Using the OSIsoft PI System & RtDuet to Calculate Standard-based KPI for Power Generation

Presented by Mark Faith

Energy in action.

Overview of AGL

- The Australian Gas Light Company (AGLC) was formed in Sydney in 1837 and supplied gas for the first public lighting of a street lamp in Sydney in 1841.

- AGLC was the second company to be listed on the then Sydney Stock Exchange in 1871.

- In 1873, for the sum of 4 pounds, AGL imported the first gas cooking stove and installed it in their Darling harbour store.

- 2012, AGL celebrated its 175th anniversary and acquired Loy Yang and its adjacent coal mine. AGL Loy Yang supplies approximately 30% of Victoria's power requirements.

- In 2013 AGL acquired the Australian Power and Gas Company, increasing our customers by approximately 10%.

- In 2014 AGL acquired Macquarie Generation from the NSW Government. Production from AGL Macquarie is equivalent to 30% of the electricity of NSW.
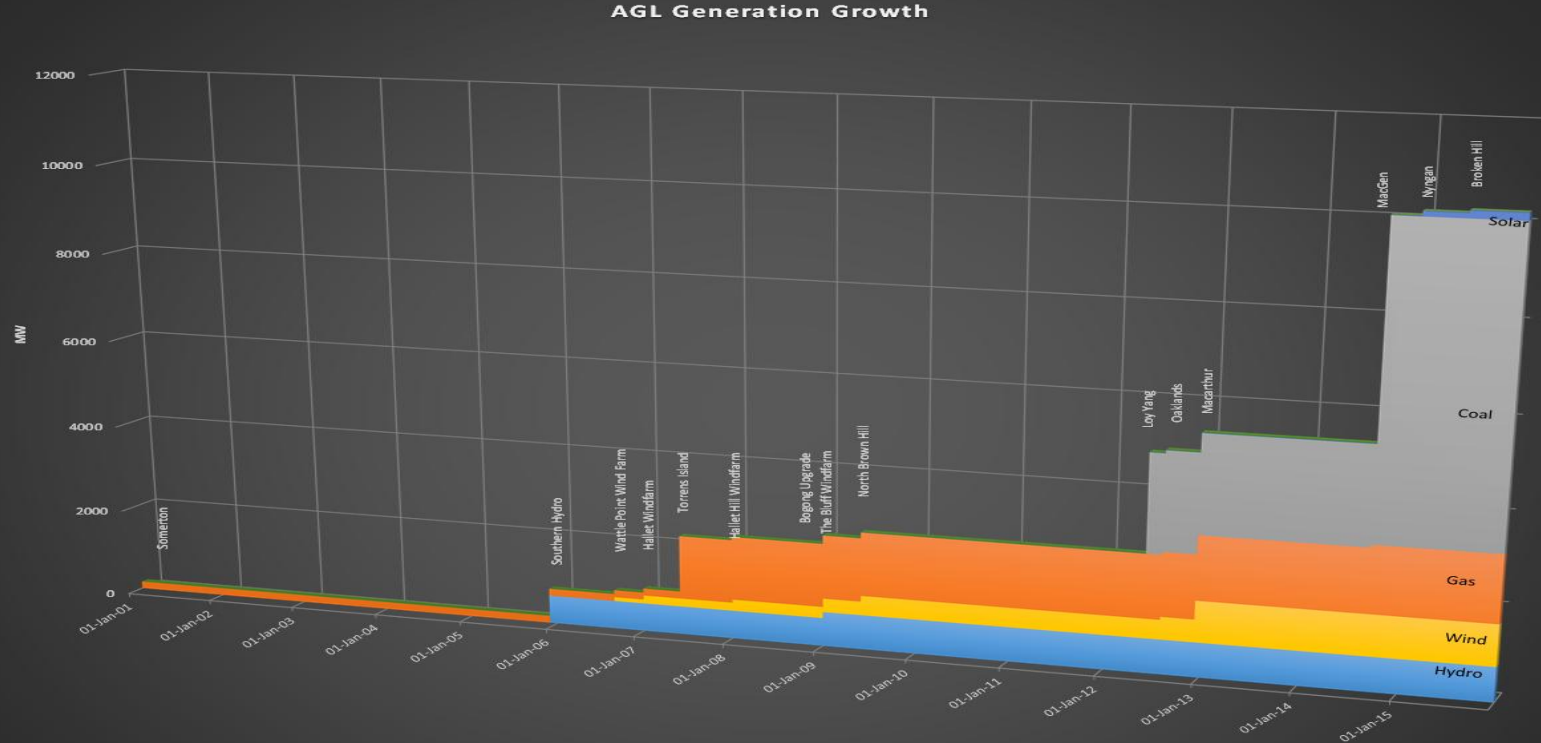
Overview of AGL

