

OCTOBER 25, 2023

Journey to Operational Excellence: AVEVA™ PI System™ Transformative Influence at Pertamina

PERTAMINA / PT KILANG PERTAMINA INTERNASIONAL

Speaker: Sembiring FRANCISKUS/ Santoso RANU / Tanida ELLEN

Co Author: SAHKUNDYAR/ Kurniawan EDWIN

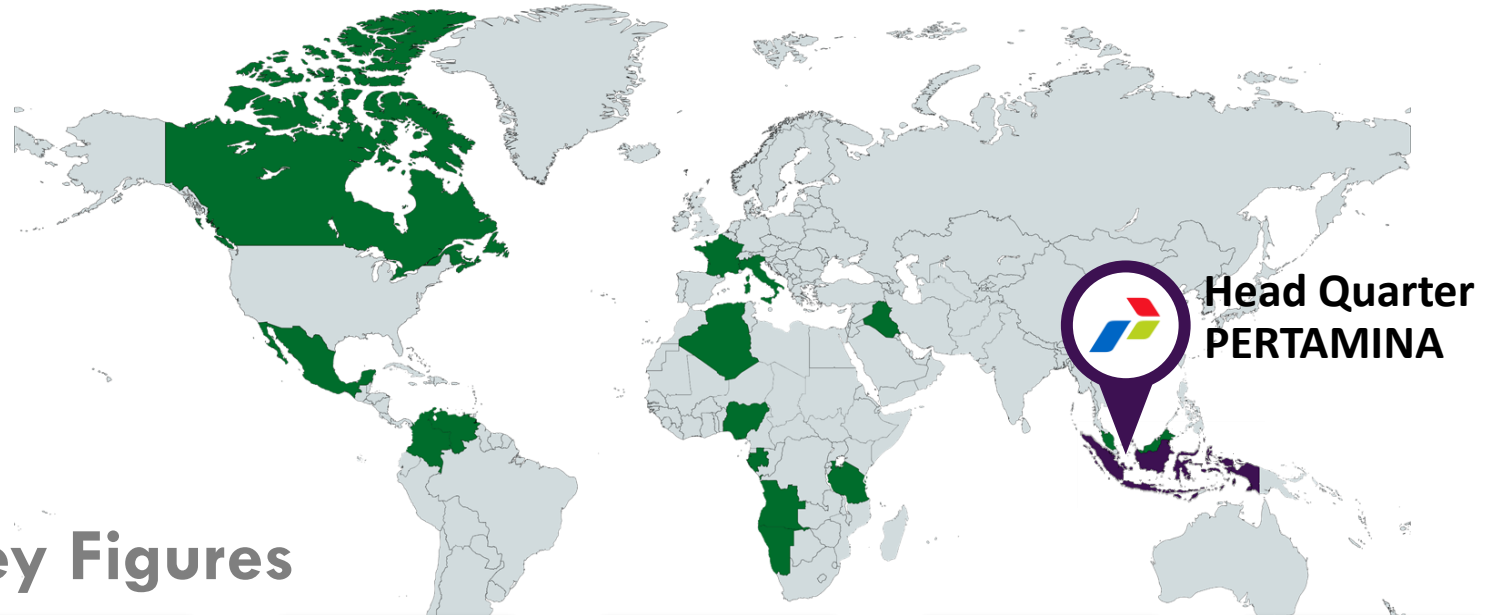
© 2023 AVEVA Group plc and its subsidiaries. All rights reserved.



AVEVA

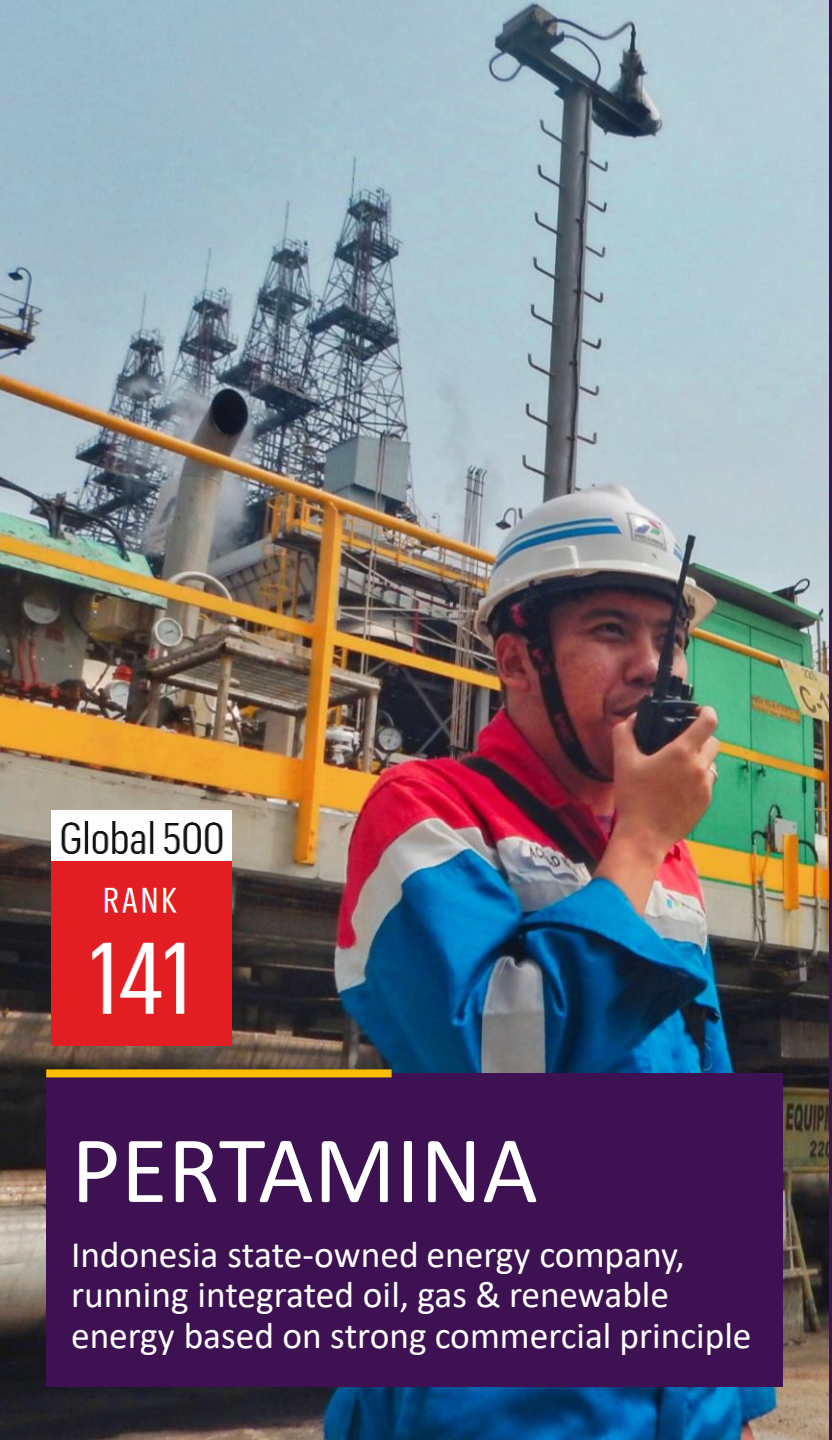


Indonesia state-owned energy company, running integrated oil, gas & renewable energy based on strong commercial principle



Key Figures





Global 500

RANK

141

PERTAMINA

Indonesia state-owned energy company, running integrated oil, gas & renewable energy based on strong commercial principle



Holdings



7
RU's

1,058
MBOPD

PT KPI focus on end-to-end management of Refinery and Petrochemical Business: from crude oil procurement to processing, including project infrastructure development.

ASPIRATION PERTAMINA 2024

“ Reputable Global Energy Company
with cap. market \$100bn ”

Secure Energy
Supply for Nation

Leading Energy
Transitions

Economic and Social
Powerhouse

5 Strategy Pillars

1

Human Capital
& Culture

2

Excellence
Project Delivery

3

Strategic
Partnership

4

Information &
Digitalization

5

Optimize
Portfolio

Spirit CIPS (Change, Innovation, Professional, Speed)

AKHLAK Value (Amanah, Kompetitif, Harmonis, Loyal, Adaptif & Kolaboratif)



Road map to 2024 Digital
Transformation covers
essential operation:

- Process Surveillance
- Process Safety & Asset Integrity
- Boost Throughput & Cost Optimization
- Reduce Carbon Emission

“**Digitalization** in Pertamina refineries has brought a new challenge: Translate the vast volume of data into useful insight & able to deliver significant impact to business.”

