

KENSTON  **N**

Wind Turbine Report

Kenston BOE Work Session
March 4, 2024

Kenston Schools Turbine – Fast Facts

- TURBINE TYPE: Aeronautica 54-750
- SIZE: 750 kW (Medium Utility Class)
FOUNDATION FOOTPRINT: 18' x 18' Exposed, 40' x 40' underground (10' Deep), with eight (8), 2 ½' foot by 14' deep piers
- TOWER HEIGHT: 65 Meters (213 feet)
- BLADE/ROTOR DIAMETER: 54 Meters (177 feet) INDIVIDUAL BLADE LENGTH: 26 Meters (85 feet)
- HEIGHT (Ground to Blade Tip): 92 Meters (302 feet)
- WEIGHT: 278,450 lbs. (Does not include Foundation)
- START SPEED: Generation starts at approximately 7 mph, reaches maximum generation (750 kW) at 26 mph
- DATA COLLECTED: Wind Speed, Wind Directional, Temperature, Power Output, Rotation
- POWER: Our Turbine produces approximately 1.3 million Kilowatt Hours per year or approximately 70% of the High School's annual electric consumption. This is enough to power 121 conventional or 242 energy efficient Ohio homes
- "Buy America" goals and requirements of the Federal American Recovery and Reinvestment Act of 2009 met. The tower came from Michigan, the nacelle from New England and the blades from Indiana. The electrical, foundation and crane services were all sourced from Ohio.

How it works

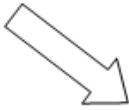
- The turbine exclusively supplies power to the high school.
- Kilowatts generated by the turbine are initially utilized by the high school.
- Any surplus power is transmitted to the grid, for which we receive credits on our electric bill.
- This setup is known as "behind the meter" as power is consumed before passing through the meter. Total building consumption cannot be individually tracked.
- The building consumption amount on the bill encompasses total consumption, including the contribution from the turbine.
- Credits on the bill represent excess power generated by the turbine when production exceeds the building's consumption.



Power Generated

Highschool Grid (Defined as all circuits under the First Energy Highschool utility meter)

If generation is less than the High School's current power usage



If generation is more than the High School's current power usage



Savings =

- 100% of the Turbine's Generation results in an Equal amount of Avoided First Energy Purchased Power. As this power is used before it ever gets to the First Energy meter or Grid, they never see it and thus it is not reflected as a line item on your bill. (The only way to see this savings is through real-time monitoring of the turbine's production and real-time comparisons with the school's usage.)
- Any additional school power needs are met by the First Energy Grid and billed at your normal rate.

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Any turbine generation also offsets your demand charges (likely the most significant part of your bill). These can only be calculated through direct real-time comparison of turbine production and building usage. This can likely be done through your building automation system.

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- 100% of the school's power usage is Avoided First Energy Purchased Power. As this power is used before it ever gets to the First Energy meter or Grid, they never see it and thus it is not reflected on their bill as a line item. The only way to see this savings is through real-time monitoring of the turbine's production and real-time comparisons with the school's usage.)
- Any surplus turbine power is sent to the First Energy Grid and credited on your bill as generation. FE only sees the surplus power not, the actual generation.

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Sale of RECs (Renewable Energy Credits) can result is thousands of dollars of revenue per year. Kenston is not currently using this opportunity.

Net Savings =

- Full Avoidance of Utility Power Purchases
- Partial Avoidance of Utility Power Purchases
- Lowering of Peak Power Usage and Thus Demand Charges
- Utility Credits for Surplus Power Sent to The Utility Grid
- REC Sales
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- Preventative Maintenance Costs
- Reserves for Major Repairs

Historical Production (kWh)

