

Integrating Wind Energy into St. Mary's and Mountain Village

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April 22, 2021



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St. Mary's and Mountain Village

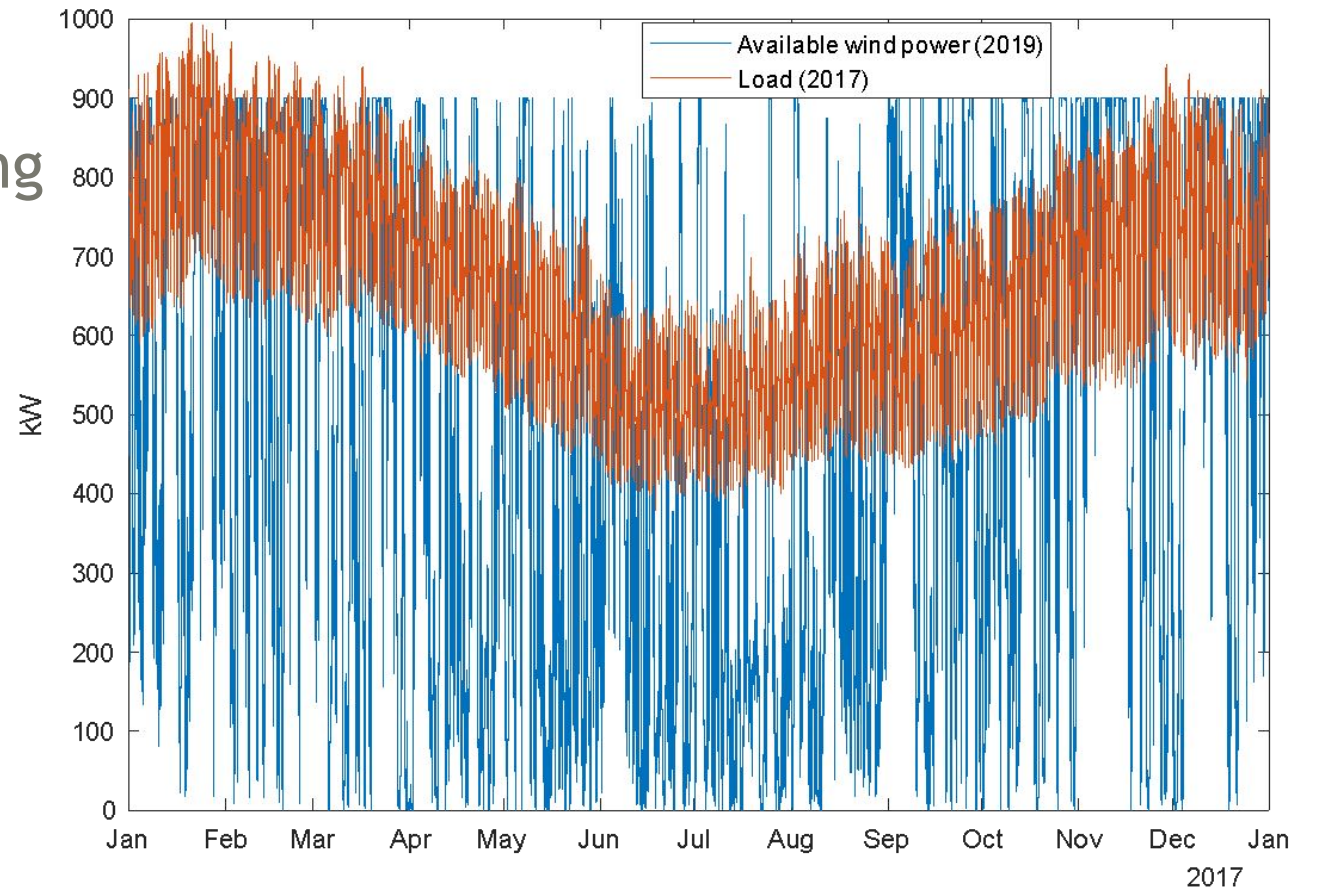
- 1377 people
- \$6.26 / gallon of diesel
- \$0.59/kWh before PCE
- 670 kW average load
- 900 kW wind power



