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Delivering Value from Operations Optimization with Hybrid Intelligence

SUBTITLE

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Radix

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Agenda

- Who is Radix?

- Operations Optimization with Hybrid Intelligence

- Renewables Performance & Availability Optimization

- Midstream Operations & Emissions Optimization

- Thermal Power Plant Production Optimization

- Key Takeaways and Industry Outlook

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WHO IS RADIX?

Radix is a global, technology solutions company delivering the most innovative industrial solutions to scale and accelerate your transformation journey as life-long partners turning challenges into opportunities.

155+	**3,625+**	**1500+**	**30+**
Valued Customers	Unique Projects	Dedicated Team Members	Countries Worldwide

A Committed Partner with 30+ years of Industrial & Engineering technology expertise providing opportunities for universal access to solve real-world challenges, while making an impact.

Radix has a strong global presence with a multidisciplinary team of industry leaders, which include 100+ data scientists, 500+ engineers, and 400+ technology, industry experts.

Stacked with the best-in-class partnerships focused on sustainability & profitability impact.

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Operations Optimization with Hybrid Intelligence

Why Hybrid Intelligence is the most valuable approach

Improved Performance	**Robustness and Redundancy**	**Data Efficiency**	**Interpretability**
• Leverage the strengths of different AI techniques. • First principles models have very high accuracy in certain scenarios. • First principle and/or rules-based models have low processing latency, which may be required for industrial processes.	• A combination of AI models can increase the robustness of a system. • First principles models extrapolate better outside historical data range.	• Hybrid models may need less data when relying on first principles equations to provide overall behavior. • First principles equations may be used to fill in ranges where historical data is not available.	• By incorporating rule-based or First principles components, hybrid models can provide more interpretable results, helping engineers and operators understand why a particular decision was made.

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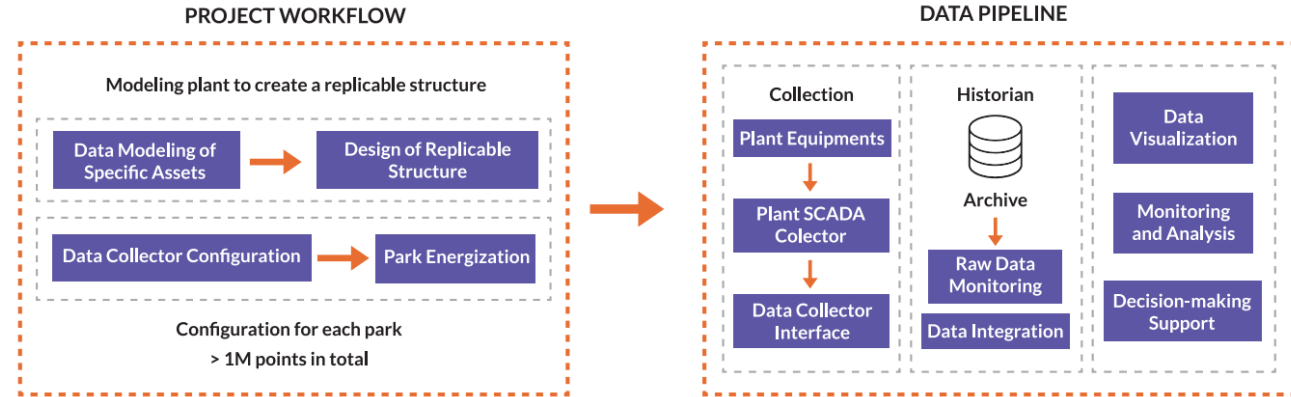# Renewables Performance & Availability Optimization

Challenges

- **Scale**: 1GWac Solar Plant with over 1MM Data Points
  - How to collect, monitor and analyze operations data efficiently
  - How to plan and execute field services optimally
- **Location**: Remote plant in arid environment
  - Limited field service team
  - Significant dust accumulation
- **Performance**: Low margins require exceptional cost control and production levels

# Renewables Performance & Availability Optimization

Solution

- Highly standardized and template-based asset modeling, analytics and visualization in AVEVA PI System

- Impact calculations and predictions to support field services planning and routing

- IoT sensors and Hybrid AI models to provide more accurate data at low cost

- Automated robotic solutions for dust and vegetation management

Renewables Performance & Availability Optimization

Results

- **4GW of energy loss avoided** due to string failures

- **25% increase in maintenance efficiency** through optimal routes based on distance vs. energy loss

