



**SCOTTISHPOWER**

# Implementing Process Safety Performance Indicators

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- **Practical Application of Process Safety in Energy Wholesale**
- **Demo Of Prototype KPI Dashboard**
- **In Development – Next Generation KPI Dashboard**
- **KPI Weighting Approach**
- **Conclusions**



# SCOTTISHPOWER

## Company Overview

ScottishPower part of Iberdrola Group, a worldwide leader in energy...

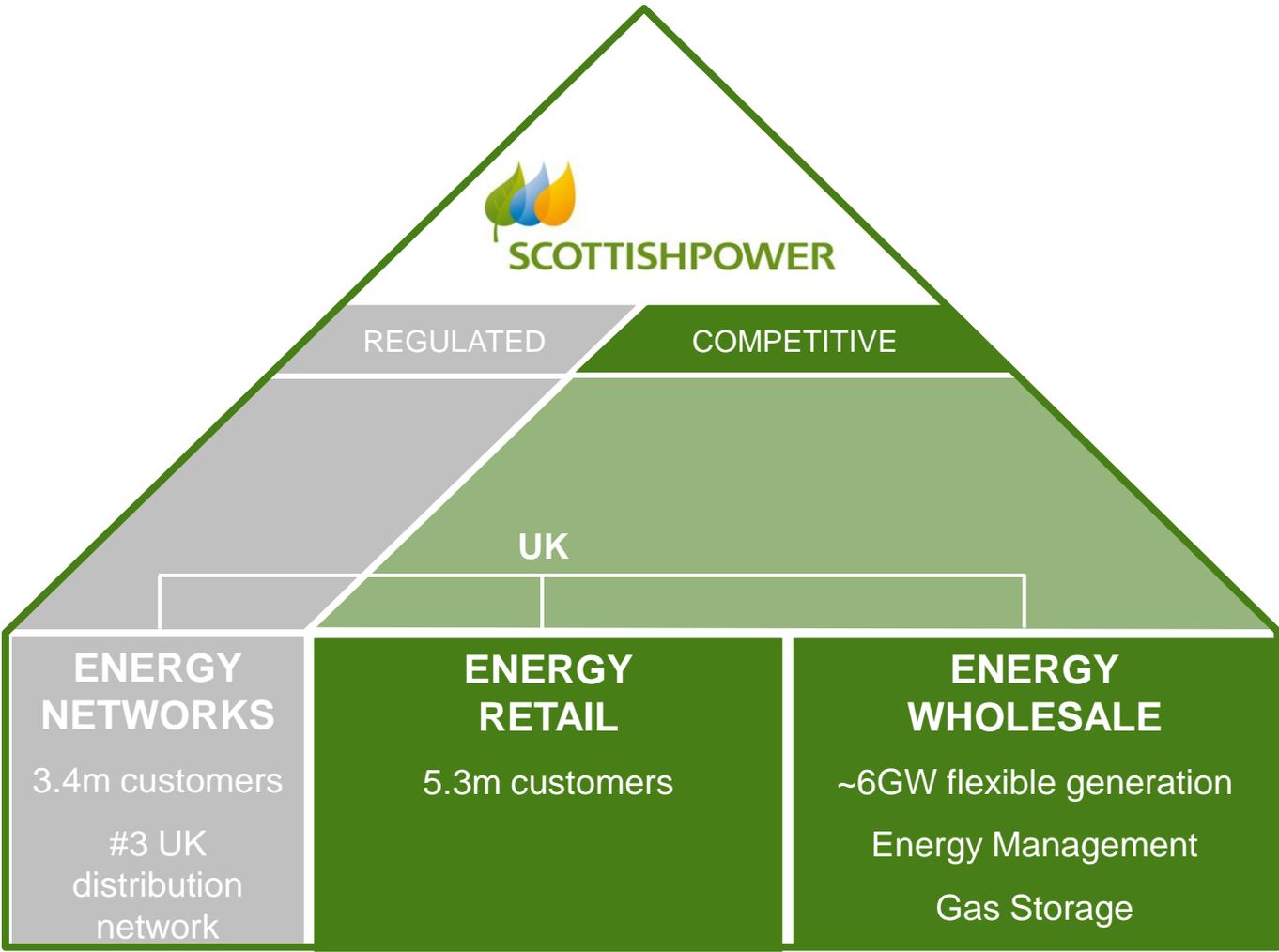


**Presence in 40 countries worldwide**

# ScottishPower Overview



ScottishPower is a major integrated power company...



