



## Regional Seminar Series Johannesburg, South Africa



## Energy Monitoring

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Anglo American Platinum

24<sup>th</sup> February 2011

Real Time Information - Currency of the New Decade

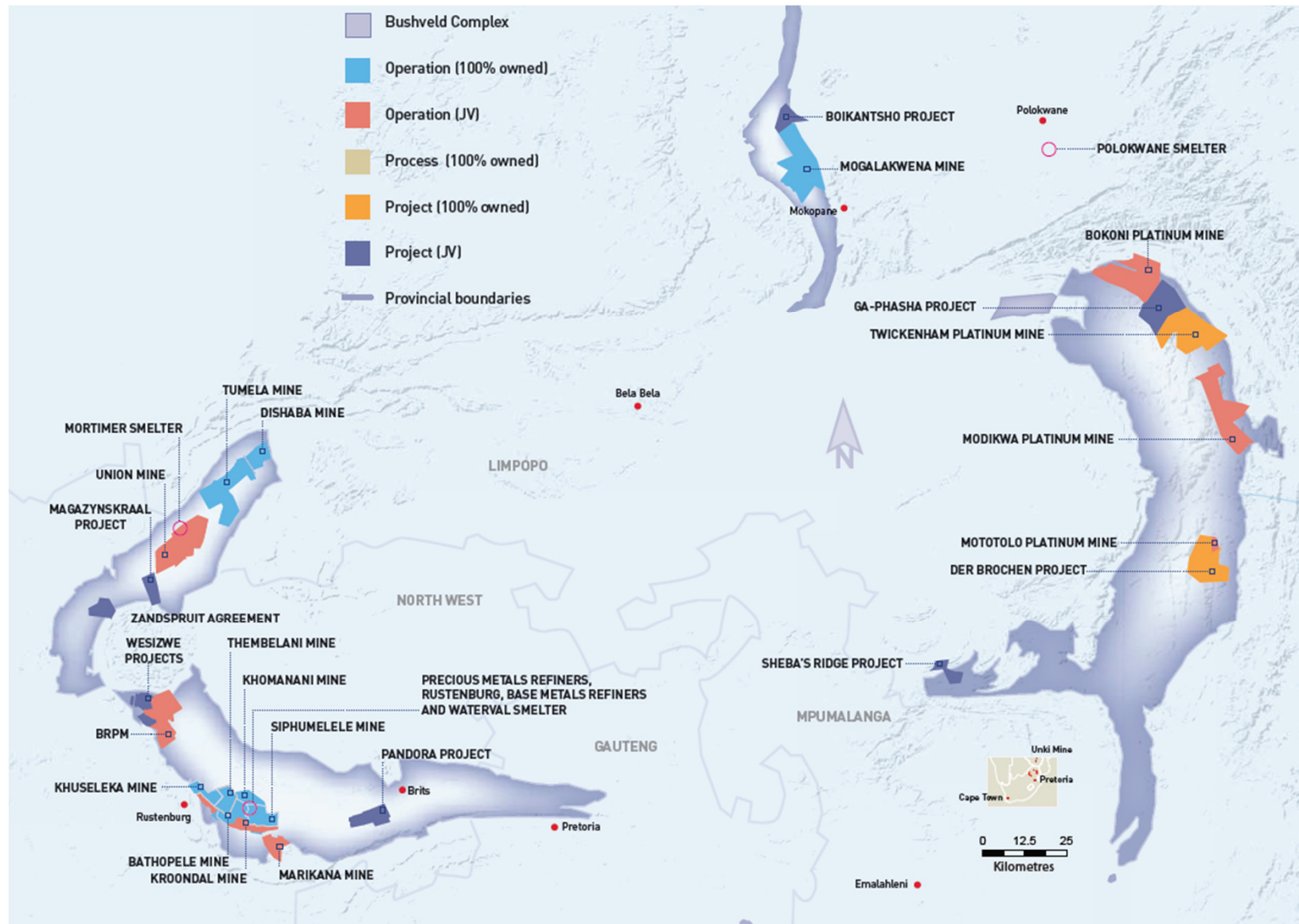
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- Introduction to Anglo Platinum
- Background to energy monitoring in Anglo Platinum
- Problem description
- The solution
- Benefits
- Next steps

## About Anglo American Platinum



# Anglo American Platinum



Anglo American Platinum is the world's premier PGM producer, supplying approximately 40% of the world's newly refined Platinum.

## **Process Division:**

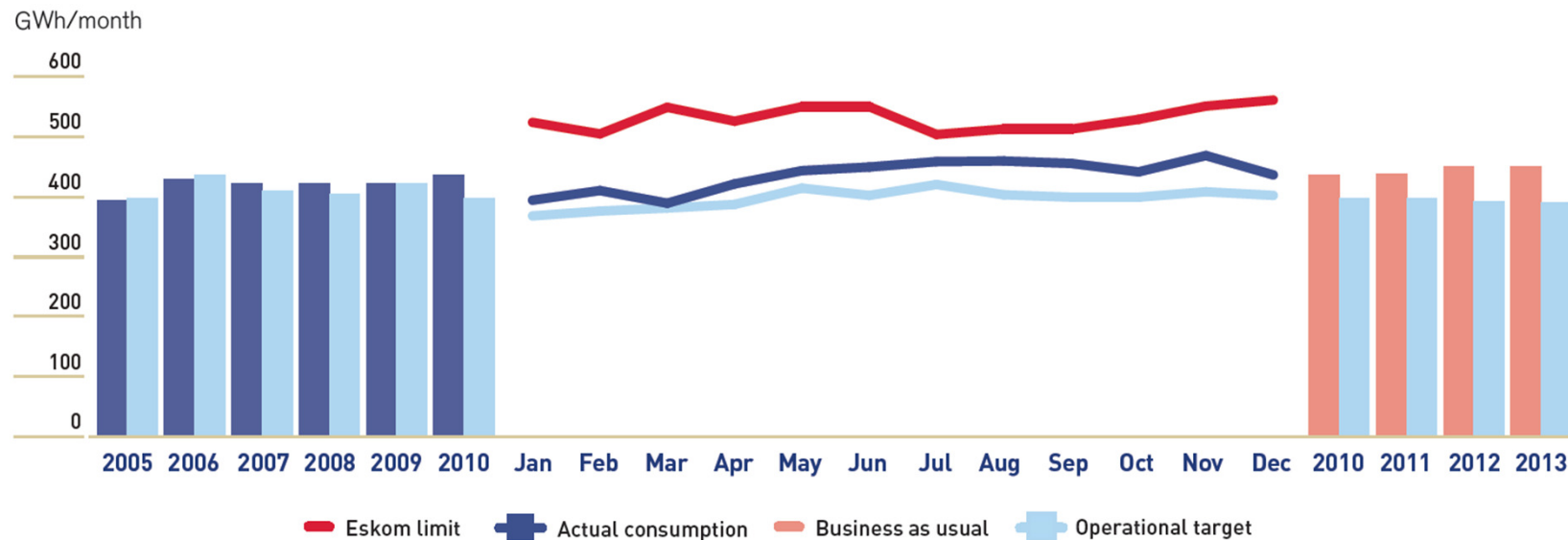
- 14 Concentrators
- 3 Smelters
- 1 Converter
- 2 Refineries
- 9 geographic operational areas



