

# AGL's Real-Time Data Journey

David Bartolo (Head of Asset Performance)

# Australian Gas Light Company (AGL)

- AGL is one of Australia's leading integrated energy companies and largest ASX listed owner, operator and developer of renewable energy generation in the country
- Drawing on more than 180 years of experience, AGL provides gas, electricity, solar PV and related products and services to more than 3.6 million customers across Australia.
- AGL operates the country's largest electricity generation portfolio and we're its largest ASX-listed investor in renewable energy. We are taking action to responsibly reduce greenhouse gas emissions while providing customers with secure and affordable energy
- Our business definition, 'Harness insights to enrich the customer's energy experience' means that our customers are at the heart of everything we do.

*We are committed to prospering in a carbon-constrained future and building customer advocacy as consumer expectations evolve*

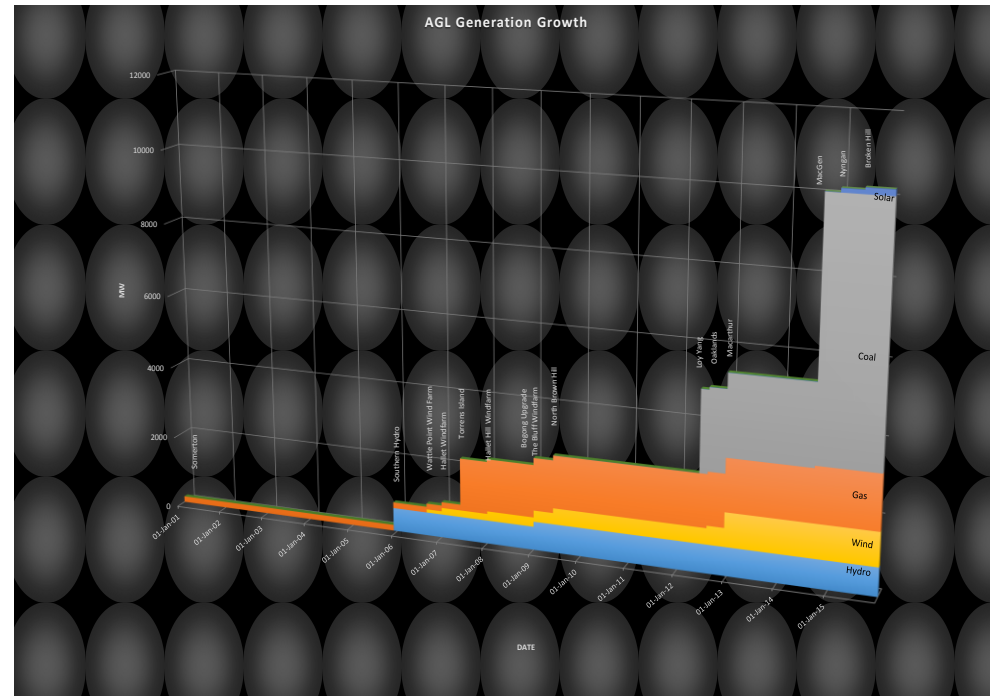


# The AGL Generation Fleet

300-10,000+ MW in 9 Years!

Fast Generation Portfolio Growth via:

- Acquisitions including:
  - Southern Hydro (700MW)
  - Torrens Island Power Station (1280MW)
  - Loy Yang Power Station (2250MW)
  - Macquarie Generation (4560MW)
- Build including:
  - 9 X Wind Farms (1589MW)
  - Bogong Hydro Power Station (150MW)
  - 2 X Solar Power Stations (155MW)



# Choosing OSIsoft PI

# Data Landscape Early 2012

- Data issues facing AGL
  - Live “Read Only” SCADA screens being used for real time visualisation
  - Data skill set not transferable
  - High reliance on human data champions at each site to provide data
  - Data precision and tractability poor
  - Many data collection processes still manual
  - Data “black spots” reducing capability to investigate asset performance and incidents effectively
  - Centralised human resources hampered by poor access to asset data
  - No capability to efficiently execute any type of Data Analytics across the portfolio
- **AGL Generation Fleet was projected to grow to 9000+ MW within 4 years! A data solution that matched our growth strategy was urgently required.....**

# OSIsoft Real Time Data Infrastructure

*The enabling technology that changes our data culture and gets us better results*

## PI is our real time data infrastructure solution

- > It includes the high performance PI Server that acts as a highly adaptable and connectable real time data historian that can connect to almost all power station field devices including, but not limited to:
  - Distributed Control Systems (DCS)
  - Programmable Logic Controllers (PLC)
  - Field Located Digital devices (instruments, controllers etc.)
- Advanced analysis and visualisation tools that greatly increase the value proposition for AGL.
- Mobile data access that is secure for all AGL users.
- Many OSIsoft Partner products that easily connect to PI.



