NOVEMBER 2022

Aggregating data with AVEVA™ Data Hub asset rules and data views for analytics and applications

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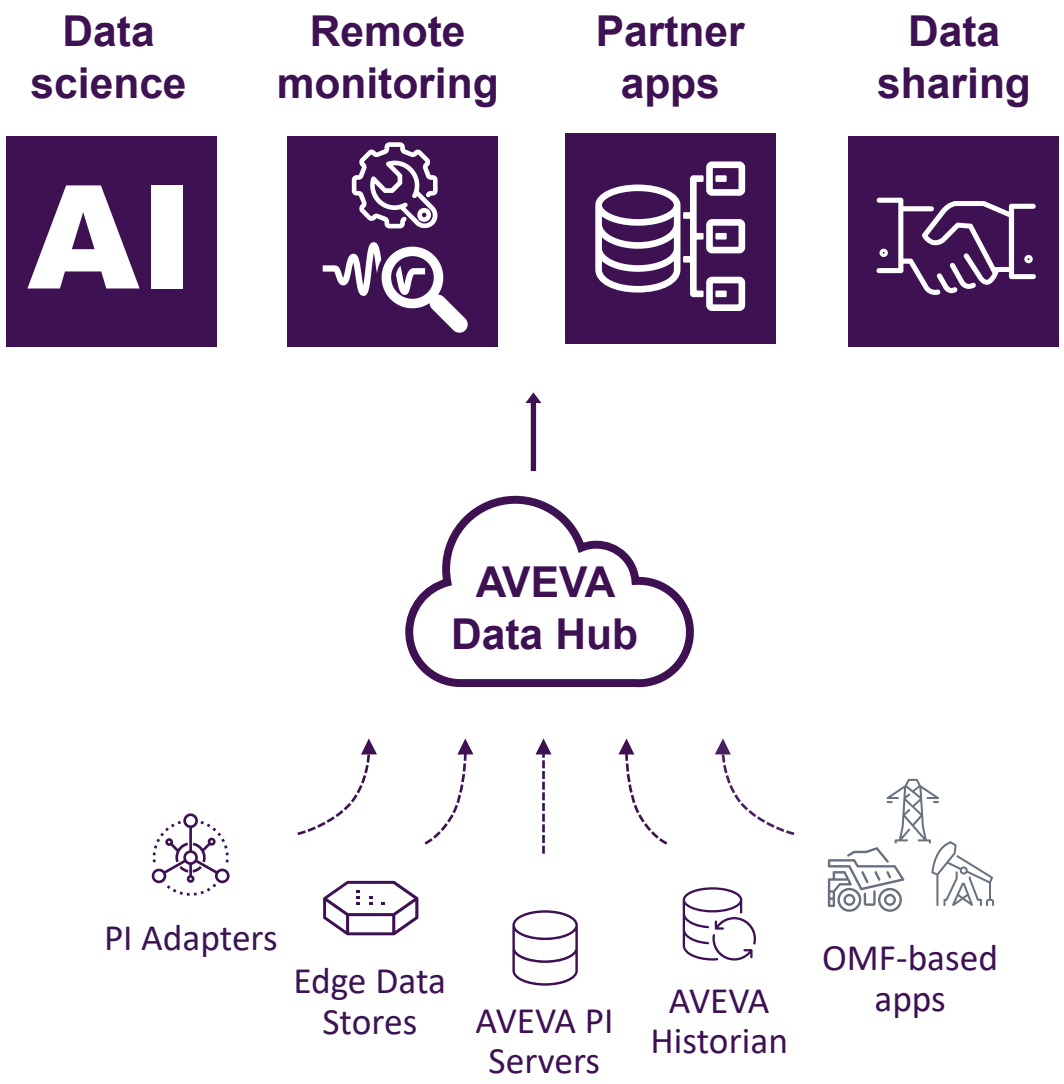
Agenda

- Overview – AVEVA Data Hub
- AVEVA Data Hub for Machine Learning
- Capabilities
- Demo
- Customer Success Story
- Summary



Cloud-native industrial platform designed for real-time operations

Managed, secure, multi-tenant platform

Operated & maintained by AVEVA

High speed, scalable, elastic, & resilient

Modern, secure REST APIs

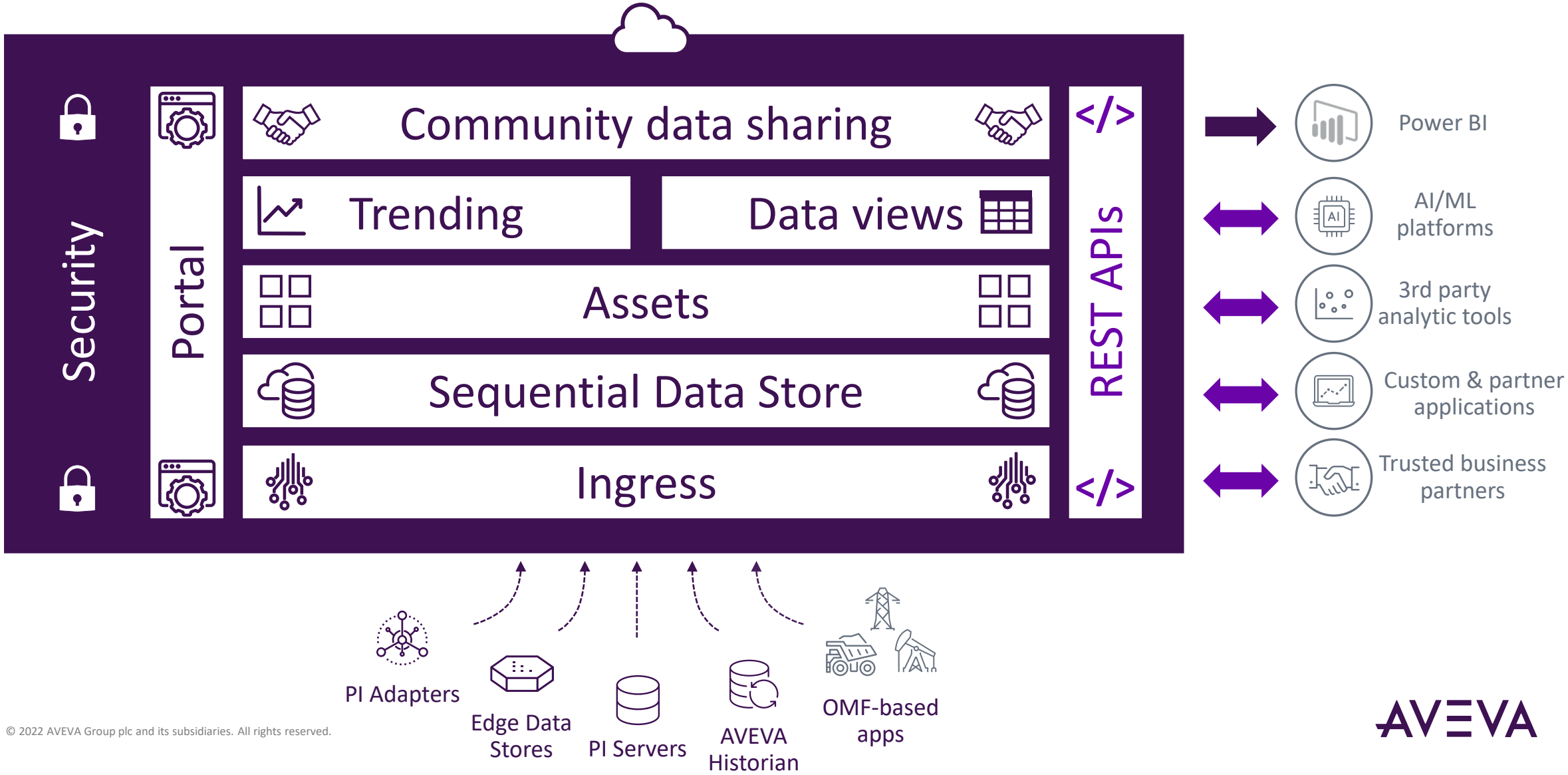
Built & deployed on Microsoft Azure

Why AVEVA Data Hub?