## Energy Monitoring



- Multiple energy sources:
  - Electrical
  - Diesel
  - Steam from coal fired boilers
- Electrical energy is the initial focus
- Anglo Platinum is a large consumer of electricity



- We all know what happened in 2008!
  - Electrical system became constrained leading to nation wide load shedding
- The electrical system is still constrained; this like to remain constrained for the next couple of years
- Electricity is becoming increasingly expensive
- Anglo Platinum is targeting a 15% reduction in electrical power consumption by 2014
- Process division accounts for the bulk of the discretionary power



- Lack of power measurements
- Numerous systems
- Large quantities of data
- An company wide integrated approach to energy saving is required. The necessary information to develop these plans is only now becoming available.

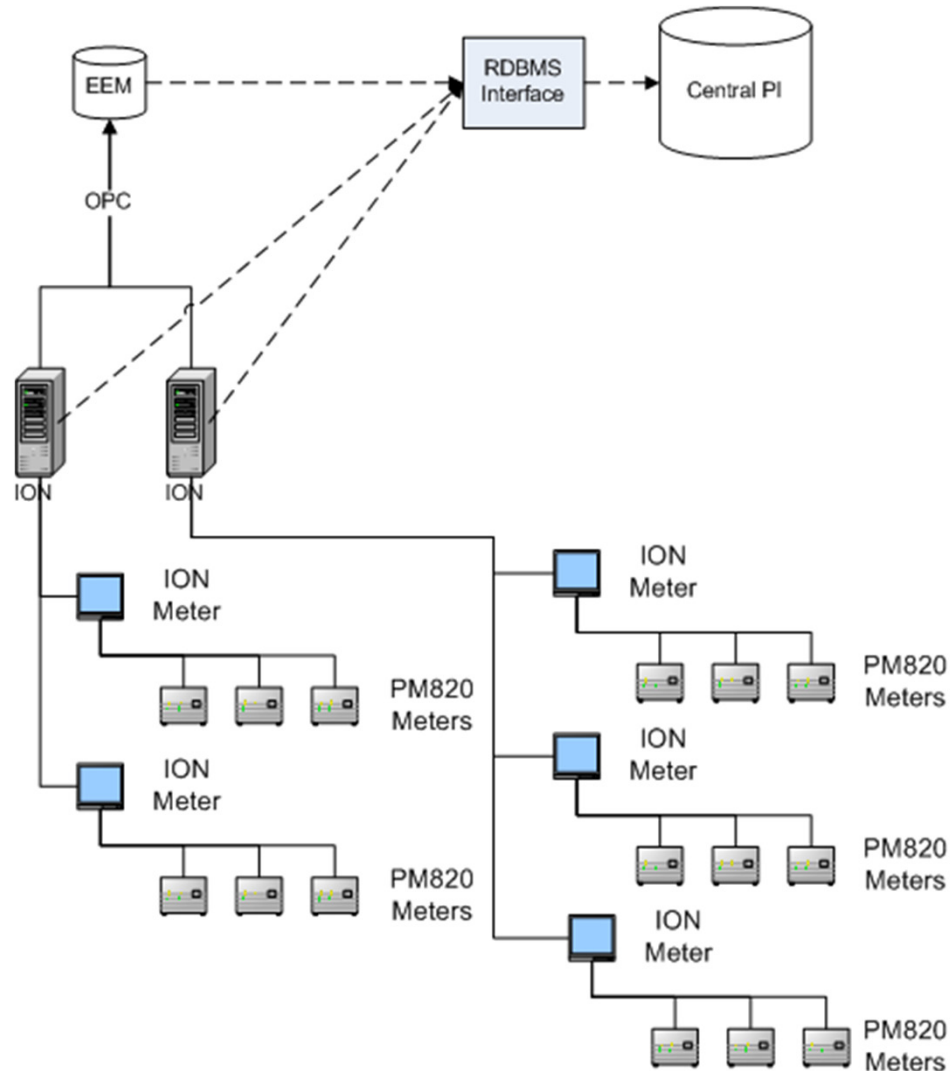
## Solution



Disclaimer: Some of the data presented is obfuscated; this has been done by introducing random factors into some of the data. However, all the displays presented are real.

- Schnieder Central Energy Measurement and Management System (CEMMS) installed in 2009/2010
  - 1 EEM system - Central server
  - 9 ION servers (one per operational area)
  - 98 ION Meters
  - 293 PM820 Meters
- Arranged by Point of Delivery
- Anglo Platinum now has online measurements of its power consumption
- Top level power consumption available but lacks granularity
- The Precious Metal Refinery was used as a pilot site
  - Small electricity user
  - The operation supports the initiative

# Solution / Data integration



- Integrate the ION data into the site's system
- Large quantity of data (2000+ Tags)
- Integration of a WAN
- Integration had to be fault tolerant
- Standard interfaces were preferable
  - Better technical support
  - NOC Monitoring