<https://www.cyak.org/mountain-village.html>

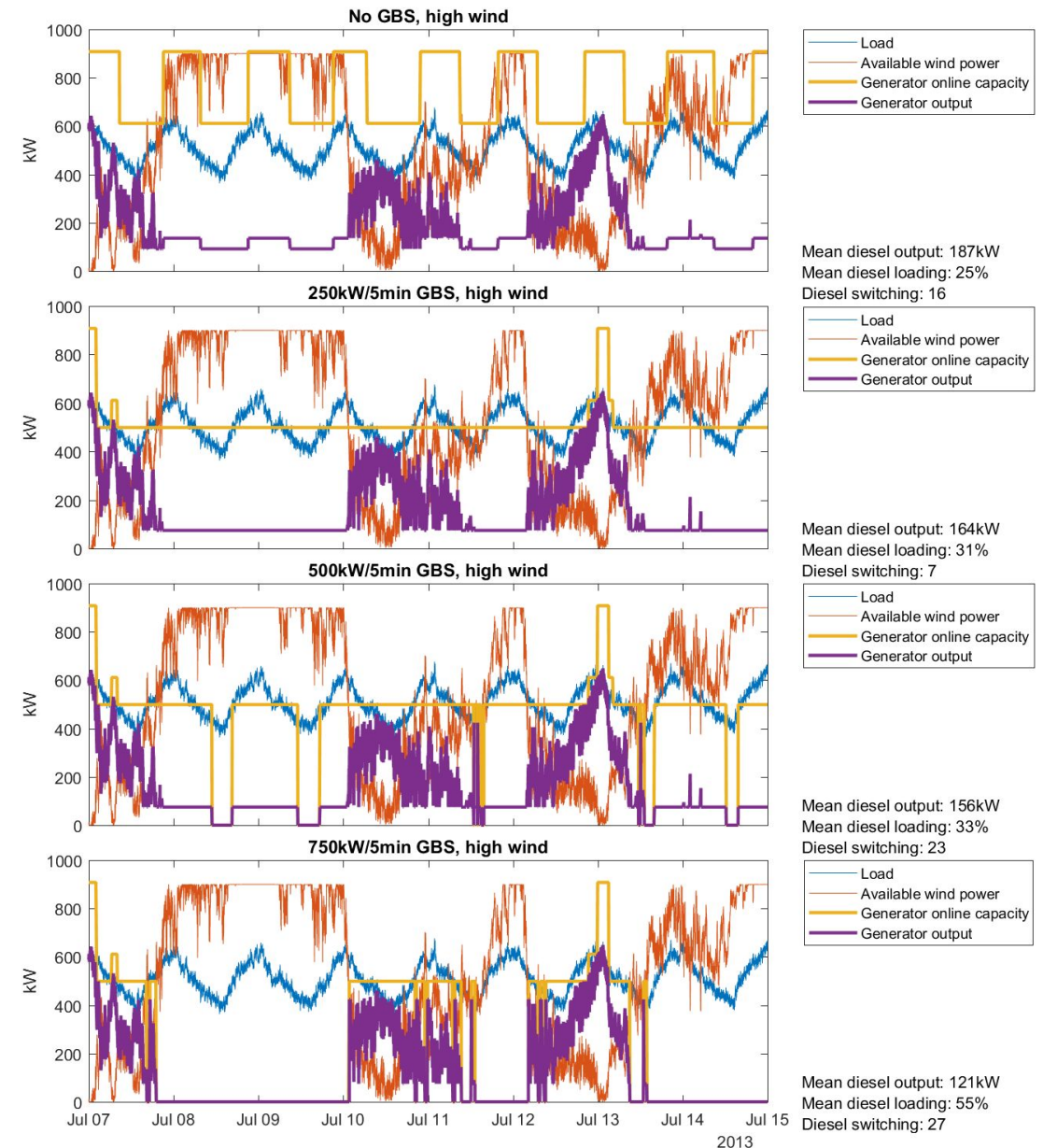
Wind Power

- Wind under load
 - Try to use directly
 - BUT diesel minimum loading
- Wind over load
 - Serve dispatchable loads
 - Store and use later
 - Curtail