- Hydro (777MW)
- Thermal
  - Black Coal (4640MW)
  - Brown Coal (2210MW)
  - Gas (1280MW)
- Frame 6 GT (170MW)
- Wind (929MW)
- Solar (155MW)

- Total – 10,161MW
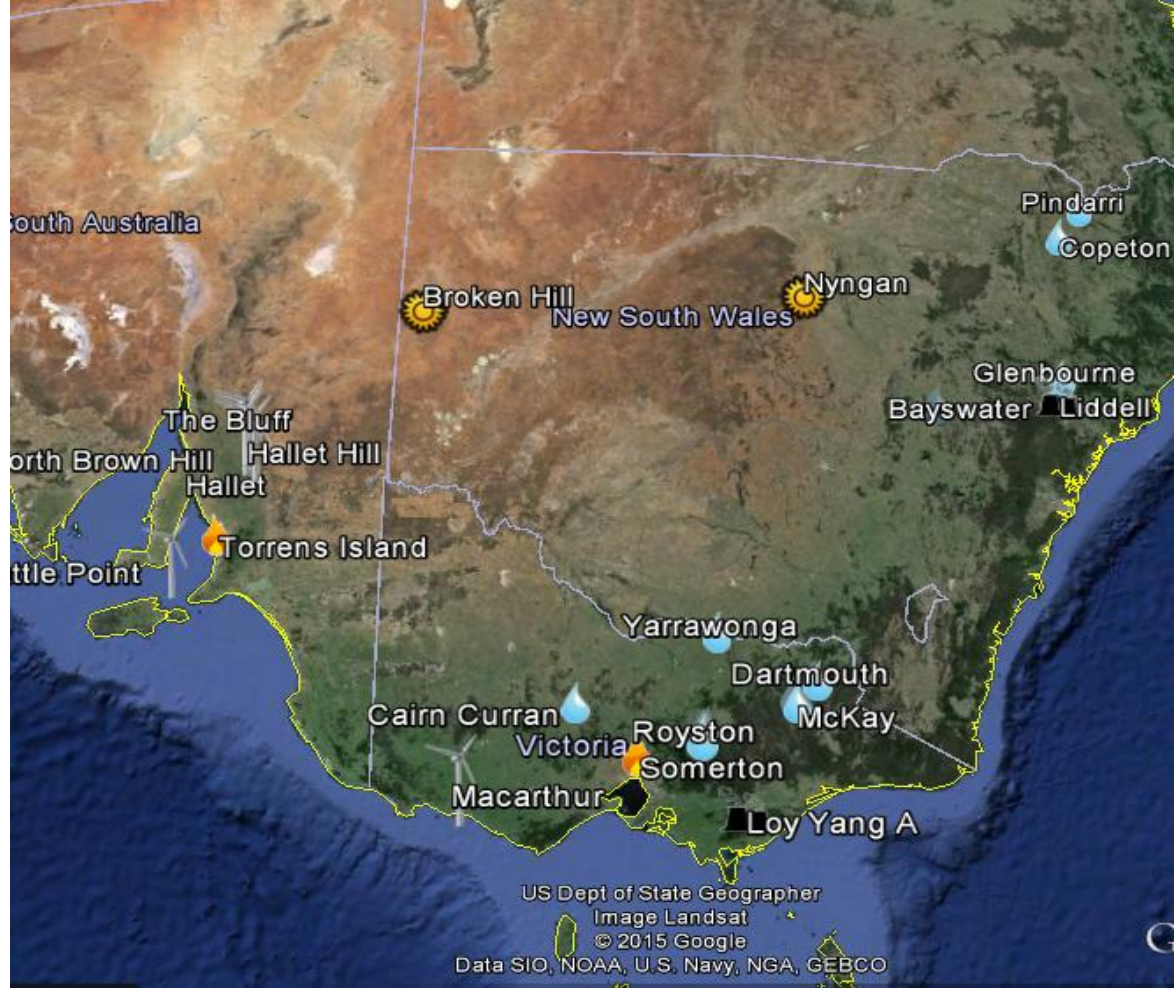
Growth of the MO Generation Fleet
300-10,000MW in 9 Years