# Solution / Contextualise



Anglo Platinum - PI System Explorer

File Edit View Go Tools Help

Database Query Date Back Check In New Element New Attribute

Elements

- Mogalakwena South
  - Mototolo
  - Polokwane Section
  - Precious Metal Refinery
    - Au SX A
    - Au SX B
    - Bay 1
    - Bay 2
    - Bay 3
    - Bay 4
    - Bay 5
    - Domestic
    - Incomers
      - WEST10\_11KV
        - WEST10\_6.6KV\_1
        - WEST10\_6.6KV\_2
        - WEST10\_6.6KV\_3
        - WEST10\_6.6KV\_4
- Level 3
- MCC Drives
- 111 MCP01
  - 310AG02
  - 310AG03
  - 310AG04
  - 310AG05
  - 310AG06
  - 310AG07
  - 310AG08
  - 310AG09
  - 310AG10
  - 310AG11
  - 310AG12
  - 310AG13
  - 310AG14
  - 310AG15
  - 310AG16
  - 310AG17
  - 310AG18
  - 310AG19
  - 310AG20
  - 310AG21
  - 310AG22
  - 310AG23
  - 310AG24

WEST10\_11KV

General Child Elements Attributes Ports Version

Filter

Name	Value
Active	1
Apparent_Energy_...	Scan Off
Apparent_Energy_...	Scan Off
CalcExpression	
Category	
NMD	0
Point configuration	
Power factor	58.057365417480469
PV	Cannot retrieve PI Point 'PMR:WEST10_11KV.PV' for attribute '\aisp...
Quality	Cannot retrieve PI Point 'PMR:WEST10_11KV.Quality' for attribute 'A...
Reactive_Energy_...	3898748.75
Reactive_Energy_...	1288.354736328125
Real_Energy_Del	9521055 kWh
Real_Energy_DeLint	925.011901855469 kWh
Site	PMR

Elements

Event Frames

Library

Unit of Measure

MyPI

Notifications

Contacts

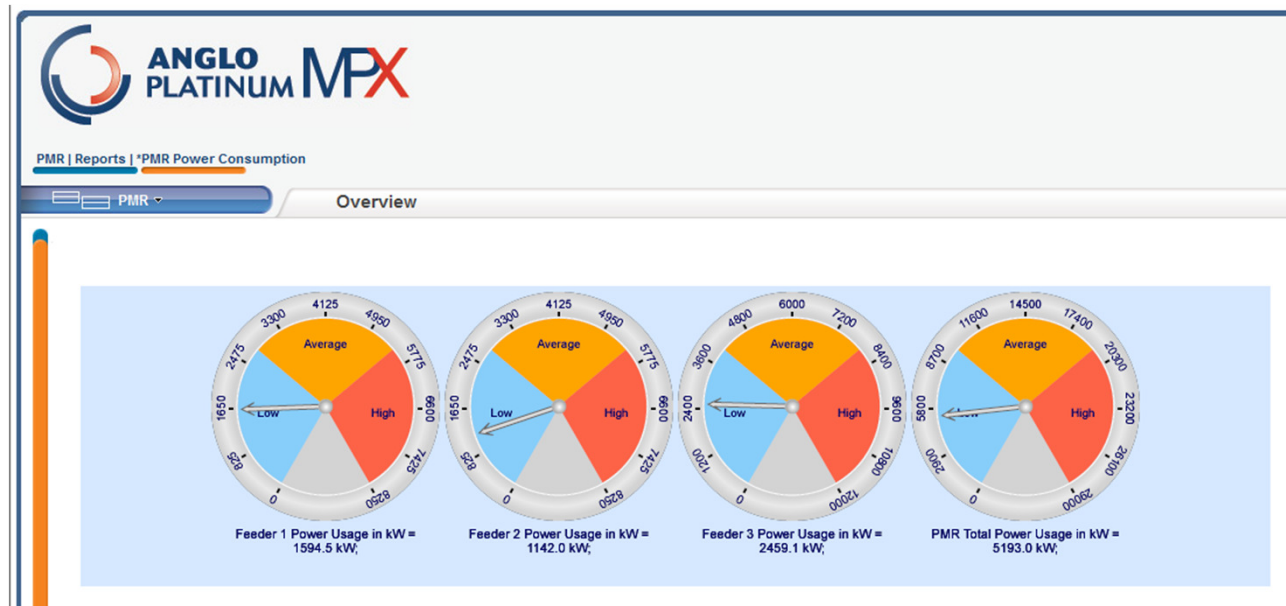
15 Attributes

- The raw tag based data needs to be brought into context
- Anglo Platinum is using OSIsoft's AF (Asset Framework) to provide this contextualisation
- Calculations are performed using a combination of Totalisers, Performance Equations and ACE.
- Totalisers and Performance Equations are configured through the AF Element Templates
- The AF-Link facilitates ACE
- Once the AF model is built the data can be analysed in multiple ways. Think of a real-time OLAP cube