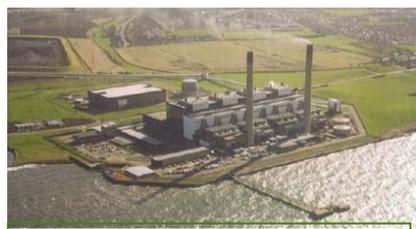
Total portfolio of 6GW\* with ~4GW in Scotland, 2GW in England

## Longannet



**2,304 MW coal**  
Operational 1970  
Fife

## Cockenzie



**1,152 MW coal**  
Operational 1967  
Near Edinburgh

## Cruachan



**440 MW pump storage**  
Operational 1965  
Argyll & Bute

## Hydros



**123 MW hydro**  
Operational 1920/30s  
Lanark, Galloway

## Rye House



**715 MW CCGT**  
Operational 1993  
Hertfordshire

## Damhead Creek



**800 MW CCGT**  
Operational 2000  
Kent

## Shoreham



**400 MW CCGT**  
Operational 2000  
Sussex

## CHPs



**102 MW CHP**  
Operational since 90s  
Various locations

\* Excluding IBE Renewables, total is ~6.6GW including renewables assets

## Driving continuous improvement in Energy Wholesale...



- **Delivery mechanism for improvement projects towards goal of Operational Excellence.**
- **The six goals are pillars, expressing business principles that underpin business**
- **Two Champion's per Big Goal are empowered to initiate change projects**
- **Sponsored and governed by the Energy Wholesale Director and the EW Management Team**
- **Fully aligns with the EW business strategy**



Longannet Power Station  
Carbon Capture Pilot Plant

# Practical Application of Process Safety in Energy Wholesale

Process Safety is now a major focus for the industry...



- The Baker Report – investigation into BP Texas City
- UK Health and Safety Executive:
  - HSE HSG254 “Developing Process Safety Indicators”
  - HSE RR509 “Plant Ageing Report”
  - GENSIP formed – Generators Safety Integrity Partnership
- PAS-55 – publicly accessible standard for Asset Management

Sharing experiences with other companies...



- Extensive benchmarking both within and outside our sector has helped us to develop our approach



## Process Safety Management Principles published at group level...

“The application of processes and procedures to the identification, understanding and control of dangers associated with the operation of ScottishPower’s assets that could result in a major accident. A major accident has the potential to result in death or serious injury to one or more employees, contractors or members of the public.”

Adequate control of:  
**People,  
Processes &  
Plant**



### process safety matters

#### Process Safety Management Principles

Within ScottishPower Process Safety Management is defined as:

The application of processes and procedures to the identification, understanding and control of dangers, associated with the operation of ScottishPower’s assets, that could result in a major accident. A major accident has the potential to result in death or serious injury to one or more employees, contractors or members of the public.

Process Safety Management is applicable to all physical assets utilised in the generation, transmission, distribution and supply of electricity, the transportation and storage of gas and the production and transportation of waste derived fuel. Process Safety Management shall be achieved through the adoption of the principles shown opposite in the areas of plant, people and processes.

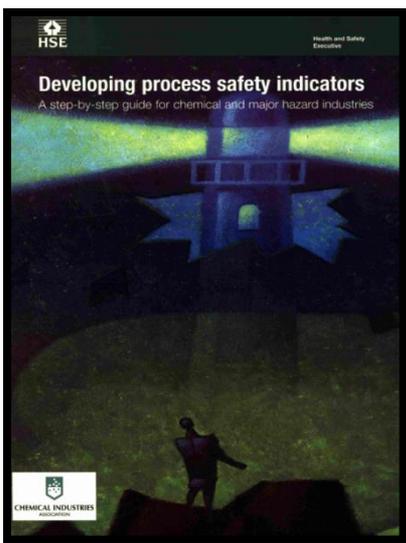
Senior management endorses these principles and are responsible for their implementation within the business. All ScottishPower staff, contractors and service providers are responsible for ensuring these principles are fully realised in their work.