- **10% recovery of energy lost** due to dirt and vegetation through demand-based cleaning methodology

- **Faster response time and more accurate actions** due to improved situation awareness and root cause analysis
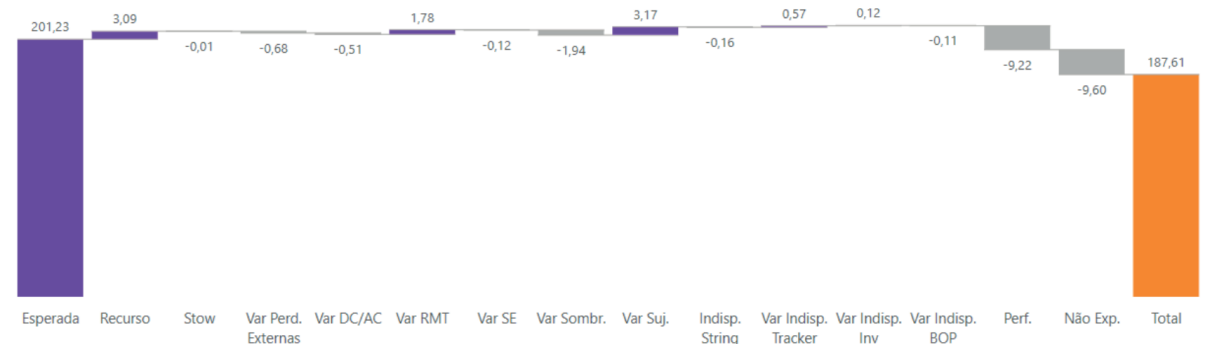
Waterfall chart of expected production vs current with breakdown of losses per category.

Midstream Operations & Emissions Optimization

Challenges

- **Seasonal & Dynamic Operations**

  - Throughput values significantly change throughout the seasons and even days or hours

  - High modeling complexity due to the large number of external variables that influence behavior

- **Regulations**

  - Emissions regulations framework is changing rapidly and anticipating changes are often necessary

- **Scale**

  - One of the largest pipelines system, which is distributed across great lengths
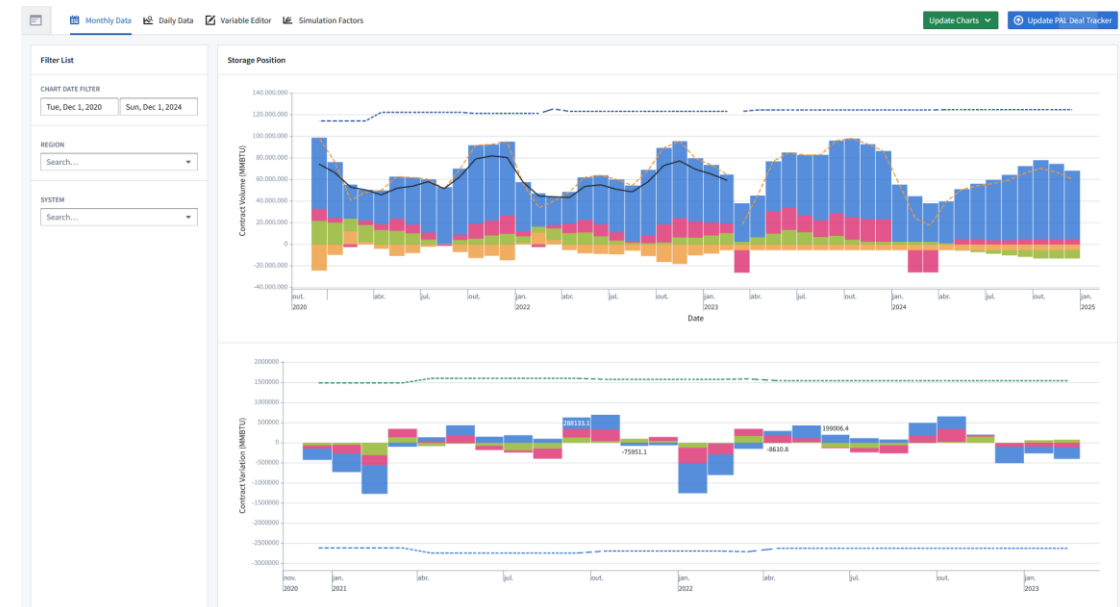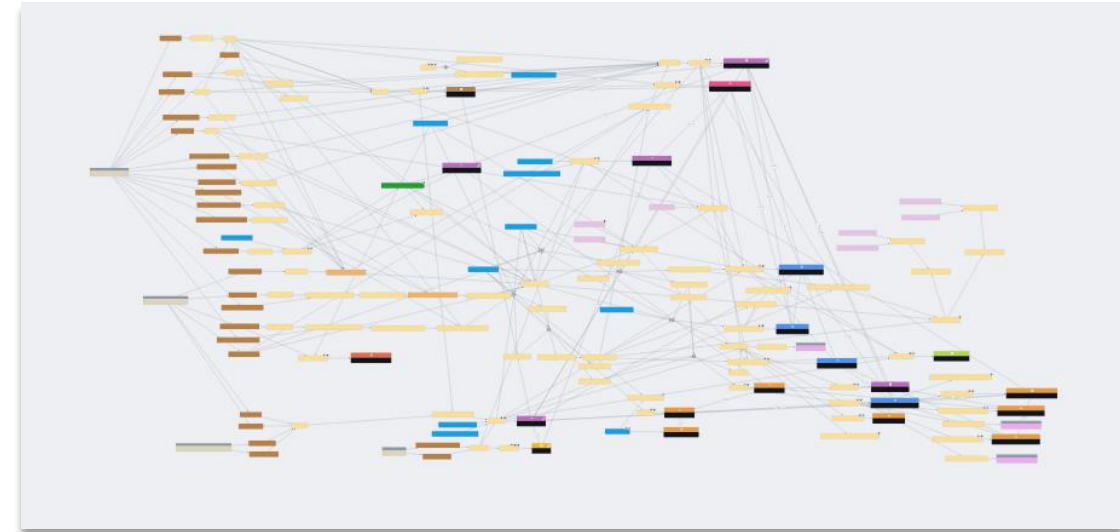
# Midstream Operations & Emissions Optimization

