Gas turbine with molten salt storage

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Ref Storage

Hi Karim,

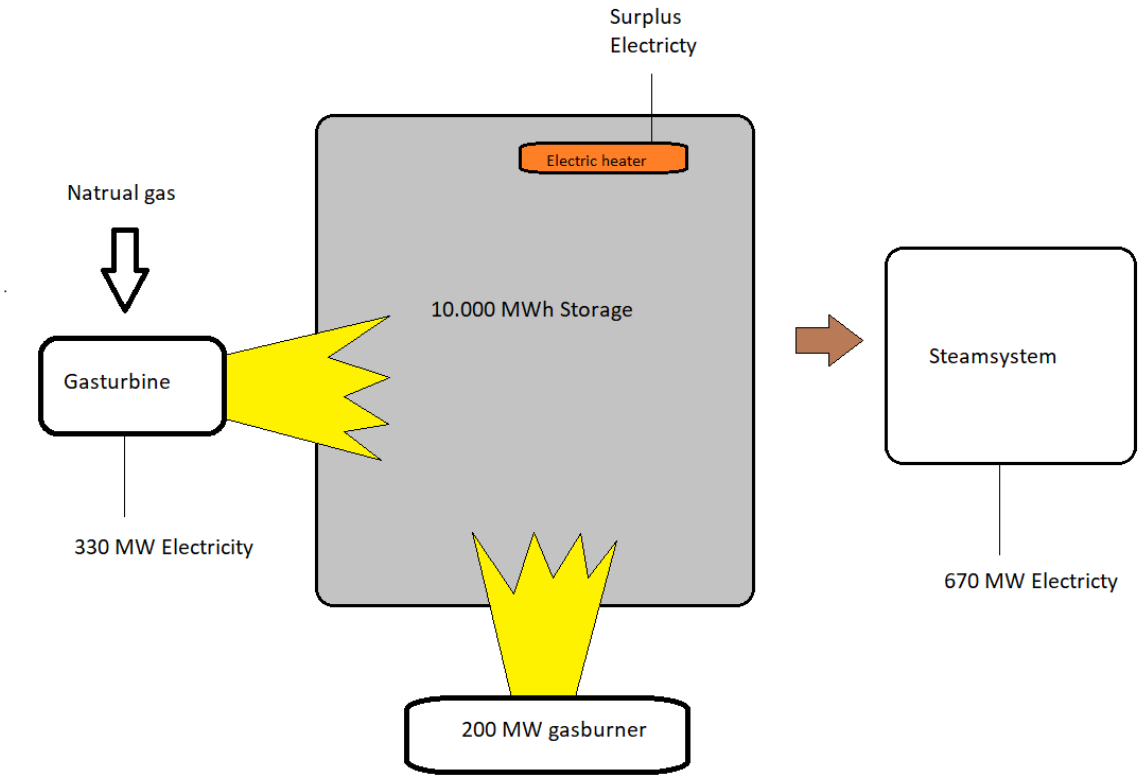
I hope my email finds you well.

I just had 3 weeks holiday and now back to work.

In continuation of our earlier talk regarding power storage we have highlighted the below.

Gas turbine with molten salt storage
A normal Combine Cycled powerplant can convert natural gas to 60% electricity.

A power plant could be made with a thermal storage; in the next page is a setup for general information.



The setup can be operated in different ways

- The gas turbine and the steam system provide 500 MW consuming 833 MW gas, as a normal CC plant.
- The gas turbine operates in 14 hours at night providing 330 MW, and 7050 MWh hot energy from the exhaust is stored in the storage. And at daytime, for 10 hours, the plant can deliver 738 MW with an overall efficiency of 60 %.
- The gas turbine operates at night in 14 Hours an provides 330 MW together with a 200 MW gas burner and the storage now contains 9850 MWh energy. Now the total output would be 1100 MW for 10 hours. Because the gas burner can heat the storage more than the exhorts (450 C) could, the overall efficiency increases to 63% of all gas consumed.
- When solar cells and windmills are installed in Lebanon, the gas turbine operates for 14 hours at night with 330 MW output and stores 7050 MWh in the storage. For 14 hours at night, surplus electricity provides 2000 MWh which heats the storage via the electric heater and all the heat is stored in a very high temperature level. Now the plant can deliver 935 MW for 10 hours when the gas is converted to 60 % electricity and nearly all the all the saved electricity is recovered 98 % or better, because the very hot energy from the surplus power can super heat the steam when electricity is produced.
- The storage can be filled with surplus power and 50 % is recovered when power is to be produced and when the gas turbine and gas burner are off.

Above can be coordinated and incorporated in the governmental plan for development ahead.

Conclusion

As an alternative to Combined Cycled powerplant for baseload with Open Cycle power plant with a 40 % efficiency for peak load and battery storage, the solution her is much cheaper in installation and provides a much better efficiency of the gas consumed. And especially when the plant provides peak load in the daytime and the setup can store much more electricity in a cheaper way.

Demonstration storage at e.g. Deir Ammar

A small 1000 MWh storage with a 50 MW electricity capacity can be made on the 500 MW Combined cycle power plant, and the plant can be prepared for the large production storage which can come later. We could eventually assist with part funding.

A solution with many windmills for Lebanon

The price on windmill power is still declining: 2,1 cent/KWh: https://masdar.ae/en/masdar-clean-energy/projects/dumat-al-jandal

I am aware that prices in Lebanon can be different.

An AC sea cable connected to the power plants along the coast and to power lines inland, and to large wind farms in northern part of Lebanon:

A suggestion for the placement of a 1 GW power plant with storage on the Zouk area:

1 GW powerplant with LNG tank and 30.000 MWh thermal storage.

Please let me know if there is an interest to discuss above.

Yours sincerely

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