# OSIsoft Enterprise Agreement

*Enabling and supporting a data transformation*

## Architecture

- EA Technical Support
- EA Rollout Plan
- System performance monitored

## Data Culture

- Face to face and online training services
- Unlimited user Licences and tags

## Scalability

- Flexible EA and PI system architecture
- Easy to include new assets

## Value Realisation

- EA assists value realisation program
- Support from OSIsoft Centre of excellence



# PI empowers AGL people with real time data



# AGL People empowered with the PI data system can build value fast

*“OSIsoft PI improves our understanding of our assets and processes and allows our team to achieve better results”*

The collage illustrates the integration of field operations with advanced data analytics. It features a worker in a safety vest, a performance graph showing trends over time, and a complex schematic of a boiler feed pump system with various units and flow paths.

PARIS powered Feed Water  
 Central Plant based on  
 Feed Pump Response Monitoring

# PI enables the AGL Operational Diagnostics Centre

# Predict It

Advanced Pattern Recognition

*“Finding failures before they find us”*



## Early Warning System

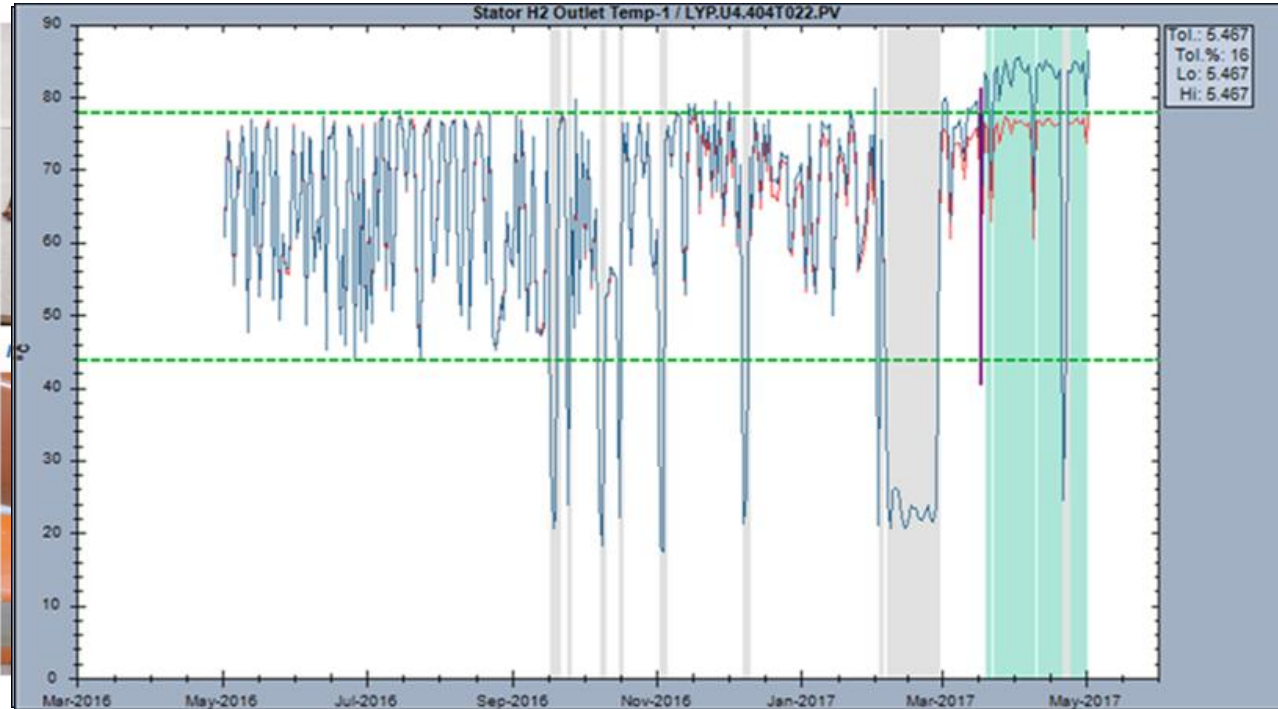
- Providing diagnostic service to Group Operations Business Units
- Foresight through early fault detection (weeks & months vs hours)
- Installed on Central PI System April 2015
- Over 2700 models monitoring over 45k critical points every 5 minutes
- Proven tool to reduce forced outage events and optimise maintenance effort