Solution

- AVEVA/SE SCADA System as main process data source

- Data Engineering Pipeline to transform operational data into Operations Intelligence

- Hybrid models leveraging first principles models, 3rd party data and historical data to forecast demand, storage levels, and emissions

- User simulated scenarios to analyze multiple possible changes and assess their combined impacts against company and regulation targets

- Multiple aggregation levels to deliver fast processing time with necessary granularity depending on the use case

Midstream Operations & Emissions Optimization

Results

- Improved revenues by enabling more spot market deals

- Storage & Gas Control optimization based on more accurate and visible data insights

- Enabled Economic-driven decision making for chemical usage

- Increased data quality due to instrumentation management application delivery

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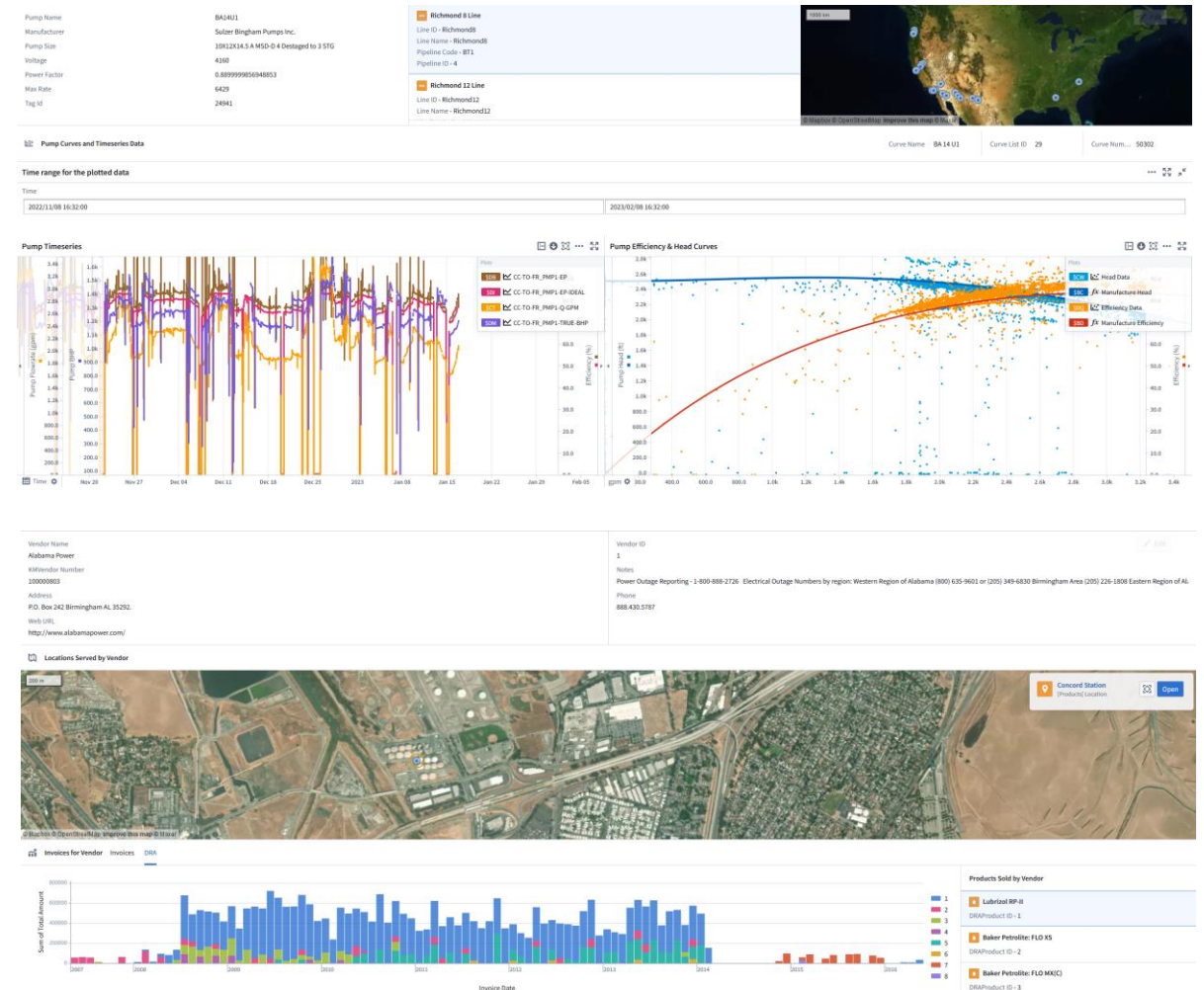
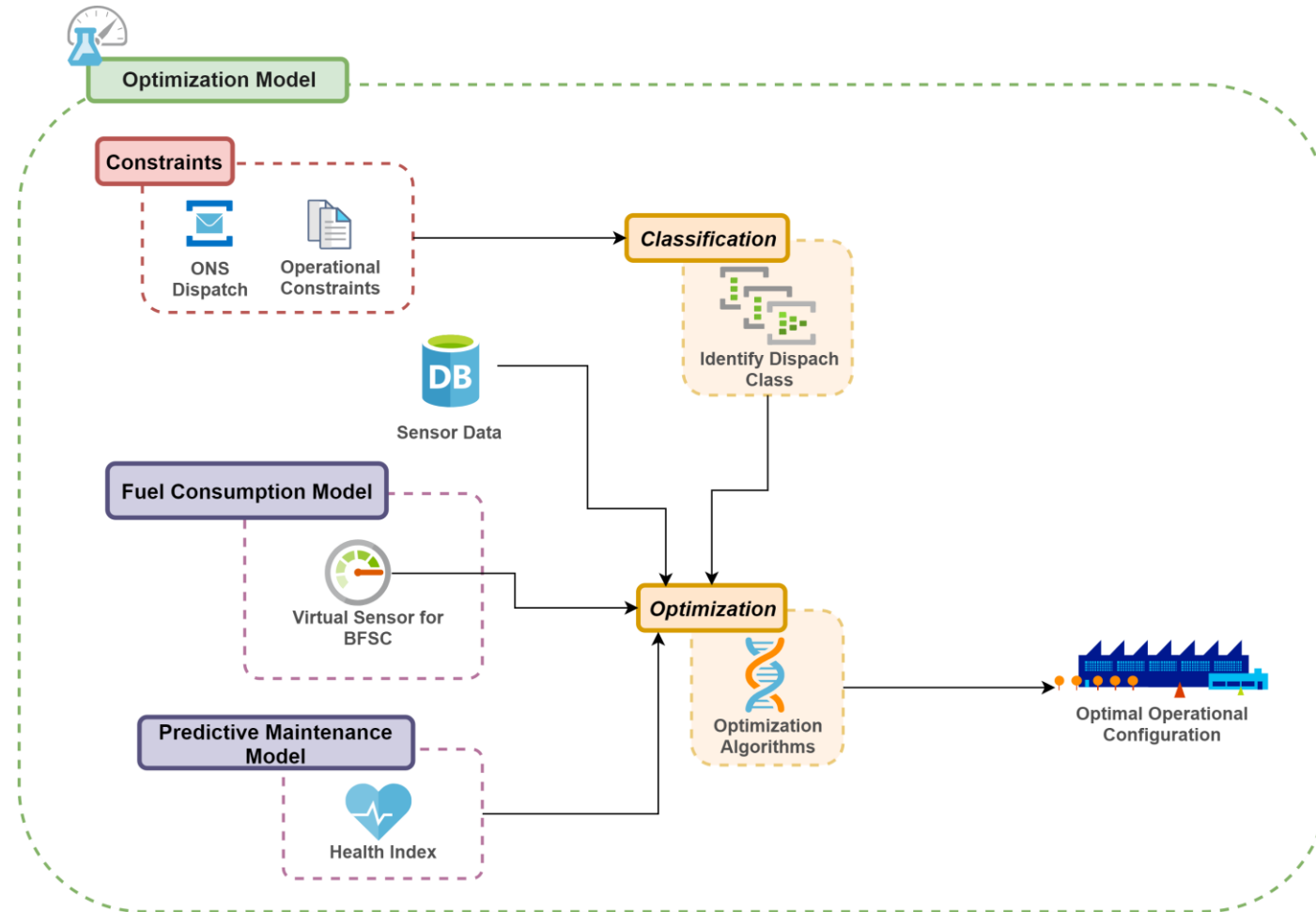# Thermal Power Plant Production Optimization