Journey to Operational Excellence



Challenge

Translating vast volume of data into useful insight & able to deliver significant impact to business

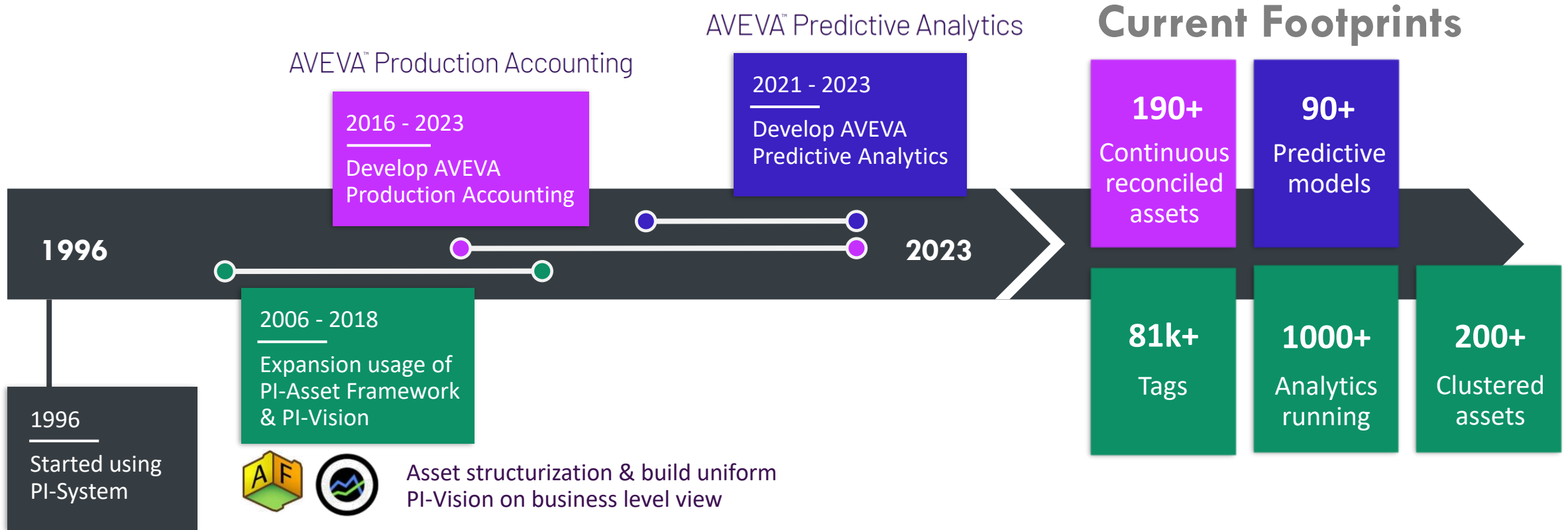
Solution

Deployed & leverage full PI-System capabilities across refineries
Adopt AVEVA Production Accounting and AVEVA Predictive Analytics

Benefits

- Faster decision making
- Optimize operation on enterprise level
- Boost throughput, cost optimization and asset integrity.

Our AVEVA™ PI System™ Development



PART 1

Data Organization & Visualization

AVEVA

PI-AF Organize Essentials Data

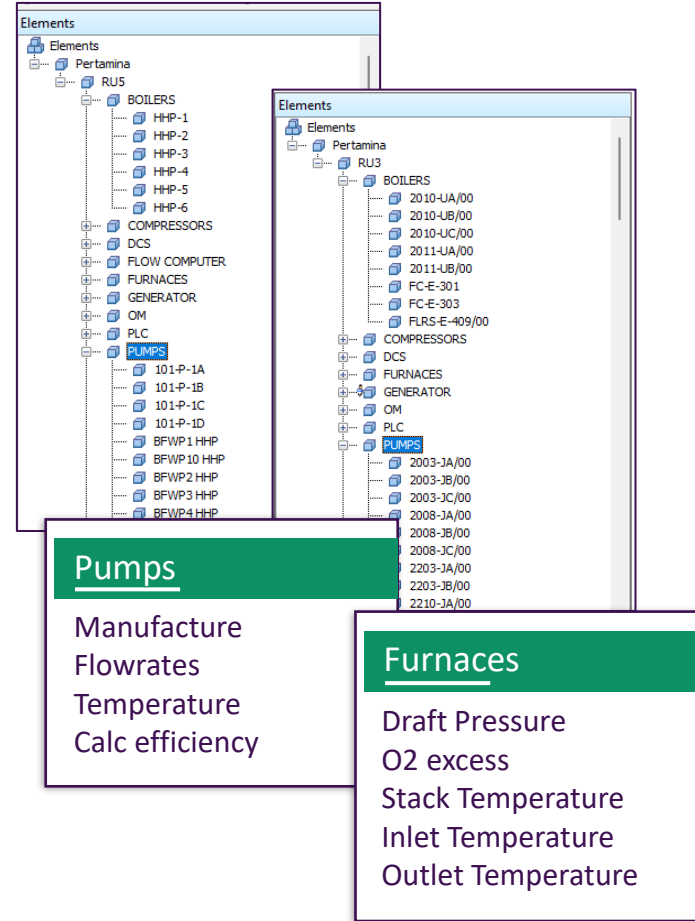


510_TK_207_WFLF
 100OA_RW_MIX_A.PNT
 101FI041_CAL 140_HCGO_COUNTER.OUT
 TG2_HP_MP_EX.XIS_1146B.PNT
 100_FR_101.RO01
 Recovery_370
 Perlu perbaikan bearing
 FI_9001
 Pump_stat
 TWT_F-1-01A
 140_FC_275.MA
 AxisVibration

101FI050
 211C1_CTL.SERVICE.CALC
 212_LKR_FPABEL
 102_TC_203.OP

900_08_BFW
 FI2050
 M_TKEV_FLOAT_E
 VA_LOSS_TON
 TY_TK_2A_LVL
 O2excess
 Nat-gas flow
 TG2_HP_MP_EX.RAD_1143B.PNT
 PPMWT %vol

%H2 ON PRODUCT
 101-P-1A
 101-P-1B
 101-P-1C
 101-P-1D
 BFWP1 HHP
 BFWP10 HHP
 BFWP2 HHP
 BFWP3 HHP
 BFWP4 HHP



Combining assets with essential operation/stocks/laboratory data

- Structured assets
- Standardized assets across PI-Databases in Refineries

Etc..

AVEVA™ PI System™ Improving Operational Surveillance



Clustered Assets

- Refineries
- Unit Operations
- Equipment
- Tanks & Stocks
- Product Specs
- KPIs Monitoring



PI Vision



Uniform and Faster Replication on PI-Vision and Asset Analytic



Asset analytics



Event frames



Notifs

The notification email from PERTAMINA states:

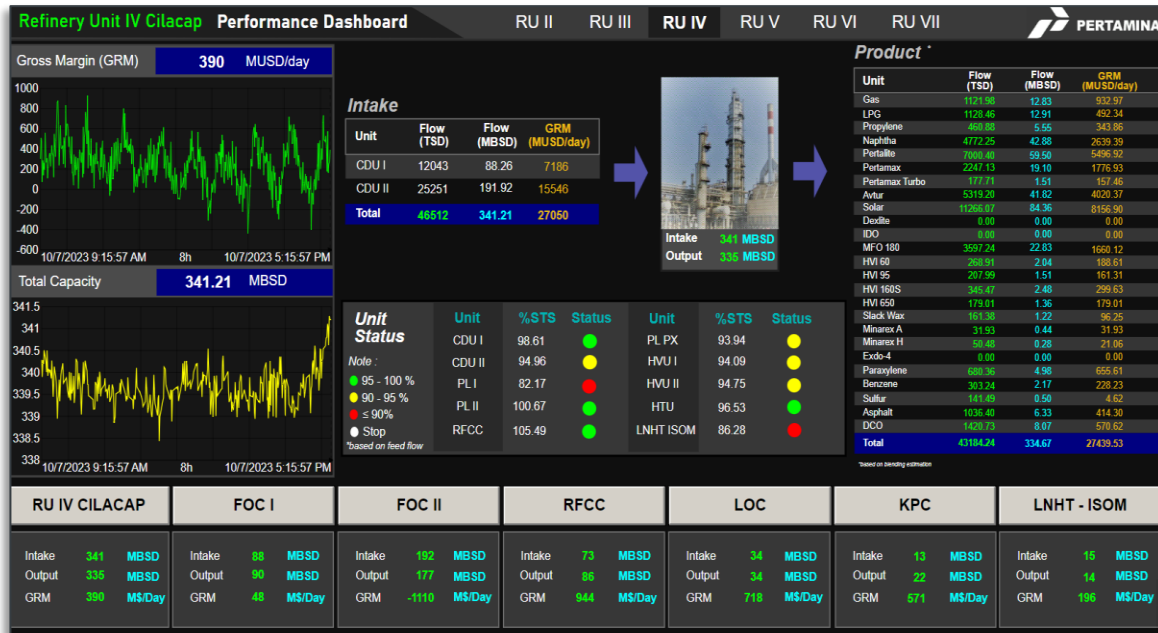
[i-CAN] RU V Balikpapan - ESD HCU B IS TRIGGERED [HCU B Trip. at .3/5/2020 12:07:15 PM] Please check E-mail for further information.

