vybeenergy

Vybe400: AI-Driven Chiller Optimization

OPSU Results

EXECUTIVE SUMMARY

Vybe Energy's Vybe400: AI-powered chiller optimization solution, installed at OPSU in partnership with HEP, has delivered the following benefits over between May 2024 and Dec 2025.

- Estimated Additional Energy Usage without Vybe Energy's system: **175,000kWh (~27%) – 246,000kWh (~33%)**
- Estimated Energy Costs Avoided: **$16.3K - $22.9K**
- Identified 2 fault detections

The total annual benefits are estimated to be in the range of $15K-20K. Furthermore, there is potential for additional benefits in the future with refinements to reduce chiller cycling, fault detection, and monitoring to support preventive maintenance.

OPTIMIZATION BENEFITS

Vybe Energy estimated the savings by comparing Actual Energy Use to Baseline or Business-as-Usual (BAU) Forecast; and Optimized Forecast. The baseline forecast assumes that the chiller operates at fixed 42°F setpoint, while the optimized forecast reflects the optimized set points to minimize kWh consumption.

				Estimated Additional Energy Usage Without Vybe Energy's system in kWh		**Savings ($)** @ $0.093/kWh	
Month	**Baseline Forecast kWh usage**	**Optimized Forecast kWh usage**	**Actual kWh usage**	Actual vs Baseline	Optimized vs Baseline	Actual vs Baseline	Optimized vs Baseline
Jun 2024	118,396	77,633	87,206	31,190 (36%)	40,763 (47%)	$2,901	$3,791
Jul 2024	127,894	87,599	96,479	31,415 (33%)	40,295 (42%)	$2,922	$3,747
Aug 2024	123,056	91,510	106,042	17,014 (16%)	31,546 (30%)	$1,582	$2,934
Jun 2025	115,284	87,927	92,979	22,305 (24%)	27,357 (29%)	$2,074	$2,544
Jul 2025	131,980	96,195	100,147	31,833 (32%)	35,785 (36%)	$2,960	$3,328

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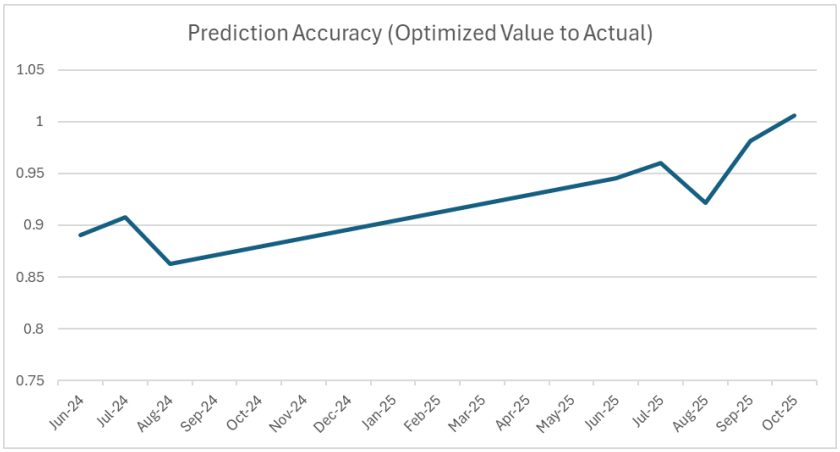
Aug 2025	127,767	94,974	103,034	24,733 (24%)	32,794 (32%)	$2,300	$3,050
Sep 2025*	41,090	32,831	33,447	7,643 (23%)	8,259 (25%)	$711	$768
Sept 2025**	59,327	49,106	57,334	N/A	10,221 (18%)	N/A	$951
Oct 2025*	38,911	30,111	29,927	8,984 (30%)	8,800 (29%)	$836	$818
Oct 2025**	45,147	38,908	43,674	N/A	6,239 (14%)	N/A	$580
Nov 2025**	34,386	32,303	41,772	N/A	2,083 (6%)	N/A	$194
Dec 2025**	20,500	18,066	24,293	N/A	2,433 (12%)	N/A	$226
Total	**983,738**	**737,163**	**816,335**	**175,116 (27%)**	**246,575 (33%)**	**$16,286**	**$22,931**

* The results shown include only days where predicted and actual chiller runtimes aligned – 11 days in September, 11 days in October, and no days in November. We are rerunning the baseline for days with discrepancies, which occurred because the chiller start/stop temperature setpoints (55°F / 51°F) were lower than the values used in our model (60°F / 55°F), resulting in longer actual runtimes. We will update the results once complete; estimated savings for these months are expected to increase.
** Estimated savings on days when the chiller ran longer, specifically on days when the chiller start/stop temperature setpoints (55°F / 51°F) were lower than the values used in our model (60°F / 55°F).