AGL Generation Growth

Background

- Merchant operation has grown 10,000MW of over the past 9 years
  - Acquisition
  - New Build

- Result – Adhoc reporting systems
  - No data control
  - Different KPI's and calculation
  - Old standards (ESAA)

AGL KPI's

- AF
- FOF
- EFOF
- FOR
- EFOR
- EFOL

- EAF
- MOF
- EMOF
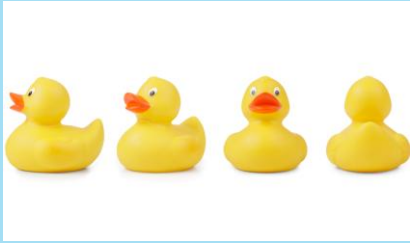- MOR
- EMOR

- UDF
- POF
- EPOF
- POR
- EPOR

Each Business Unit used their own Metrics of measures.
In addition to the many standards they also made some up.

Difficult to align and compare results across the fleet.

Pick the appropriate KPI for what you are trying to measure.

Challenges

| Alignment	People	System	Requirements
Alignment of systems	People personalities	In-house developed or purchase external system	Data control
Alignment of KPI's across the business	Spreadsheet attachment	One System to fulfill requirements	Controlled calculations
	Fear of change	Ability to operated in Power generation and Mine applications	Ease of Access
	Job Protection		Output to the PI System

The Journey from Mayhem to Best Practice – KPI's

- No Control of Data

- Custom KPI's

- Disparate KPI's

- Old Standards

- Inaccurate Reporting

- Reliance on spreadsheets and individuals
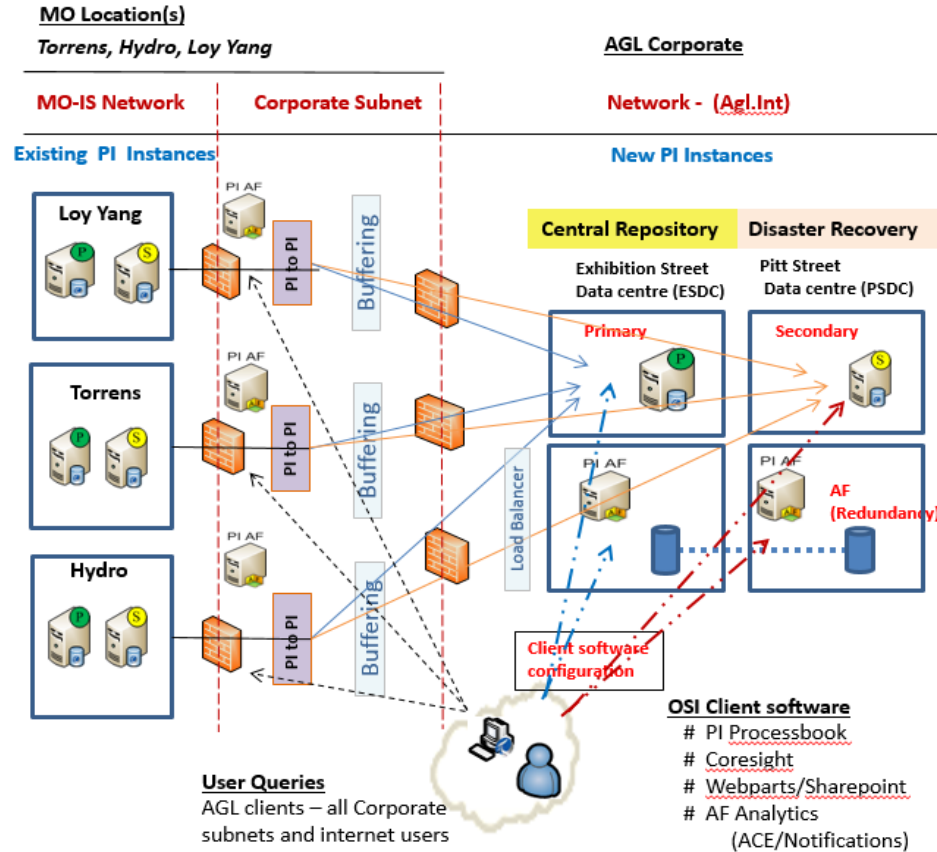
THEN
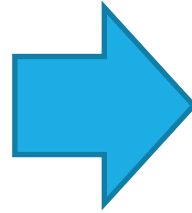
NOW