Challenges

- **Increase Production and Availability**

  - Critical infrastructure is required to be always available and perform on a high efficiency

- **Lack of data**

  - Missing instrumentation and relatively short amounts of historized data due to being a peaker plant

- **Maximize Asset Health**

  - Asset health should be monitored and considered during optimization to reduce maintenance costs

# Thermal Power Plant Production Optimization

Solution

- Virtual Sensor for Fuel Consumption estimate on most machines

- Asset Health Index score based on Digital Twin models for each asset component

- Hybrid Model for Performance Optimization across different segments of the equipment operational range

- Fuel Quality Estimator to consider specs change impacts on operations

- Multi-objective optimization funcion

Thermal Power Plant Production Optimization

Results

- 0.5% Revenue increase due to higher generation performance

- 84% accuracy in predicting equipment failure

- Individual equipment health and performance model

- Optimized operations configuration plan through the Advisory System
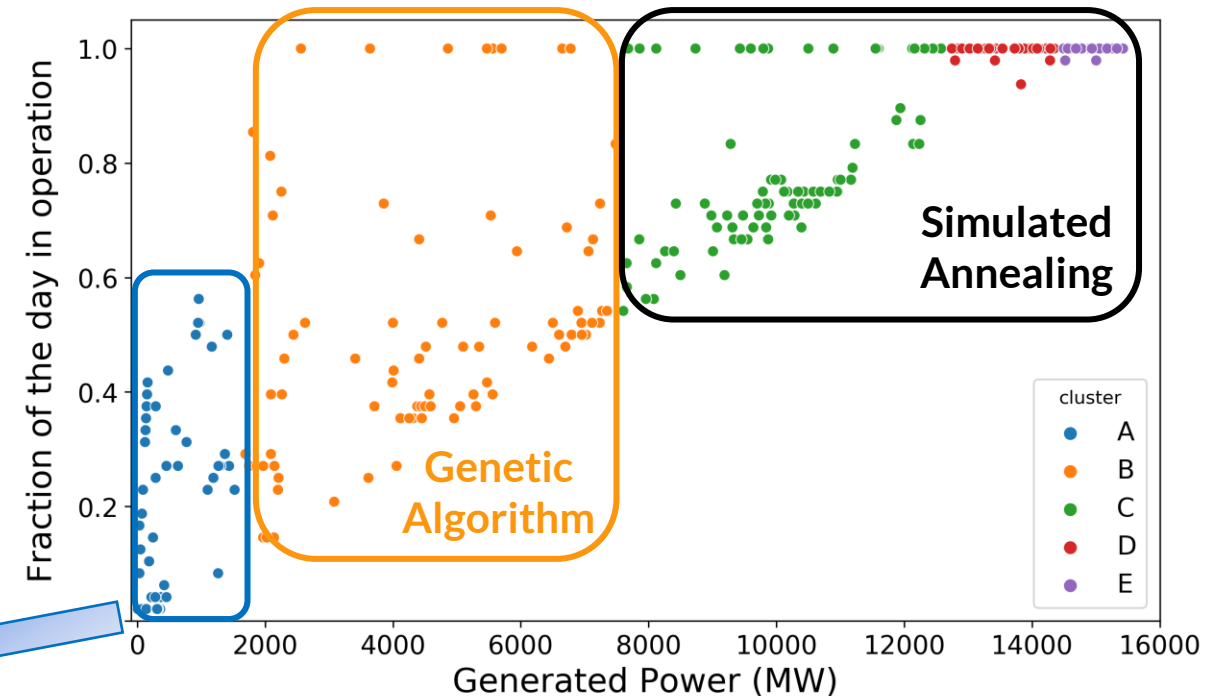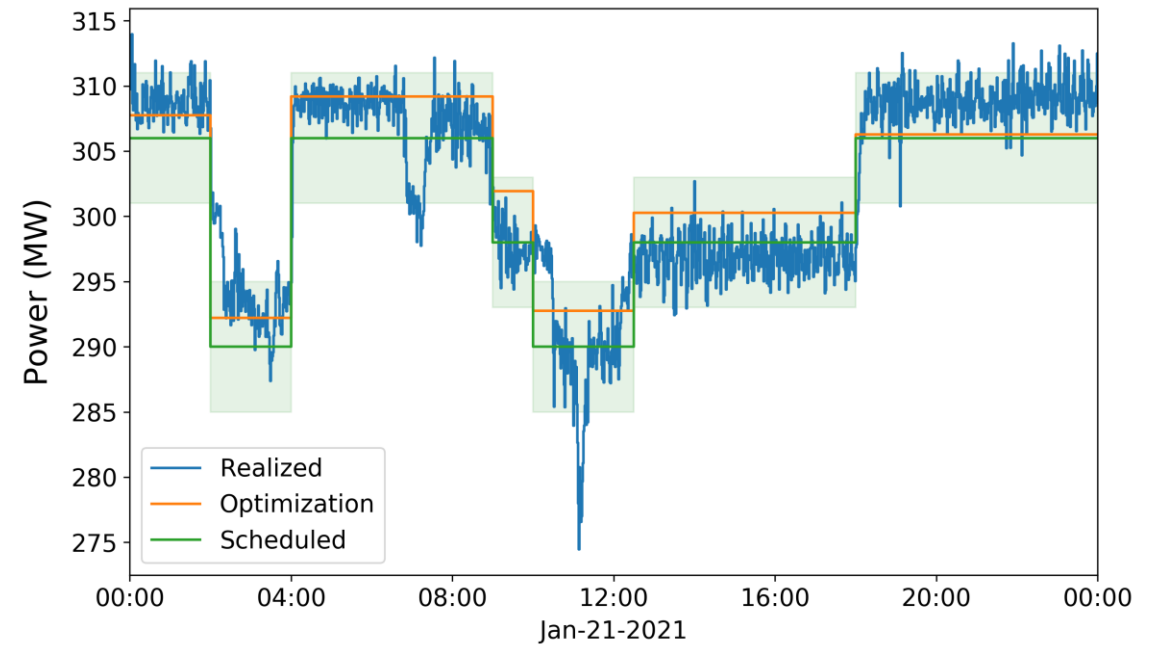
Key Takeaways

- Hybrid Intelligence provides superior results for different industries and challenges when compared to pure AI models

- Requires more human-effort to design, implement and maintain

- Requires less data to produce an accurate model

- Industry Domain experience coupled with the technology expertise is a must for achieving great results

Industry Outlook

- Hybrid Intelligence adoption will accelerate as companies pursue the next level of results from these solutions

- Industry collaboration unlocks even better accuracies and results

- Generative AI models are introducing new use cases for Hybrid Intelligence

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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.

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