MAY 11 2025

# AVEVA Days Perth
# Pacific User Group – Oil/Gas/Energy

Lead: Cindy Crow, Industry Principal

12-13 MAY 2025

# AVEVA DAY

PERTH

## The Industrial Intelligence Event 2025

12-13 MAY 2025

# AVEVA DAY

PERTH

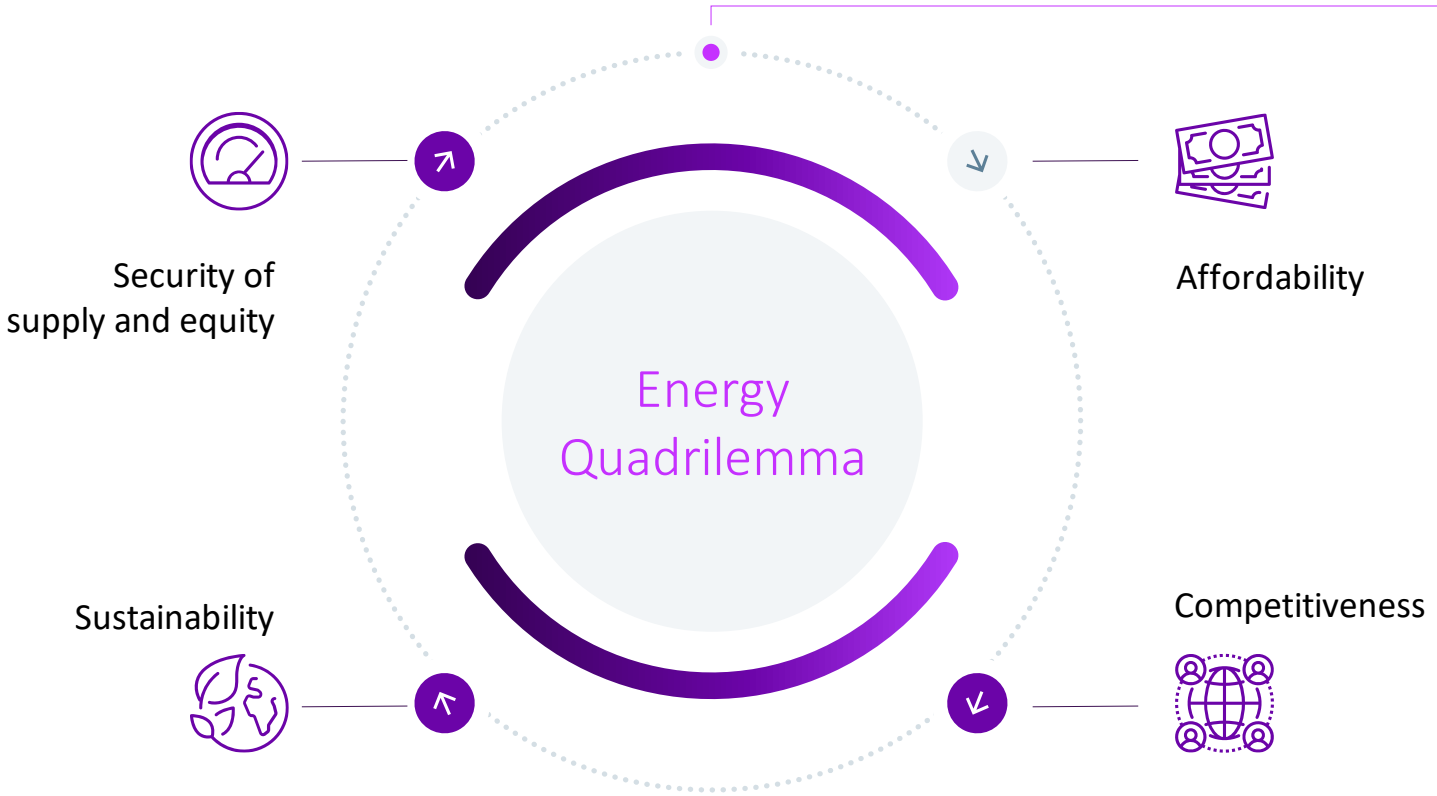
## The Industrial Intelligence Event 2025

| | | |
|---|---|---|
| 9am-9.10am | Introduction to the Energy User Group | Cindy |
| 9:10–9:30am | PI Road Map, Engineering, Presales | PI – Albis |
| 9.30-10am | **Topic #1: Emissions** < Total Energy<br>**Topic #2: Data Quality, Data Mgt** <Petronas | Cindy presenter |
| 10-10.30am | Morning tea break (in room) | |
| 10.30-11am | **Topic #3: Analytics and AI:** Panel | Cindy facilitator |
| 11:00 – 11:20am | **CONNECT your Industrial Lifecycle Vision** | Cindy presenter |
| 11.20-11.30am | Q&A – feedback | Cindy |

# Global and Australian Energy Industry Market

Cindy Crow Industry Principal Oil & Gas

# The Energy Industry is still facing a very complex market and geopolitical situation with the need to balance all the dimensions of the energy quadrilemma…

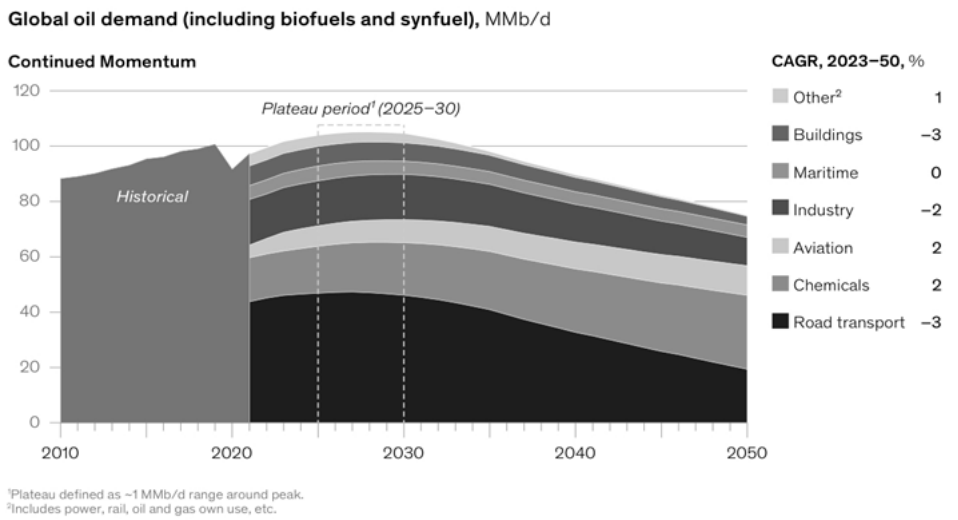



All the dimensions of the quadrilemma have one thing in common:

## Process and Energy Efficiency leading to Operational Excellence

# …in a business environment where the need for oil & gas demand will be driven by an estimated 18% increase by 2050 while the world will still be focused on achieving net zero…

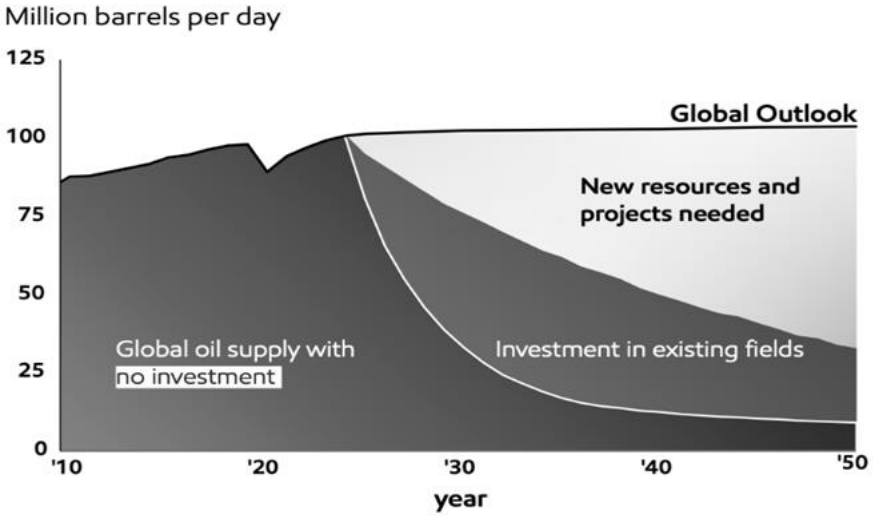
## GLOBAL OIL DEMAND TILL 2050




Ref. McKinsey – Global Energy Perspective 2024

Oil & Gas demand is expected to plateau between 2025 and 2035 at around 102 MMb/d and then start declining but will still contribute between 40-60% of the overall energy demand in 2050.