  
 Nick Horler,  
 CEO ScottishPower



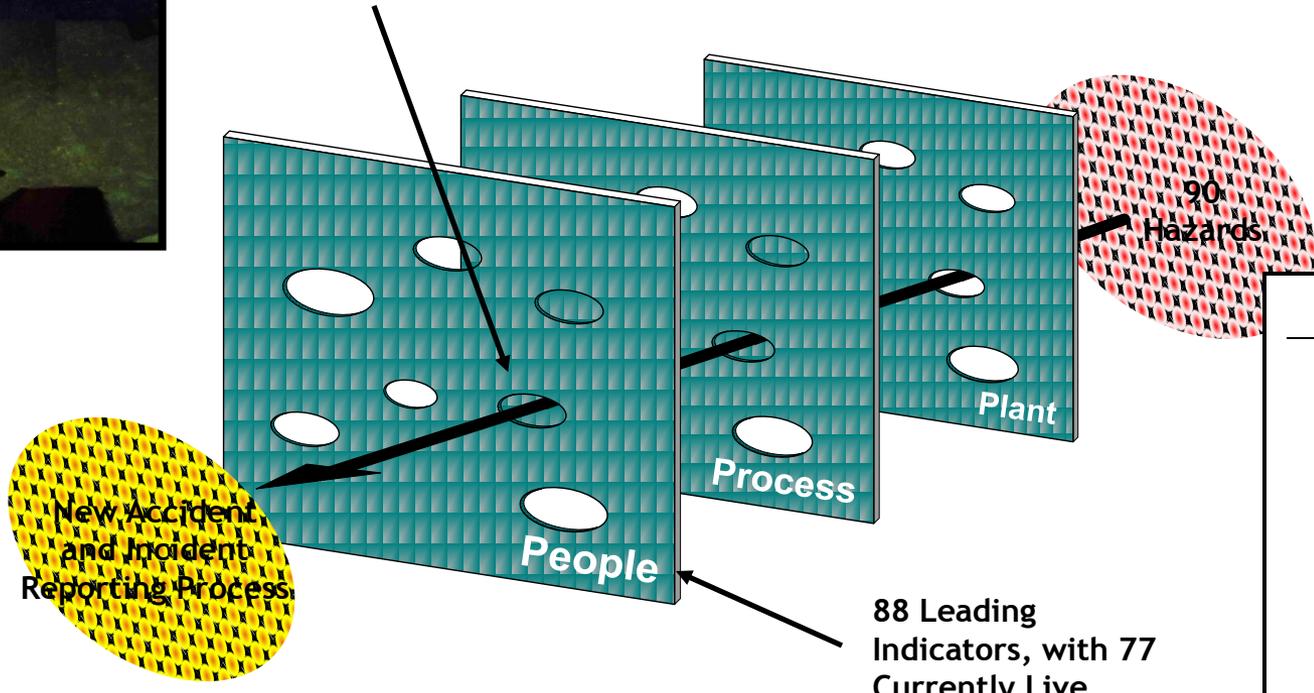
- Plant**
- All physical assets shall be approved, installed, operated, maintained, modified and decommissioned in accordance with industry and business standards, specifications, practices and procedures.
  - All physical assets shall be operated within their technical limitations and constraints which shall be defined and understood by relevant staff
  - All safety critical assets shall be identified and managed to ensure correct operation when required
- People**
- Provision of effective leadership to demonstrate a commitment to process safety at all organisational levels and develop a positive process safety culture
  - All tasks shall only be undertaken by staff who are trained, competent and appropriately authorised
  - All staff shall achieve and retain competencies relevant to their role through the training and competency assurance framework
  - Staff shall make informed decisions based on information which is correct, up to date, and readily available
  - Staff shall take personal ownership of results
- Processes**
- All accidents, incidents and near misses shall be reported and investigated at the earliest opportunity
  - Relevant hazard and safety information shall be communicated and shared, internally and externally, to ensure key messages reach those to whom it is most critical
  - A risk control framework shall be operated that identifies, assesses and mitigates hazards associated with the physical assets
  - A change control framework shall ensure the integrity of physical assets and the associated system
  - A framework of performance measurement supporting the review and continual improvement of associated processes will be operated