# Solution / How to save

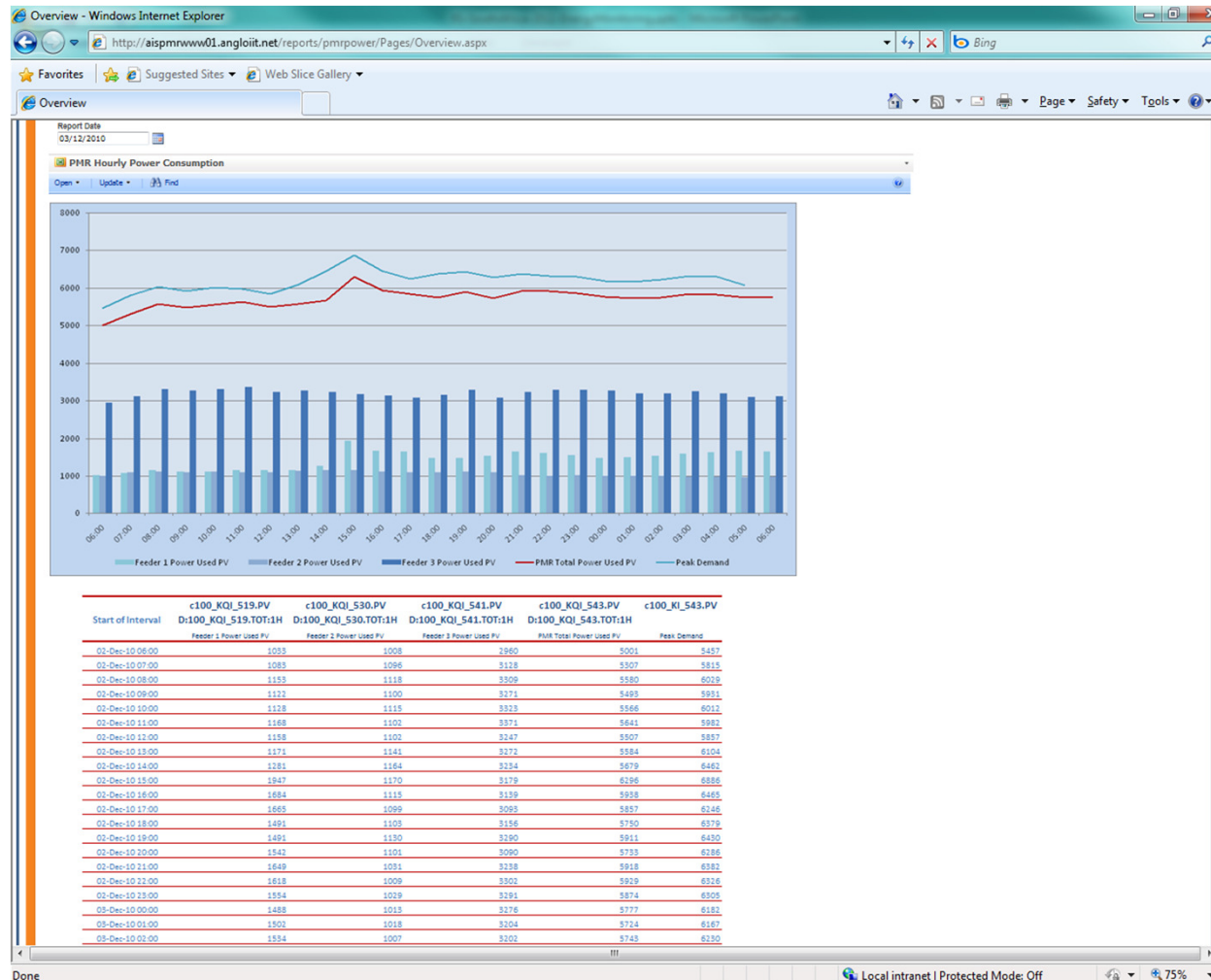


- Present the information in an easy to understand manner.
- Develop high level metrics linked to production
- Implement analyses showing where the power is used
- “You cannot control what you don’t measure”





# Solution / How to save



- Granular break down of the power consumption
- Easy to use format

# Solution / How to save



Power Comparison - Windows Internet Explorer

http://aispmrwww01.angloil.net/reports/pmrpower/Pages/PowerComparison.aspx

Power Comparison

OSIsoft Event Registration

ANGLO PLATINUM MPX

PMR | Reports | PMR Power Consumption

Power Comparison

Click here to return to previous page...