## REQUIRED INVESTMENT TO SUSTAIN DEMAND




Ref. ExxonMobil Global Outlook 2024

With no intervention, oil supply will fall down to 30 MMb/d by 2030 hence investment in new fields and assets is needed to meet the demand

# …driving the Energy Industry to focus on five main priorities for the next short/mid term future…

| Upstream growth and consolidation ✓ | Reshaping the downstream sector ✓ | Diverging new energy bets ✓ | Performance push ✓ | Reducing Scope 1 and Scope 2 ✓ |
|---|---|---|---|---|
| Investment growth and increase in consolidation and M&A (especially in the Permian Basin). Increase focus on scaling up and opening new plays like deepwater. No OECD countries heavily investing in new assets. | Investors in downstream sector are rationalizing their refining portfolios with many companies increasingly integrating further into chemicals (oil to chemicals). | Investment growth and increase in consolidation and M&A (especially in the Permian Basin). Increase focus on scaling up and opening new plays like deepwater. No OECD countries are heavily investing in new assets. | Focus on driving performance and focusing on improved capital expenditures and cost efficiency leveraging AI for predictive maintenance and embracing learner capital project delivery. | From decarbonization perspective the main area of focus is reducing Scope 1 and 2 emissions (including methane) by electrifying oil field, improving energy efficiency and enhancing methane monitoring(1). |

**(1) 50+** Oil and Companies signed during **COP2**8 the O&G Decarbonization charter committing on net zero by 2050 and reduce methane emissions **by 2030**.

# Australian Market

# LNG

# Continued Investment and Diversification

- Australia will continue to be global leader in LNG exports
- Reserves in Northwest Shelf, Browse Basin (both Woodside) and Queensland (Origin/APLNG)CSG will provide sustained LNG production
- Growing demand from Asia-Pacific markets such as China, Japan and Korea are an advantage to Australia as well as physical proximity
- Decarbonization will put pressure on LNG possibly leading to investments in CCS (Carbon Capture and Storage) to offset emissions.
- Digitalization and technology investments will enhance operational efficiency and reduce production costs, helping maintain a competitive advantage

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# Renewables

# Diversification into Renewables

## Only AUS projects sited

- Offshore Wind
- Solar
- Hydrogen
- Hybrid Energy projects that combine Oil and Gas and offset with renewables are expected in 2025
- Wind: INPEX Flat Rocks Wind Farm
- Solar: INPEX Bungola 1&2 Farm, Cohuna, Girgarre, Quorn Park Hybrid(with battery)
- Hydrogen: Woodside H2 Projects; H2Perth, H2TAS in Australia and H2OK in North America invested $5 Billion
- Batteries: Origin $1.07B into batteries

# Sustainability and Decarbonization

## Commitment to Net-Zero Targets

- Australia Committed to Net Zero by 2050

In 2025 a stronger emphasis on Sustainability and decarbonization across O&G is expected, driven by society, regulatory pressures and investors.

- Reducing GHG (Green House Gases)

  Improving Energy Efficiency

  Carbon Capture and Storage

  Methane Emissions Reduction

- Shift towards a more Circular Economy

  Increasing focus on recycling and repurposing materials reducing waste and minimizing the environmental impact of operations



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Technological Innovation and

Digital Transformation

# Adoption of Advanced Technologies

- Technological innovation will continue to be a driving force thru 2025
- Digital transformation, including adoption of advanced technologies:
  - Artificial Intelligence AI
  - Machine Learning
  - Big data Analytics
  - IOT Internet of Things

  Enhancing Operational Efficiency, Reducing Costs and

  Improving Decision-Making.
- We expect increased investment in digital twins(DT)- virtual replicas of physical assets that allow for real-time monitoring and simulation
- DT will enable predictive maintenance, optimize production processes and reduce downtime leading to significant cost savings and improved performance.
- Robotics and Automation; Enhancing safety by reducing human intervention and improved efficiency by automating repetitive tasks



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# Summary

Summary

Australia is poised for significant transformation in 2025, driven by technological advances, the global energy transition, regulatory changes, and evolving market dynamics. Companies that adapt to these new trends, invest in new technologies and prioritize sustainability will be well positioned to thrive.

The ability to navigate uncertainty, embrace change and innovate will be key to success in Australia's Oil and Gas Industry.



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# PI Roadmap, Engineering and Presales

Albis Durant

24/10/2023

# Leveraging Real Time Operational Data to Reduce Greenhouse Gas Emissions

TotalEnergies: Leveraging real time operational data to reduce greenhouse gas emission

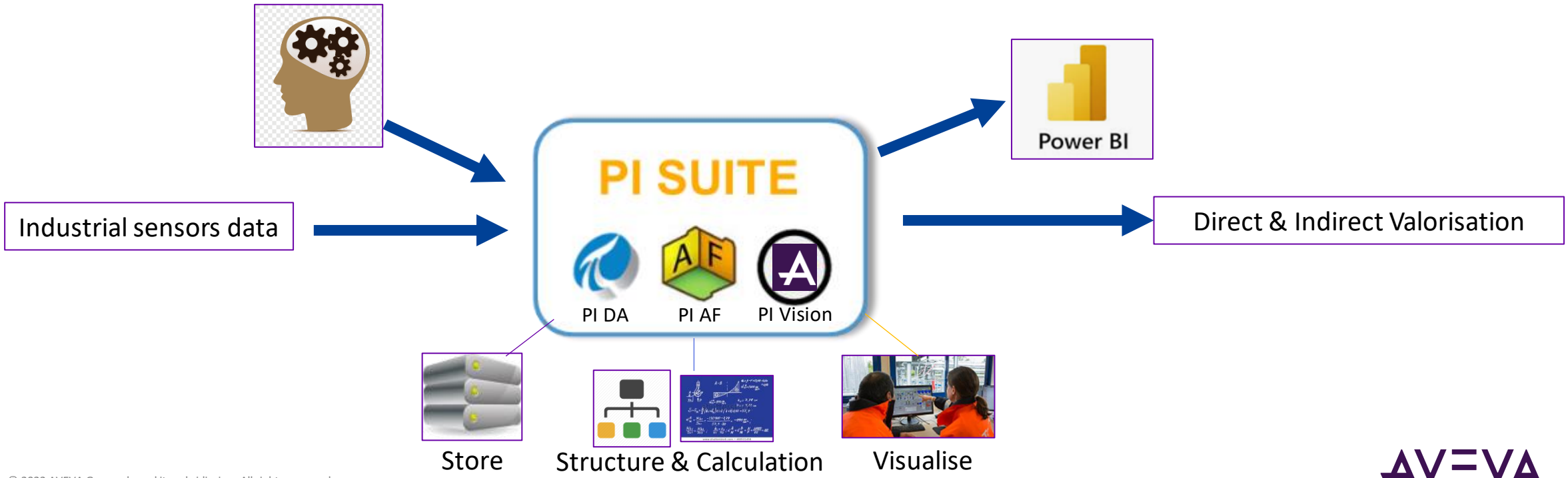
# About Monitoring Center and PI

## Our Objectives:

- Data provider: Recover and archive site instruments times series data.
- Digital Solution maker: Build, deploy and run monitoring applications
- Digital Enabler: Stream PI data to other digital solution

## Some PI Facts

- 16 Affiliates
- 18 Years of Historical Data



Oil & Gas – Worldwide Solution

# Realtime monitoring of 85% Scope1 GHG emissions within the Company's E&P Operated asset

## Challenge

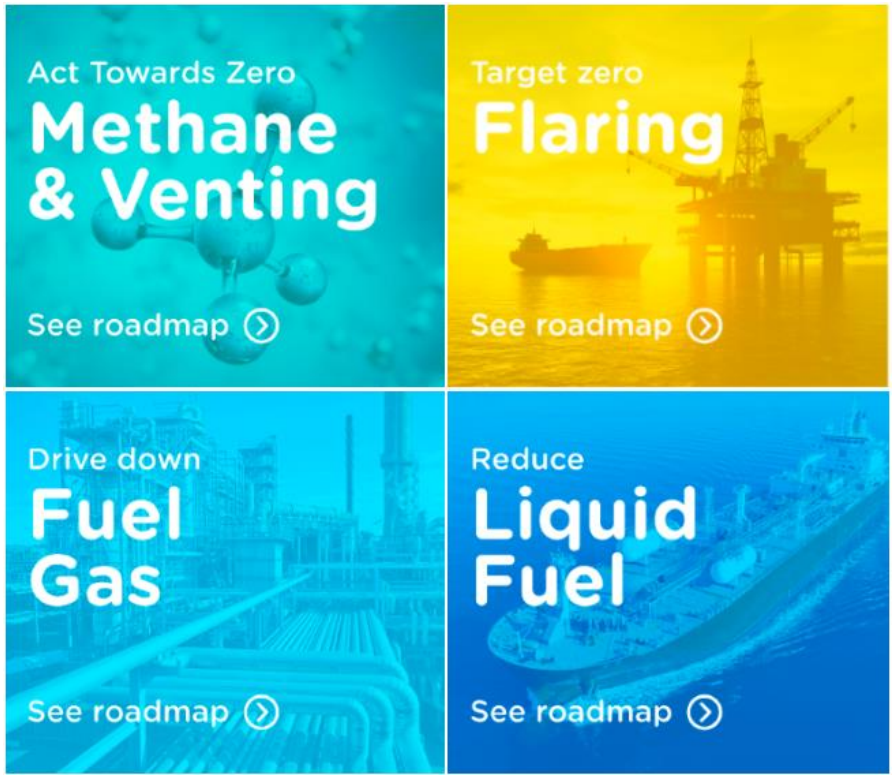
- Transform our operational practices toward greenhouse gases focus and environmentally friendly perspective by maximizing the utilization of existing field data and software resources
- Deploy an efficient, cost-effective digital solution that can be rapidly scaled up to broaden the range of monitored asset emissions,