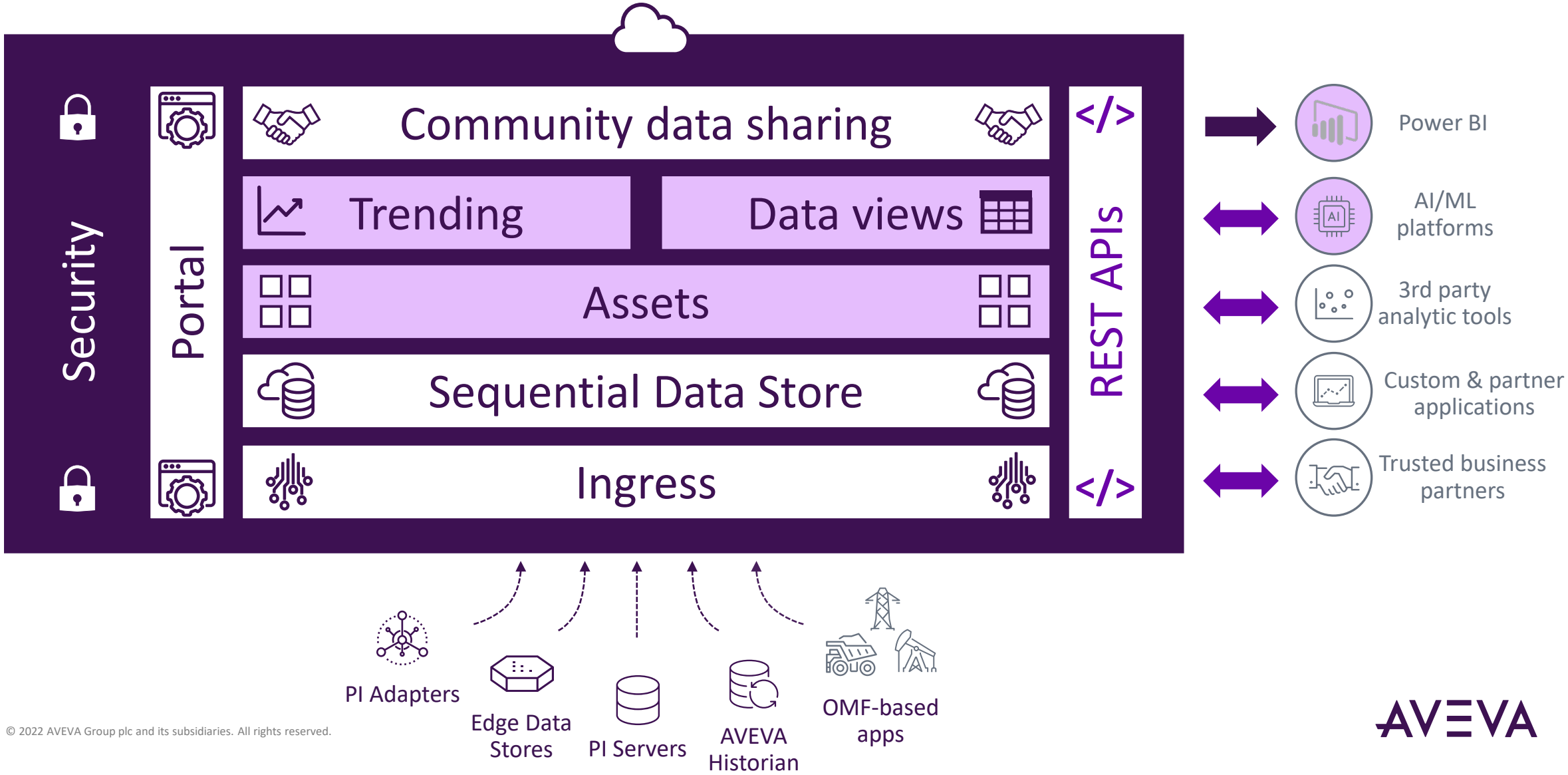
For Data Science/Machine Learning Projects

- Platform as a Service – Zero Maintenance
- Contextualization at Scale
- Data Science-Ready
- REST API

AVEVA Data Hub Capabilities

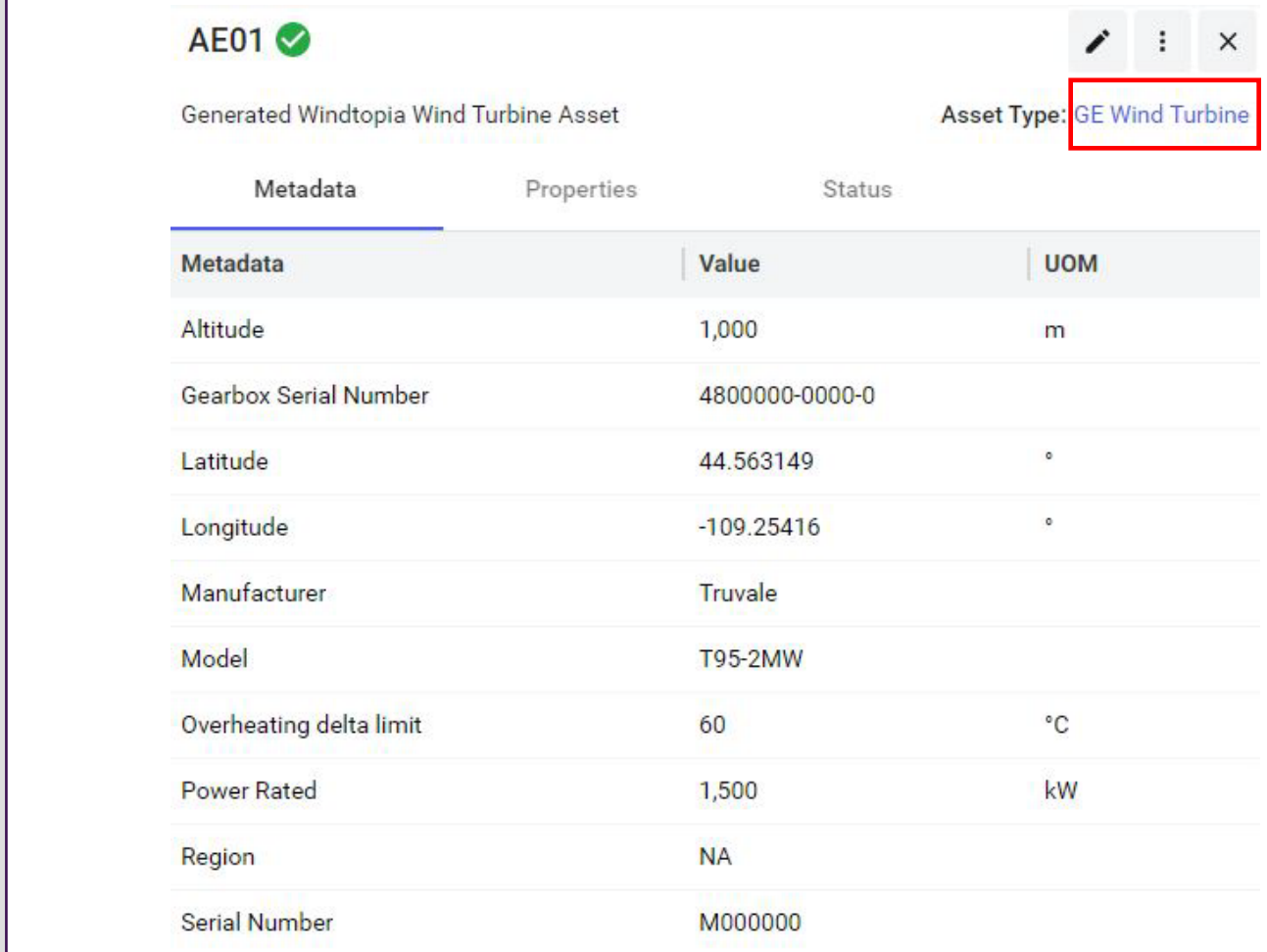


AVEVA Data Hub Capabilities



Assets give useful context to your data streams

Assets



- **Static metadata** (Region: North America, Wind farm: Big Buffalo Wind Farm, Asset Type: GE Wind Turbine, Manufacturer: Truvale, …)