- Single data repository – the PI System

- Standardized reporting system

- Standardized RtDuet KPI engine

- Alignment with International standards

- Single Supported System

Light Bulb Moment

PI System

- Centralized data
- Data control
- Easy access
- Minimize Data Repositories
- RtDuet

Central PI Instance – Concept Overview

MO Location(s)
Torrens, Hydro, Loy Yang

AGL Corporate

MO-IS Network | Corporate Subnet | Network - (Agl.Int)

Existing PI Instances | New PI Instances

Loy Yang

PI AF

PI to PI

Buffering

Torrens

Hydro

Central Repository | Disaster Recovery

Exhibition Street Data centre (ESDC) | Pitt Street Data centre (PSDC)

Primary | Secondary

Load Balancer

AF (Redundancy)

Client software configuration

User Queries
AGL clients – all Corporate subnets and internet users

OSI Client software
- # PI Processbook
- # Coresight
- # Webparts/Sharepoint
- # AF Analytics
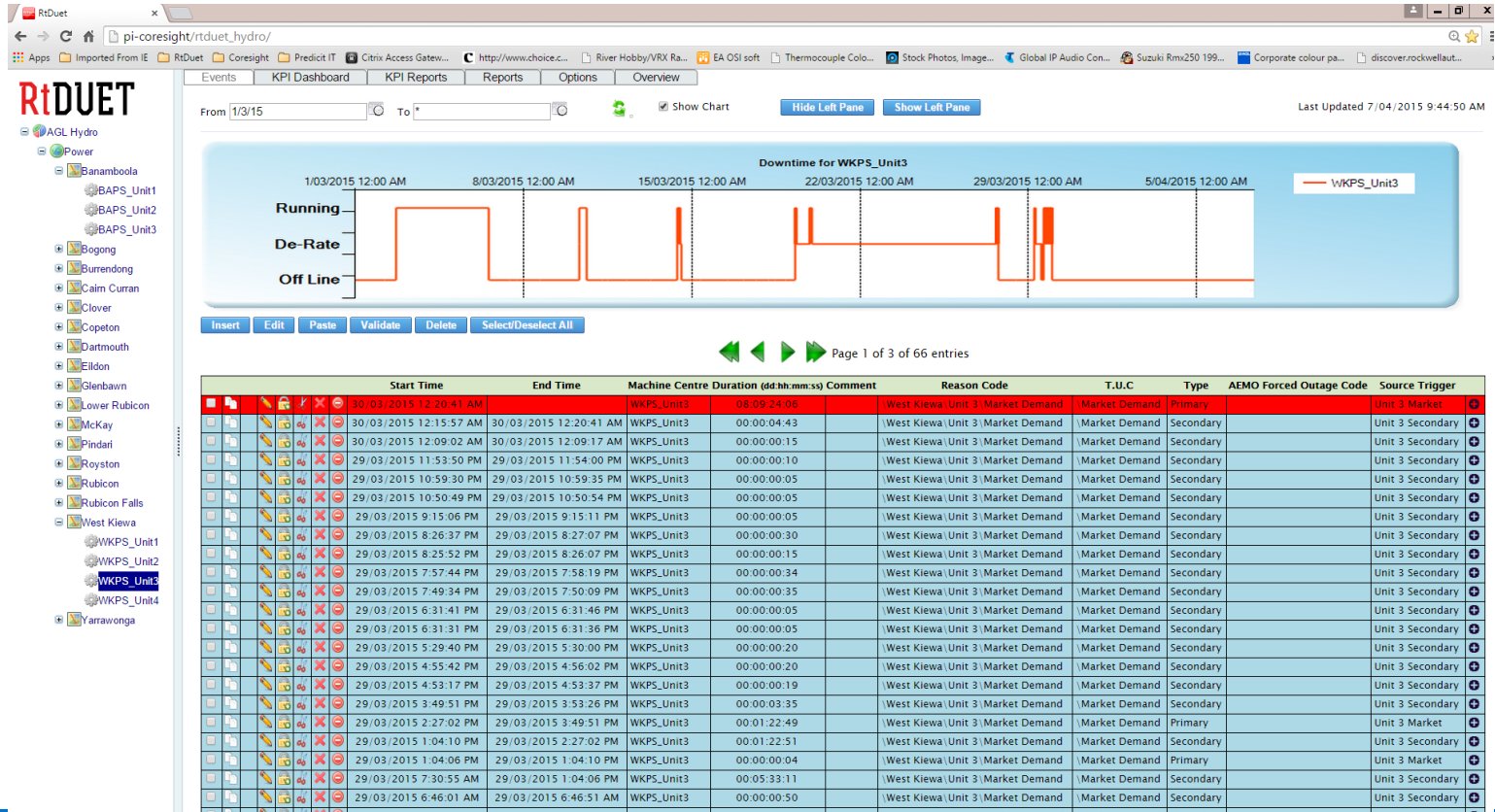   (ACE/Notifications)