## Solution

- Centralized and standardized approach, with a PI-AF model built once and then applied to hundreds of equipment and assets, supplying real-time data calculations, analysis and KPIs

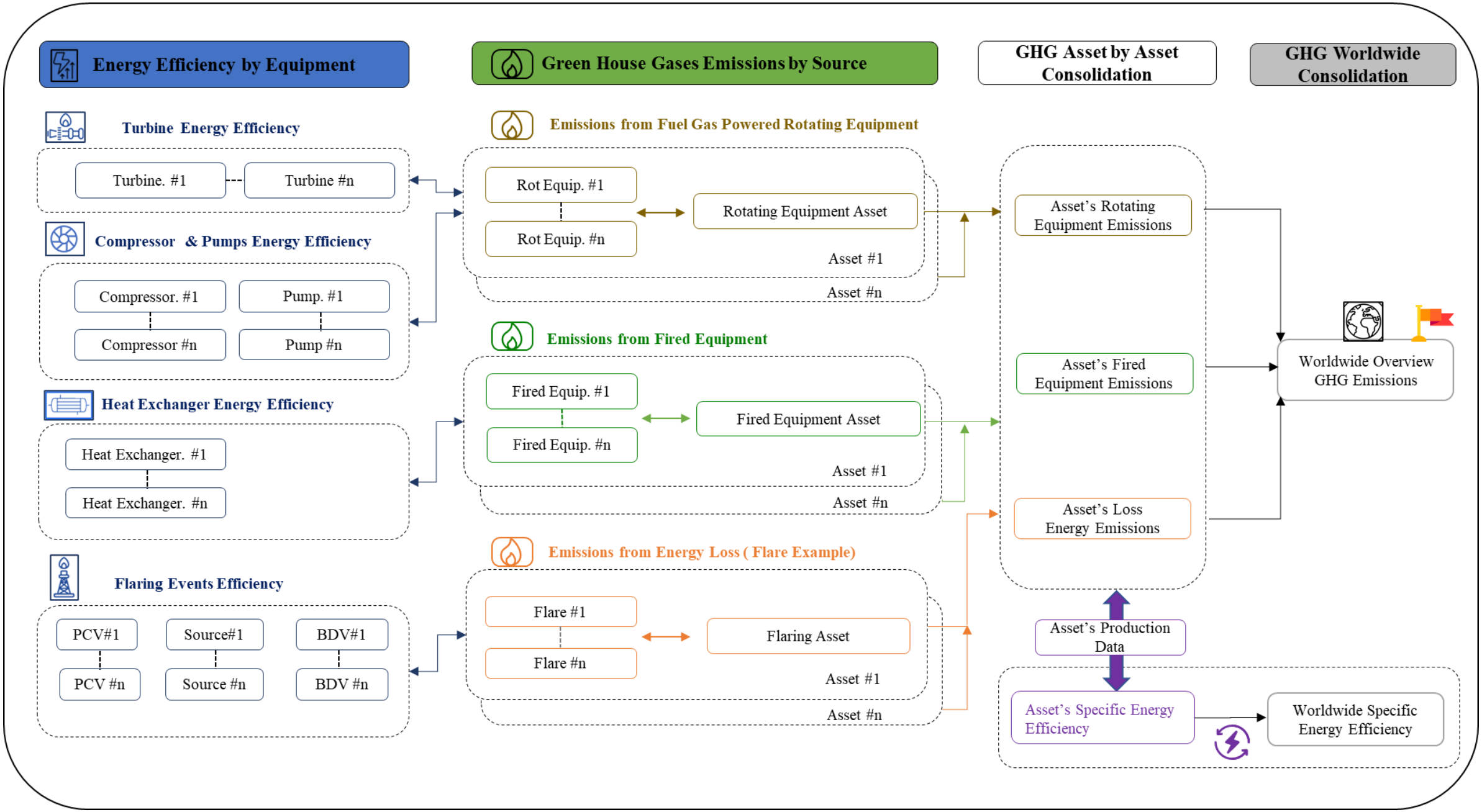
## Results

- **Successful development of industrialized monitoring tool within a three-year timeframe**
- **Headquarters and operating centers relying on the solution's displays consistently for daily discussions and operational decision-making.**
- **Efficiently identification of poorly performing equipment and undesired process deviations that contribute to GHG emissions.**

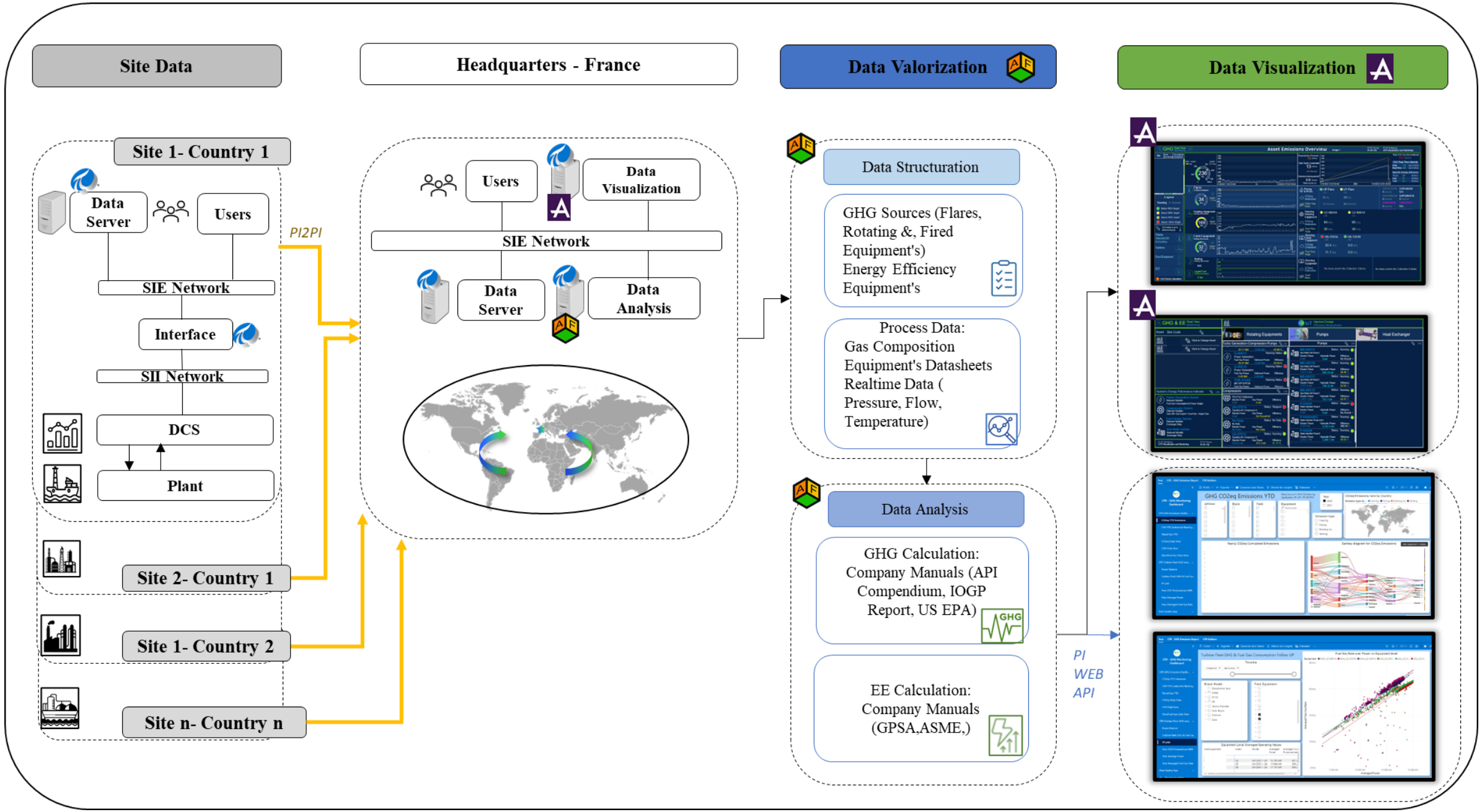


“To effectively reduce emissions and enhance energy efficiency, it is first needed to calculate and display this data through relevant indicators in suitable time for operational follow up.”