ION vs PMR Power meter last 24 hours

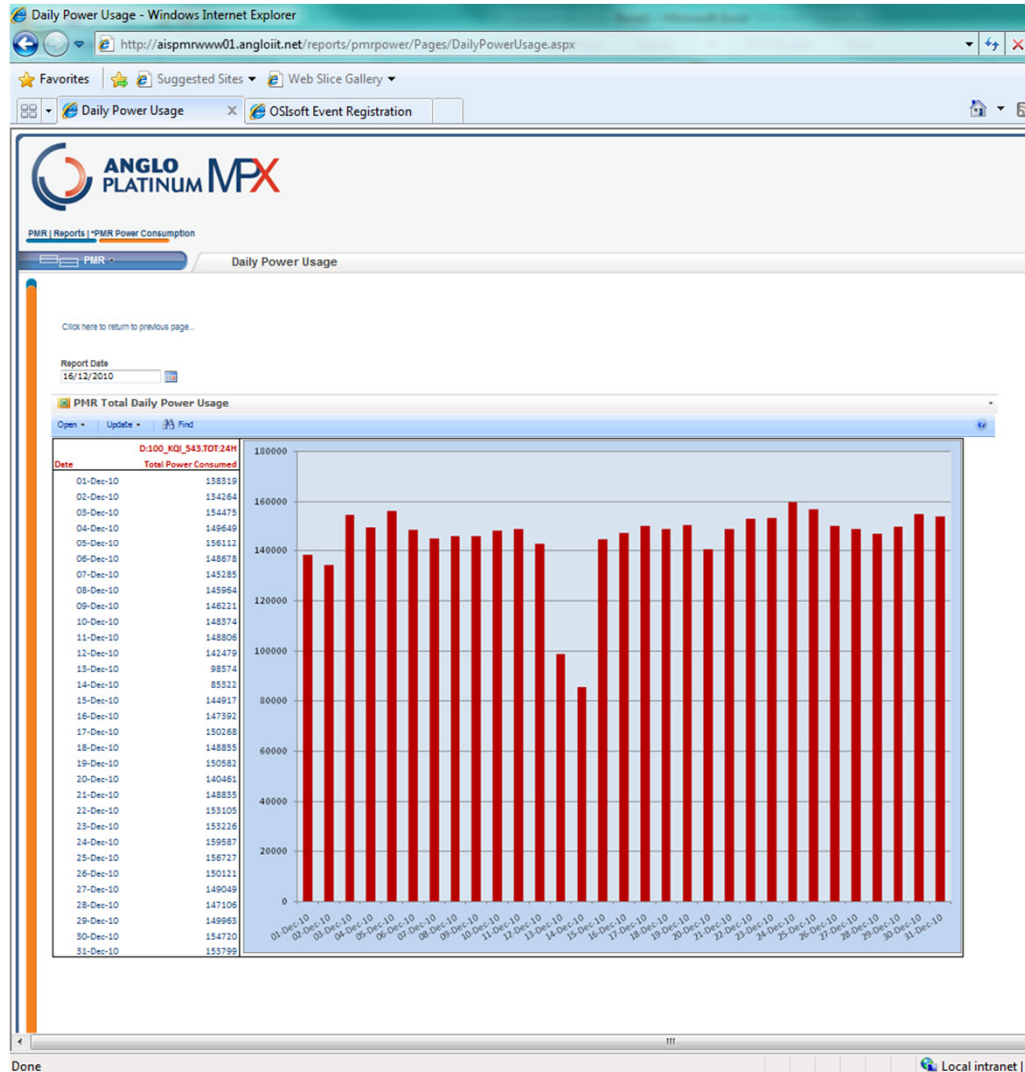
Date/Time	A-100_K01_515_ION.TOT.30min	D-100_K01_515_TOT.30min	% Difference	A-100_K01_530_ION.TOT.30min	D-100_K01_530_TOT.30min	% Difference	RS_WTFL_LINX/INCOMER/KW_Cel_M	D-100_K01_541_TOT.30min	% Difference
15-Feb-11 06:00:00	763	765	0.00%	474	474	0.00%	999	976	2.24%
15-Feb-11 06:30:00	764	764	0.00%	467	467	0.00%	990	949	2.12%
15-Feb-11 07:00:00	774	776	0.00%	449	449	0.00%	942	928	1.52%
15-Feb-11 07:30:00	774	775	0.13%	445	445	0.00%	937	922	1.66%
15-Feb-11 08:00:00	772	770	0.26%	465	465	0.00%	941	922	2.05%
15-Feb-11 08:30:00	798	798	0.00%	472	472	0.00%	938	920	1.98%
15-Feb-11 09:00:00	728	727	0.14%	467	468	-0.21%	956	956	2.17%
15-Feb-11 09:30:00	646	646	0.00%	485	484	0.21%	951	937	1.52%
15-Feb-11 10:00:00	640	637	0.47%	481	481	0.00%	961	943	1.96%
15-Feb-11 10:30:00	654	655	-0.15%	471	472	-0.21%	960	943	1.83%
15-Feb-11 11:00:00	662	662	0.00%	488	488	0.00%	962	944	1.95%
15-Feb-11 11:30:00	680	679	0.15%	1049955+11	288	-100.00%	979	4461	-78.06%
15-Feb-11 12:00:00	678	677	0.15%	0	477	-100.00%	977	957	2.05%
15-Feb-11 12:30:00	No Sample	661	-	No Sample	475	-	980	961	1.98%
15-Feb-11 13:00:00	662	752	-11.97%	474	487	-2.67%	974	955	2.00%
15-Feb-11 13:30:00	752	899	-16.26%	487	484	0.62%	977	960	1.75%
15-Feb-11 14:00:00	1818	918	98.04%	962	477	101.68%	999	982	1.77%
15-Feb-11 14:30:00	920	920	0.00%	474	475	-0.21%	997	981	1.64%
15-Feb-11 15:00:00	922	921	0.11%	475	475	0.00%	966	955	1.69%
15-Feb-11 15:30:00	905	901	-0.11%	478	478	0.00%	982	961	2.17%
15-Feb-11 16:00:00	868	865	0.35%	481	481	0.00%	962	942	2.09%
15-Feb-11 16:30:00	854	855	-0.12%	463	464	-0.22%	938	903	1.74%
15-Feb-11 17:00:00	851	849	0.35%	458	458	0.00%	958	940	1.91%
15-Feb-11 17:30:00	842	842	0.00%	457	457	0.00%	995	979	2.07%
15-Feb-11 18:00:00	840	840	0.00%	448	449	-0.22%	984	965	2.00%
15-Feb-11 18:30:00	838	836	0.24%	458	457	0.22%	978	961	1.95%
15-Feb-11 19:00:00	830	830	0.00%	459	460	-0.22%	969	948	2.24%
15-Feb-11 19:30:00	834	833	0.12%	475	475	0.00%	992	976	1.75%
15-Feb-11 20:00:00	838	836	0.24%	477	476	0.21%	1002	984	1.80%
15-Feb-11 20:30:00	834	833	0.12%	468	469	-0.21%	998	979	1.89%
15-Feb-11 21:00:00	826	826	0.00%	475	475	0.00%	985	967	1.83%
15-Feb-11 21:30:00	828	827	0.12%	482	482	0.00%	999	977	2.20%
15-Feb-11 22:00:00	836	835	0.12%	471	471	0.00%	987	968	1.94%
15-Feb-11 22:30:00	830	830	0.00%	487	487	0.00%	954	937	1.86%
15-Feb-11 23:00:00	840	838	0.24%	451	452	-0.22%	982	963	1.94%
15-Feb-11 23:30:00	842	841	0.12%	446	446	0.00%	1009	991	1.87%
16-Feb-11 00:00:00	810	809	0.12%	444	444	0.00%	1005	985	2.08%
16-Feb-11 00:30:00	768	767	0.13%	442	441	0.23%	993	976	1.71%
16-Feb-11 01:00:00	758	756	0.26%	443	444	-0.23%	1006	986	1.99%
16-Feb-11 01:30:00	746	748	-0.27%	411	411	0.00%	1036	1017	1.86%