## \$18.7M value realised since installation

- Total set up cost \$1.2M
- Annual running costs \$620k

# July 17 ODC: Significant Failure Avoided

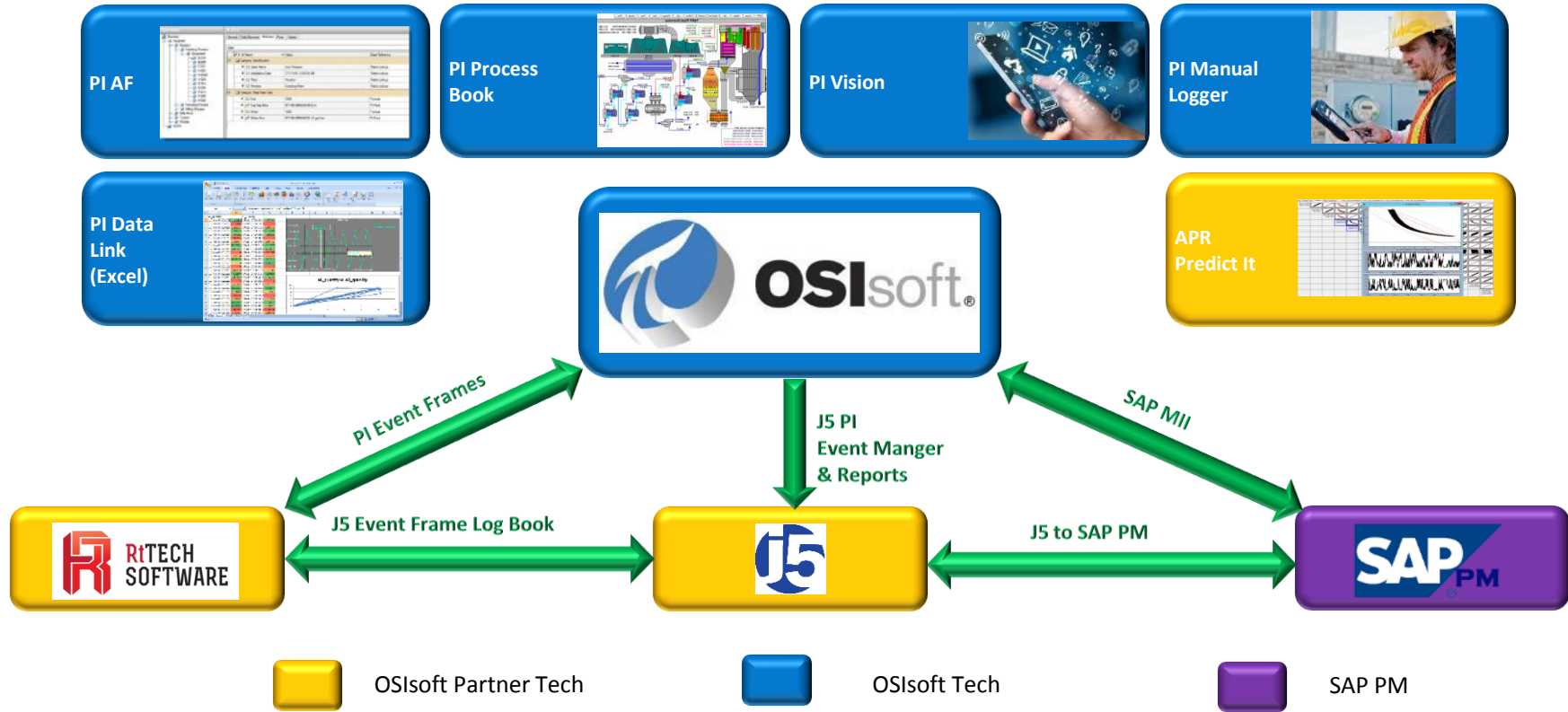
- Loy Yang Station U4 Generator, 560MW, Hydrogen Cooled Stator



**May 2017**  
 Hydrogen outlet #1 found to be tampered and checked by ENG above bay. It calculated expectation calculated expectation Unit repaired in situ 4.5 weeks. ~~As a result of the stator winding fault~~ (estimated 12-14 weeks) Unit placed under close monitoring since 70% and comprehensive inspection actioned.