[i-CAN] RU V Balikpapan - ESD HCU B IS TRIGGERED [HCU B Trip. at .3/5/2020 12:55:16 PM] Please check E-mail for further information.

The PI Vision event detail window shows:

- Event:** HPU B Operational Status 2020-03-05 08:53:15 AM
- Triggering Time:** 3/7/2020 4:39 AM
- Triggering Conditions:** CDU:SD
- Table of Parameters:**

Parameter	Tag Number	UoM	Status
FEED	100-FC-101	m3/h	OK
FLOW PASS 100 H-1 NO 1	100-FSLL-102	m3/h	OK
FLOW PASS 100 H-1 NO 3	100-FSLL-104	m3/h	OK
FLOW PASS 100 H-1 NO 5	100-FSLL-106	m3/h	OK
FLOW PASS 100 H-1 NO 7	100-FSLL-108	m3/h	OK
FURNACE PRESS IDP	100-PSLL-901	mmHg	OK
COMBUSTION AIR TO 100 H-1	100-FSLL-901	T	OK
PILOT GAS 100 H-1	100-PSLL-15	kg/cm2	OK



Refinery operation monitoring template: opr. parameter, quality, capacity target and generic gross margin

Collections of tank data from ATG



PI-Vision

AVEVA™ PI System™ Improving Operational Surveillance

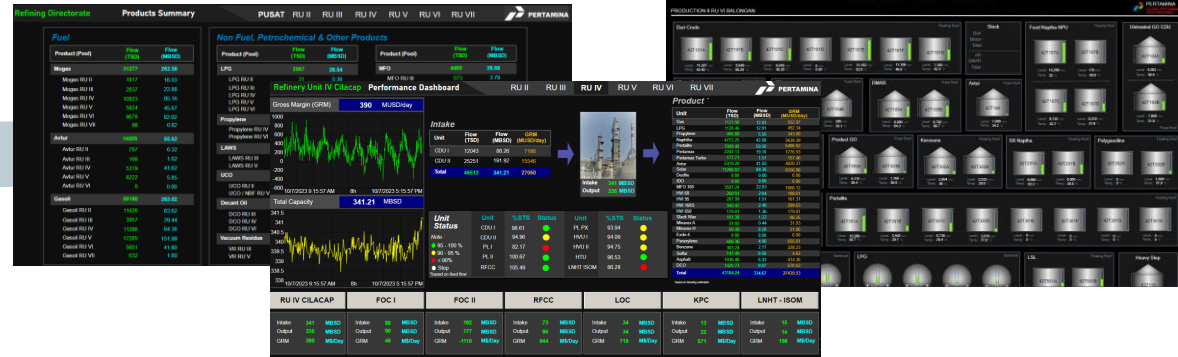


Clustered Assets

- Refineries
- Unit Operations
- Equipment
- Tanks & Stocks
- Product Specs
- KPIs Monitoring



PI Vision



Uniform and Faster Replication on PI-Vision and Asset Analytic



Asset analytics



Event frames

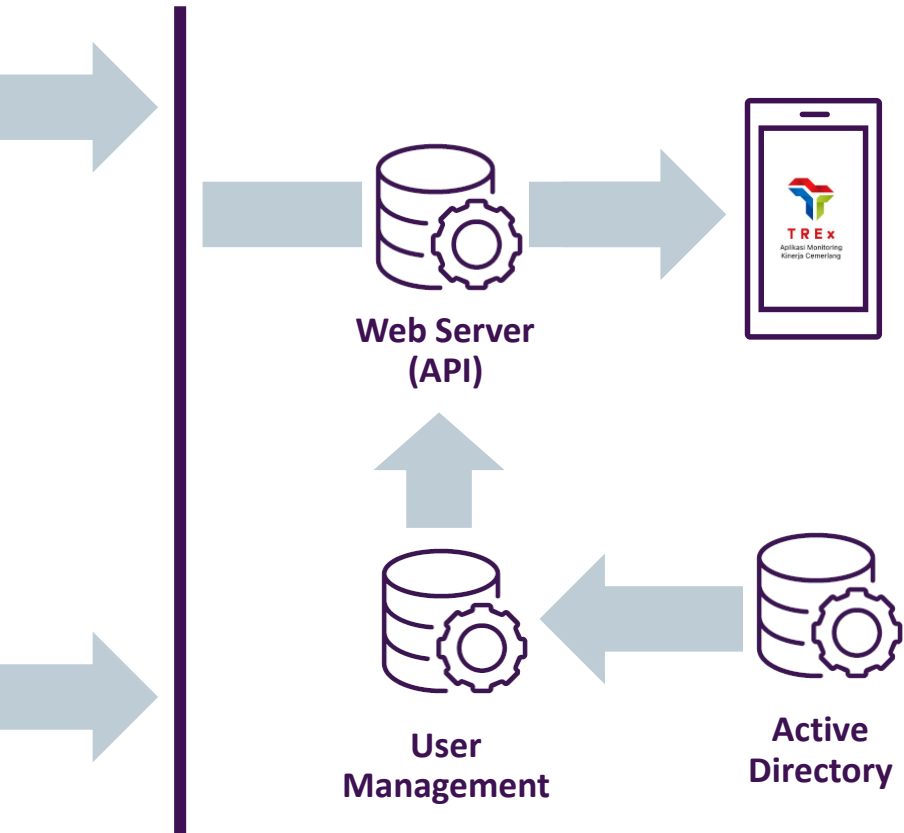


Notifs

The notification shows an ESD (Emergency Shutdown) event for 'RU V Balikpapan - ESD HCU B IS TRIGGERED'. The event log on the desktop shows a table of parameters and their values at the time of the event.

Parameter	Tag Number	UoM	Status
FEED	100-FC-101	m ³ /h	OK
FLOW PASS 100 H-1 NO 1	100-FSLL-102	m ³ /h	OK
FLOW PASS 100 H-1 NO 3	100-FSLL-104	m ³ /h	OK
FLOW PASS 100 H-1 NO 5	100-FSLL-106	m ³ /h	OK
FLOW PASS 100 H-1 NO 7	100-FSLL-108	m ³ /h	OK
FURNACE PRESS ID#	100-PSLL-901	mmHg	OK
COMBUSTION AIR TO 100 H-1	100-FSLL-901	T	OK
PILOT GAS 100 H-1	100-PSLL-15	kg/cm ²	OK

AVEVA™ PI System™ as Cornerstone of TREx

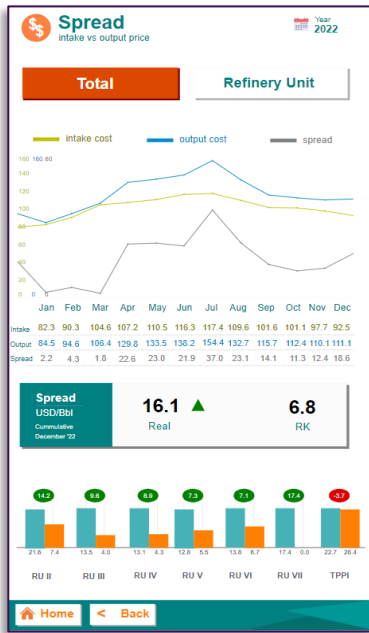


One stop mobile-app operation monitoring tool in refineries

- Financials: spread, gross margin, valuable products and production summaries (management team)
- Operation: Operation KPIs and key operate parameter & lab results
- I-Can: Information critical equipment alarm

The collage displays several key screens from the TREx mobile application:

- PROFIT**: Financial overview with metrics like Actual, STS, and Readiness.
- Unit Capacity**: Real-time capacity monitoring for various refinery units.
- Notification of the Day**: Alerts for critical events, such as 'RU IV Cilacap'.
- Spread**: Line charts showing intake vs output price and spread over time.
- Stream Product Quality**: Summary status for various streams, showing 'On Spec' and 'Off Spec' counts.
- Unit Capacity RU II Dumsal**: Detailed capacity and readiness data for specific units.
- Utilities**: Monitoring of various utility systems like steam flow, power generation, and water levels.