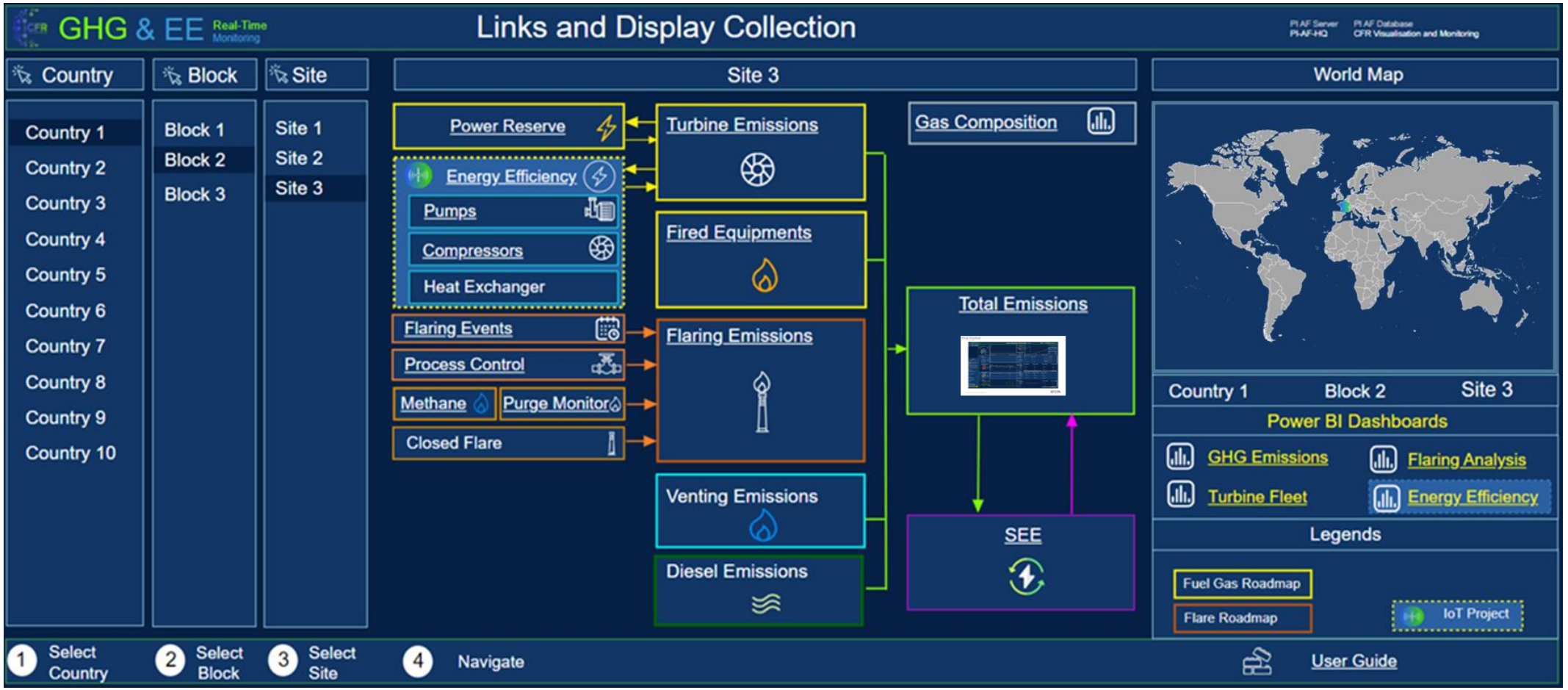
# GHG & EE Real-time Monitoring Deployment Challenge



# Implementing Aveva portfolio for creating a centralized solution



# Final Product



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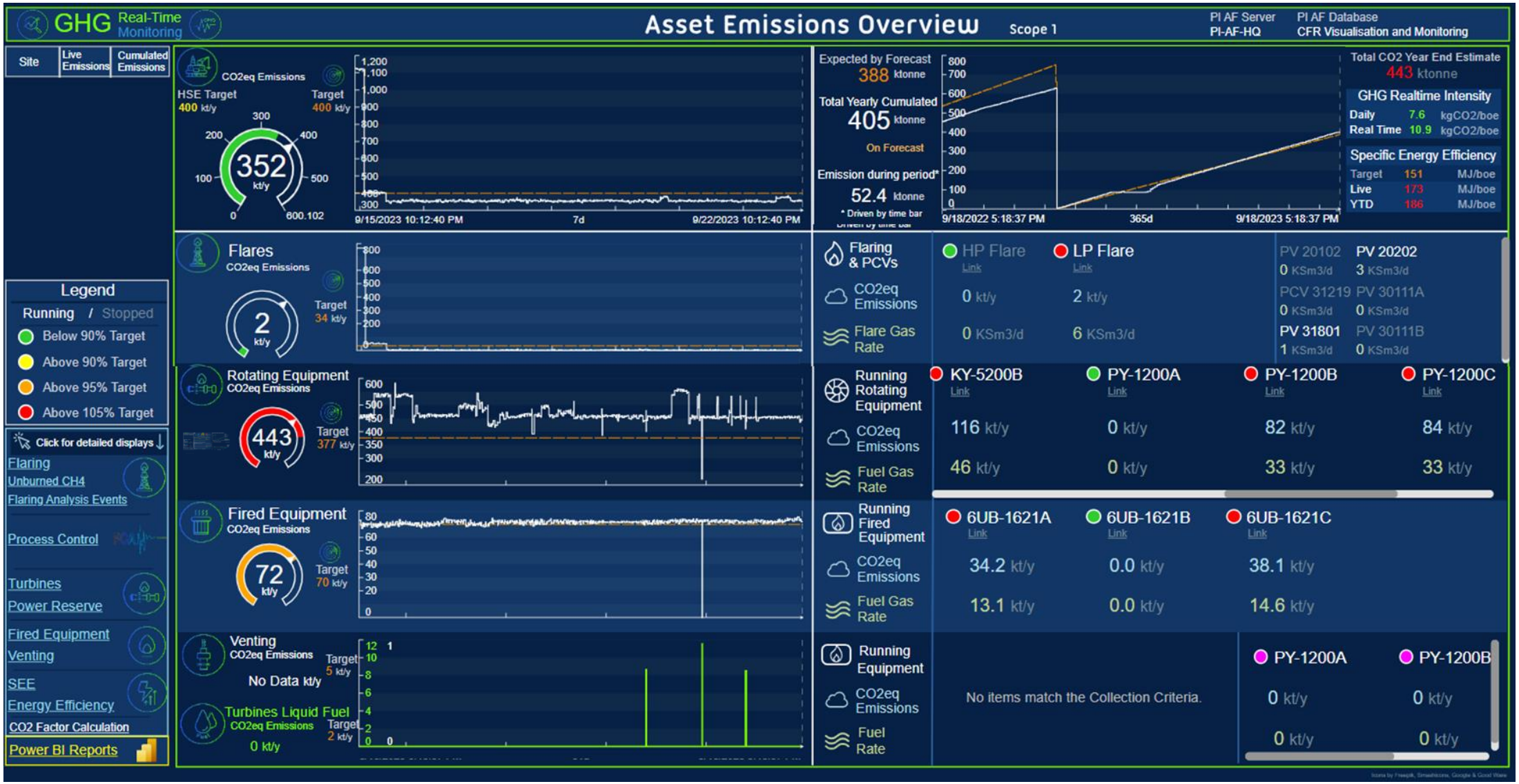




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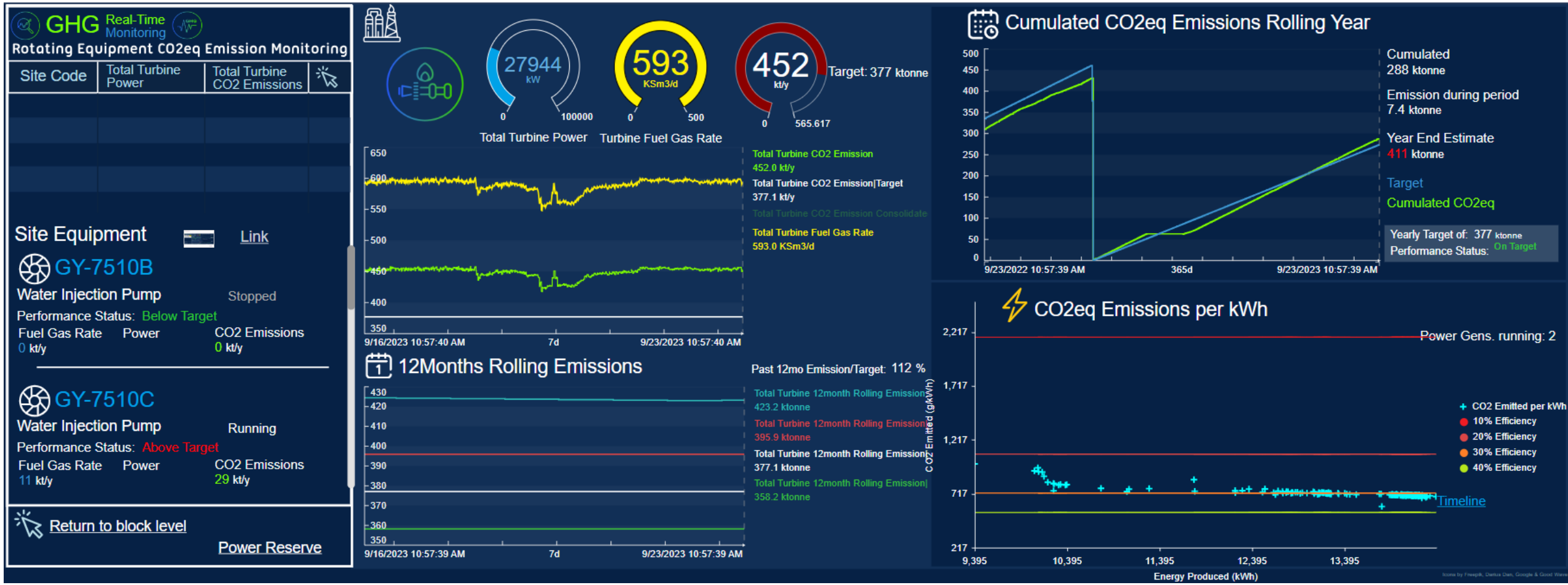