Assets give useful context to your data streams

Assets

AE01

Generated Windtopia Wind Turbine Asset

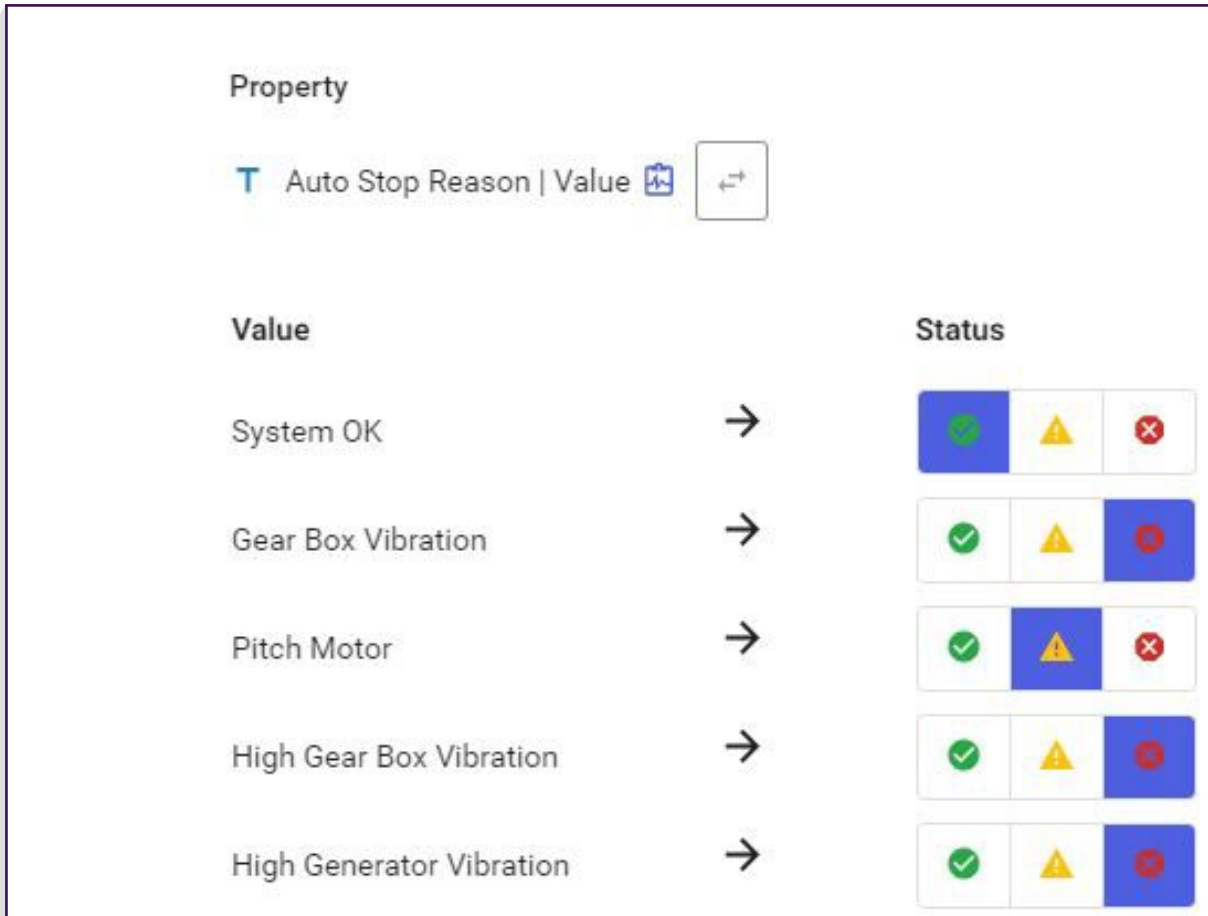
Metadata | Properties | Status

Property	Last Value	UOM	Timestamp
Auto Stop Reason	4.000		10/17/22, 7:10 AM
Apparent Power	1,514.068		10/17/22, 11:14 AM
Revenue - Daily	266.340		10/17/22, 11:03 AM
Expected Power - 10 min rolling avg	1,500.011		10/17/22, 11:09 AM
Energy Production - Monthly	266.981		10/17/22, 11:03 AM
Revenue Rate	53.246		10/17/22, 11:14 AM
Wind Deviation 1s	-27.461	°	10/17/22, 11:14 AM
Wind Deviation 10s	-10.698	°	10/17/22, 11:13 AM
Wind Speed	14.415	m/s2	10/17/22, 11:14 AM

- **Static metadata** (Region: North America, Wind farm: Big Buffalo Wind Farm, Asset Type: GE Wind Turbine, Manufacturer: Truvale, …)
- **Stream reference properties** (Active power, expected power, operating state, etc.)