Key financial parameter vs business target, for management team

PROFIT
Plant operation performance & Finance Tracking

PERTAMINA
KEMENTERIAN ENERGI DAN PERTANAHAN REPUBLIK INDONESIA

- Financial: Report (Validated Data by Finance), Tracking (Operational Data)
- Product
- Operasional: RUs Detail, Product Quality, KeyPI, Refinery Dashboard

Unit Capacity RU II Dumai
Real time capacity

Total Pengolahan CDU	Today	MBSD	%STS	%Readiness	%Design
Actual	15705	143.4	110.4	88.2	84.3
STS	17877	129.9			
Readiness	20678	150.0			
Design	23435	170.0			

Pengolahan Unit

UNIT	Ant. Trid	STS Trid	Ant. MBSD	STS MBSD	Readiness MBSD	Design MBSD	%STS	%Readiness	%Design
CDU DMI	16783	16442	121.6	120.0	120.0	120.0	101	100	101
CDU SPK	2642	1234	21.8	6.9	30.0	50.0	226	60	44
NRU	572	559	7.2	6.8	9.3	9.3	104	100	77
PL-1	492	493	0.2	0.2	0.2	0.2	100	100	100
NHDT	1156	1156	9.9	9.9	10.1	10.1	100	100	88
PL-2	1039	1040	8.8	8.8	8.9	8.8	100	100	100
HVU	11082	10516	78.3	74.3	85.7	100.0	105	81	74
DCU	2197	2231	14.8	21.6	58.3	38.3	68	100	41
DHDT	1085	1759	8.5	6.0	12.7	12.7	142	100	67
HCU 211	3888	3546	28.9	25.6	28.6	31.9	103	81	84
HCU 212	3454	3782	24.9	27.2	24.9	31.9	92	79	79

Utilities

Produk	Unit	Opr. Window	Aktual	Status
HP Steam Press	kg/cm2	Min 40.5	40.5	●
HP to MP Letdown	ton/hr	Max 406	292	●
HP to MP Letdown	ton/hr	40-70	35	●
Total Power Gen	MW	Max 72	26	●
Lvl TK Treated Water	%	Min 85	88 / 90	●
Lvl TK Demin Water	%	Min 85	75 / 75	●
Inst. Air Press.	kg/cm2	Min 5.2	5.4	●

H2P, SWS, External Gas

SWS - Flow Inlet	m3/hr	Dsp 75	64.3	●
H2P 701 Product	Nm3/hr	Dsp 44000	36991.1	●
H2P 702 Product	Nm3/hr	Dsp 44000	32442.8	●
External Gas	MMBTUD	Min 41.4	32.1	●

Operation parameter and product quality monitoring for engineering & technical team

Stream Product Quality
Summary status all RUs

Date: 07 Oct 2023

	Total Stream	On Spec	Off Spec
RU II	39	30	9
RU III	23	21	2
RU IV	44	33	11
RU V	16	12	4
RU VI	22	16	6
RU VII	0	0	0

Note: - Dashboard Product Quality RU VII sedang dalam pengembangan

Notifikasi

Notification of The Day
16 February 2022

Total Notification : 1

RU IV Cilacap 1

Event Frame

Notification of The Day
16 February 2022

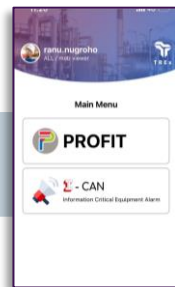
Total Notification : 11

- RU II Dumai 1
- RU III Paju 0
- RU IV Cilacap 1
- RU V Balikpapan 0
- RU VI Balongan 0
- RU VII Kasim 0

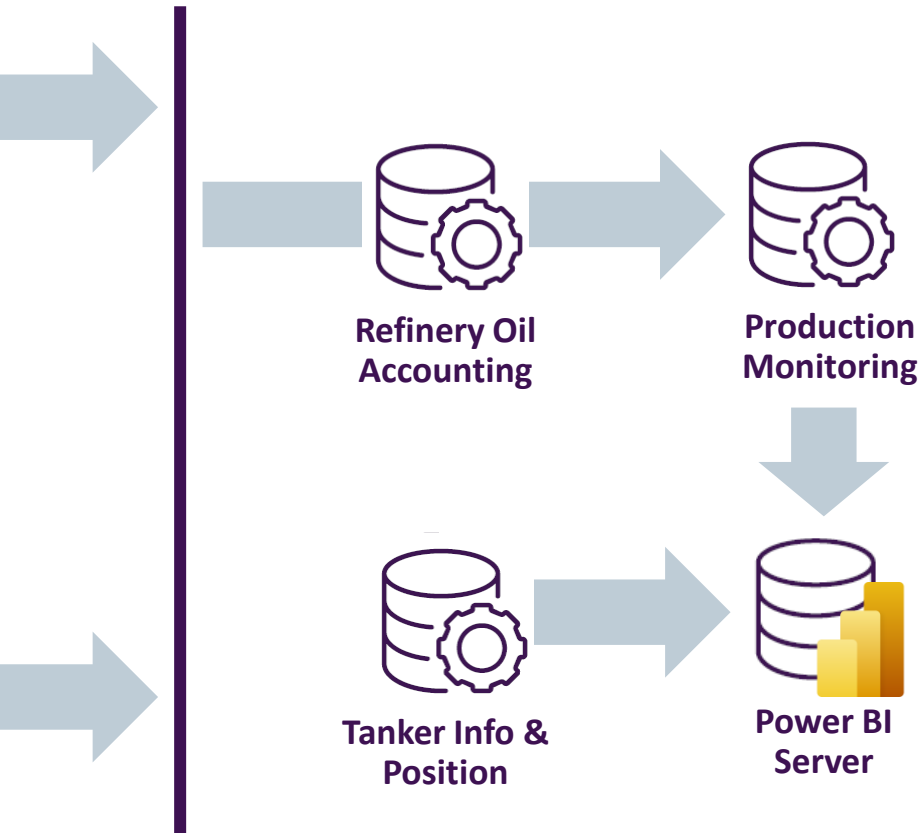
I-Can: List of critical equipment alarm triggered



Web Server (API)