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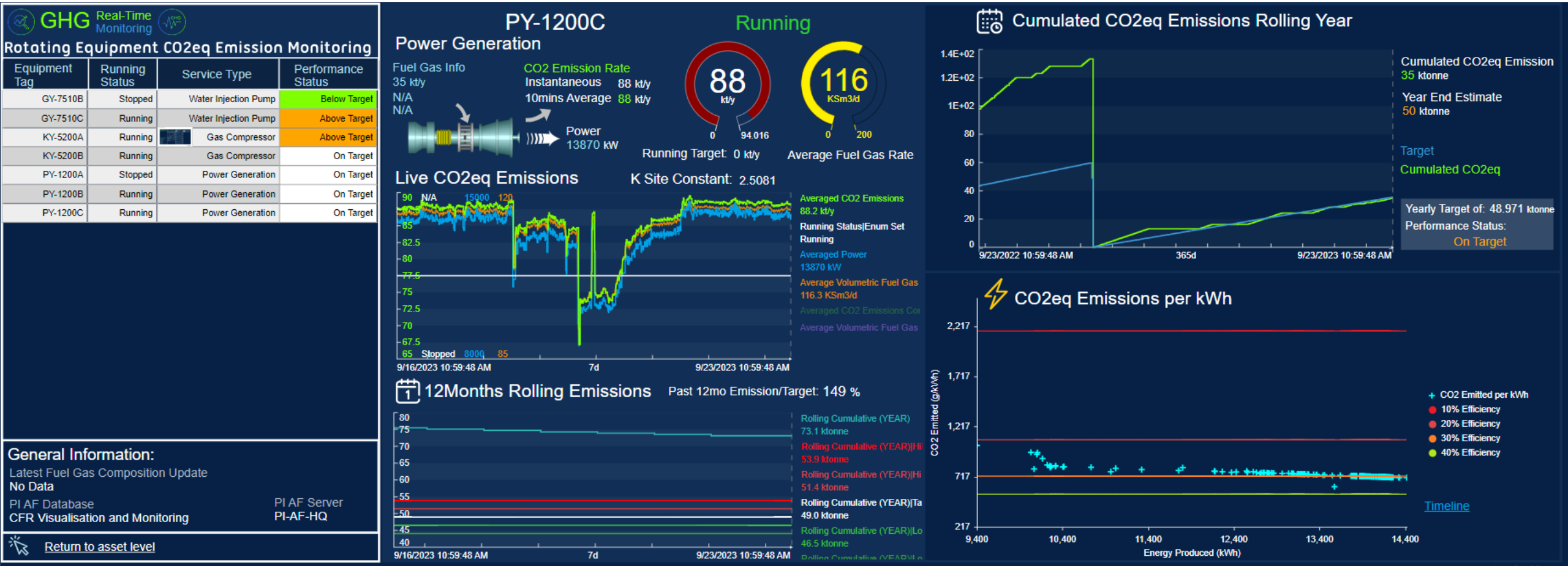

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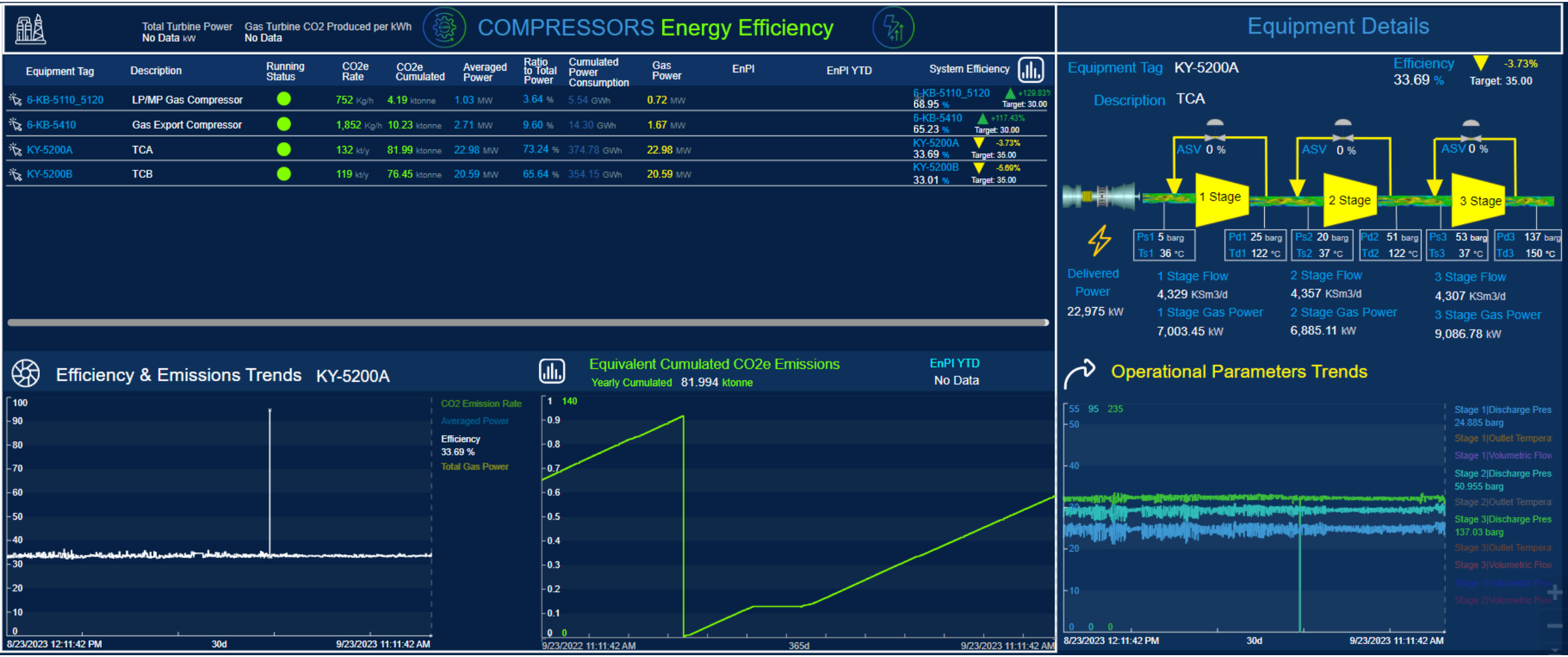


“Now that we've established all the monitoring tools, let's proactively identify opportunities to reduce greenhouse gas emissions”

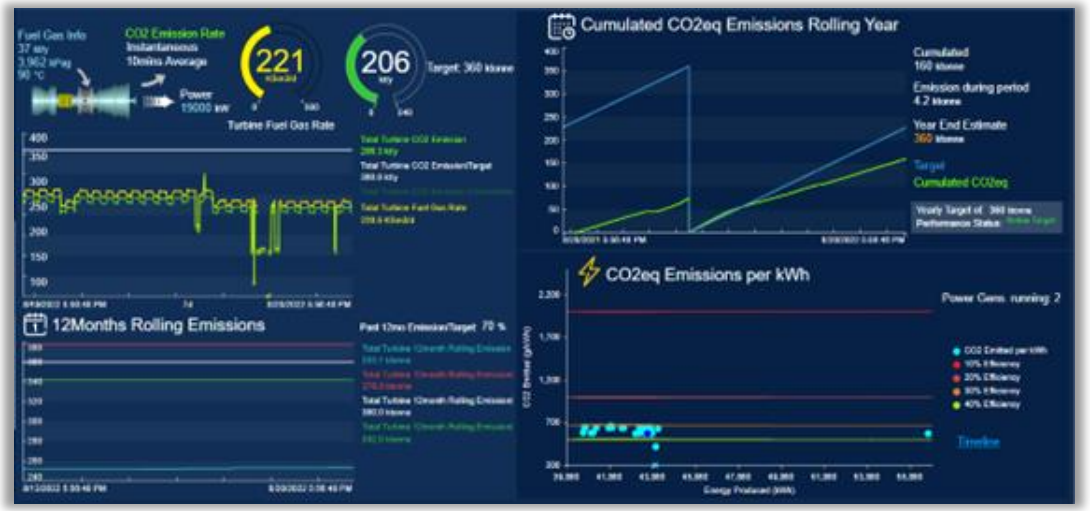
# Use Cases

- **Purge Gas Optimization**
- **Categorizing flaring sources to decrease flared gas**
- **Detecting Passing Valves**
- **Detection of Process Control Anomalies to reduce flared gas**
- **Optimize the power delivery configuration to reduce emissions**
- **Reducing emissions by recycling less gas on compression system**
- **Reducing emissions by adjusting Water Injection pump pressure**
- **Detection of anomalies in pumps performance**
- **Reducing power consumption through gas compressors**
- **Closed Flare performance analysis**

# Study Case : Optimize the power delivery configuration to reduce emissions

### Site Power Generation Overview


### Site Power Generation CO2 Emissions




**Introduction**
Focus: Power Reserve Module
Significance: GHG Emissions Implications
Key Metric: Power Reserve (Required vs. Delivered)