Assets give useful context to your data streams

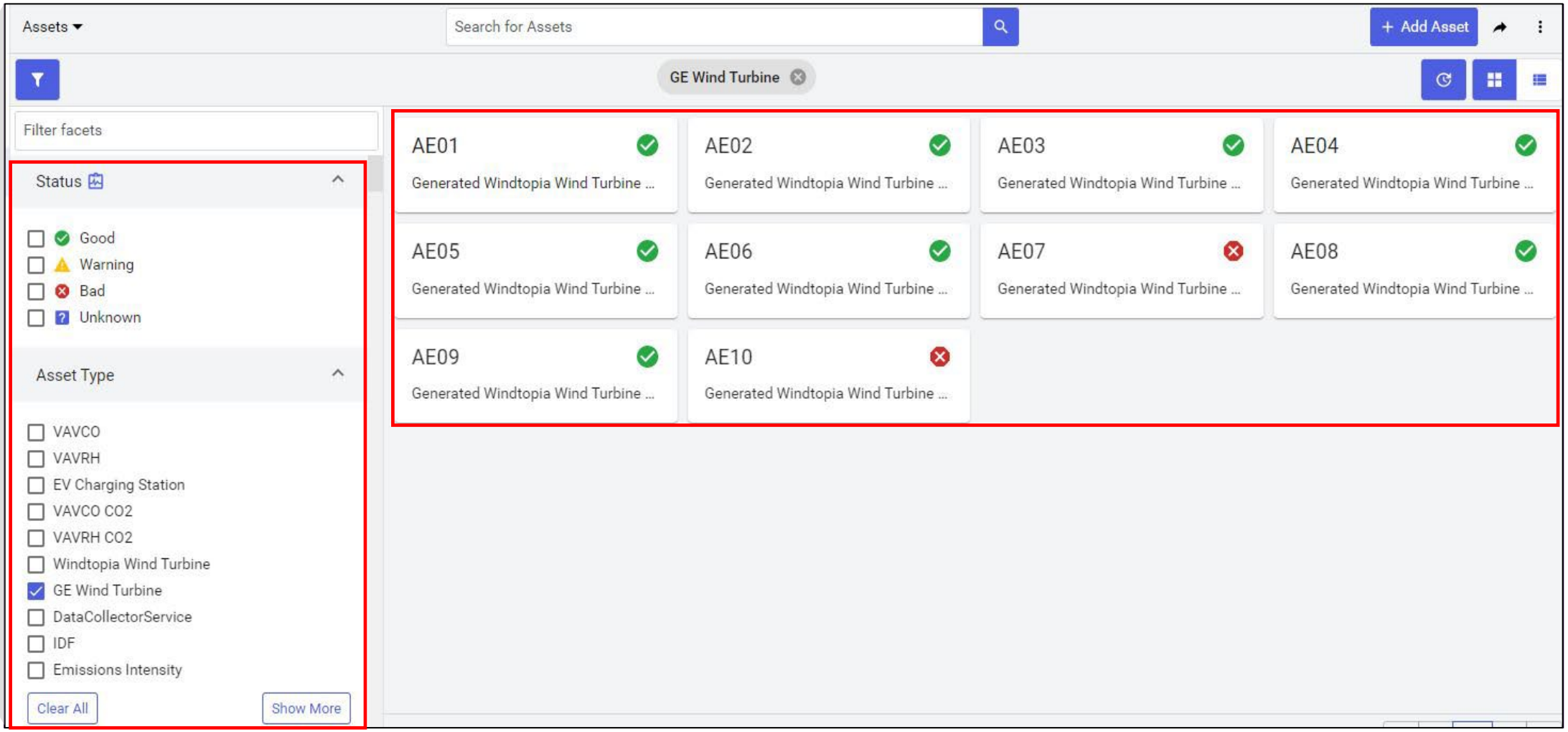
Assets



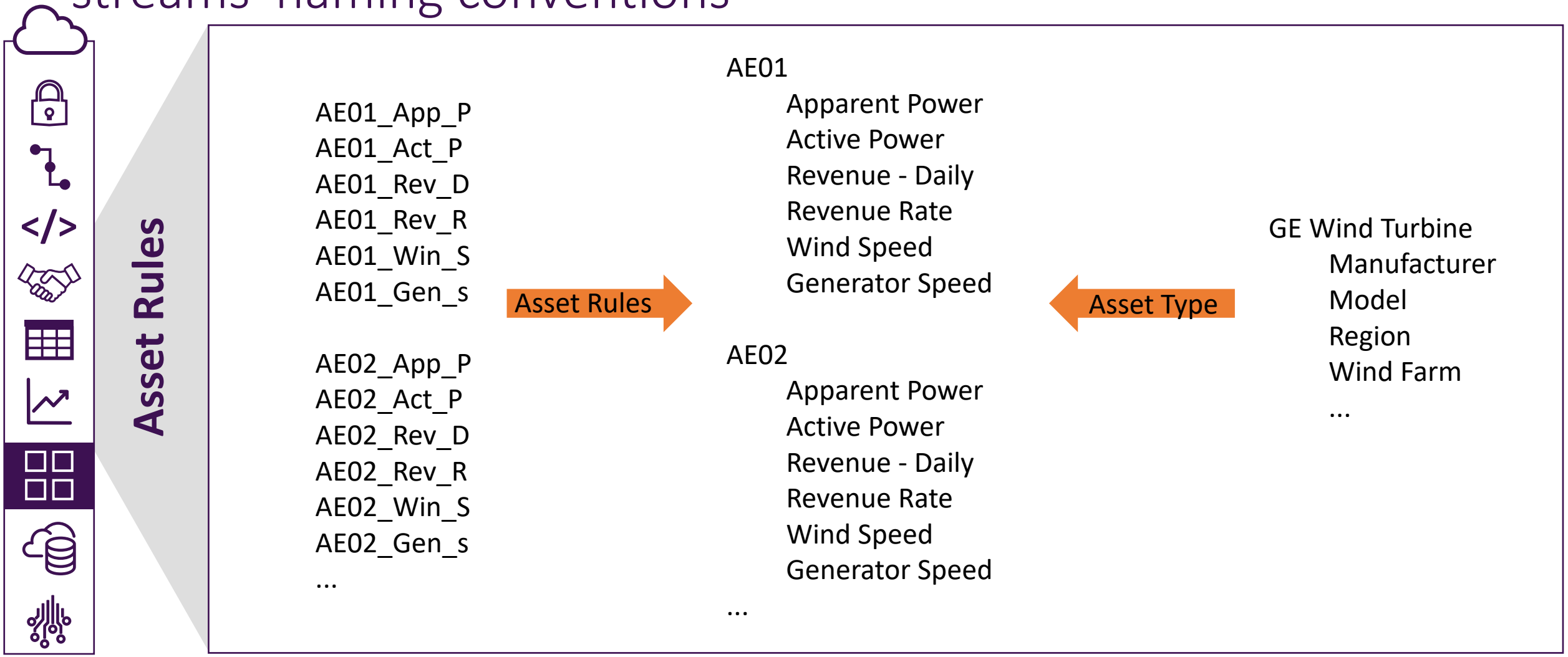
- **Static metadata** (Region: North America, Wind farm: Big Buffalo Wind Farm, Asset Type: GE Wind Turbine, Manufacturer: Truvale, …)
- **Stream reference properties** (Active power, expected power, operating state, etc.)
- **Asset status** (stream property values mapped to status: good, warning, bad)

Asset status enables real-time monitoring

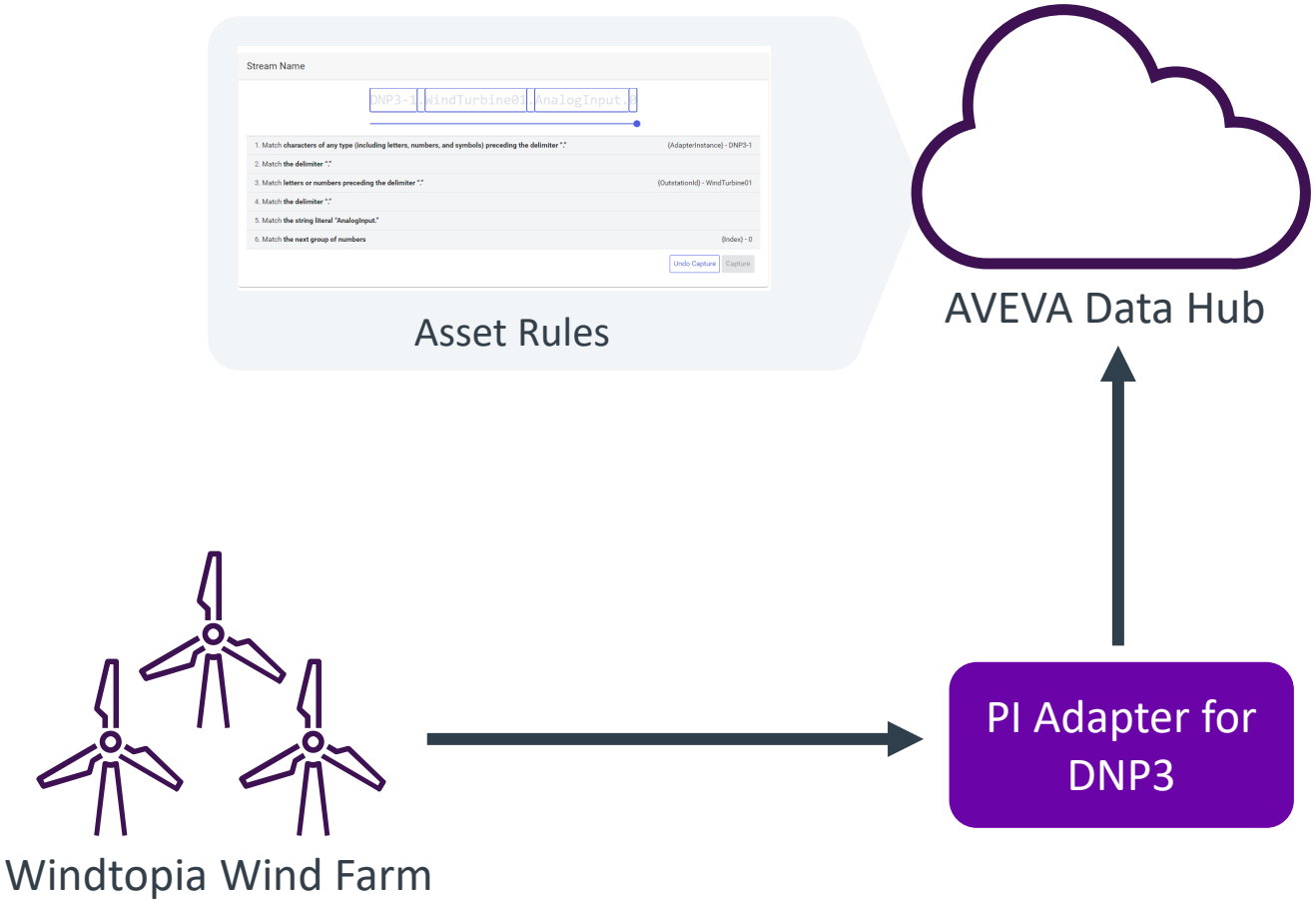
Assets



Assets rules automatically create/update assets based on streams' naming conventions



Demo

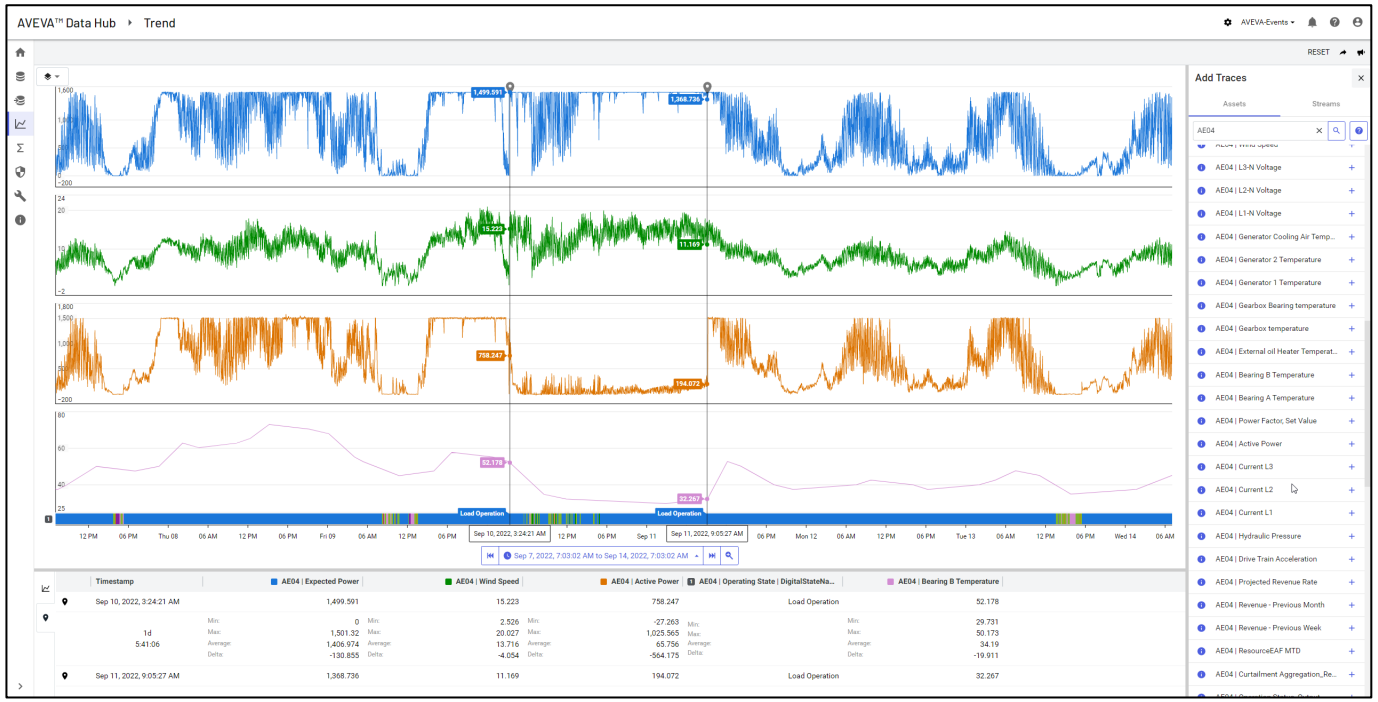


Visual trending enables asset root cause analysis & investigations

Trending

- ✓ Stream & asset search
- ✓ Common trend interactions
- ✓ Stacked trends
- ✓ Trend summary calcs
- ✓ Min/max easy cursors
- ✓ Multiple cursor delta summary calcs
- ✓ Trend sharing
- ✓ URL parameters
- ✓ String & Enum trending
- ✓ Seamless contextual navigation from Asset Explorer
- ✓ Trending asset properties
- ✓ Asset swapping
- ✓ Trending shared streams