AVEVA™ PI System™ as Cornerstone of Stock Monitoring



JOD PRIMARY 2.2

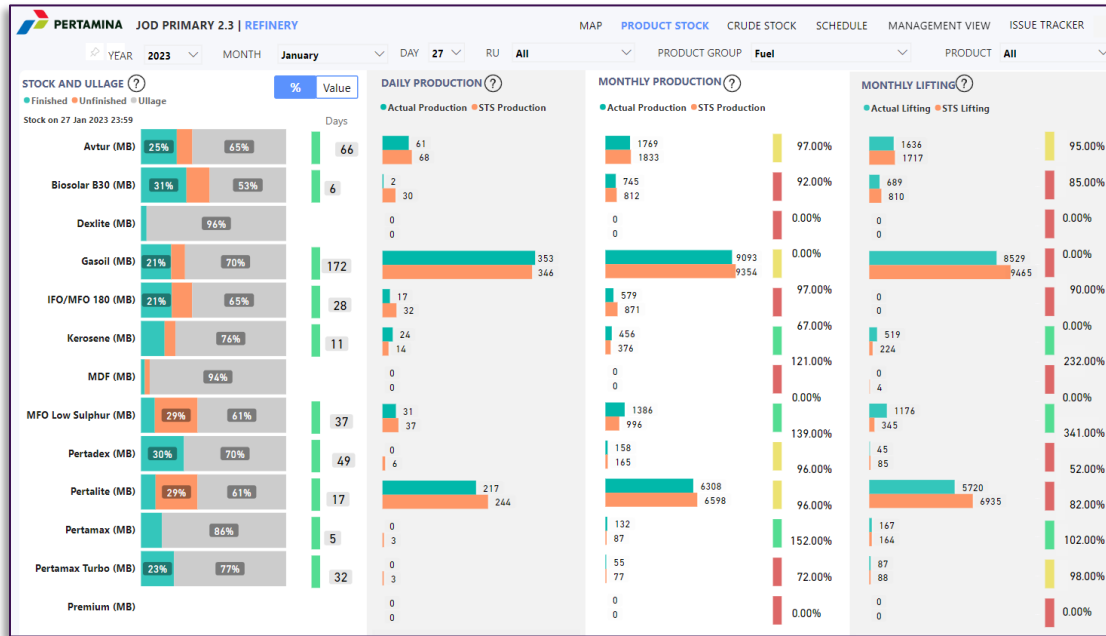


Planning & production monitoring tools in refinery

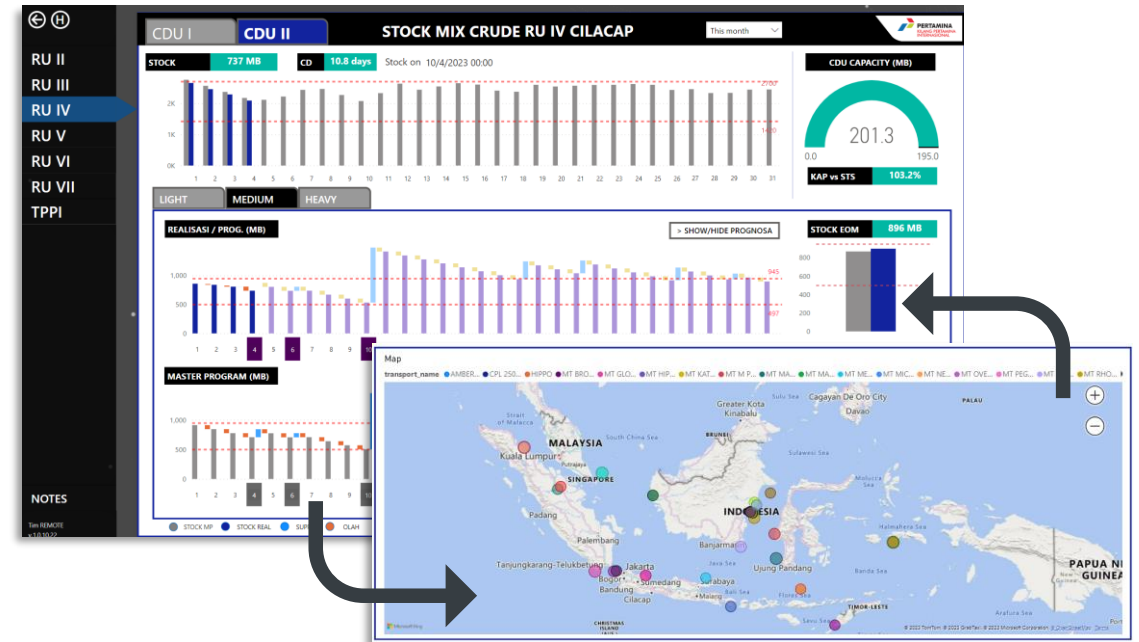
- Crude & Products: Stock, ullages, end of month forecast
- Production & Lifting: Business KPIs and ship tracking
- Operation: Refinery capacity, issues tracking



PART 1



Stock position and coverage days for crude & products



Combine stock position, production planning & shipping data to generate stock forecast (until end of month)



Refinery Oil Accounting



Production Monitoring



Tanker Info & Position

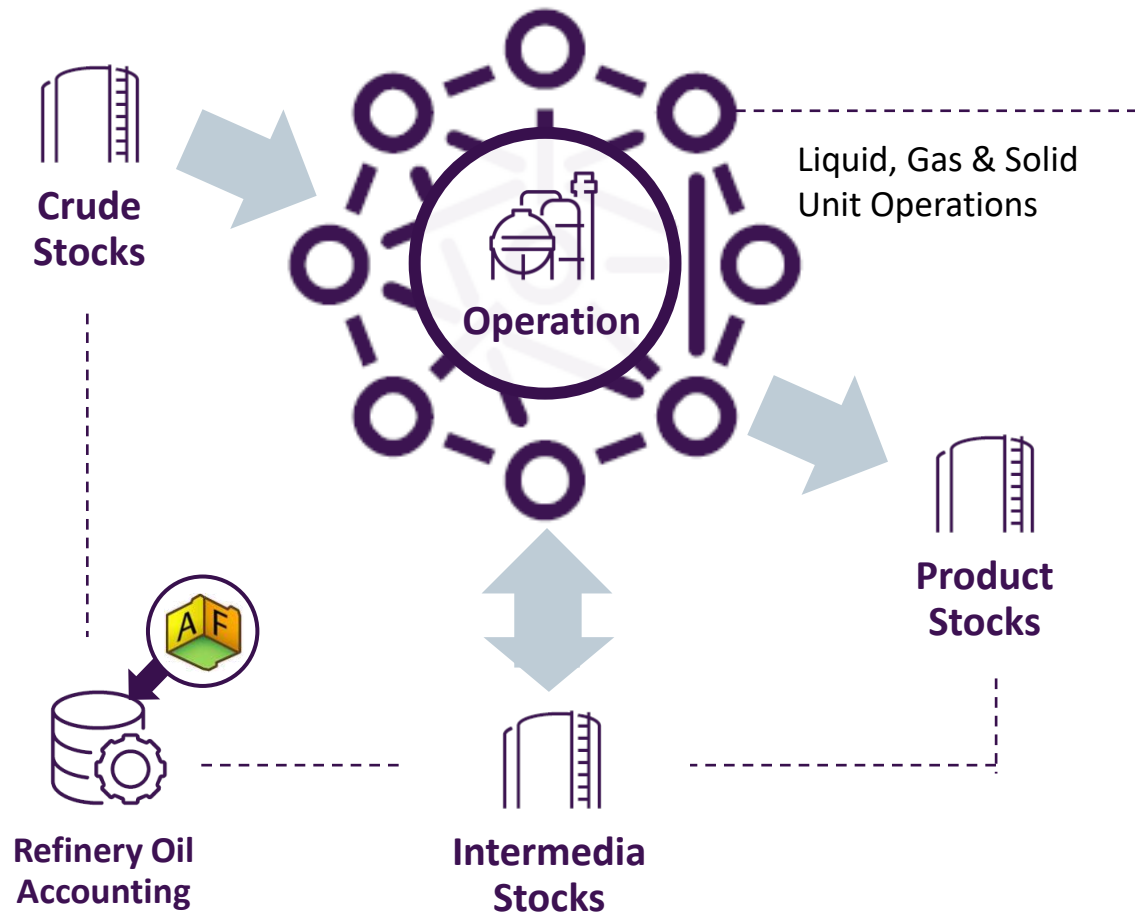


PART 2

Better Mass Balance & Production Accounting

AVEVA

Mass Balance is Something...



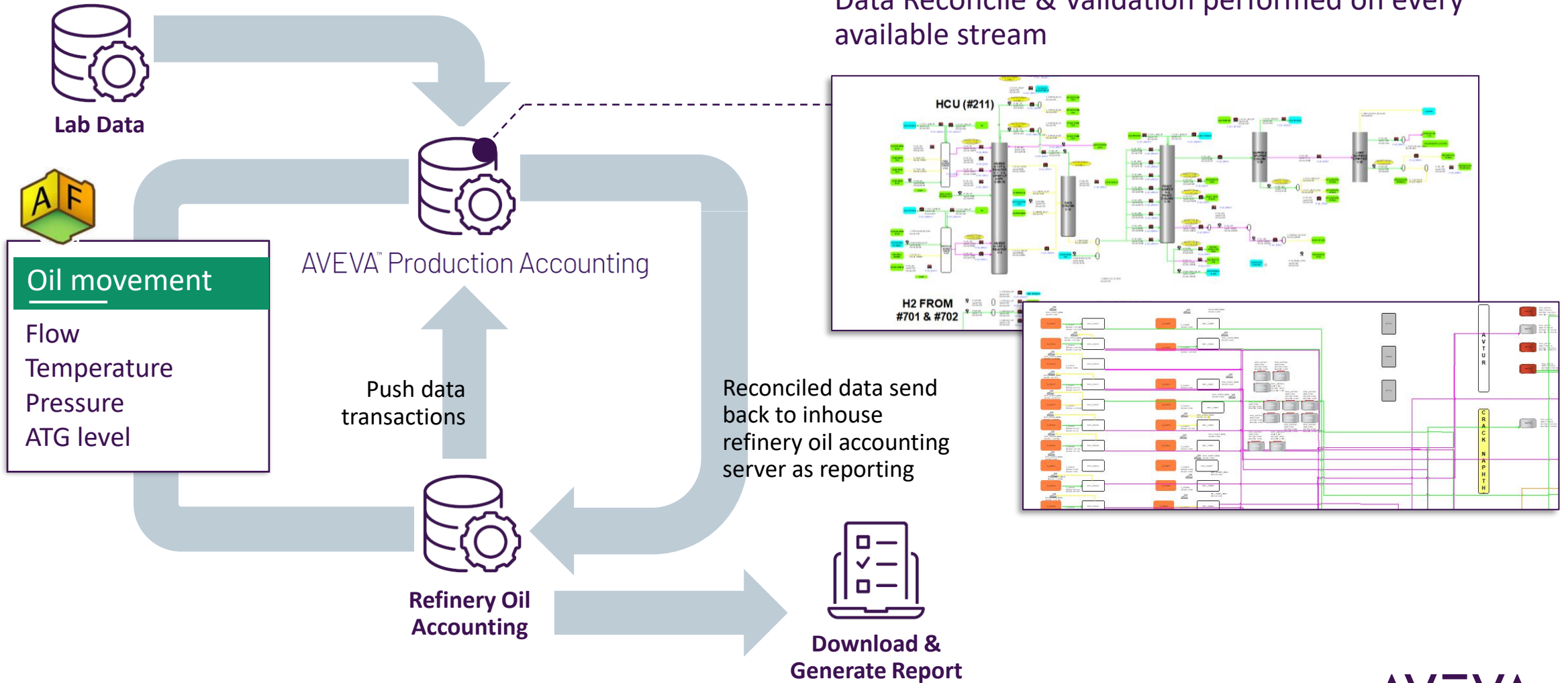
Traditionally solving mass balance within unit operations is complex due to Gross Error

