteries are potentially harm to the environment and should be avoided to the max.

Gravitational potential energy, flywheel, and high-pressure energy storage are less efficient to make this task happen; hence we need a solution that is less bulky than pumped hydro and stable like chemical batteries but without the usage of chemicals.This is where our solution is significant and undeniable.

Sustainability

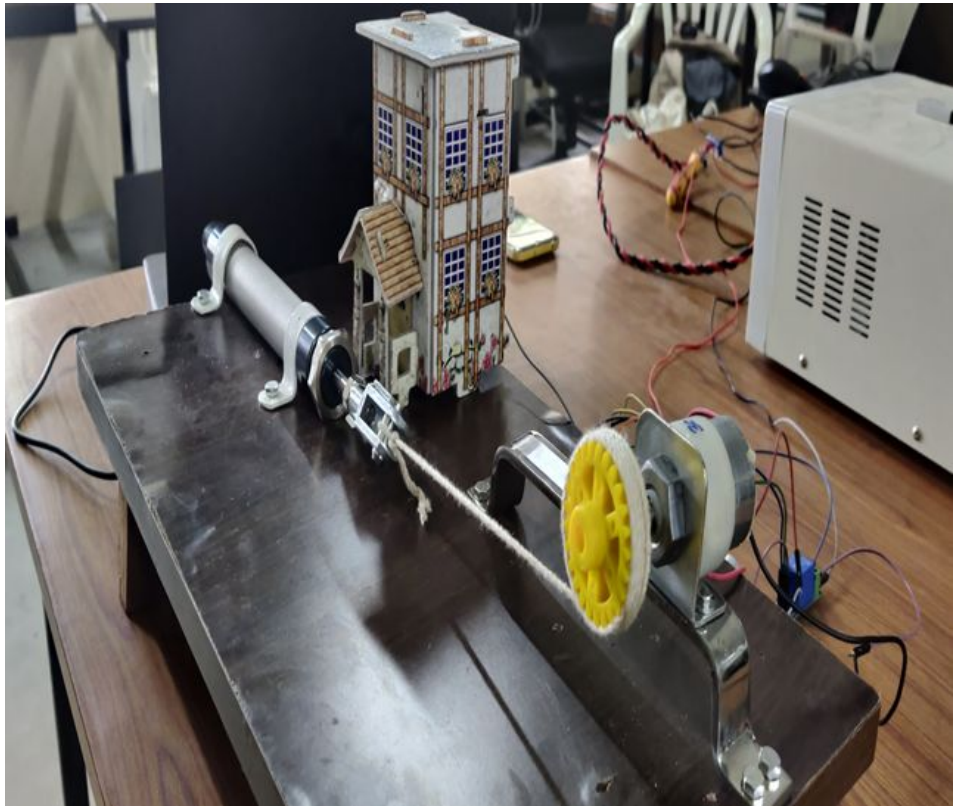
HOW IS YOUR SOLUTION SUSTAINABLE?

Our solution is made of locally available on-the-shelf components. This reduces the carbon foot print caused due to supply chain.

We don't have charge cycle and our solution can be used for more than 30 years with minimum replacement. Mre over most of our components are reusable or recyclable. Hence, our solution is more sustainable than many of our competitors.

Practicality & Business Viability

Renewable energy generators and providers need grid-scale low-cost solutions to provide energy throughout the clock at a huge scale. Energy generators need to invest a lot more than required to meet the peak demand. This can also be met using energy storage.
Secondary and tertiary energy fluctuation can be dealt with mechanical batteries. These markets need our solution badly.
The solution can be sold as a unit of storage as equipment or storage service can be provided for energy distributors based on the scale of need.



Thank you!