Trending



Sharing with URL Parameters

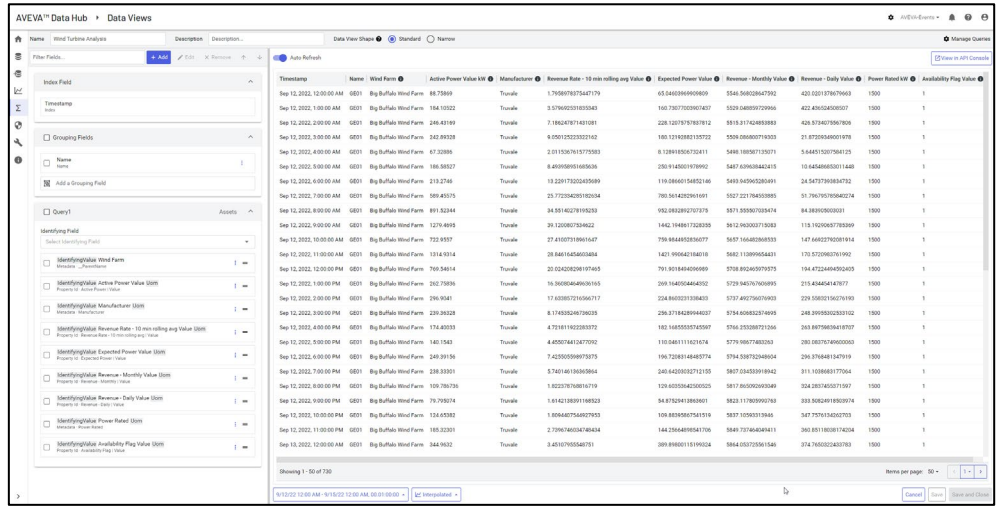
https://datahub.connect.aveva.com/tenant/cee3a3fd-aeb2-4950-80f5-4b72c77322b1/trend?origin=1;cee3a3fd-aeb2-4950-80f5-4b72c77322b1;uswe.datahub.connect.aveva.com;ed809cce-0e64-446f-a4c3-ada80bcf3367&trace=a;1;d68f33a8-0bc8-43a6-a9b4-9aadd041ed1f;Expected%2520Power;Value;%25231A76D9&trace=a;1;d68f33a8-0bc8-43a6-a9b4-9aadd041ed1f;Wind%2520Speed;Value;%2523008A00&trace=a;1;d68f33a8-0bc8-43a6-a9b4-9aadd041ed1f;Active%2520Power;Value;%2523DC7300&trace=a;1;d68f33a8-0bc8-43a6-a9b4-9aadd041ed1f;Operating%2520State;DigitalStateName&trace=a;1;d68f33a8-0bc8-43a6-a9b4-9aadd041ed1f;Bearing%2520B%2520Temperature;Value;%2523D28CD2&mode=stacked&cursor=2022-09-10T07:24:21.797Z&cursor=2022-09-11T13:05:27.127Z&selectedTrace=null;&startIndex=2022-09-07T11:03:02.714Z&endIndex=2022-09-14T11:03:02.715Z

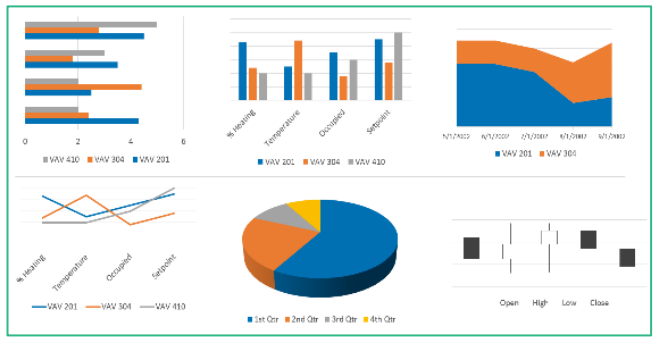
Data Views curate operational data for external consumption

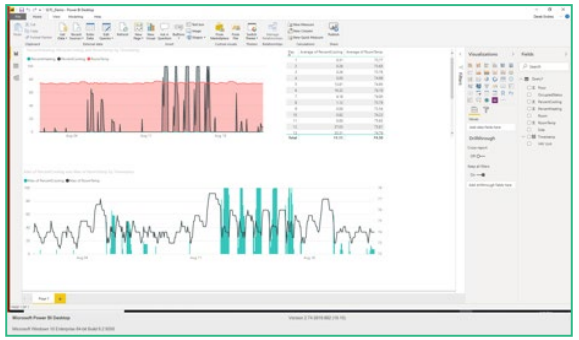
Data Views

Enabling data exploration, integration, & data science

Data View







Data Science Tools & Data Exploration

Data Science via Code

Partners & Apps

Cloud Platforms

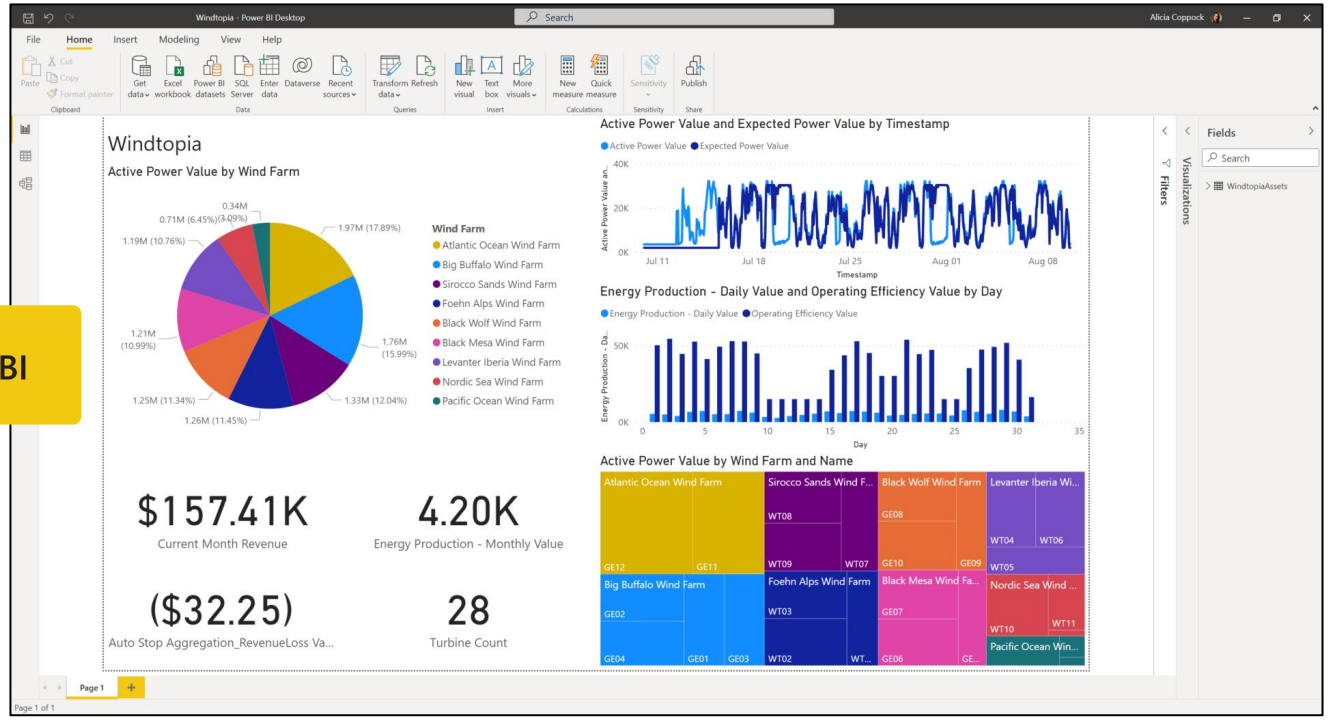
Easily slice & dice your AVEVA Data Hub data in Power BI