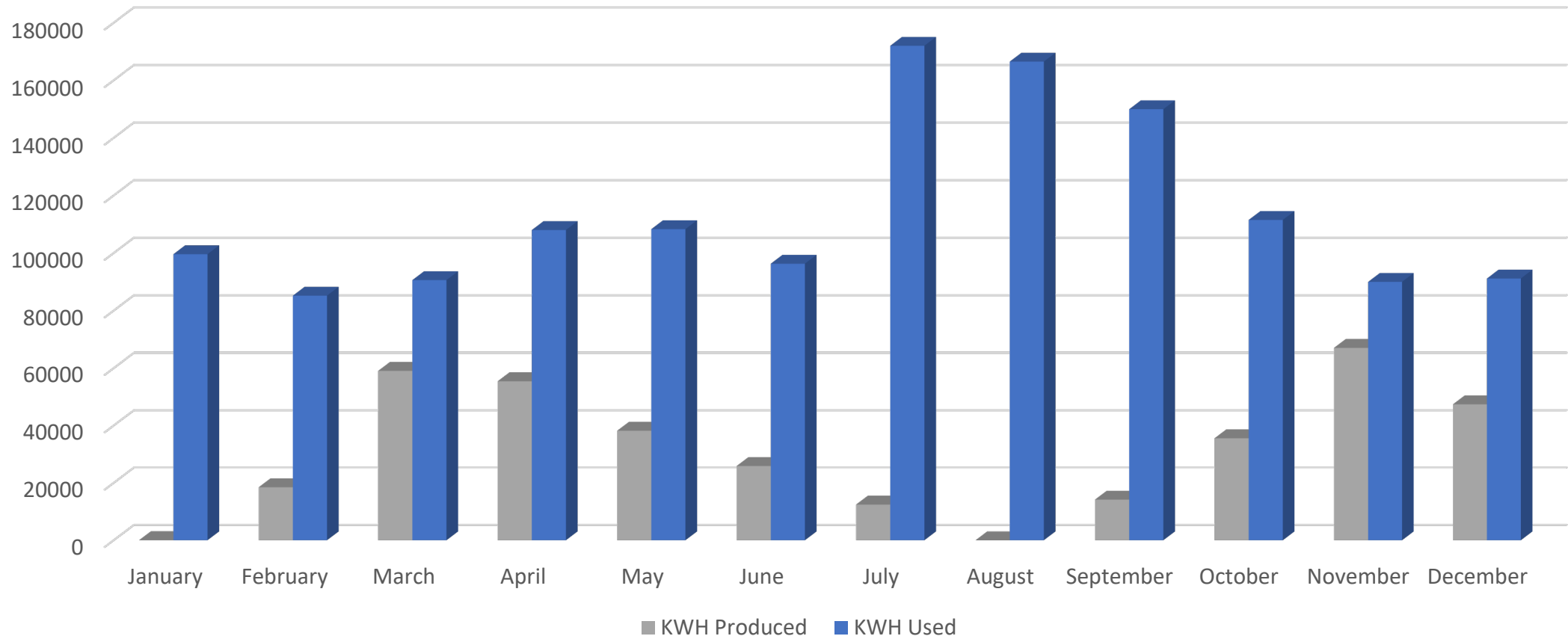
Year	kWh Produced
2013	No data
2014	No data
2015	No data
2016	50,766
2017	No data
2018	No data
2019	246,825
2020	493,998
2021	513,332
2022	560,957
2023	373,738
Total:	2,239,616

Production 2023

Month	kWh Produced
January	56.00
February	18,476.00
March	59,077.00
April	55,445.00
May	38,179.00
June	25,889.00
July	12,441.00
August	0.00
September	14,170.00
October	35,555.00
November	67,052.00
December	47,398.00
Total	373,738.00



Usage vs. Production 2023



Approximate Savings

Month	HS Consumption (kwh)	Billed Amount	Turbine Production (kwh)	Credited kwh	Total Billed Consumption (kwh)	Turbine Savings	Percent Savings On Total
October	111,501	\$14,169.44	35,872	6,701	104,800	\$4,850	26%
November	89,979	\$11,278.54	61,488	8,922	81,057	\$8,556	43%
December	100,941	\$10,349.55	53,109	9,790	91,151	\$6,030	37%
January	115,470	\$11,621.51	31,114	7,645	107,825	\$3,354	22%

Annual Costs

(2019-2023 totals)

Insurance - \$95,082

Maintenance - \$71,231.4

	2019	2020	2021	2022	2023
Maintenance	\$14,950	\$13,750	\$13,750	\$13,750	\$15,040
Insurance	\$17,134	\$17,134	\$18,333	\$19,916	\$22,565
Totals	\$32,084	\$30,884	\$32,083	\$33,666	\$37,605

Next Steps

- Document all data, calculate savings on a monthly and annual basis.
- Continue to determine the total cost of the initial project.
- Keep turbine spinning at all times to maximize savings.
- The district must be diligent with the turbine. Keeping up with maintenance, repairs, and tracking data are essential



Thank You!