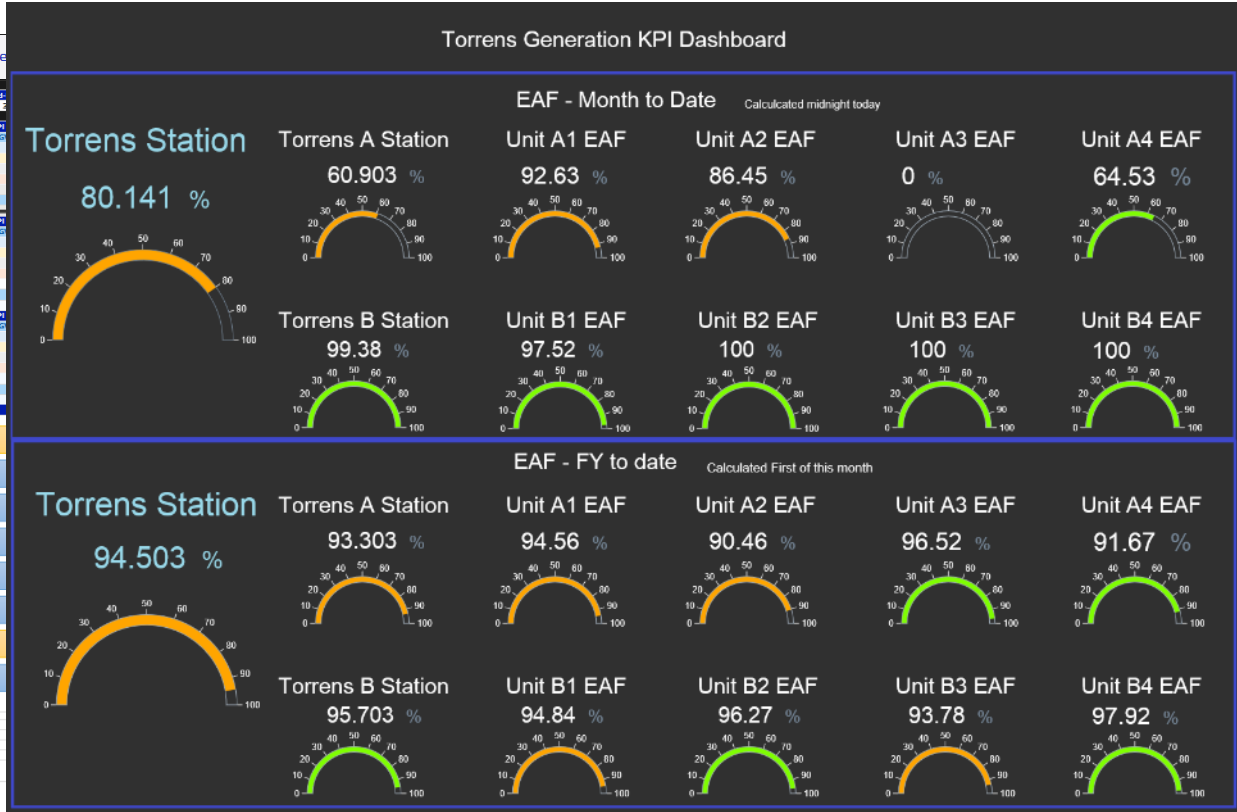
# PI enables a new technology platform for operations

# OSIsoft PI: The heart of our operational technology platform





# Rt Duet: Real performance in real time



agj Torrens Monthly Review

Month	Station	Rolling
KPI		
EAFs - %	77.6%	
POF - %	16.8%	
LOF - %	5.2%	
UDF - %	0.4%	
PLN - %	1.1%	
Power Statistic	100.0%	
Torrens A		
EAFs - %	83.7%	
POF - %	12.2%	
LOF - %	4.1%	
UDF - %	0.0%	
PLN - %	1.0%	
Power Statistic	100.0%	
Torrens B		
EAFs - %	74.0%	
POF - %	19.5%	
LOF - %	0.6%	
UDF - %	0.0%	
PLN - %	0.6%	
Power Statistic	100.0%	

Unit	Value
Unit B4	100.0
Unit B3	97.9
Unit B2	96.3
Unit B1	94.8
Unit A4	91.7
Unit A3	96.5
Unit A2	90.5
Unit A1	94.6
Station	94.5

212.88

	BU %	OWN
Pumps, Pt	1.06	18.67
Plant Conditi	0.98	9.29
	0.81	7.74
	0.75	7.12
	0.73	6.98
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	-	-
	0.60	-
	3.23	49.81
	BU %	OWN
Plant Conditi	0.30	2.87
Plant Conditi	0.06	0.57
Plant Conditi	0.09	0.25
	-	-
	-	-
	0.39	3.69
	BU %	OWN
	12.18	115.99
	4.14	39.43
	0.42	3.96
	-	-
	-	-
	16.74	159.38