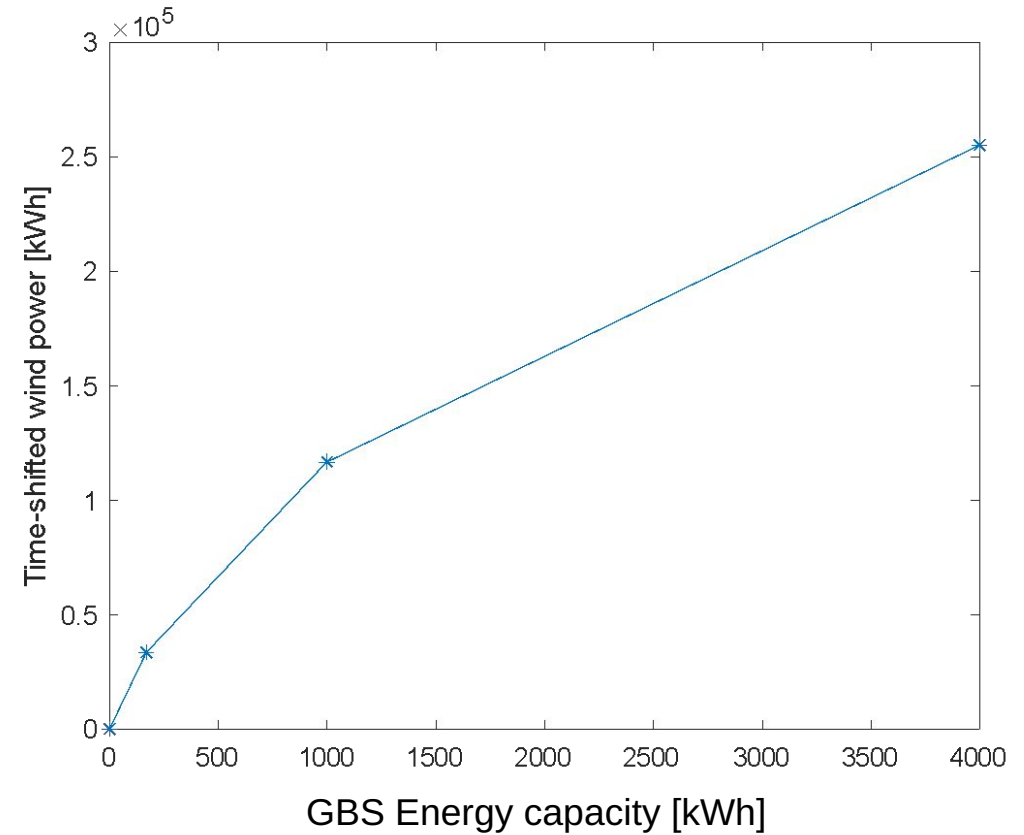
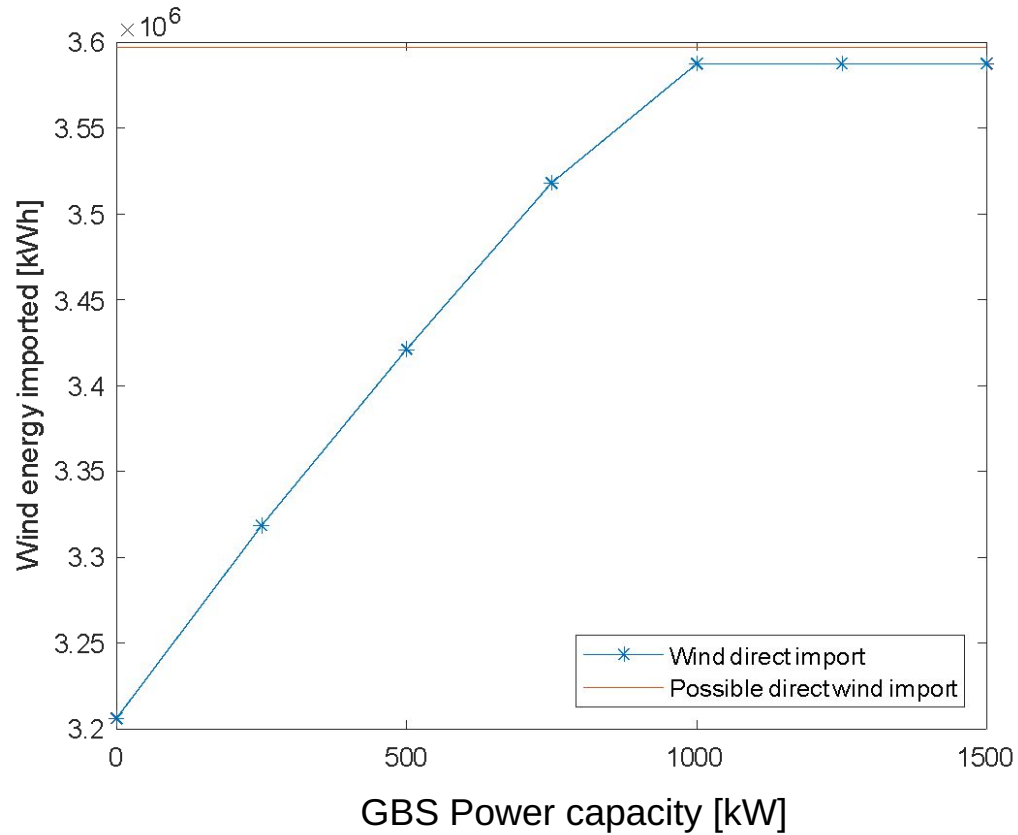