Done

Local intranet | Protected

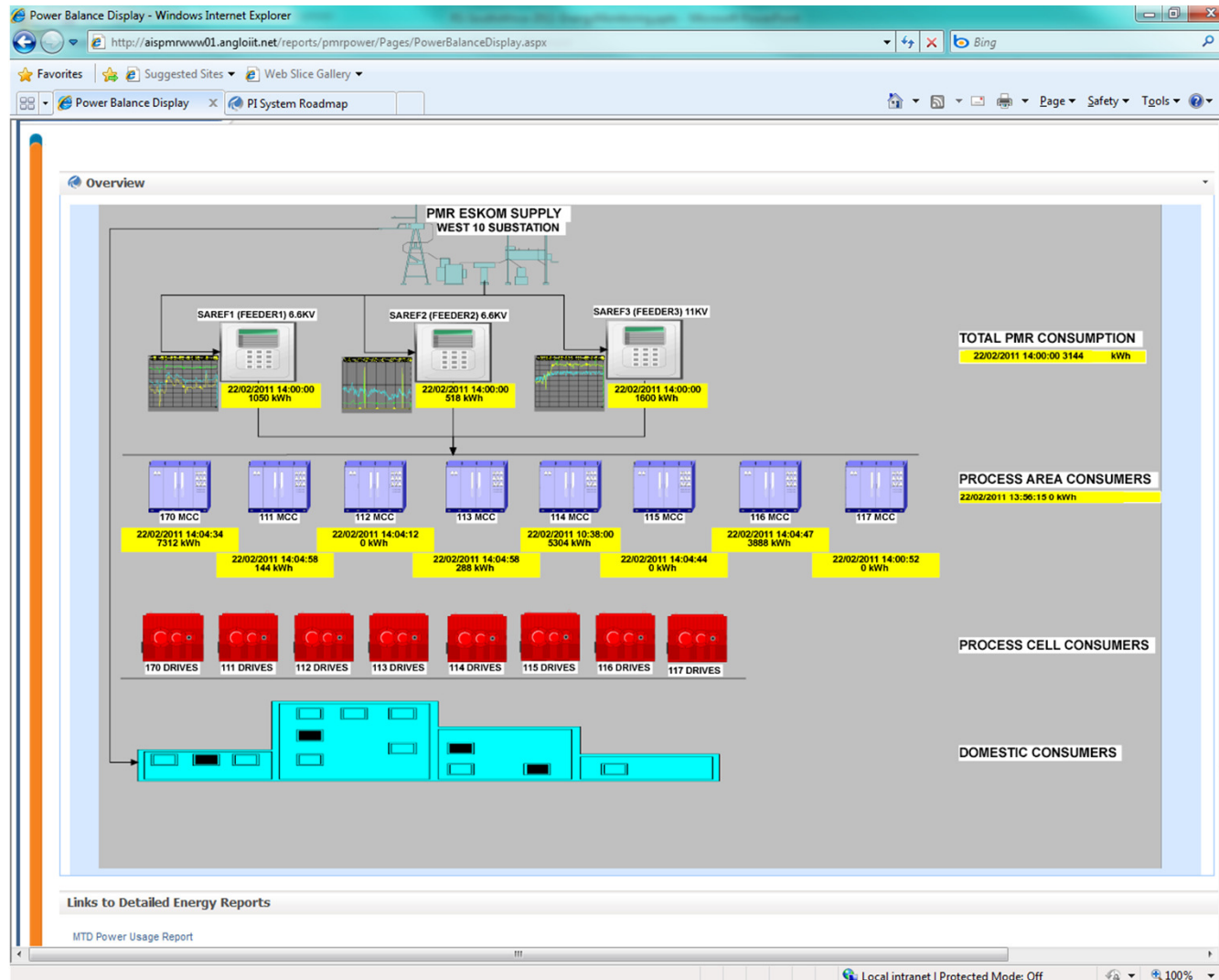
- Comparison between the plant meters and the ION meters
- ION used for check billing and cost allocation
- Power factor monitoring useful
- Conditional formatting to highlight issues
- Data validation definitely required

# Solution / How to save



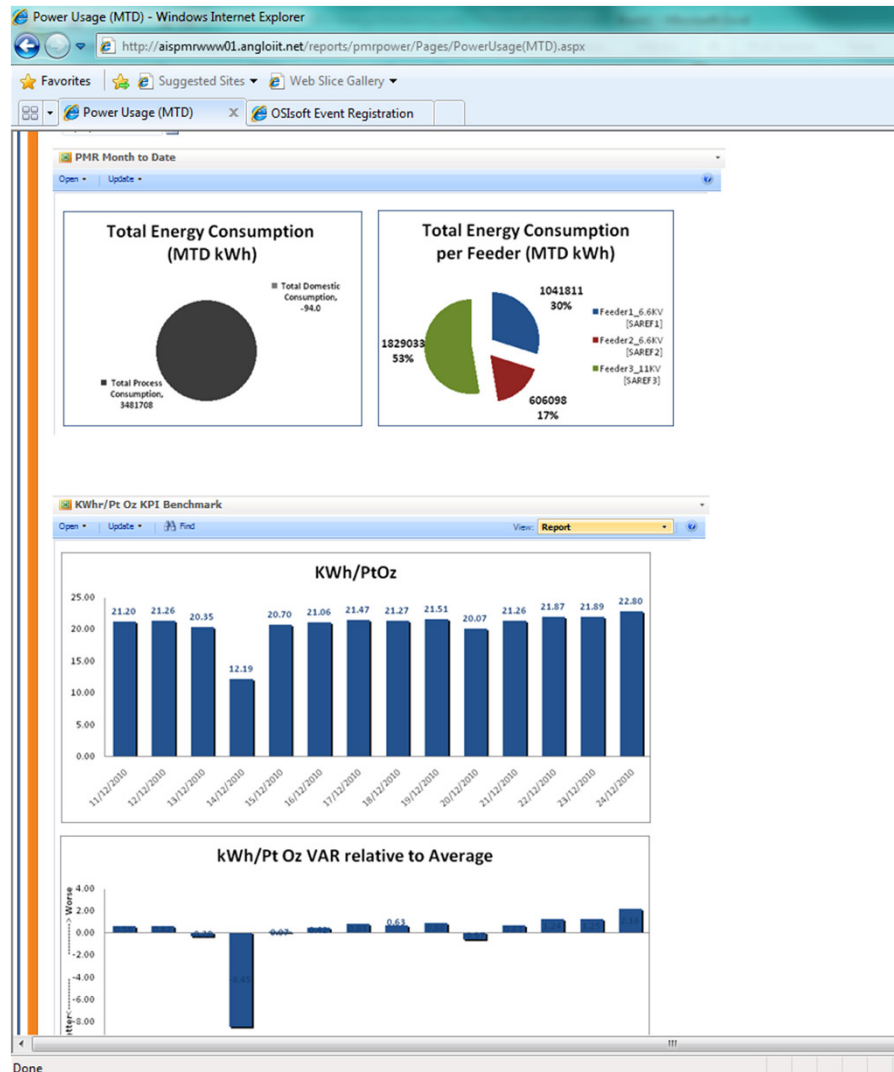
- Higher granularity analysis – daily consumptions
- Identify monthly trends
- Graphical display easy to read
- The display is dynamic; the user can choose any period they like

