



# Smart Integration of Wind Turbines With Hydrogen Storage and The Conventional Grid Covering The Industrial Area of Yanbu

**Team  
63**

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## Background

In recent years, the demand of reliable renewable energy system has increased to meet the future 2030-2050 carbon emission plans. Our solution use wind turbines as main power source while utilizing excess energy along with water to produce hydrogen as energy carrier. when the wind turbines fails, the stored hydrogen is fed to a fuel cell to produce electricity.

### The projects constraint:

- Less than 0.9 MT of emissions
- Less than 23 min of response time
- 2.256 SAR/kWh levelized cost

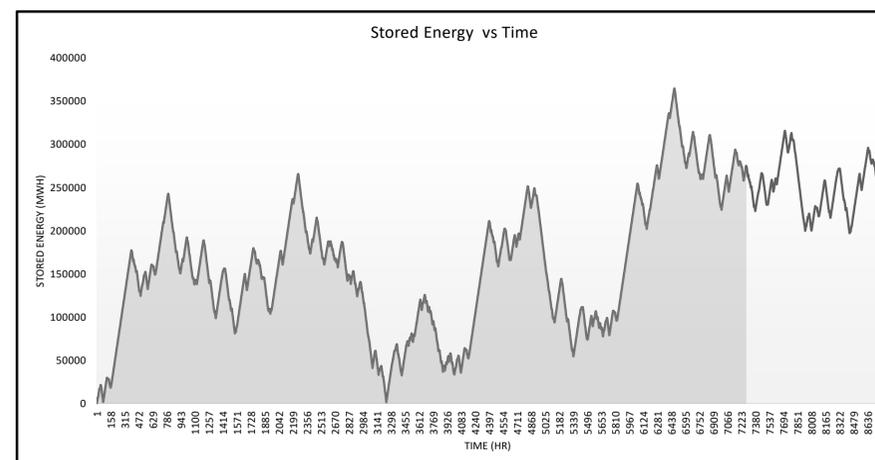
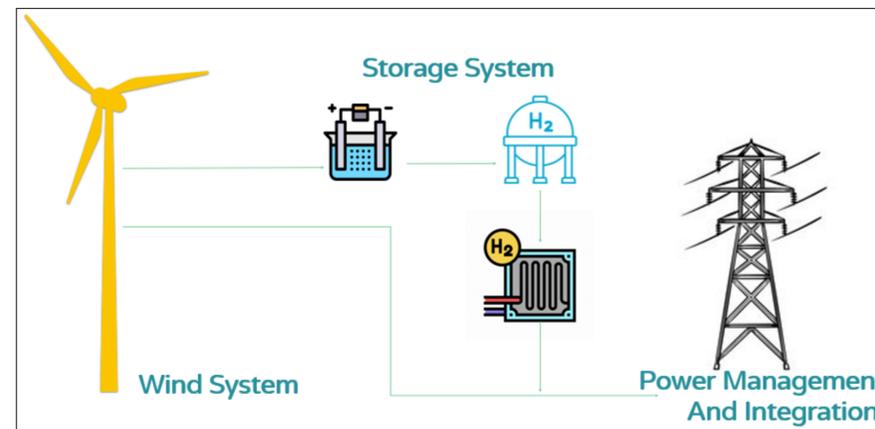
### With these specifications:

- 800 MW Electrolyser
- 1.1 GW System Capacity
- 1% outage rate

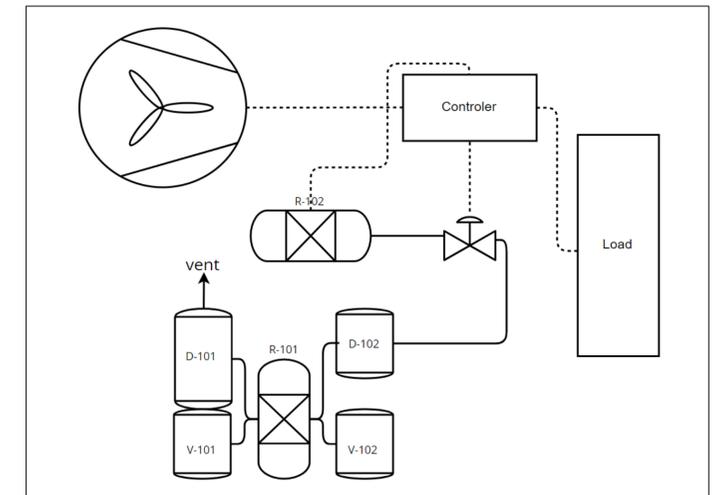
### Project Impact:

- Combining reliability and economy is what gives our product its edge
- Efficient wind capture and energy storage and recovery .
- the shift of industrial utility to a sustainable reliable alternative

## Results



## Prototype



Industrial loads are constant which helps dynamics of the fuel cell. As seen from the stored energy, the outage rate is satisfied. Wind speed in Yanbu allow the turbines to pass the speed threshold of the wind. The hydrogen system will ensure minimum emissions by preventing the usage of Fossil Fuel energy. Integrating the storage with the load would limit the responses time to meet the constrain.

## Conclusions

- Wind farm size is 602 turbines
- Solid Oxid Fuel Cell
- Electrolyzer size need to be 697 MW
- Storage size is around 11048 tones of
- pipe-type technology for Hydrogen storage