**Efficiency and Load**
Correlation: Turbine Efficiency & Load
Maximizing Efficiency: Load Optimization
Inefficiencies

**Scenario: Excess Power Reserve**
Consequence: Lower Efficiency, Increased GHG Emissions

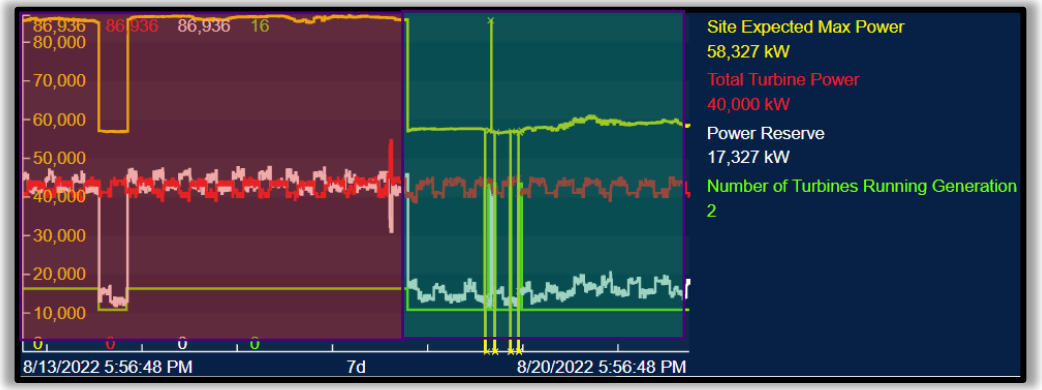
**Reliability vs. Redundancy**
Considerations: N+1 Configurations
Context: Reliability vs. Efficiency Trade-off

**Result: Equipment Deactivation**
Impact: Reduced Power Demand, GHG Emissions
Enhanced Efficiency: Closer to Optimal Operating Point
Emission Reduction

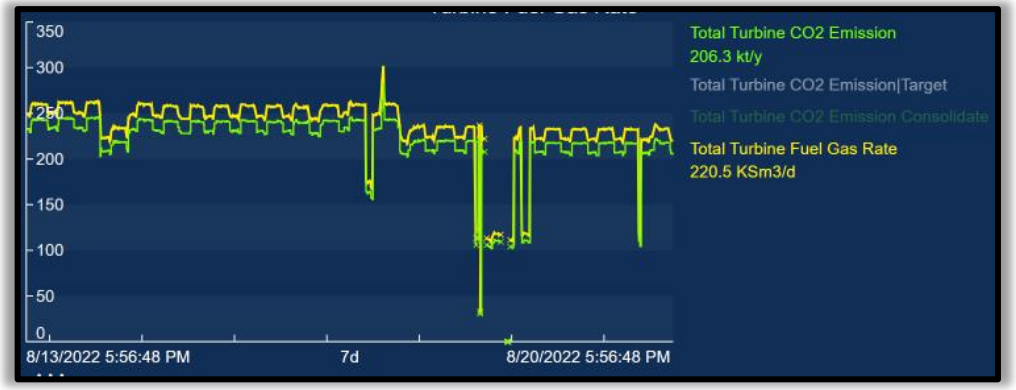
**Achievement**: 15% CO2 Emission Reduction Annually

# Study Case : Optimize the power delivery configuration to reduce emissions

**Power Reserve at Site Level**




**Turbine CO2 Emissions**

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# Conclusions and Take-aways

- **Achievements:**
  - Effective reduction in GHG emissions through practical & cost-effective solutions.
  - Tangible benefits observed across the company.

- **Strategy & Approach:**
  - Standardized model: Built once, applied across multiple assets.
  - Streamlined process for quick industrialization, allowing expanded monitoring and real-time data analysis.

- **Benefits of Real-Time Tool:**
  - **Instant Insights:** Real-time visibility on operational changes.
  - **Operational Excellence:** Informed decision-making based on comprehensive data.
  - **Emission Reduction:** Identification and benchmarking emissions from equipment.
  - **Financial & Environmental:** Boost in revenues and a decrease in environmental impact.

- **Operational Improvements:**
  - Easy optimization of energy efficiency and emissions through minor adjustments.
  - No capital expenditure needed—focus on studying existing configurations.
  - Identify major contributors with just a few clicks, initiating impactful emission reduction projects.

- **Final Thoughts:**
  - Shift in operational practices towards a greenhouse gas focus.
  - Demonstrated feasibility of reducing GHG emissions in pursuit of a net zero carbon energy transition.



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OCTOBER 25, 2023

# PETRONAS accelerates digital transformation with decision ready data

Presented By : Cindy Crow

# The “WHY” For Digital Transformation… Moving Forward Together 50.30.0

## Financial Resiliency

50% improvement in cash flow from Operations by 2025

## Growth

30% revenue by 2030 from new non-traditional business to complement growth in existing core

## Sustainability

**Net zero** carbon emissions by 2050 with positive social impact and adherence to business ethics corporate governance

# The “How”…Enterprise Architecture (EA) Implementation to accelerate digital transformation

**Objective** — **Current State** → **Future State**

EA aims to drive PETRONAS towards a more structured and streamlined digital organisation while supporting strategic priorities

Target Goals




- **Strategic technology blueprint** to deliver business capabilities for the next 3-5 years
- **Standardised capabilities**, data model to reduce cost, complexity and drive efficiency
- Potential savings from **application rationalization** and license optimization
- Improve **business agility** for future growth
- **Single view** of IT and Digital landscape
- Improve **process efficiency** and **operational excellence**



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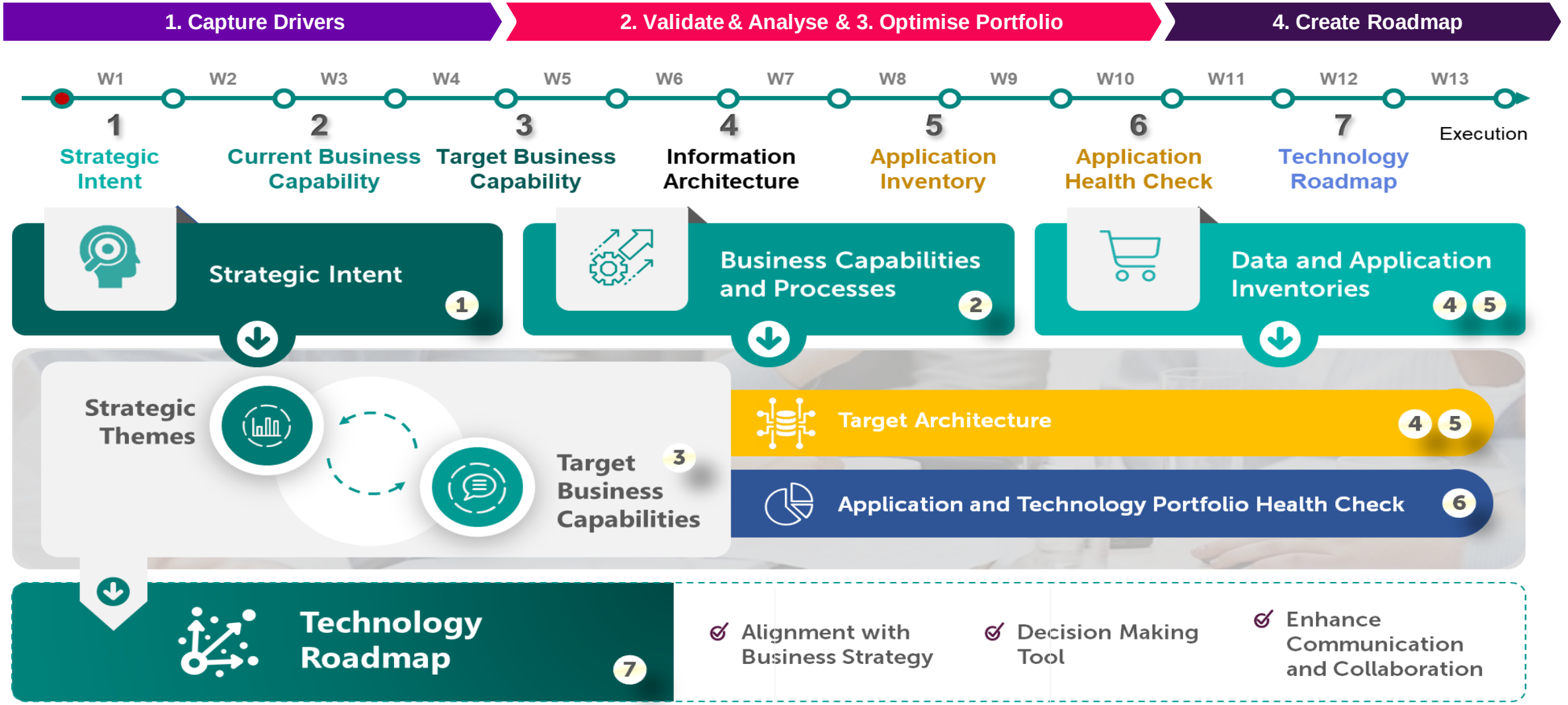
# Enterprise Architecture Implementation Approach



# Addressing Data Challenge - PETRONAS Data Liberation

## KEY ISSUES

Lacks reliable real-time data capability to operate and sustain the development and adoption of advanced analytics e.g. AI & ML.
**Limited data accessibility** to provide proactive Operations & Maintenance Solutions effectively across PETRONAS assets and plants.