- Bad Measurement
- Stuck tank gauges
- Miss of transaction data
- Human calculus error

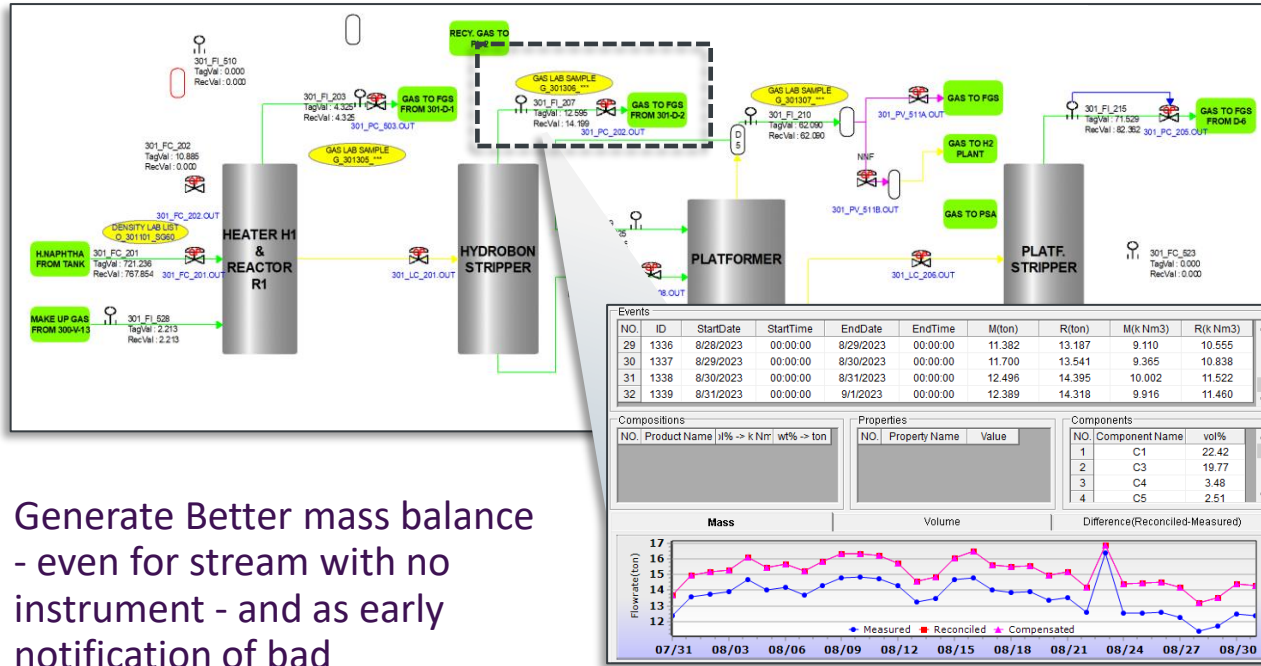
Unfortunately, these questions only can be answered with mass balance..

- Which flowmeter is inaccurate?
- How much refinery loss?
- How much is real energy consumption?
- How much cost of gasoline in CDU and hydrocracker?

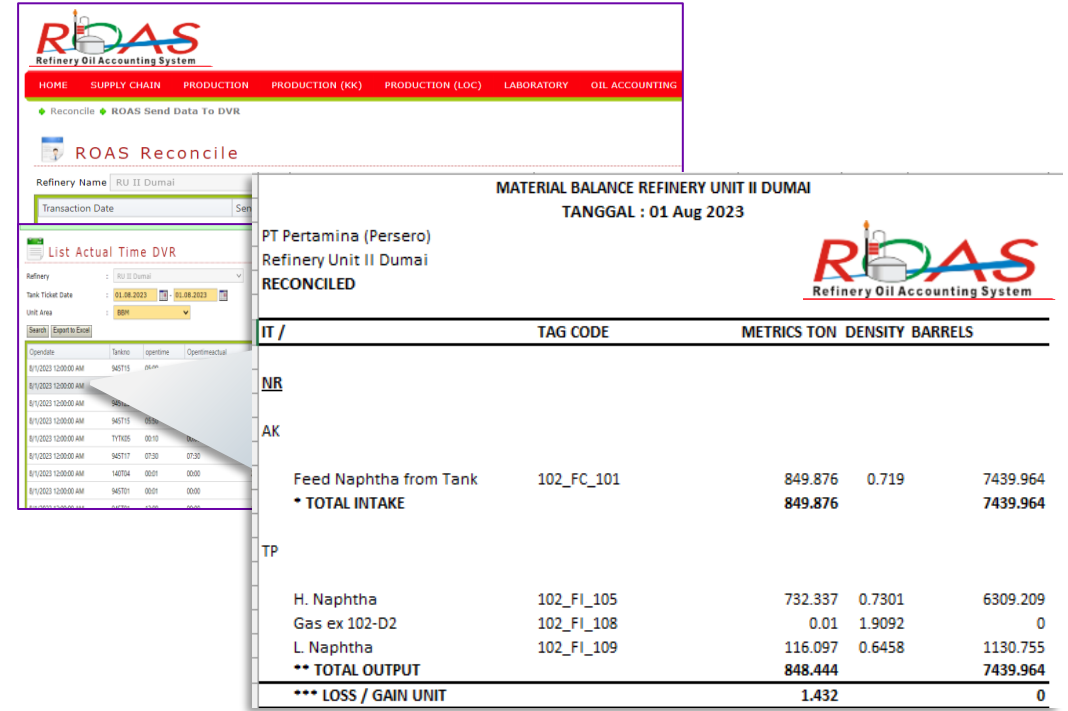
AVEVA™ PI System™ Improving Data Validation



PART 2



Generate Better mass balance - even for stream with no instrument - and as early notification of bad measurement



Mass balance report generated and sent to Refinery Oil Accounting Server as single point source of refinery oil movement data