Starting in September 2025, the chiller start/stop temperature setpoints (55°F / 51°F) were manually changed onsite and were lower than the values used by Vybe Energy (60°F / 55°F). As a result, the chiller ran longer than predicted on some days. Specifically, when temperatures dropped below 55°F, Vybe Energy's model expected the chiller to shut off, whereas in practice the chiller continued operating until temperatures fell below 51°F. This additional runtime and the associated kilowatt consumption were not captured in the model. Going forward, Vybe Energy will need to incorporate any manual changes to boundary conditions into the model.

After adjusting for days in September and October 2025 where runtimes were aligned, Vybe400's kilowatt consumption predictions have progressively improved, typically achieving 95–100% accuracy relative to actual energy usage. Variances that did occur were primarily due to operational factors during the optimization period—for example, operational issues with Chiller 1 in August 2024 and a potentially faulty sensor in June 2025, which was addressed in August 2025.



ADDITIONAL BENEFITS

Fault detection that enables timely response and preventative maintenance

- Identified discrepancy in leaving water temperature compared to set point that helped identify a fault temperate sensor (June 2025). Issue was addressed in July 2025.
- Identified chiller malfunction (July 2024)

Opportunities for further kWh reduction

This is an opportunity to stabilize chiller operations, reducing frequent ramping that currently causes unnecessary energy spikes. Implementing this will significantly lower kWh consumption and improve overall system efficiency. We are currently working with Harrison Energy Partners on how best to implement this control strategy.

CONCLUSION

Vybe Energy's AI-driven chiller optimization platform demonstrates clear energy savings during active control periods. With further refinements to reduce chiller cycling, the savings potential could be even greater.

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APPENDIX

PROJECT SUMMARY

Site Overview

Vybe Energy's Vybe400 is an AI-powered chiller optimization platform that has been operational at Oklahoma Panhandle State University (OPSU) Physical Plant Building since May 2024. Since then, Vybe Energy has piloted and validated the performance of the technology in a live environment. Operational and energy consumption data from the chiller plant has been collected since October 2023. This report outlines the platform's effectiveness in reducing energy consumption and delivering cost savings for OPSU.

Optimization Timeline

The Physical Plant Building is equipped with two (2) Carrier centrifugal chillers, with only one chiller typically operating at a time. Both chillers are of similar age and have comparable performance in terms of efficiency. Vybe Energy began collecting data from both chillers on October 21, 2023. Over the monitoring period, the AI-driven optimization platform was active for 147 days and exclusively on Chiller 1. Importantly, even during periods when optimization was inactive, Vybe Energy continued to collect detailed data from both Chiller 1 and Chiller 2. This enabled a direct comparison of energy usage under optimized and non-optimized conditions. The specific period of performance is shown below:

- Oct 21, 2023: Vybe Energy started collecting data
- May 20, 2024: AI optimization activated.
- Sep 4, 2024: Optimization paused due to an issue with Chiller 1.
- May 11, 2025: Optimization re-enabled following resolution of mechanical issue.

METHODOLOGY

The chiller model developed by Vybe Energy is designed to predict energy consumption based on outside air temperature (OAT) and other key variables, while also estimating what energy usage would have been under a business-as-usual (BAU) or baseline scenario without optimization. Vybe Energy measures energy consumption every minute, while the optimization forecast is developed every 15 minutes and considers OAT and other variables. The baseline is also forecast every 15 minutes for the same condition but maintains the chiller at the fixed 42°F setpoint without optimization.

- AI Optimized Actual Energy Consumption – energy consumption recorded by the chiller
- Baseline Forecast – chiller operating at fixed 42°F setpoint without optimization
- AI Optimized Forecast – chiller energy consumption predicted by Vybe400.

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ADDITIONAL BENEFITS

Opportunities for further kWh reduction

The frequent ramping up and down of the chiller results in increased energy consumption. We believe this typically occurs more frequently as OATs fluctuate near and below the 55°F to 60°F threshold—leading to operational inefficiencies not yet fully mitigated by the current control strategy. Addressing this cycling behavior represents a clear opportunity for further energy savings.

Fault Detection #1

In June 2025, Vybe Energy identified that the chiller was not reaching its target chilled water setpoint. After reviewing the issue with HEP, two potential causes were considered:

1. A calibration error in the temperature sensor
2. A large temperature differential (greater than 10°F) or DeltaT between entering and leaving water, suggesting the chiller was running at full capacity but unable to meet the setpoint—typically a result of persistently high OAT

Vybe Energy ruled out the second possibility, as outdoor temperatures had not been unusually high in recent months and the data did not indicate a high DeltaT. In July 2025, HEP conducted a running inspection of the chiller and adjusted the temperature offset, resulting in the leaving water temperature aligning more closely with the desired setpoint.

By proactively identifying this issue, Vybe Energy likely helped OSPU avoid more serious system strain and a costly future replacement of the heat exchanger—ultimately saving them significant expense and downtime.

Fault Detection #2

May 21, 2025: Vybe Energy alerted HEP that the chiller had stopped running, allowing HEP to immediately address the issue.