## DATA ADJACENCY PROGRAM

The Data Adjacency Program looks at liberating all the data across assets and plants and eventually ingesting them into PETRONAS Enterprise Data Hub (EDH) to ensure data integrity at source and consistent across organization, and to ensure availability and sustainability of data integrity (example PI Data, SAP data, etc.)

.

## RESULTS

Asset and plant data in PETRONAS Enterprise Data Hub (EDH)

DATA FLOW

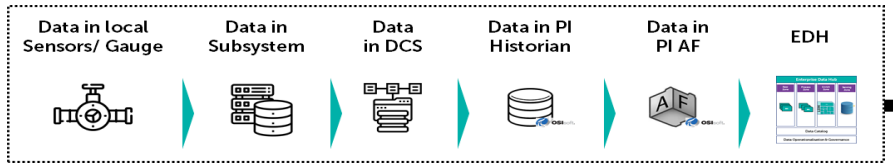

DATA PAIN POINTS

1. **Existing data ecosystem designed for operating the facilities with some data are still stranded**
2. **Repository without ability to differentiate between final and working file**
3. **Unstructured Data being generated and utilized on daily basis**
4. **Manual retrieval and acquisition of data**

DATA INGESTION

Approach

PI Data:




Data Sources: Plant Information (PI) & SAP

Data Types

- i.e. Plant Operations
- Plant Reliability Data
- Plant Maintenance
- Plant Maintenance

Enterprise Data Hub

- Access Pattern
- Data Transformation Pipeline
- Data Serve Pattern

DATA ENRICHMENT

Data Integrity & standardization at source
- Data cleaned and goes thru data standardization process.

**Data quality & full data visibility**
- Consistent quality data
- Improve data quality to ensure trusted data is being consumed from repository

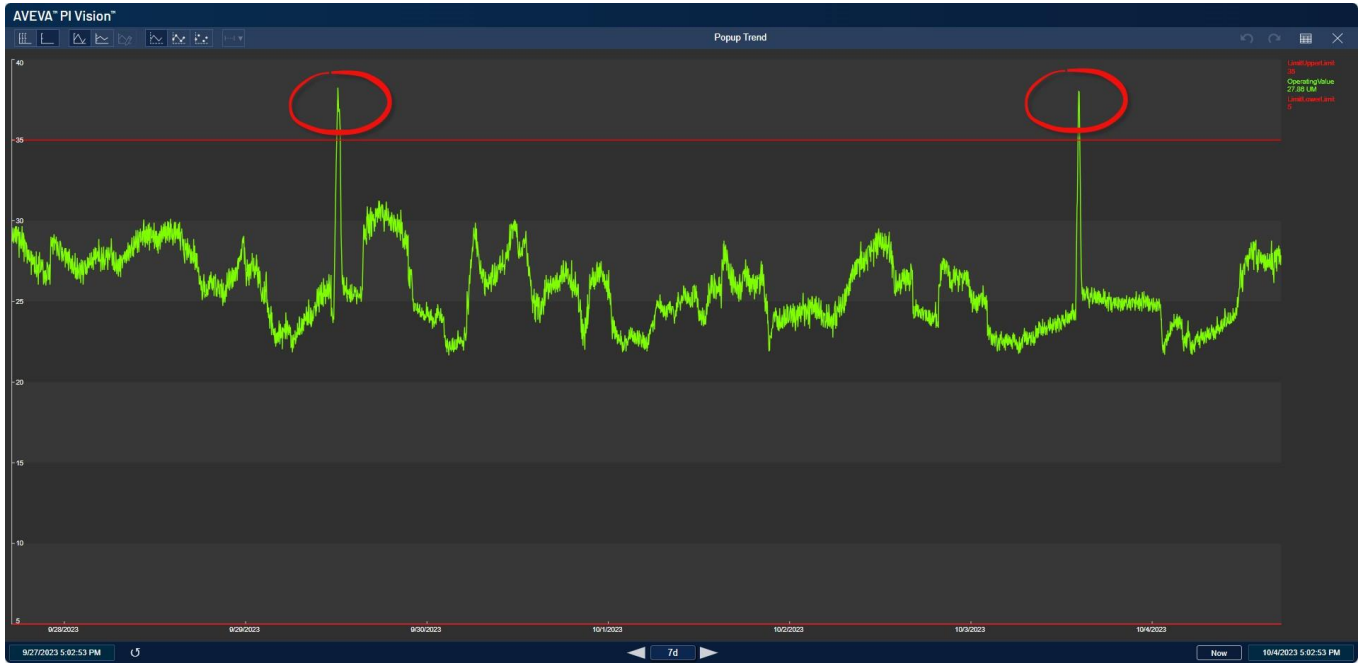
**Liberated data is ingested into Enterprise Data Hub (EDH)**

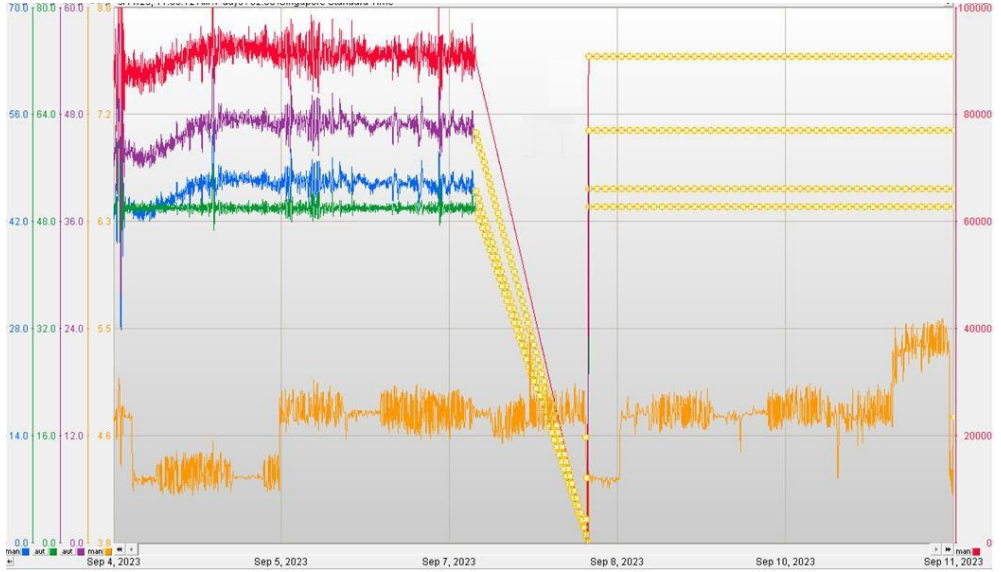
-Single Source of Truth (Curate Once, Use Everywhere)

Integrated data ecosystem & stewardship
- Structured data being generated and utilized on daily basis

# Problem Faced by Digital Product Owner

- Analytic result untrustworthy. Unable to make decision and action.
- Troubleshooting time-consuming because lack of visibility.
- Loss of trust and low user adoption.




# Factors Contribute on Data Reliability Issue

Hardware Failure

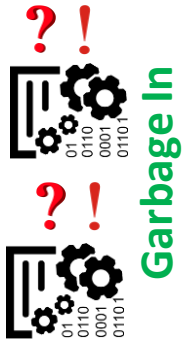
Transmitter Faulty

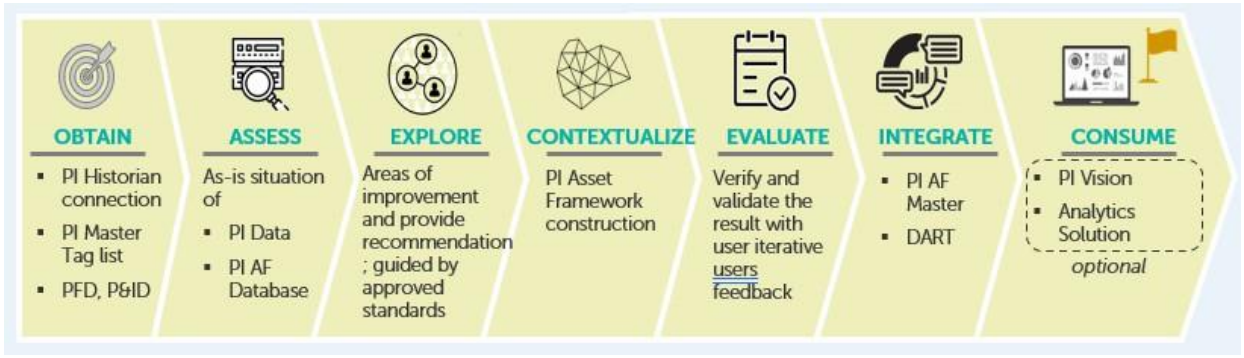
Network Failure

Wrong Configuration (Human Error)

Hard to Track with Thousands of Plant Data !!!