## Risk Control Systems fall into one of three categories...

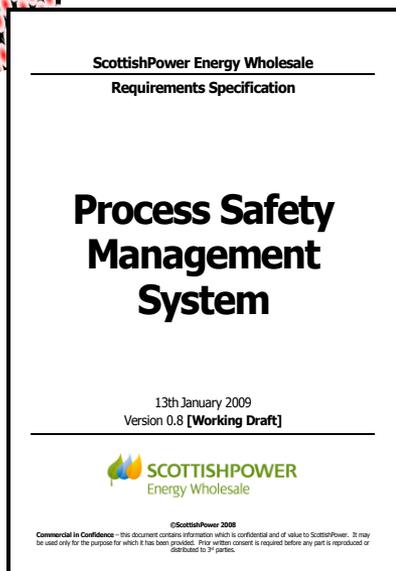


### 42 Risk Control Systems

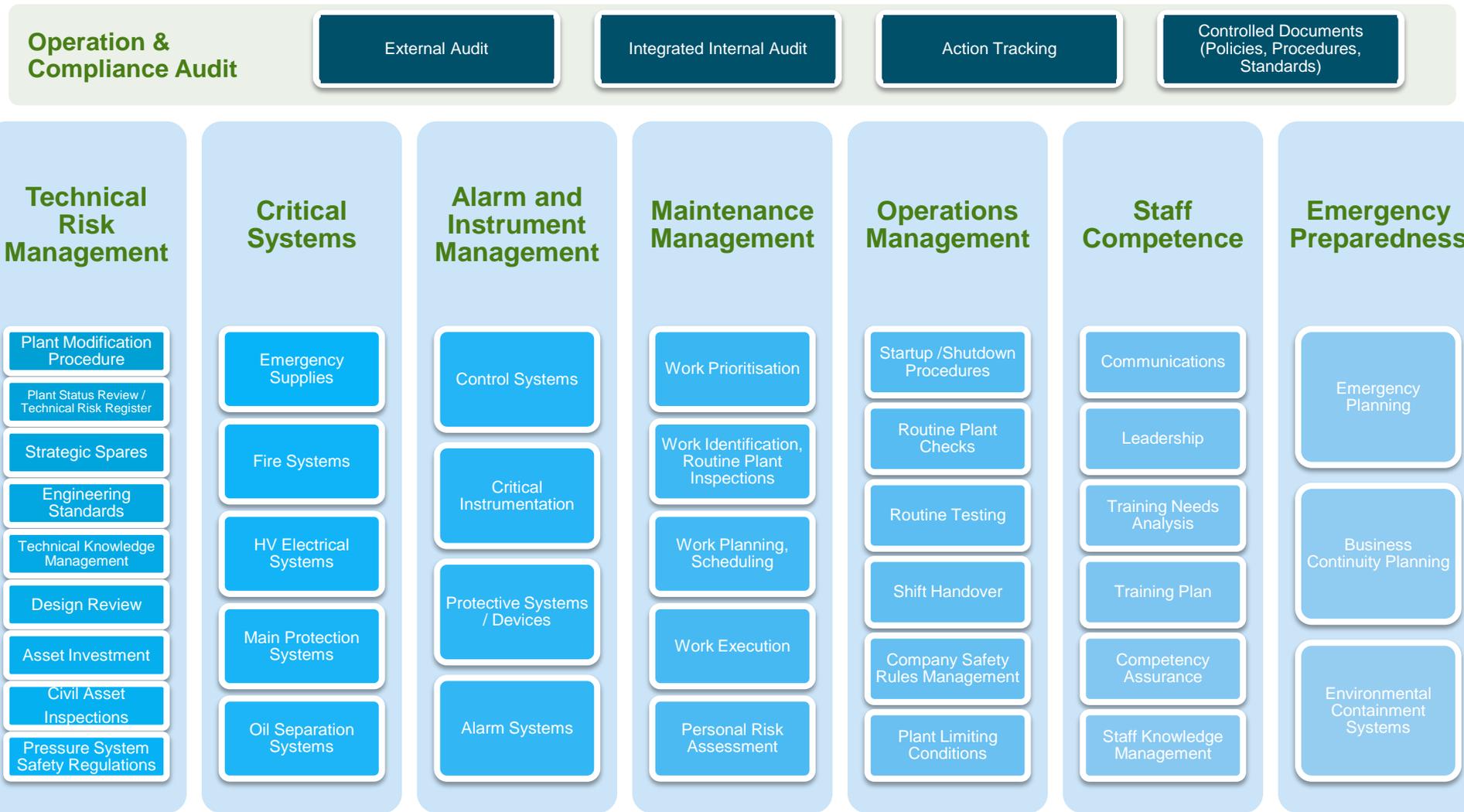
3 Classifications Of Lagging Indicators



88 Leading Indicators, with 77 Currently Live



## 8 “Risk Control Areas” underpin Energy Wholesale’s PSMS...



Best practice asset management is foundation for Process Safety...