# Solution / How to save



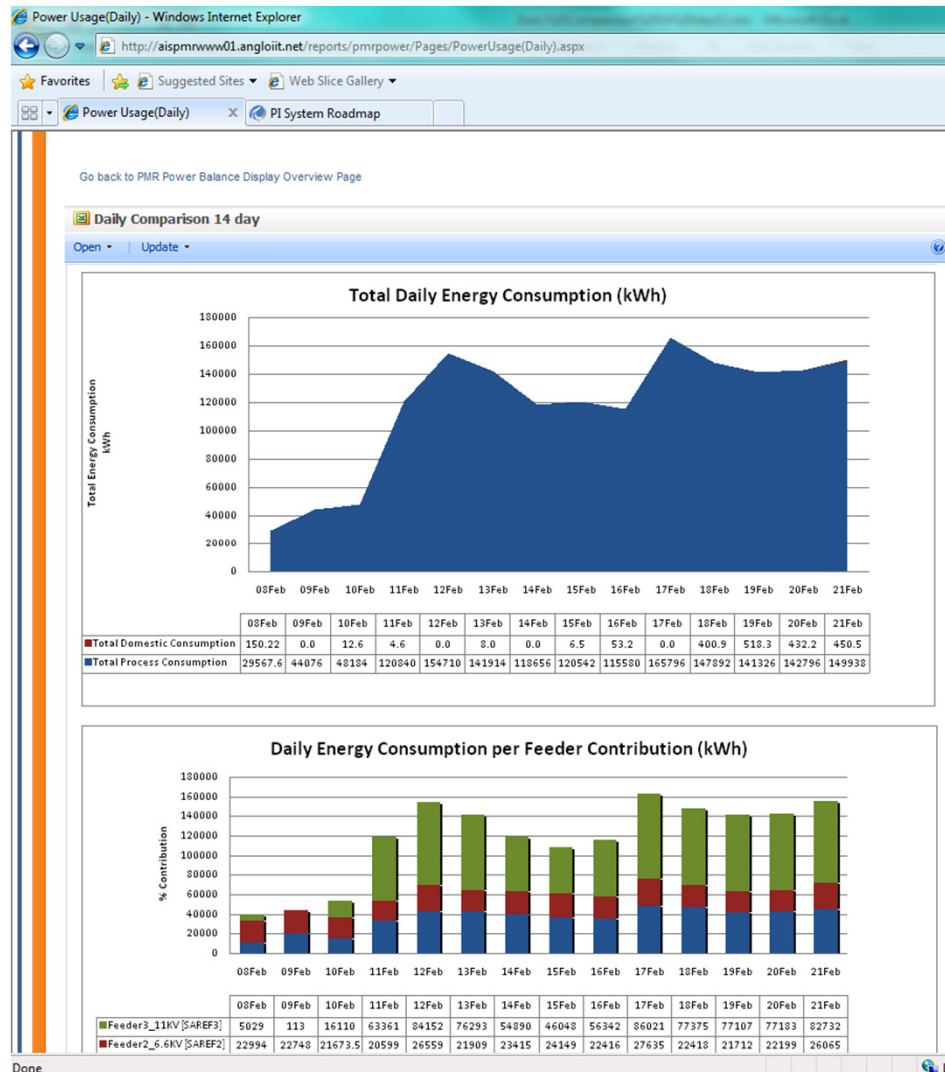
- Graphical power balance display

# Solution / Data Analysis



- The asset model facilitates analysing the data in different ways
- Basic performance metric can be drawn using the existing integration to the LIMS system
- These reports show clear variances in the amount of power used per platinum Oz refined
- The operational staff can now look at the cause rather than simply collecting the data

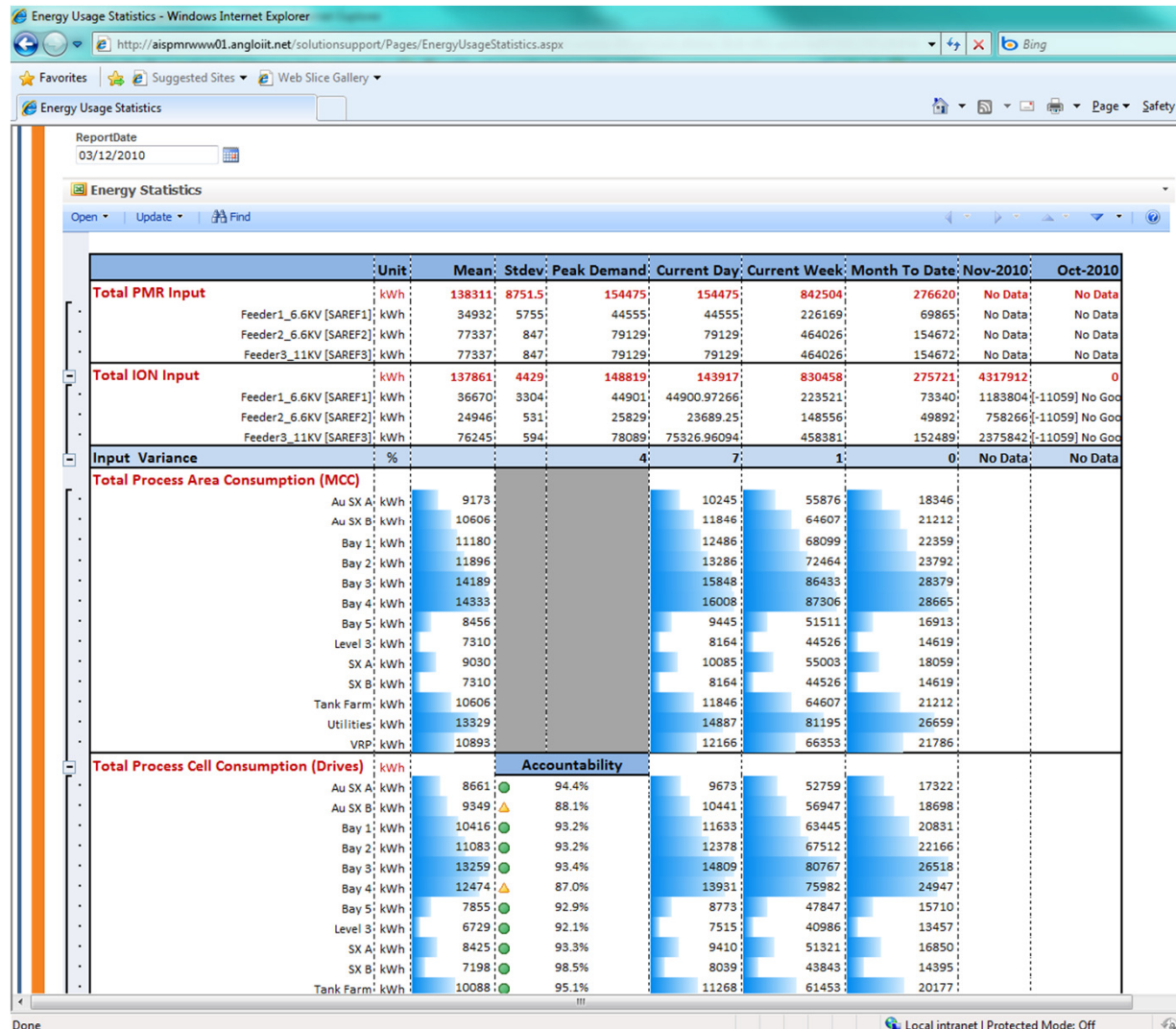
# Solution / Data Analysis



- The same data can be displayed in different formats
- This view is from an engineering perspective
- Indication that the feeders are not balanced