Grid Bridging System

- Use the wind under the load!
 - GBS provides spinning reserve
 - Turn diesel generators off
 - Save diesel fuel and run time costs
- Time shift excess wind
 - Secondary value
 - If you have the energy capacity



Spinning Reserve vs Time Shifting



Displaced Thermal Generation



Marine exhaust manifold

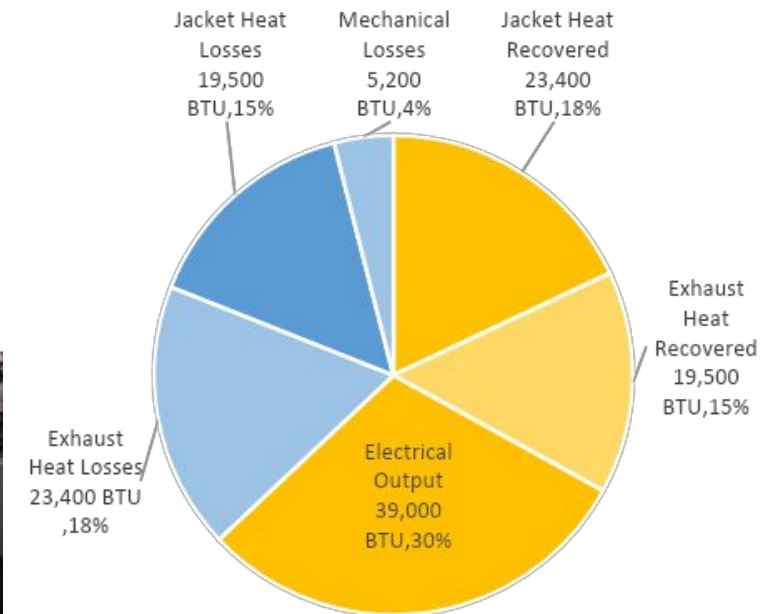
Distribution to water plant



Water jacket
heat recovery

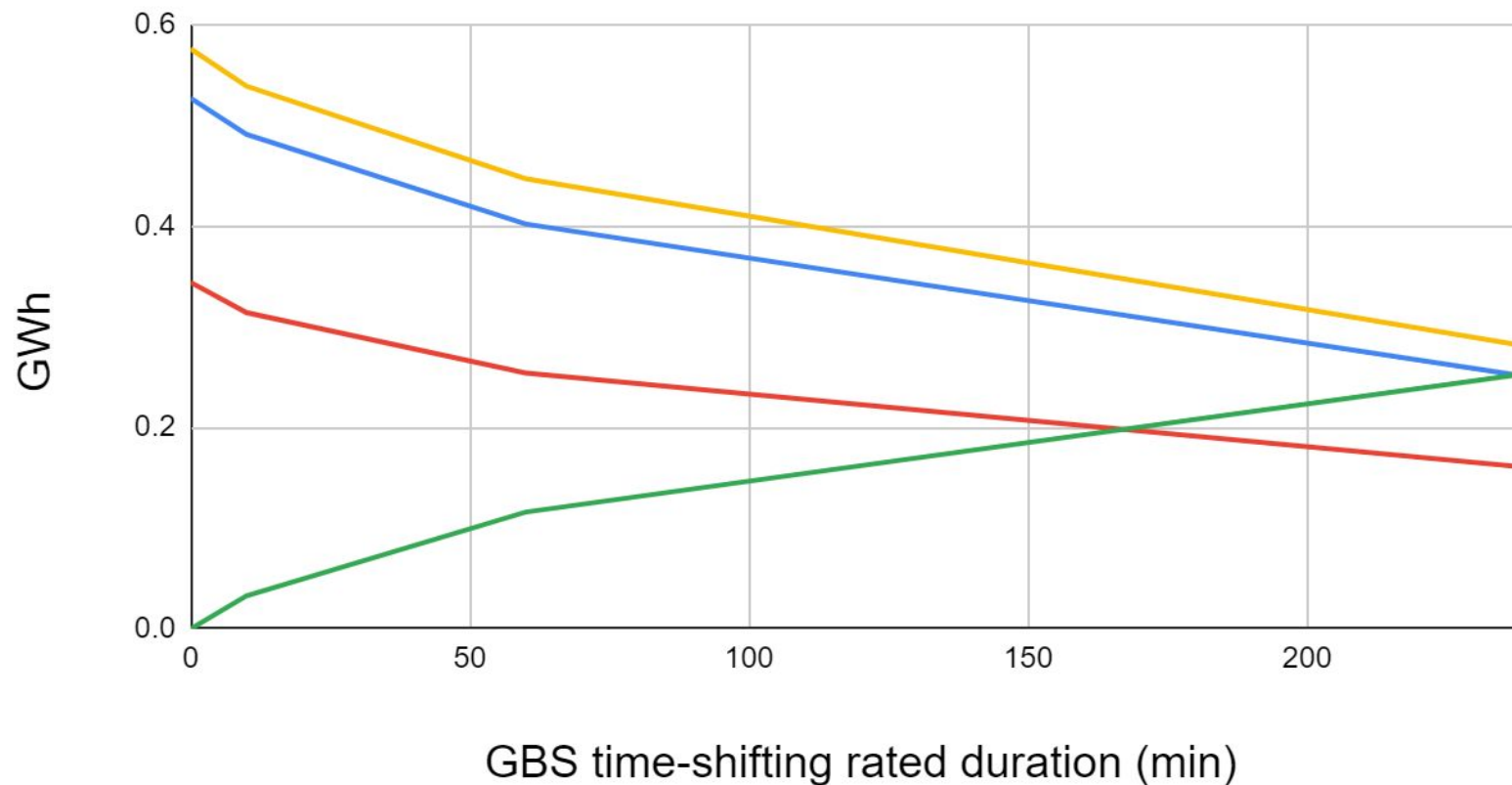


Energy use of 1 gallon of diesel with heat recovery



Time-shifting vs Dispatchable Loads

— Heating With 250 kW Boiler — Heating With 125 kW Boiler — Surplus Wind
— Time Shifted Wind



Summary

- Modern wind turbines are amazing - very good at curtailing
- Try to use as much wind energy directly as possible
- Time shift or use dispatchable loads to use excess wind energy
- Consider impact and opportunities for thermal loads in design

Thank you!

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Thank you to the US Department of
Energy and the US Office of Naval
Research for supporting this work.