What is RtDuet

- RtDuet is installed and configured using Asset Framework (AF)

- Utilizes PI Tags to trigger events and records the results in standard Event Frames

- Event Frames are then classified with time usage codes. Forced Outage, Partial Outage, etc.

- RtDuet calculates the configured KPI's using the classified Event Frames

What is RtDuet?

RtTech Challenges

New Industry

- Approach for tracking events
- Terminology
  - De-rates vs Slowdowns
- KPI Calculations
  - Standard Industry Calculations
  - Alignment to IEEE and NERC (GADS)
    - o Definitions
    - o Validation
  - Time Usage Codes
  - New Documentation

RtTech Challenges

- Incomplete Source Tags (PE's or Standard)
    - Fail to Start PEs
    - Tags in Error
- Validation
    - Deepak. Data QA
- Multiple plant types
    - Hydro
    - Gas
    - Coal
    - Mine

RtTech Challenges

Solution

- Great communications
  - Frequent and well managed meetings
- Great documentation
  - AGL to RtTech
  - RtTech to AGL
- Dedicated resource on premise

Journey to Realization

Project Start – March 14

Database Configured with triggers – April 14

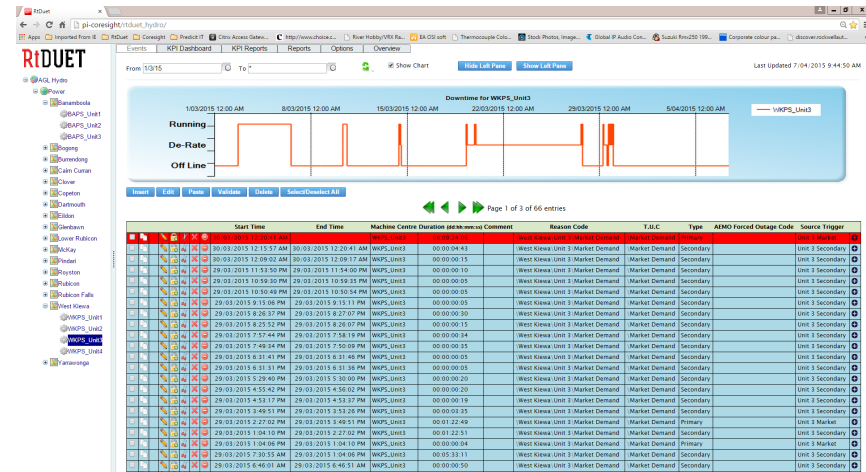KPI's configured – June 14

Site Trial – July 14

All sites live – Sept 14

PI System outputs – Dec 14

User Guides – Jan 15

Move to Central – March 15

Mega Watt Weight KPI's – Near Future
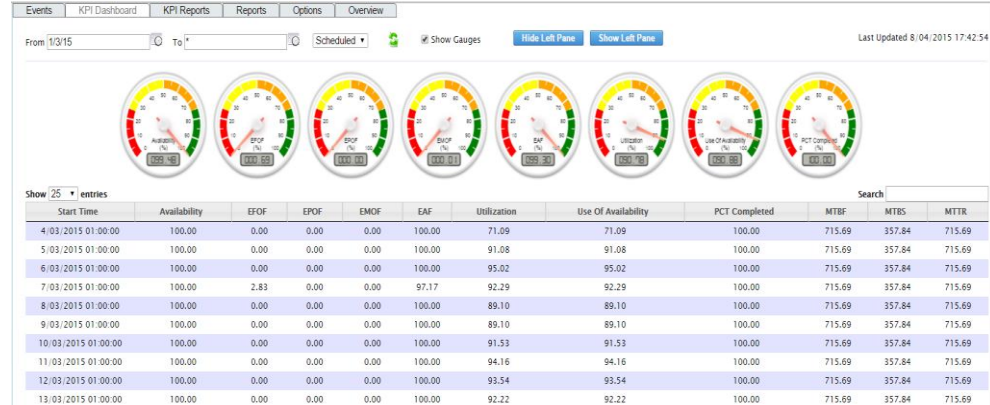
RtDuet implementation

- Roll out to business
  - Roadshows
- Management endorsement
- Engage key stakeholders
- Dedicated team – even if it is only two
- Set clear objectives and project time lines
- Communicate objectives, project timelines and the reason for change
- Utilize site experience
- Communicate progress

Project Challenges

- Table flooding
- SDK and sub second data issue
- Personnel and history
- New KPI's requirement
- KPI Rollup
- Multiple time zones
- Expectations
- OSIsoft & RtTech assistance in fixing issues

OSIsoft EA ensured success

Project Status

- Moved to Central PI Server