Power BI Connector

AVEVA Data Hub Power BI Connector

AVEVA Data Hub Data Views

Power BI

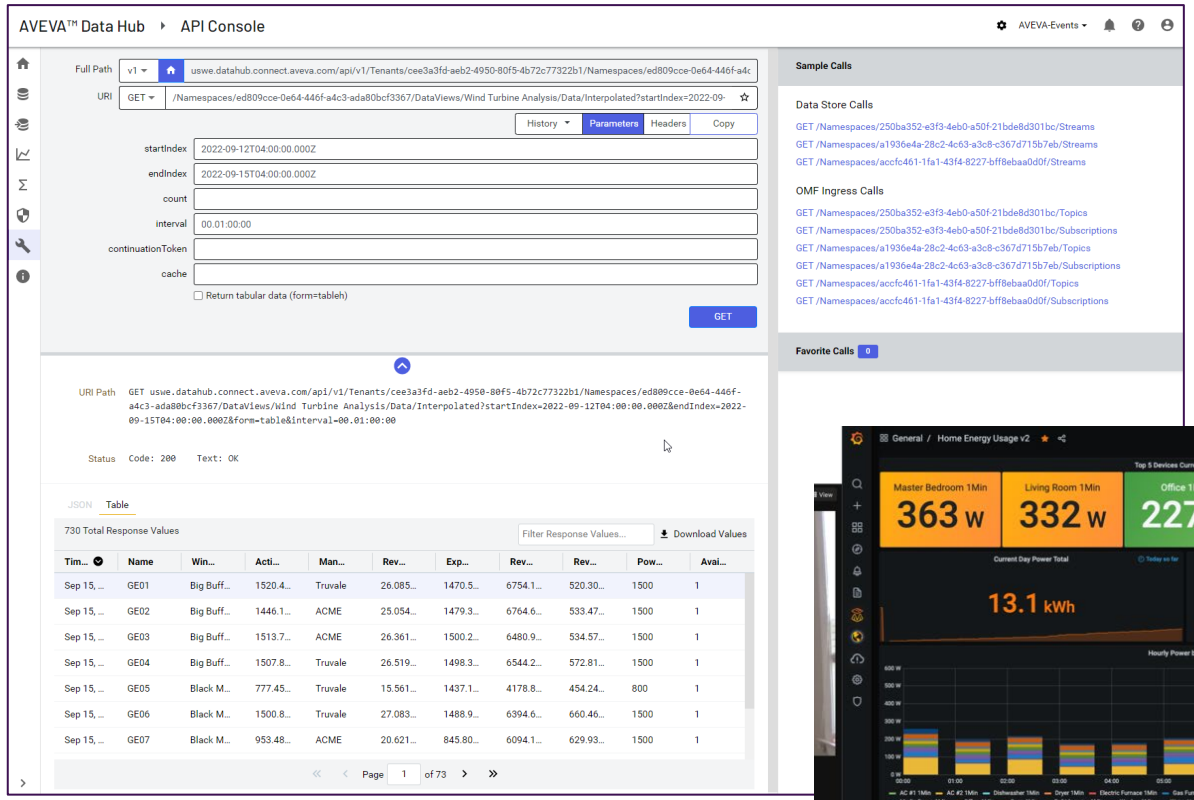


- ✓ Import AVEVA Data Hub Data Views into Power BI
- ✓ Stored & Interpolated retrieval modes
- ✓ No coding required
- ✓ Power BI Desktop and Power BI Service (through On-Premises Data Gateway)

Data Hub API Documentation: https://docs.osisoft.com/bundle/data-hub/page/api-reference/ocs-api-reference.html

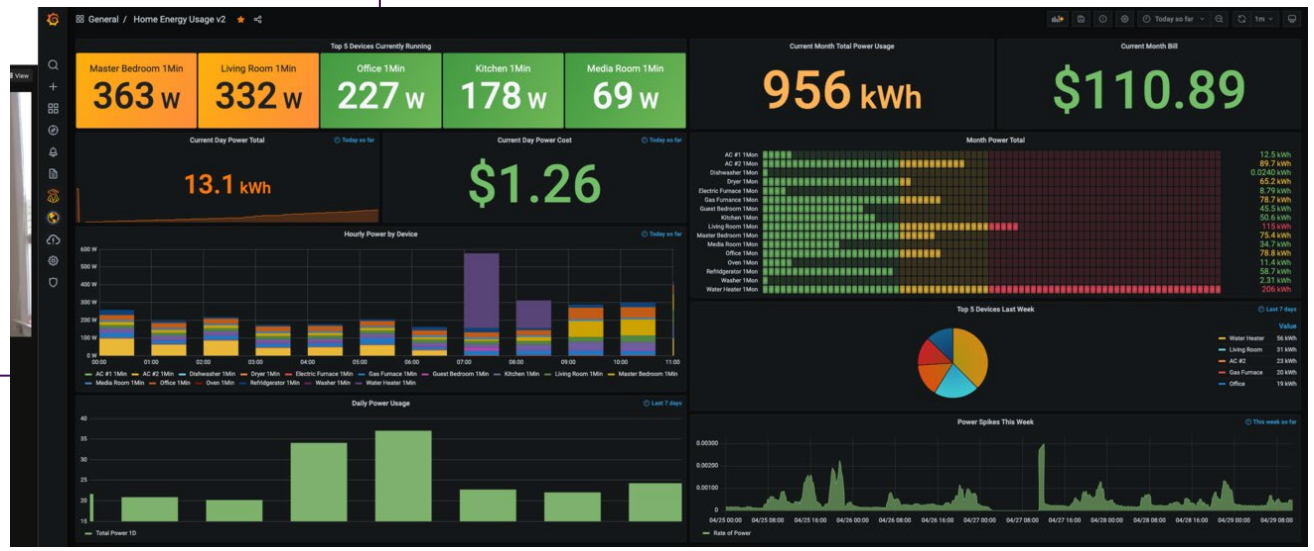
Modern REST API to enable your applications

REST API

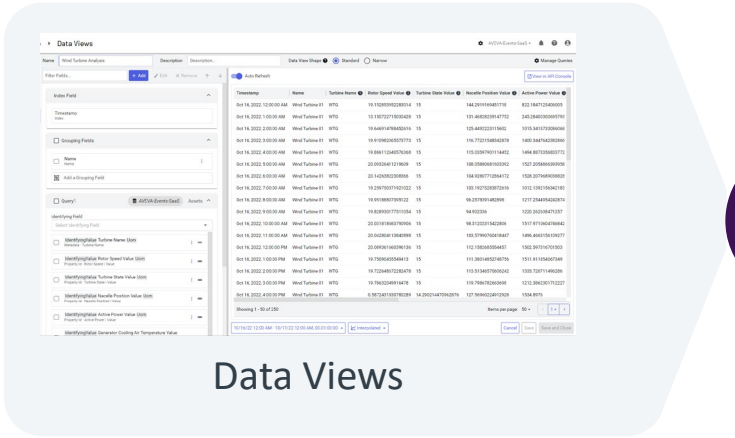


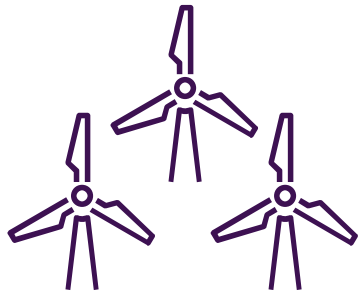
C#
Python
Java
NodeJS
Angular

https://github.com/osisoft



Demo





PI Adapter for DNP3

Data Hub

datahub.connect.aveva.com/tenant/cee3a3fd-aeb2-4950-80f5-4b72c77322b1/data-views?id=Wind%20Turbine%20Analysis&nid=250ba352-e3f3-4eb0-a50f-21bde8d301bc

AVEVA™ Data Hub ▸ Data Views

AVEVA-Events-SaaS

- Home
- Data Management
- Data Collection
- Visualization
- Analytics
- Security
- Developer Tools
- Support

COLLAPSE

Retrieve Data Views in Microsoft Power BI for advanced data visualization and analysis: Download Power BI Connector

Filter Data Views...