**Best Practice Asset Management**



**Good Process Safety Management**

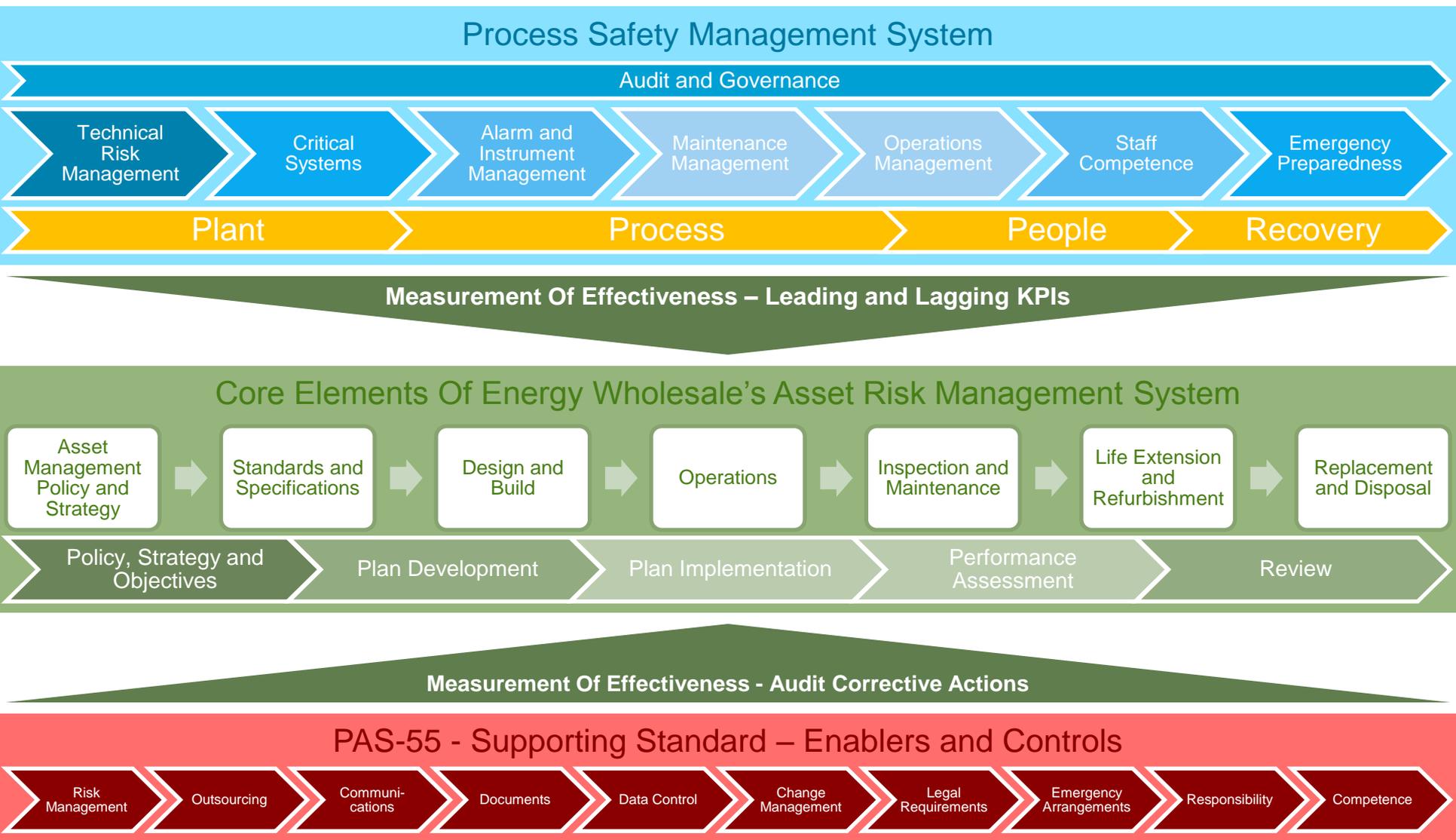


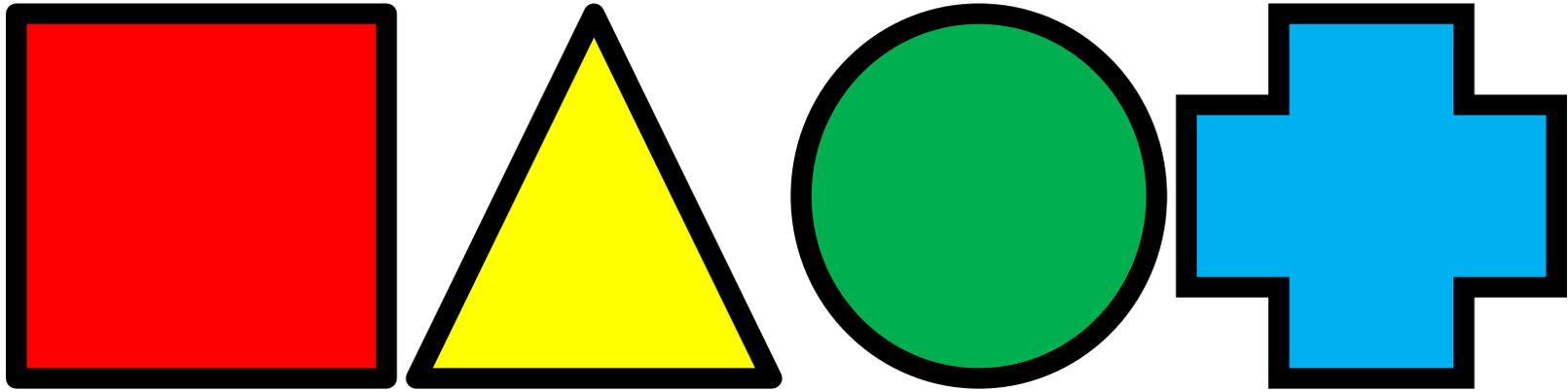
- Focus on driving towards best practice Asset Management
- Business agreed to adoption of PAS-55
- Integrated approach taken
- 2<sup>nd</sup> generator world wide to achieve accreditation



# Integrated Approach

## Relationship between PAS-55 and Process Safety Management System...





# Prototype KPI Dashboard

Demonstration of leading and lagging indicators...

Demonstration of first generation dashboard...

