American Electric Power Challenge: Wind Turbine Data Analytics

AEP is currently putting into service our North Central Energy Facility (NCEF). This is composed of three wind farms in Oklahoma. It will have a combined total capacity of nearly 1500MW, contain 531 wind turbines and cover an area of approximately 300,000 acres.

The management and maintenance of this facility to assure maximum production will be an enormous effort. As part of the project, we have had an engineering team working to leverage sensors with associated monitoring diagnostics and analytic software. This system will need to detect issues early, identify predictive maintenance and improve the overall efficiency.

The Challenge:

For the Hack 2022 challenge, the students will be provided with a dataset. The dataset provided is for 10 different turbines, 10-minute averages for 1 Year. 5 of the turbines are relatively healthy, the other 5 have known issues. It could be a blade; it could be a gearbox; it could be something you would never expect…

Use the data set provided to:
- Identify the issues
- See if the turbines are under or over performing
- Calculate Capacity Factor
- Calculate Time Based Availability
- Calculate Production Based Availability
- Get creative, see what else can be discovered in the data

Key parameters to get you started:
- Wind Speed
- Power (output)
- Rotor Speed
- State and Fault (current operational state of the turbine)
- Temperatures
- Vibrations
- Rotor Diameter is 127m for tip speed calculations
- Hub Height is approximately 90m

Data

A location containing all data will be made available by OHI/O

The data will be made available on the day of the challenge.

Prize: **Up to four $250 Amazon Gift Card**

Judging Criteria:

a) Originality - Does it do something entirely novel, or at least take a fresh approach to an old problem?

b) Execution - Is the application usable in its current state? Is the user experience smooth? Does everything appear to work? Is it well designed?

c) Usefulness - Is the application practical? Is it something people would actually use? Does it fulfill a real need people have? Did it produce new and useful data?

d) Presentation - How well was the project presented? Did it make the application more compelling? Did it give a good idea of its purpose?

e) Learning - Did the team stretch themselves? Did they try to learn something new? What kind of projects have they worked on before?