# Decision Ready Data (DRD) Provides Data Reliability Visibility

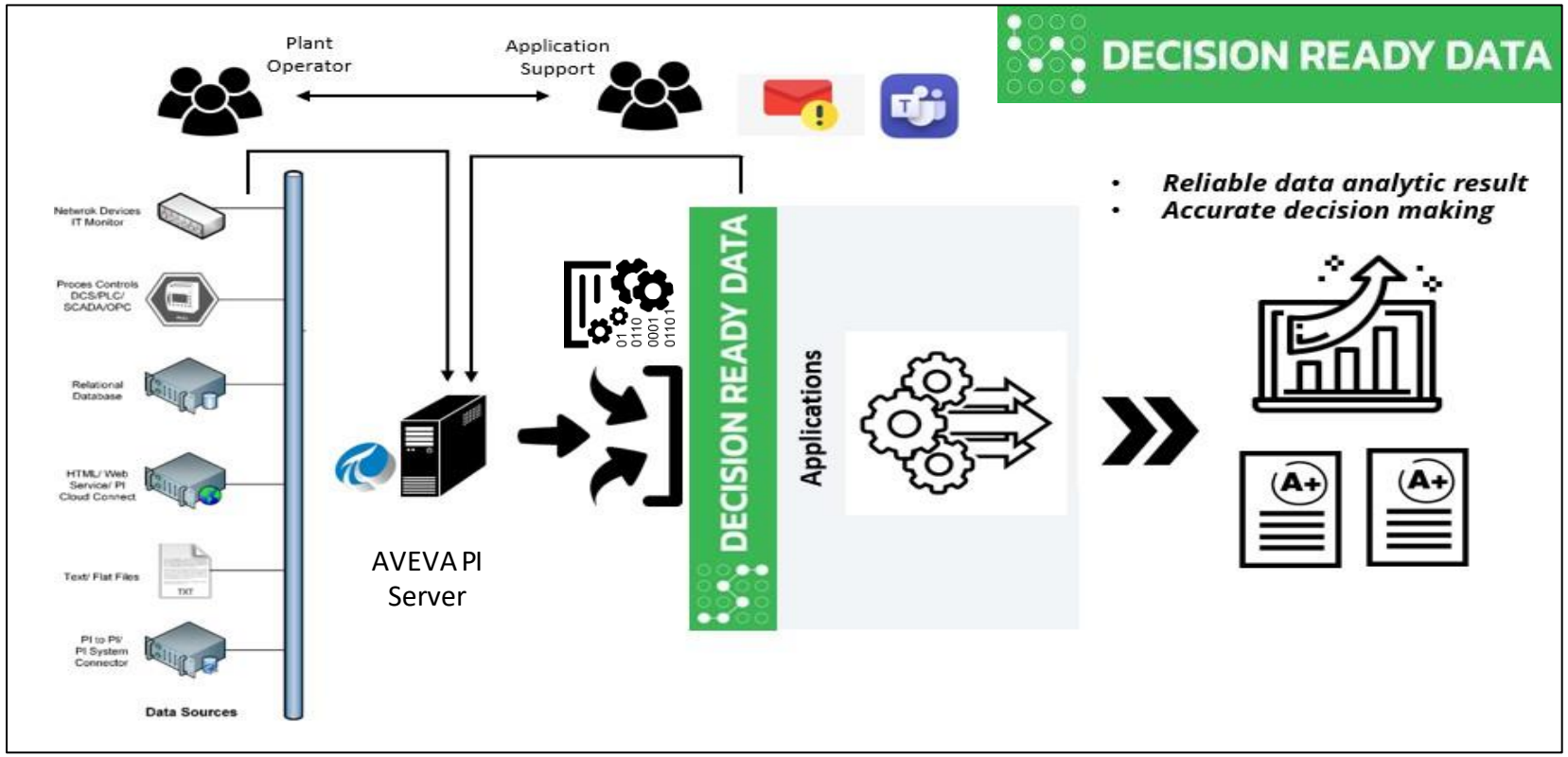




**Unreliable data impacting analytics**
If the data reliability from a specific asset is consistently poor over a prolonged period, it will jeopardize the investment and success of the analytic tools that uses the data.

**Finding unreliable data takes time**
More data means more time spent for you to find the bad unreliable data and less time to act.



# Decision Ready Data (DRD) Provides Data Reliability Visibility

**Analyze Plant Data Healthiness in Real-Time**

**Visibility on Data Reliability for Proactive Action**

**Use case specific monitoring**

**High level status and individual tag health status.**

# Decision Ready Data (DRD) Provides Infrastructure Health Visibility

**System Uptime, Server Hardware Health & Network Status**

**PI Server, PI Interfaces & Data Source Systems Monitoring**

**Trigger Alert Notification**

**PI-BA Jobs Monitoring**

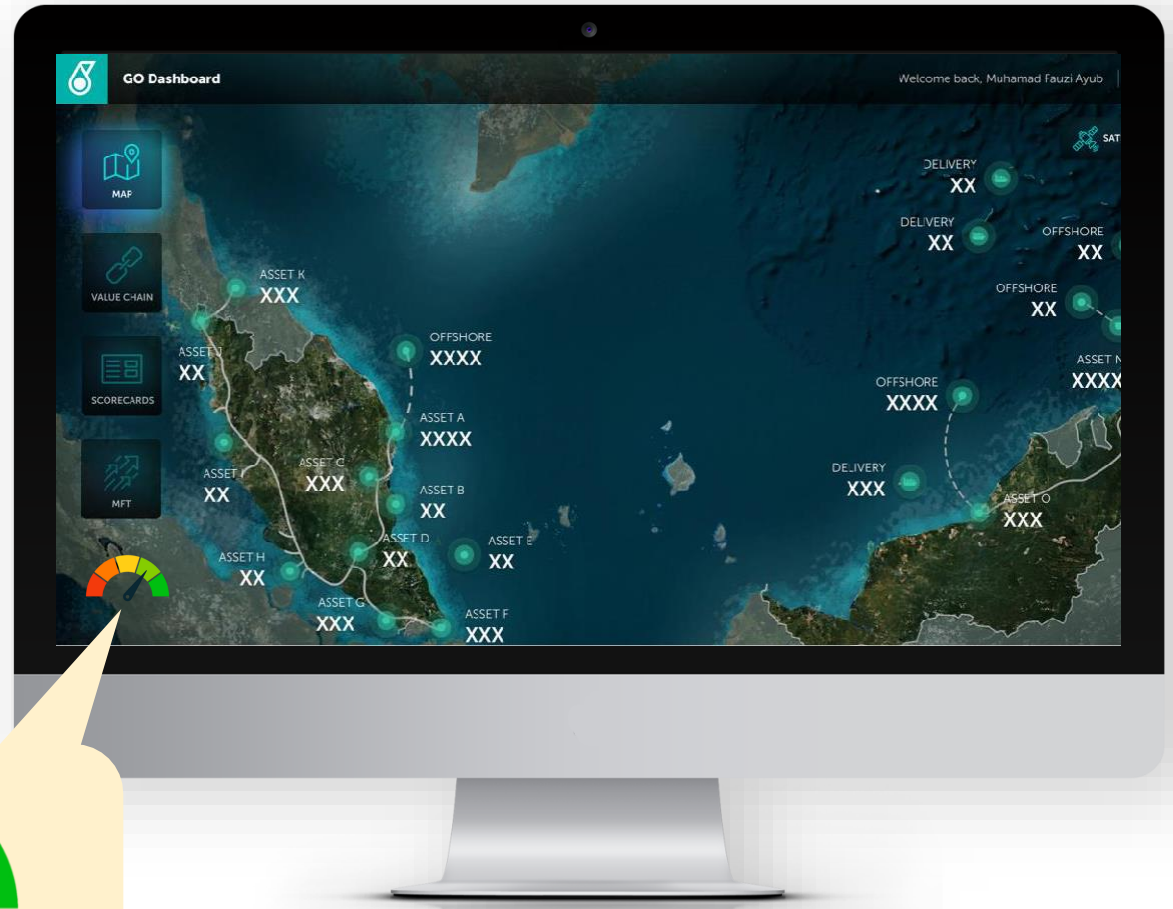
# Decision Ready Data (DRD) Provides API for 3rd Party Integration

**3rd Party Application Integration**

**Data Status Based On Use Case**

**End User Have Better Visibility On Data Status**

**Increase Product Adoption**




**Data Status on 3rd Party application**

# Decision Ready Data (DRD) Outcome

- DRD has successfully safeguarded millions of value creation to Digital application by providing continuously reliable & good quality data.
- DRD provides data quality visibility, reduced data down-time and makes time-series analytics trustworthy
- DRD provides your organization the capability to act proactively on data quality issues.
- DRD provides more accurate analytic result for better decision making.

**Within 1 month, data reliability improves from 40% to 70% with DRD**


## Testimony

*"It's a challenge to ensure uptime in our Advance Analytics solution with a complex oil and gas digital architecture.*

*It's crucial to have a tool that can facilitate, providing us an overview of the solution, data, applications, and network insights. DRD eases our tasks in monitoring and tracking the overall health of application, enabling continuous value creation through high uptime."*

*Digital Product Owner*

PETRONAS

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ENERGY | MALAYSIA

# PETRONAS implements enterprise data architecture to achieve transformation goals

## Challenge

- Support the digital transformation required to improve company's cash flow, increase revenue and achieve net zero emissions.
- Improve business agility and support new ways of working.
- Ensure integrity of operations data for decision making.

## Solution

- Implemented an enterprise-wide data architecture (NervCentre) based on AVEVA™ PI System™ and AVEVA™ PI Vision™

## Results

- **Increased visibility to data quality and reduced data downtime.**
- **Able to proactively resolve data quality issues that arise.**
- **End-to-end visibility of the health of critical infrastructure.**
- **More accurate analytic results for better decision making.**


BREAK
30 Minutes