- **Matrix View**
- **Summary Charts**
- **Detail View**
  - **Crib Sheets**
  - **Trending**
  - **Drill Down**
- **Monthly Governance Reporting**

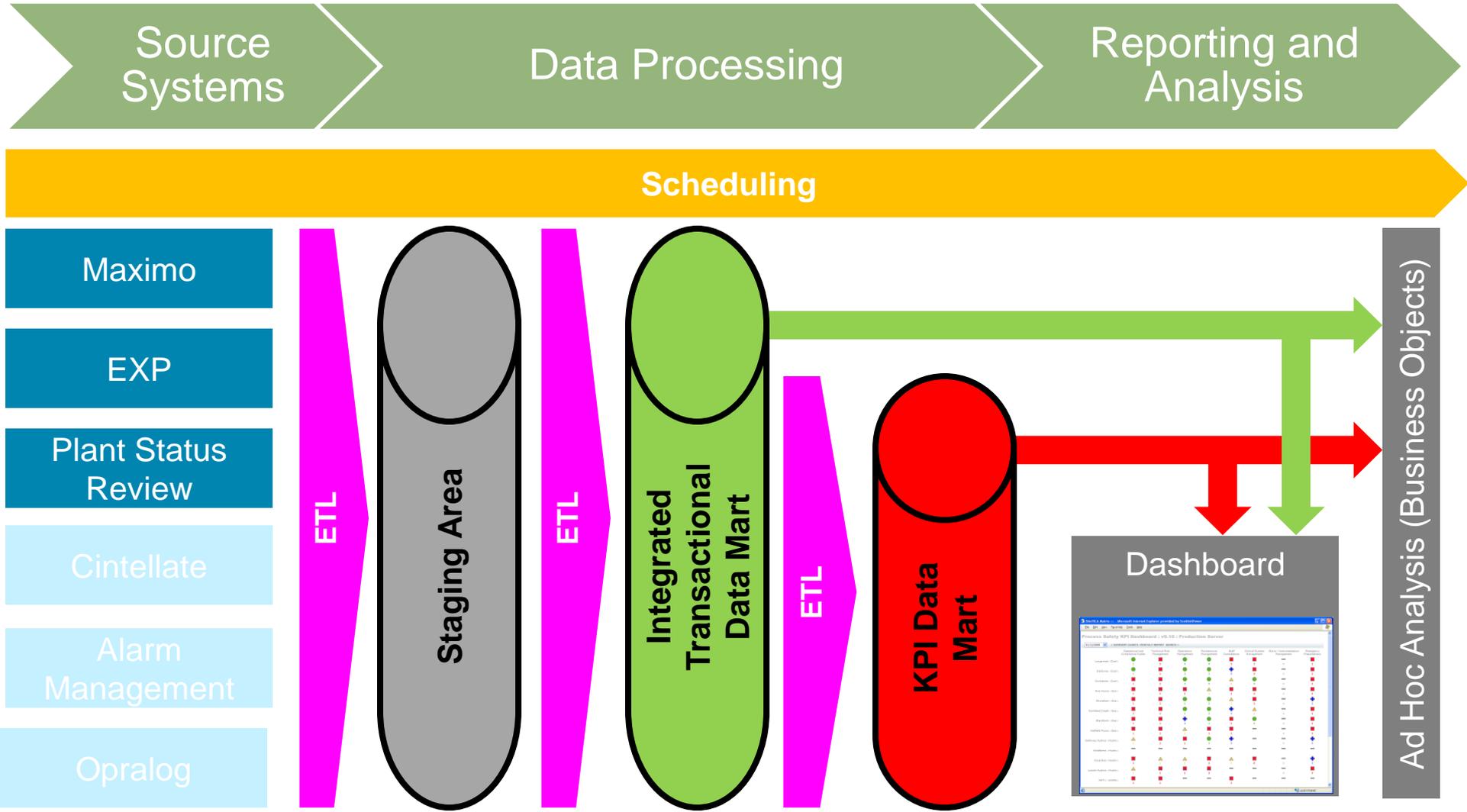


# Enduring Dashboard Solution

Preview of next generation of software in development...