Boiler Pressure Parts  
Electrical Power  
Planned Outage

Weighted Duration

03:01:02:15  
02:10:02:15  
00:00:00:00

Copy CSV

# OSIsoft technology enables the Thermodynamic Performance Optimisation System (TPOS)



# TPOS (under development)

M  
Op  
fo  
Design / Bu  
How:

The screenshot displays the Operator TPOS Unit overview screen, which is a complex interface for monitoring and controlling a power plant. The interface is divided into several sections:

- Unit Selection:** A vertical sidebar on the left allows the operator to select between four units (Unit 1, Unit 2, Unit 3, Unit 4), each represented by a different color (blue, orange, green, yellow).
- Process Flow Diagram:** The central area shows a detailed schematic of the feed heating system. It includes components like the GEH (Generator Exhaust Heater), LP1A, LP2A, LP1B, LP2B, LP3, LP4, DA (Drain Accumulator), BFF (Boiler Feedwater Filter), HP6B, and HP7B. Each component is accompanied by real-time data such as Inlet Temp, Outlet Temp, Temp Rise, DCA, HR Effect, and % Tubes Plugged.
- Data Tables:** Below the flow diagram, there are tables listing heater numbers and their HR Effect. For example, LP1A / LP2A has an HR Effect of 58.2, and LP3 has an HR Effect of 58.2.
- Trend Graphs:** The bottom section features four trend groups, each showing a line graph of a specific parameter over time. The graphs are labeled with parameters like E\_HP7B|HR Effect, E\_HP7B|Inlet Temp, E\_HP7B|Outlet Temp, and E\_HP7B|TTD.
- System Description:** A sidebar on the right provides additional information about the system, including System Description, EPRI Guidelines, Heat Rate Exp, and Home.



- Utilise a specialist thermodynamicist to develop and build the system

Operator TPOS Unit overview screen

# OSIsoft technology enables the Wind Yield Optimisation System (WYOS)

# WYOS (under development)

Mission:

*Increase Wind Portfolio Yield (1-2%)*

Design / Build:

- Identify underperforming turbines and true performance level
- Turbine alarm trending system
- Turbine uptime/downtime tracking
- Improve Wind resource understanding & forecasting (in PI)
- Improve Capability to sense high stress operating conditions & trends (Eg. Yaw error, feathering etc)

How:

- Use existing software (Primarily PI), combined with cloud computing
- OSIssoft (Centre of Excellence)
- Internal dedicated resource to develop and build the system ( + some support from OSIssoft skilled contractors)



# WYOS (under development)



## Overviews



## Detail screens (linked from overview)



David Bowly | 29 November 2017

# Operational Diagnostics Centre



Reduce unplanned generation losses across a mixed technology portfolio of > 10,000 MW



## CHALLENGE

Improve capability to sense active failure modes at the earliest possible opportunity and take actions to avoid loss

- Data isolated and scattered
- Multiple SCADA technologies in play
- No access to real time data

## SOLUTION

Phase #1: Centralise all real time data via OSISoft PI

Phase #2: Install and commission Advanced Pattern Recognition Technology

- Predict It (APR) technology was fast to install and did not require a large data base (it uses Pi directly)
- A Centralised Operational Diagnostics Centre (ODC) reduced the number of recourses required and increased the level of skills
- ODC also uses PI system for deep dive investigations

## RESULTS

\$18.7M of avoided losses in 3 years (from a standing start)

\$8.5M of savings last financial year

- ODC delivers significant tangible benefits
- OSISoft PI enables data transformation and the pursuit many other business improvements
- ODC technology now focusing on process safety uplift

# AGL's Real-Time Data Journey



- David Bartolo
- [david.bartolo@agl.com.au](mailto:david.bartolo@agl.com.au)
- Head of Asset Performance
- AGL



# Questions

Please wait for the **microphone** before asking your questions



State your **name & company**

# Please remember to...

Complete the Online Survey for this session



**Download the Conference App for OSISOFT Users Conference 2017**

- View the latest agenda and create your own
- Meet and connect with other attendees



search **OSISOFT** in the app store

Merci

谢谢

Спасибо

Danke

Gracias

Thank You

감사합니다

ありがとう

Grazie



Obrigado

*“Knowledge, if it does not determine action, is dead to us”*

Plotinus, Roman philosopher (205 AD - 270 AD)