+ Add Data View

Id	Name	Description	Query Sources
Wind Turbine Analysis	Wind Turbine Analysis		AVEVA-Events-SaaS

Showing 1 - 1 of 1

Items per page: 50

1

Wind Turbine Analysis

Id
Wind Turbine Analysis

Name
Wind Turbine Analysis

Shape
Standard

API URL
https://uswe.datahub.connect.aveva.com/api/v1/Tenants/cee3a3fd-aeb2-4950-80f5-4b72c77322b1/Namespaces/250ba352-e3f3-4eb0-a50f-21bde8d301bc/DataViews/Wind%20Turbine%20Analysis

Queries

Query1 — AVEVA-Events-SaaS — Assets

Query Value
assetTypeName:"DNP3 Windtopia Wind Turbine"

Fields

IdentifyingValue Turbine Name Uom
Metadata · Turbine Name

IdentifyingValue Rotor Speed Value Uom
Property Id · Rotor Speed | Value

IdentifyingValue Turbine State Value Uom
Property Id · Turbine State | Value

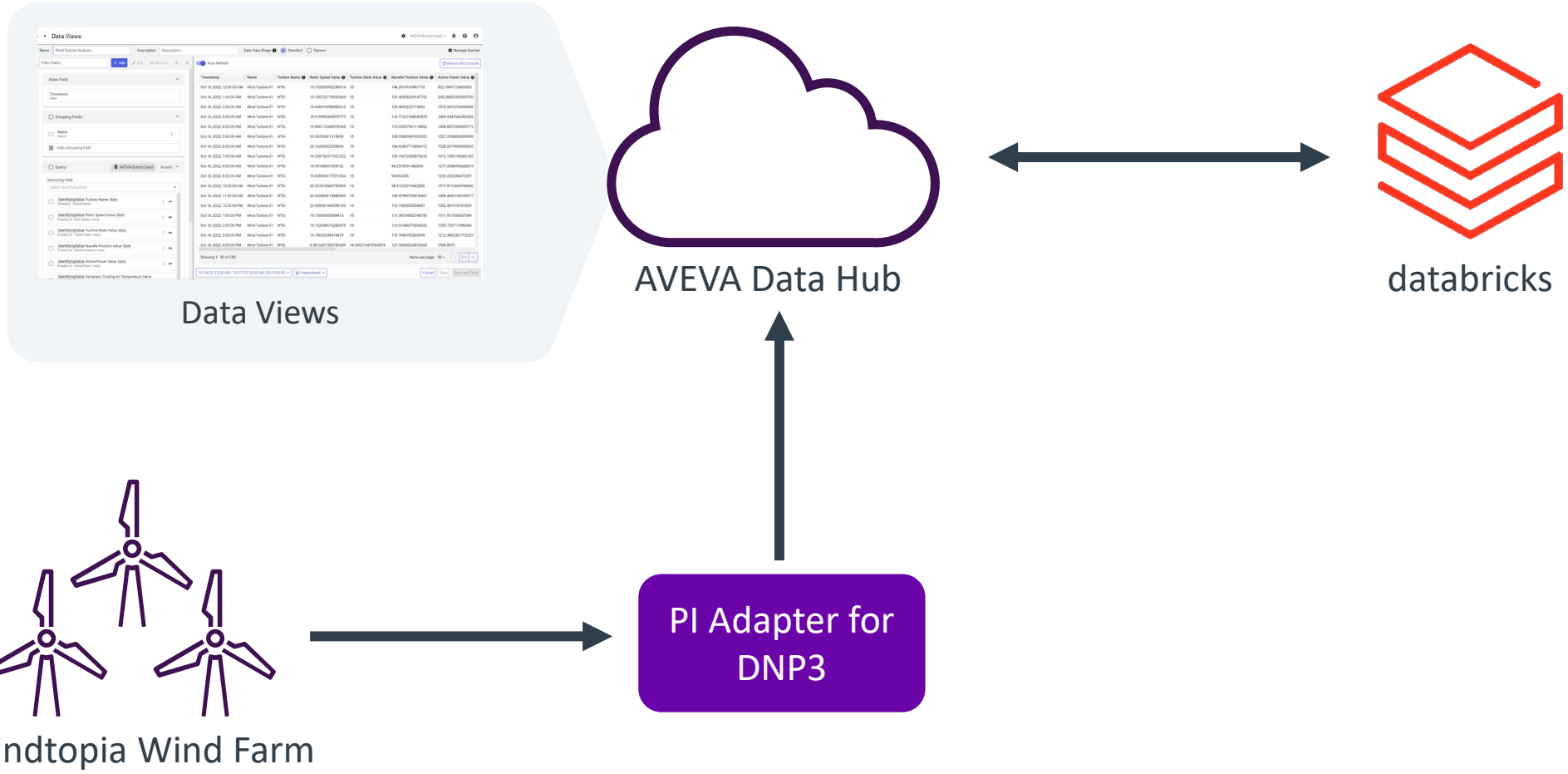
IdentifyingValue Nacelle Position Value Uom
Property Id · Nacelle Position | Value

IdentifyingValue Active Power Value Uom
Property Id · Active Power | Value

IdentifyingValue Generator Cooling Air Temperature Value Uom
Property Id · Generator Cooling Air Temperature | Value

IdentifyingValue Wind Speed Value Uom

Demo



AVEVA DATA HUB

Customer Success Story

Machine Learning Using AVEVA PI System Data w/ AVEVA Data Hub

drax

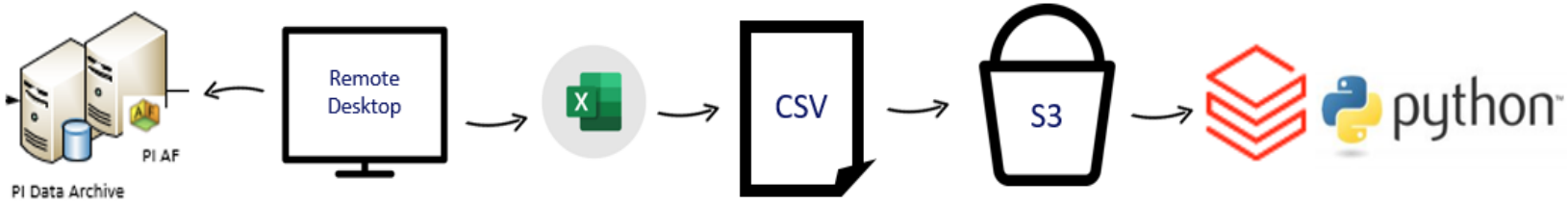
Minimizing downtime with smart maintenance

Challenge

- ‘Gas in Coolant’ leaks can cause unpredicted downtime, resulting in significant loss per incident.
- Generators are taken out for service too early due to lack of visibility of generator defects.
- Fuel mill blockages impose significant cost of outages & repairs.
- No tools available to work with live data on predictive functionalities.

AVEVA

From…



- Remote desktop used to access Drax systems
- PI Datalink on remote machine used to pull data into CSV
- CSV saved on Sharepoint
- CSV downloaded locally
- CSV uploaded to S3
- CSV now accessible from S3 and usable in Databricks

Entire process takes a **minimum of 30 minutes** much longer for large data pulls (repeated often).

drax

Minimizing downtime with smart maintenance

Challenge

- ‘Gas in Coolant’ leaks can cause unpredicted downtime, resulting in significant loss per incident.
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Solution

- Lighthouse: deploy AVEVA Data Hub as a cloud data platform to make PI data available to Drax’s data science teams & tools - automated and at scale. (was a manual workload for small data sets before)
- Enables predictive analytics on historical and fresh data.
- Calculate lead time predictions for Generator ‘Gas in Coolant’ leaks as well as for Fuel Mill blockages, to enable longer service times (postpone maintenance based on data).

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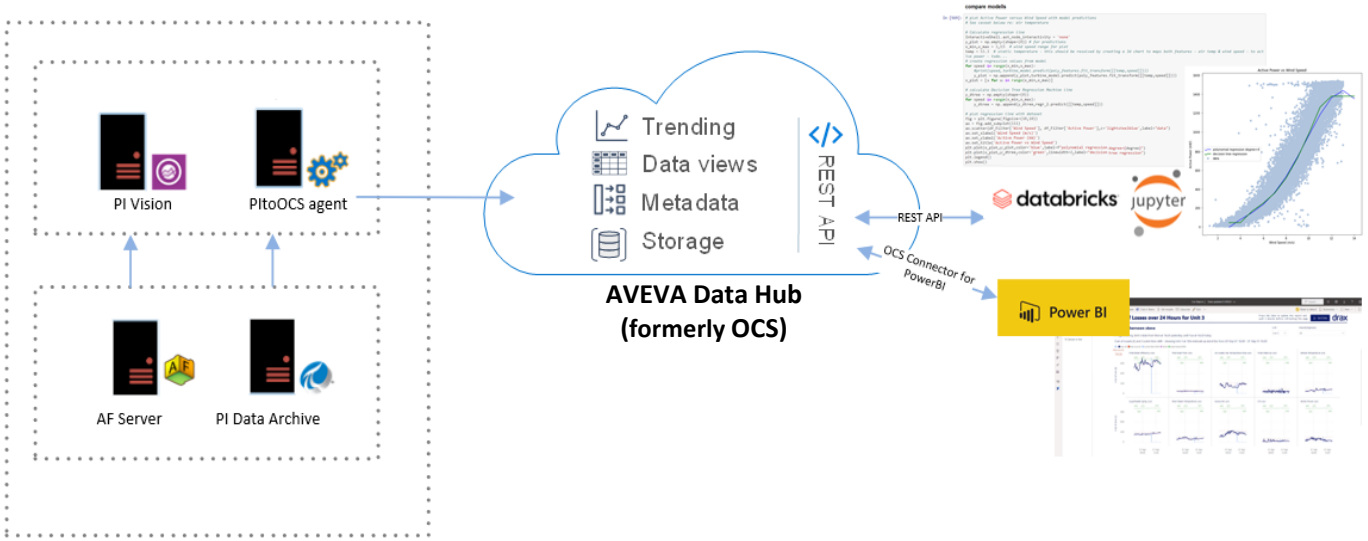
To: AVEVA Data Hub greatly improves Drax's Data Pipeline

The Data Science team can now access PI Data from Databricks, Drax's chosen Data Science platform.



