



# Utilize the Power of Pumped Storage Hydropower in Baysh Dam

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## Problem Statment

One of the major problems that faces the cities in the southern region of Saudi Arabia is power outages. Pumped storage hydropower offers a solution to overcome the shortage of electricity in these cities by providing a sustainable source of energy to electricity companies as a backup source of energy in emergency situations.

## Constraints

The Geography and Topographic :

- The minimum head between the two reservoirs must be higher than 250 m

## Target Specifications

- Volume flow rate of 350 m<sup>3</sup>/s
- The diameter of the penstock tunnel is 8 m
- The material of the penstock tunnel is commercial steel
- Upper dam location 17°43'41 N 42°40'45 E
- Turbine location 17°43'16 N 42°42'45 E
- Upper dam height of 60 m
- Penstock tunnel length of approximately 5750 m
- The power generated from the turbine is 924 MW
- The power consumed by pump is 1016.3 MW

## Project Impact

Economic Impact

- Increase the total energy production
- Enhanced energy independence
- Diversification of energy sources

Societal Impact

- Job creation and skill development

Environmental Impact

• Potential Environmental Benefits:

- Generation of clean renewable energy
- Reduction in dependence on fossil Fuels

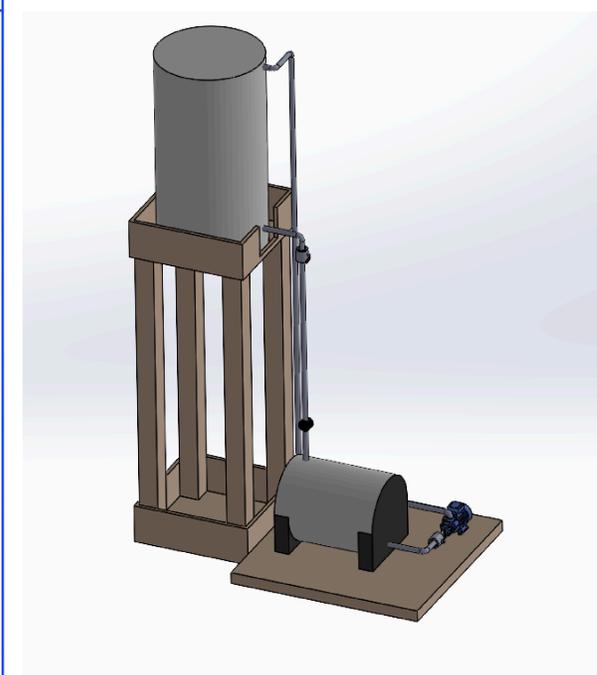
• Potential Environmental Concerns:

- Impact on water resources
- Reduction in agricultural Land area

## Baysh Dam



## Solidwork Design



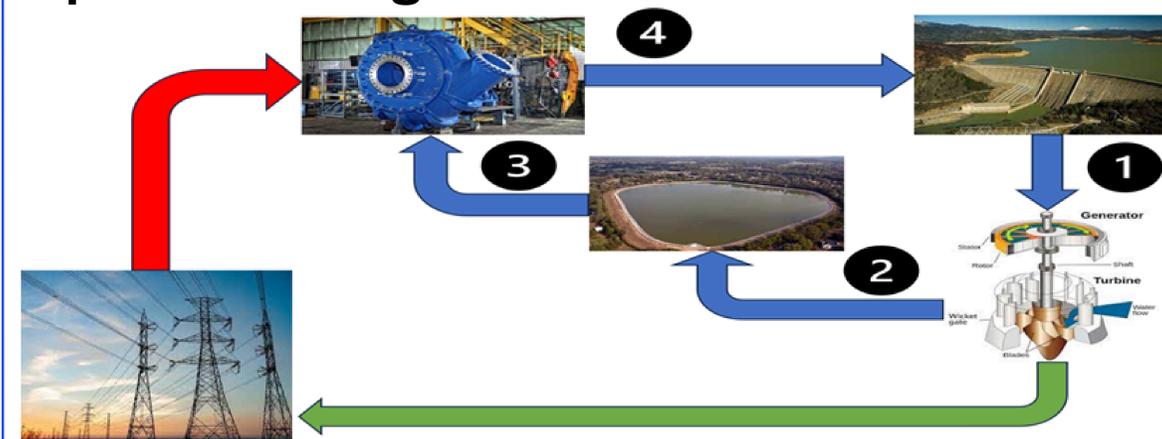
## Prototype Design



## Testing and Validation

- The design predicts a theoretical power output of 9.58 W.
- The actual power output realized is 5.76 W.
- A relatively low turbine efficiency is a key factor influencing the disparity between theoretical and actual power output.

## Operation Diagram



## Conclusion

In conclusion, implementing pumped storage hydropower technology in Saudi Arabia's dams would significantly enhance the nation's total energy capacity. This advancement aligns perfectly with the objectives outlined in Vision 2030, specifically the goal of reducing dependence on oil.