AVEVA™ Production Accounting



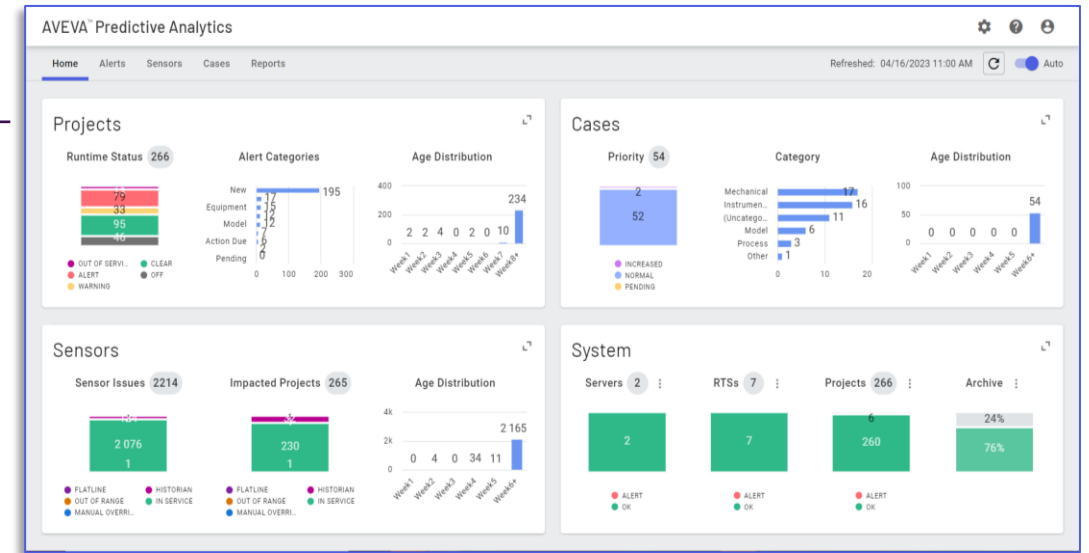
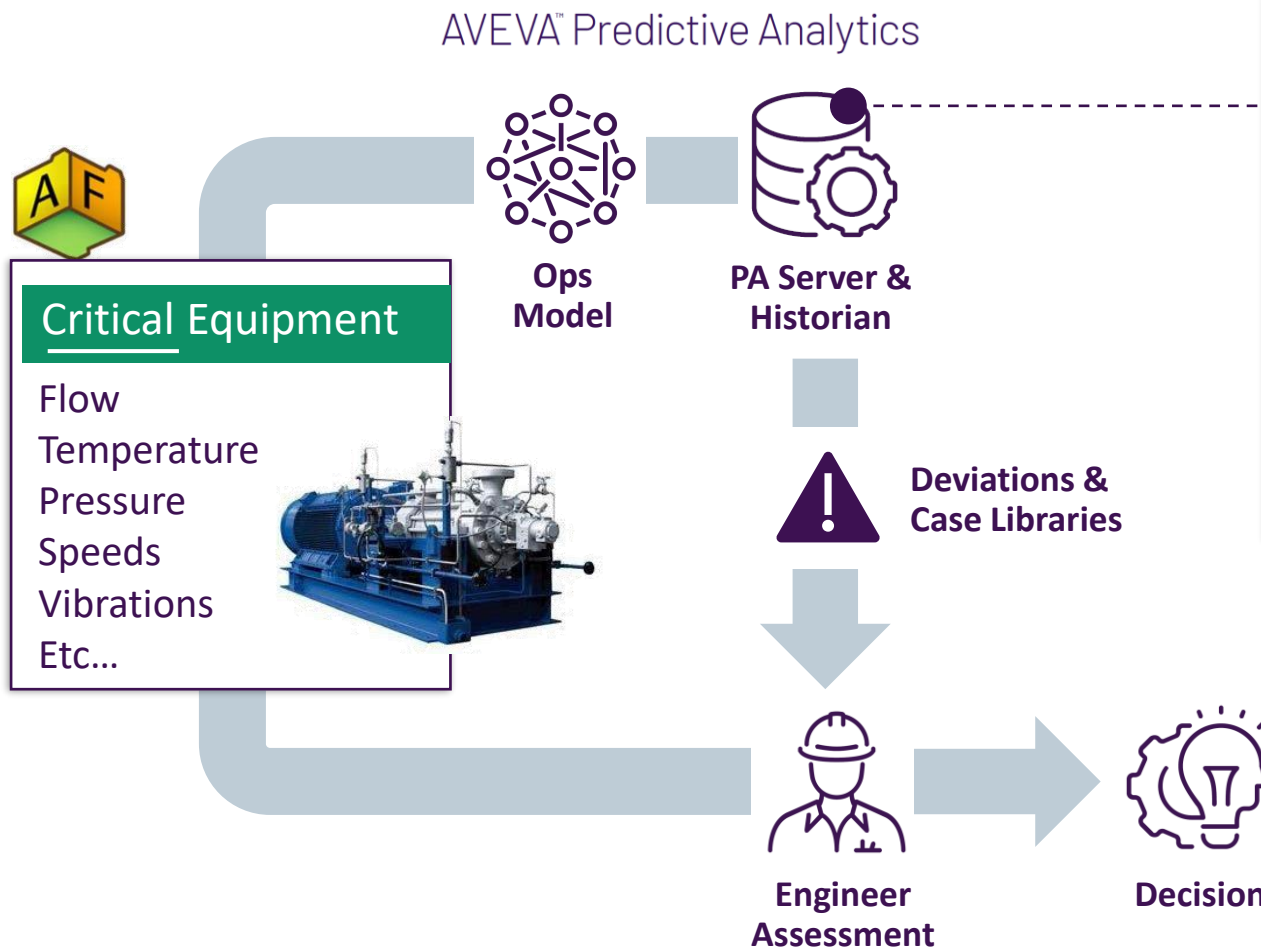
Refinery Oil Accounting

PART 3

Improve Assets Reliability

AVEVA

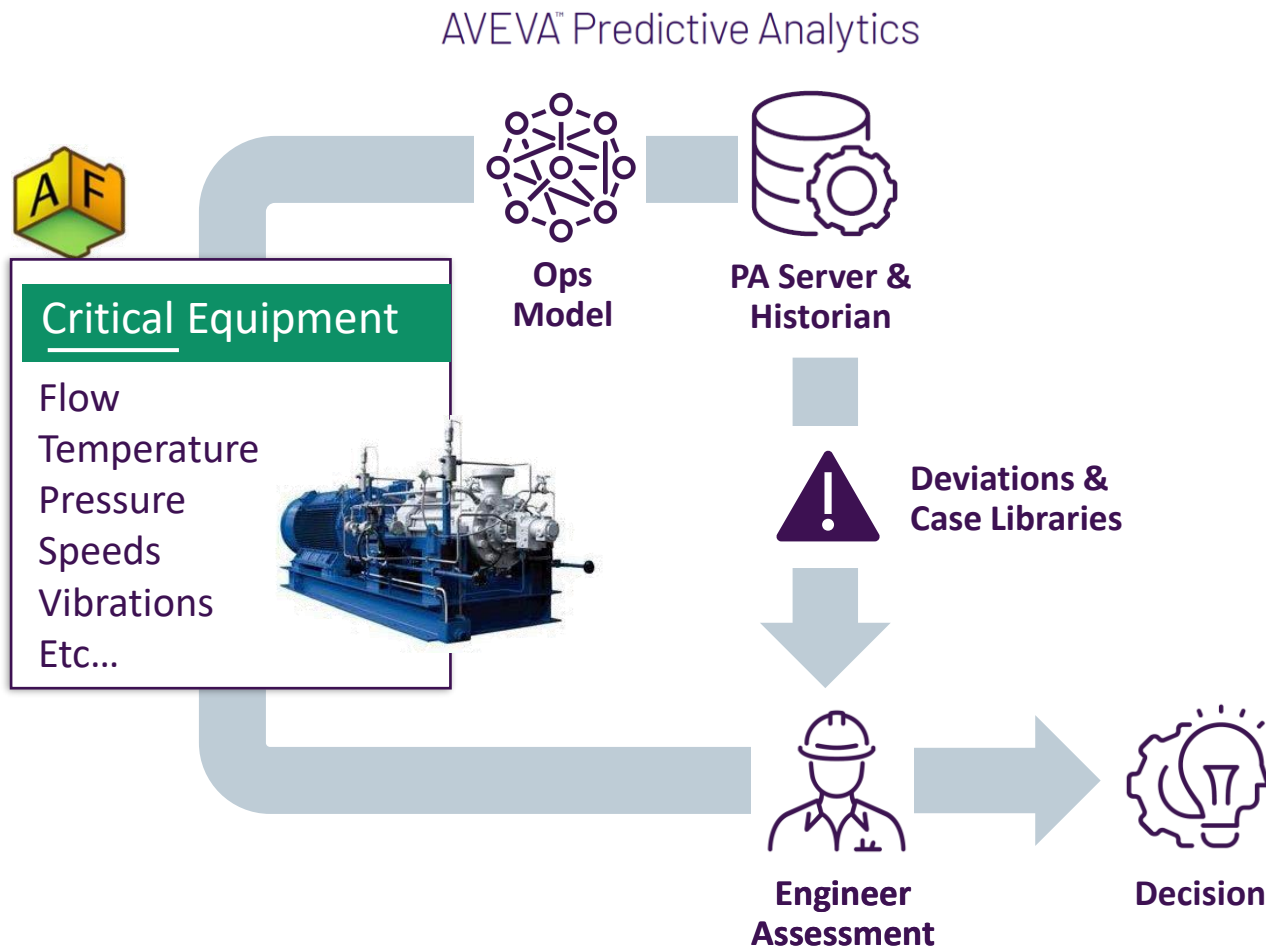
Predictive Analysis (PA) Reshape Maintenance Surveillance



Enriching refinery's predictive maintenance with early warning of potential failures of