- Data ingested from AVEVA PI System by AVEVA Data Hub agent
- Data Views to prep data
- AVEVA Data Hub Rest API queried from Databricks notebook
- Small repeated queries made to Data Hub using Databricks for close to live data
- Large queries made to Data Hub and saved to S3 for repeated use (Large data set for training ML models)

drax

Minimizing downtime with smart maintenance

Challenge → Solution → Benefits

- ‘Gas in Coolant’ leaks can cause unpredicted downtime, resulting in significant loss per incident.
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- Enables predictive analytics on historical and fresh data.
- Calculate lead time predictions for Generator ‘Gas in Coolant’ leaks as well as for Fuel Mill blockages, to enable longer service times (postpone maintenance based on data).

- Outages can be avoided, service times prolonged and repairs planned more efficiently. Significant savings per day due to maintenance reduction, and production output de-risked through analytics driven alarms and improved dome scheduling.
- Standardized, off the shelf SAAS environment to enable data science scenarios at scale - without impacting on-premise operations systems.
  This solution is now available to enable more use cases and business value.

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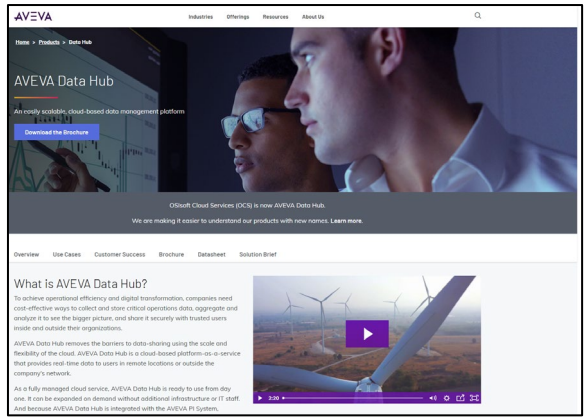
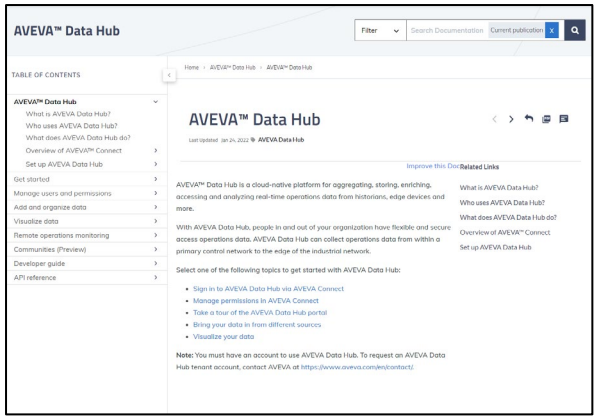
Where to find more information on AVEVA Data Hub

Overview & Resources



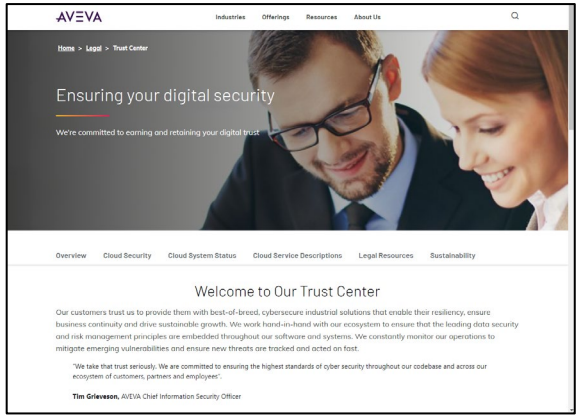
https://www.aveva.com/en/products/data-hub/

Documentation



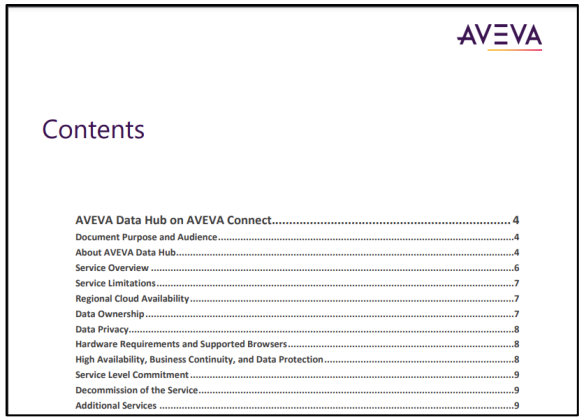
https://docs.osisoft.com/bundle/data-hub/page/adh-content-portal-overview.html

Security & Trust Center



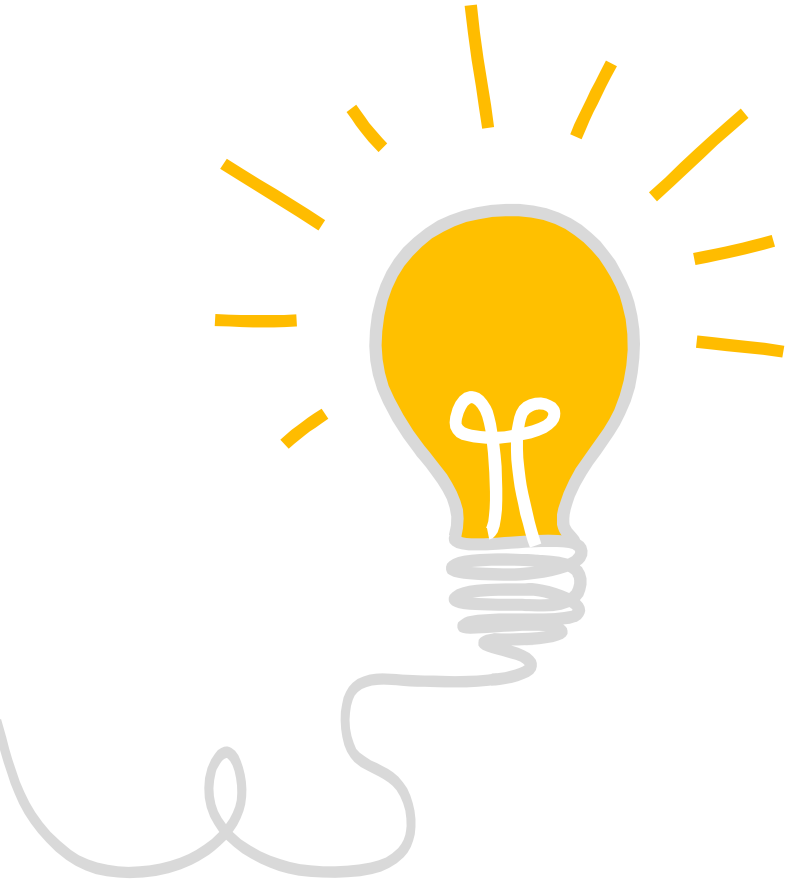
https://www.aveva.com/en/legal/trust/

Service Description



https://www.aveva.com/content/dam/aveva/documents/legal/service-documents/AVEVA-Data-Hub-on-AVEVA-Connect_v1-0.pdf

How can you influence the AVEVA Data Hub roadmap?



https://feedback.aveva.com

Let us know your product feedback!

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Collin Bardini

Sr. Software Developer, Product Readiness Guild

- AVEVA
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Questions?

Please wait for the microphone

State your name and company

Please remember to…

Navigate to this session in the mobile app to complete the survey.

Thank you

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ABOUT AVEVA

AVEVA is a global leader in industrial software, sparking ingenuity to drive responsible use of the world's resources. The company's secure industrial cloud platform and applications enable businesses to harness the power of their information and improve collaboration with customers, suppliers and partners.

Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. With operations around the globe, we are headquartered in Cambridge, UK and listed on the London Stock Exchange's FTSE 100.

Learn more at www.aveva.com

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