# Solution / Data Analysis



- Another view of the data
- Data is rolled up using the AF model
- Show clearly where the power is being used

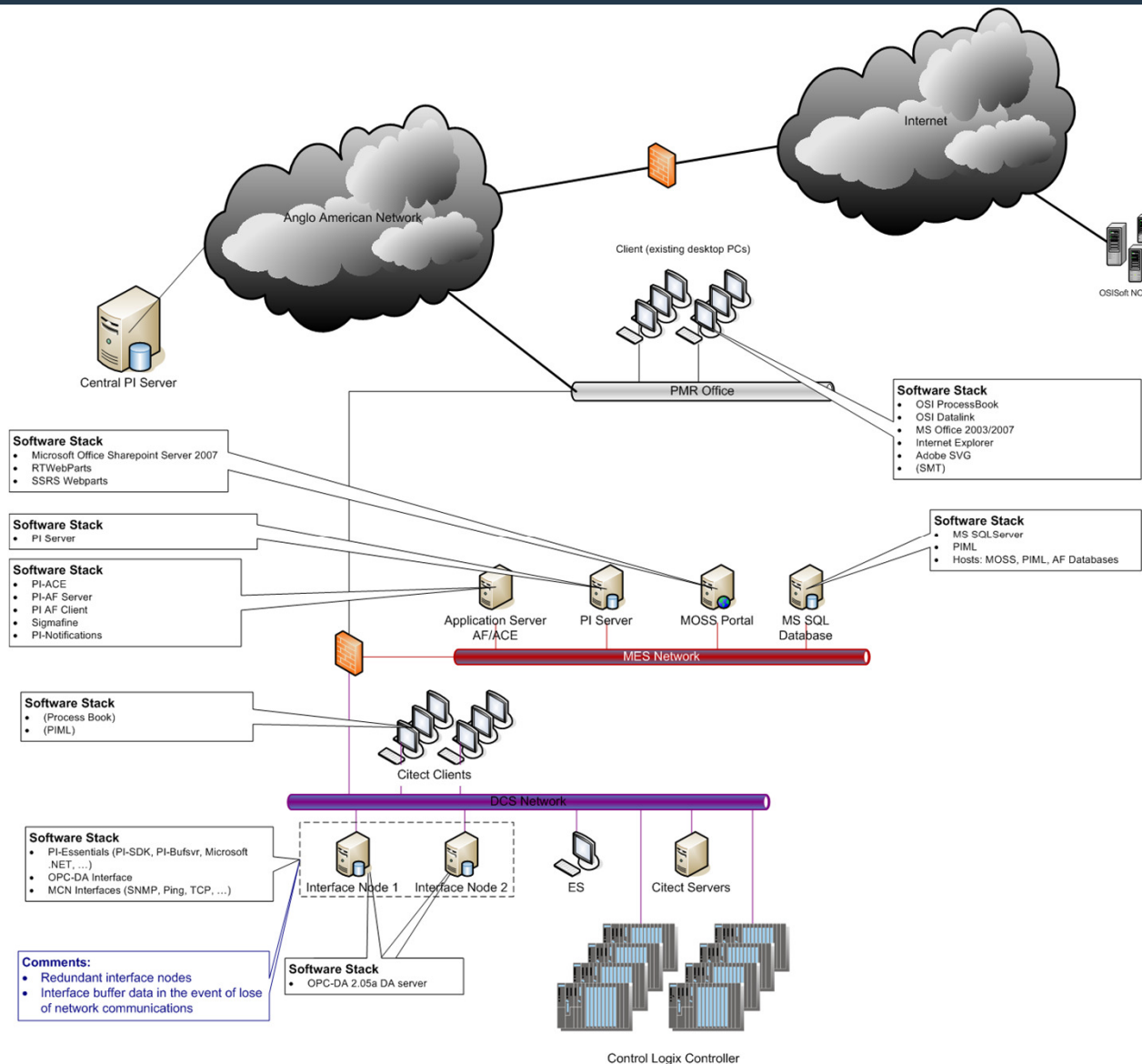
A large number of OSIsoft's products have been used to complete this solution in under 2 months using only internal staff

The Enterprise Agreement (EA) facilitates the solution by:

- Technical support
- COE advice on displays
- Unlimited product license
  - No tag counting
  - Multiple interfaces
- The NOC - OSIsoft effectively monitors the ION solution which has proven invaluable

- The following OSIsoft Products were used to provide this solution:
  - PI Server
  - RDBMS Interface
    - ION Data
    - LIMS Data
  - OPC Interface
    - Real time process data
  - ACE
  - AF
    - Including custom DataReferences (Rollup DR)
  - Datalink and Datalink for Excel Services
  - ProcessBook for displays
  - PI Webparts
  - PI OLE DB Enterprise

# PI System Architecture



## Results



- The results are preliminary with a considerable amount of work still to be completed
- A roll out to the concentrators is in the planning stages. Due to the scale of the concentrator operations the potential benefits are enormous
- Visibility of energy consumption improved
  - Many people didn't know ION existed and only a few had access
  - Data collection and manual roll ups are time consuming therefore the information was not looked at regularly
- Integrating the data into a model provides the key to unlocking the data
- “You cannot control what you don't measure”



## Future Plans / Next Steps



- Expand the PMR solution to meet the site's requirements
- Include data validation and clean up into the solution
- Build notifications
- Implement a similar solution at two Anglo Platinum concentrators in 2011
- Use the OLAP functionality to provide more analysis across operations
  - Compare flow sheets in terms of energy efficiency
  - Compare similar unit operations across sites
- Integrate the solution into AO (Anglo American's Asset Optimisation Initiative)



# Thank you

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