90 Critical Equipments

Predictive Analysis (PA) Reshape Maintenance Surveillance



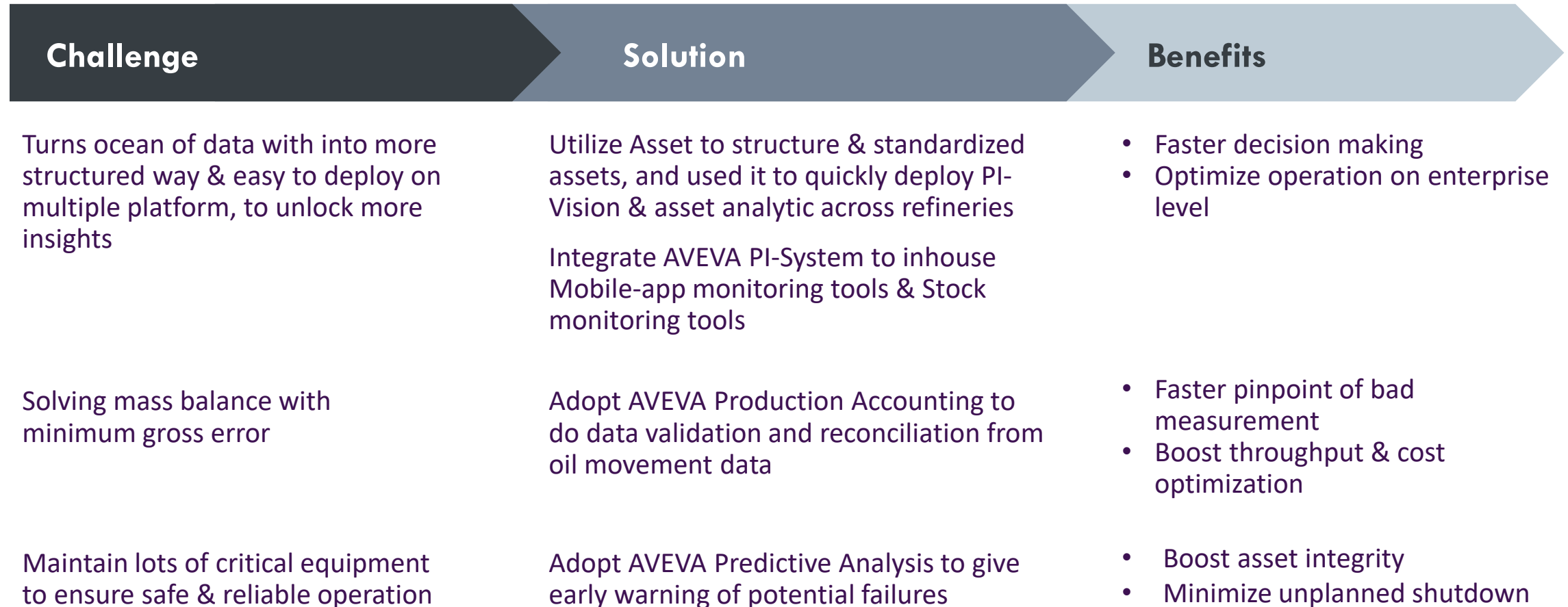
The detailed journey specific on Predictive Maintenance will be delivered in next session from PERTAMINA expertise

So, stay connected!



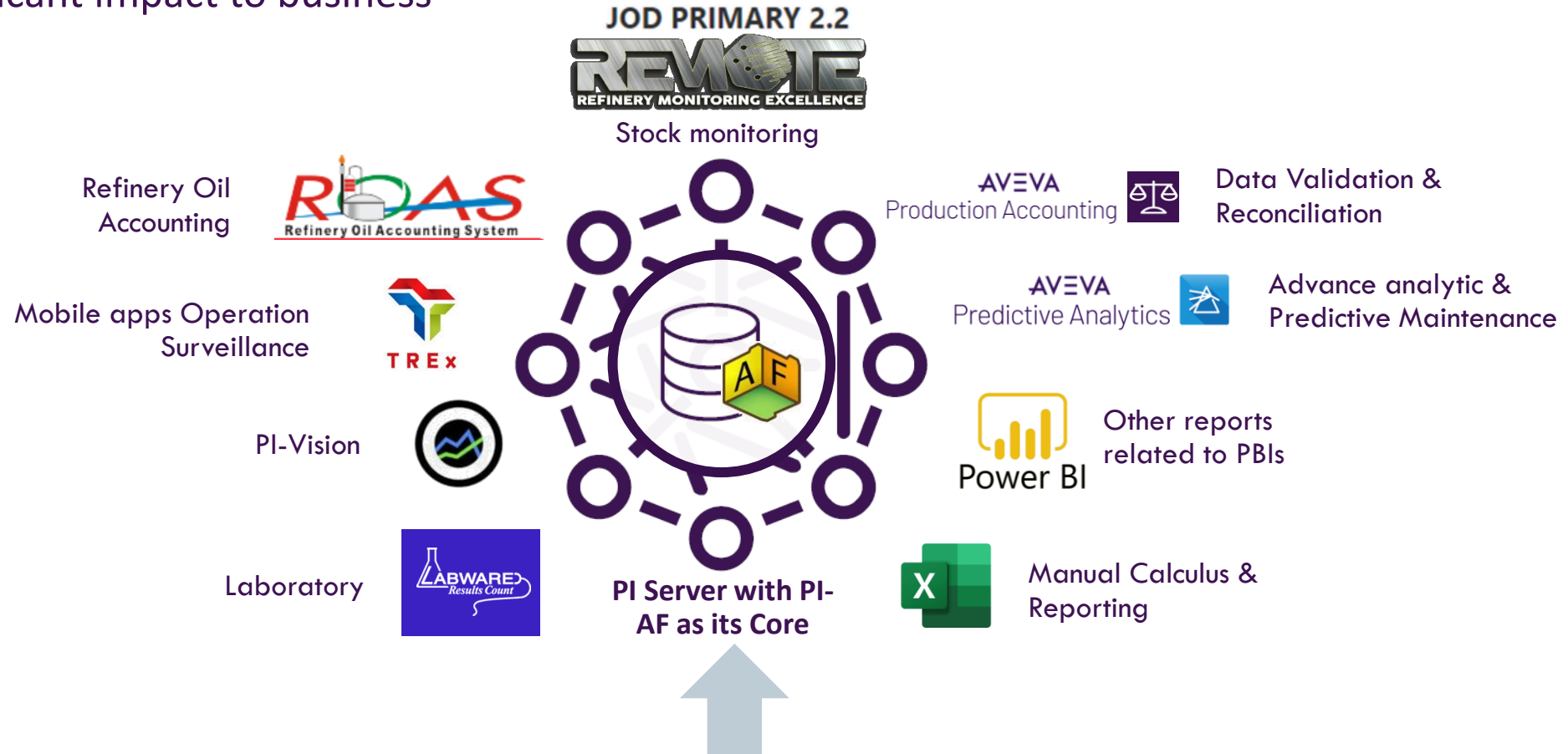
“ Maintaining Indonesia Energy Security with AVEVA PI System and AVEVA Predictive Analytics ”

Summaries of our journey so far



CLOSING

AVEVA product solution has been extensively adopted by PERTAMINA/PT KPI's operation business, translating vast volume of data to useful insight & deliver significant impact to business





Franciskus Sembiring

Facility Improvement Sr Specialist

- PT KPI – Process and Facility
- franciskus.sembiring@pertamina.com



Ranu Santoso Nugroho

PIMS, LIMS and APC Engineer

- PT KPI – Engineering & Development
- ranu.nugroho@pertamina.com



Ellen Fransiska Tanida

Business App Solution Sr Analyst

- PT KPI – Business IT Solution
- ellen.tanida@pertamina.com



THANK YOU 😊

This presentation may include predictions, estimates, intentions, beliefs and other statements that are or may be construed as being forward-looking. While these forward-looking statements represent our current judgment on what the future holds, they are subject to risks and uncertainties that could result in actual outcomes differing materially from those projected in these statements. No statement contained herein constitutes a commitment by AVEVA to perform any particular action or to deliver any particular product or product features. Readers are cautioned not to place undue reliance on these forward-looking statements, which reflect our opinions only as of the date of this presentation.

The Company shall not be obliged to disclose any revision to these forward-looking statements to reflect events or circumstances occurring after the date on which they are made or to reflect the occurrence of future events.

 [linkedin.com/company/aveva](https://www.linkedin.com/company/aveva)

 [@avevagroup](https://twitter.com/avevagroup)

ABOUT AVEVA

AVEVA is a world leader in industrial software, providing engineering and operational solutions across multiple industries, including oil and gas, chemical, pharmaceutical, power and utilities, marine, renewables, and food and beverage. Our agnostic and open architecture helps organizations design, build, operate, maintain and optimize the complete lifecycle of complex industrial assets, from production plants and offshore platforms to manufactured consumer goods.

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. The company is headquartered in Cambridge, UK.

Learn more at www.aveva.com