- Reporting from 2 business units
- Advanced trigger/event configuration
- Acceptance across Business Units as the reporting tool
- Dedicated resource to lead Performance Reporting across AGL Merchant Operations
- Decommissioning of old systems
  - Excel spreadsheets
  - Hydro Delphi system

	Month				Year to Date		
	Actual	Budget	Variance		Actual	Budget	Variance
Generation (GWh)							
Loy Yang	1,354	1,331	●	23	10,819	10,964	● (145)
Macquarie	2,308	1,978	●	330	13,333	12,773	● 560
Torrens	86	61	●	25	1,145	765	● 380
Hydro	62	58	●	4	999	641	● 358
Somerton	0	0	●	-	9	0	● 9
Wind	179	237	●	(58)	1,807	2,065	● (258)
Total Generation	3,988	3,665	●	323	28,112	27,208	● 904
AGL Availability %	(MW Weighted)						
Merchant Operations	87.2	85.4	●	1.8	83.8	85.1	● (1.3)
Station Availability %							
Loy Yang	98.5	94.7	●	3.8	90.0	88.1	● 1.9
Macquarie	83.7	80.6	●	3.1	75.9	80.6	● (4.7)
Torrens	72.3	78.0	●	(5.6)	87.3	85.2	● 2.0
Hydro	90.1	87.7	●	2.4	94.2	90.5	● 3.8
Wind	94.9	95.0	●	(0.1)	93.5	95.0	● (1.5)
Loy Yang Coal Supply							
LY Coal Mined (KT)	2,517	2,487	●	31	20,279	21,770	● (1,491)
Coal Supply Reliability %	99.2	98.8	●	0.4	98.5	98.8	● (0.3)
MWh Loss - LYA	15,000				225,050		
Start Reliability %							
Somerton	100.0	98.0	●	2.0	99.5	98.0	● 1.5
Hydro	99.3	99.0	●	0.3	99.0	99.0	● (0.0)
AGL EFOF %	(MW Weighted)						
Merchant Operations	8.7	8.5	●	(0.2)	8.7	8.3	● (0.4)
EFOF %							
Torrens	3.2	3.4	●	0.2	1.6	2.6	● 1.0
LY Station	1.6	3.0	●	1.4	3.5	3.0	● (0.5)
Hydro	1.4	2.2	●	0.8	1.7	2.2	● 0.5
Somerton	0.0	3.2	●	3.2	1.0	3.2	● 2.2
Macquarie	15.1	13.7	●	(1.4)	14.7	13.7	● (1.0)
MO Availability ex AGLM	90.2	89.5	●	0.6	90.7	89.0	● (1.7)
MO EFOF ex AGLM	2.0	3.0	●	(1.0)	2.5	2.8	● 0.2

Mark Faith

MFaith@AGL.com.au

Engineer Reliability and Performance Systems

AGL LTD PTY

Melbourne, Australia

Keith Flynn

Keith@RtTechSoftware.com

P.Eng. CTO

RtTech Software

Moncton, Canada

Questions

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

State your
name & company

THANK YOU