# KPI Dashboard Architecture

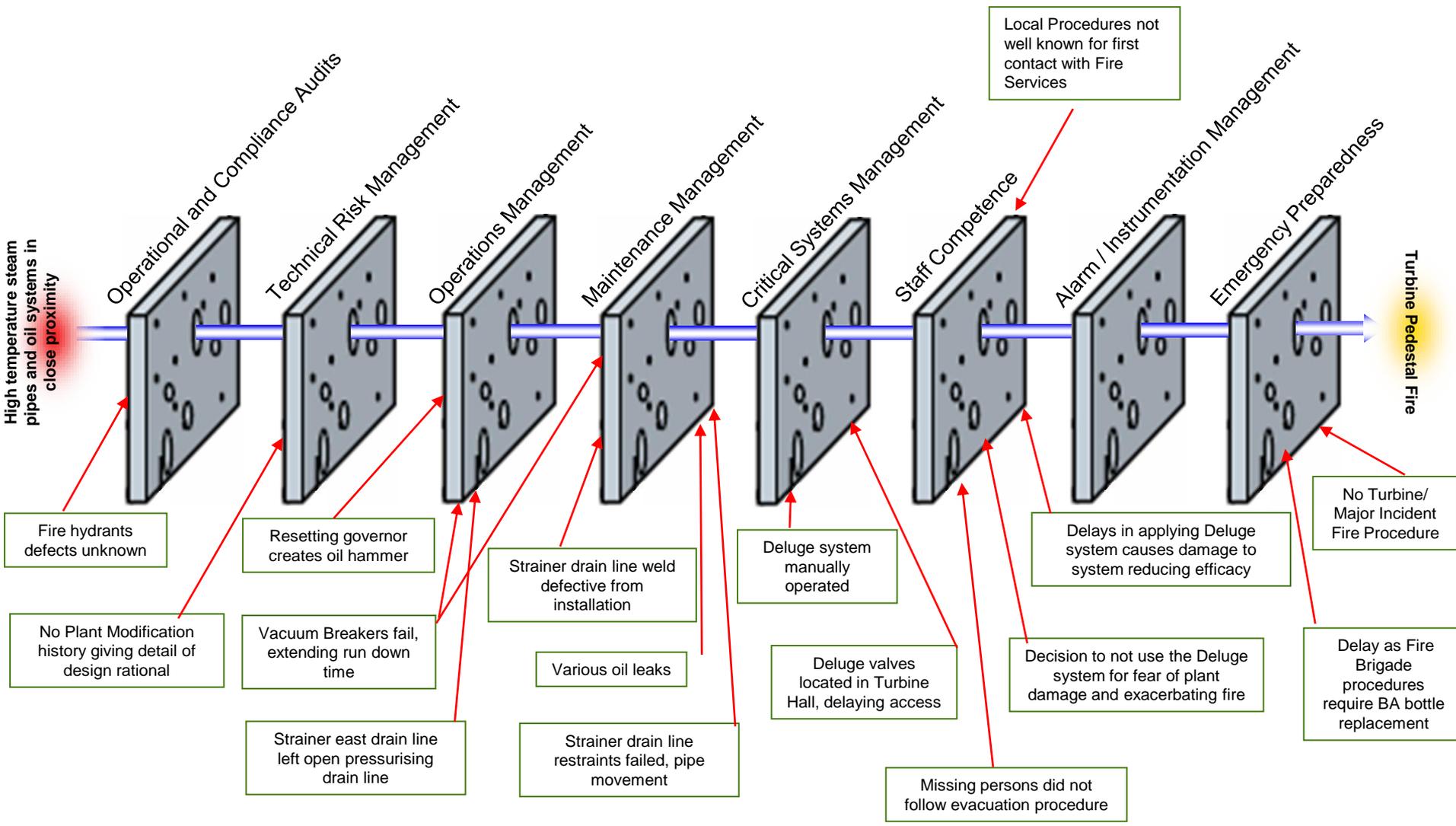
An enterprise scale solution...



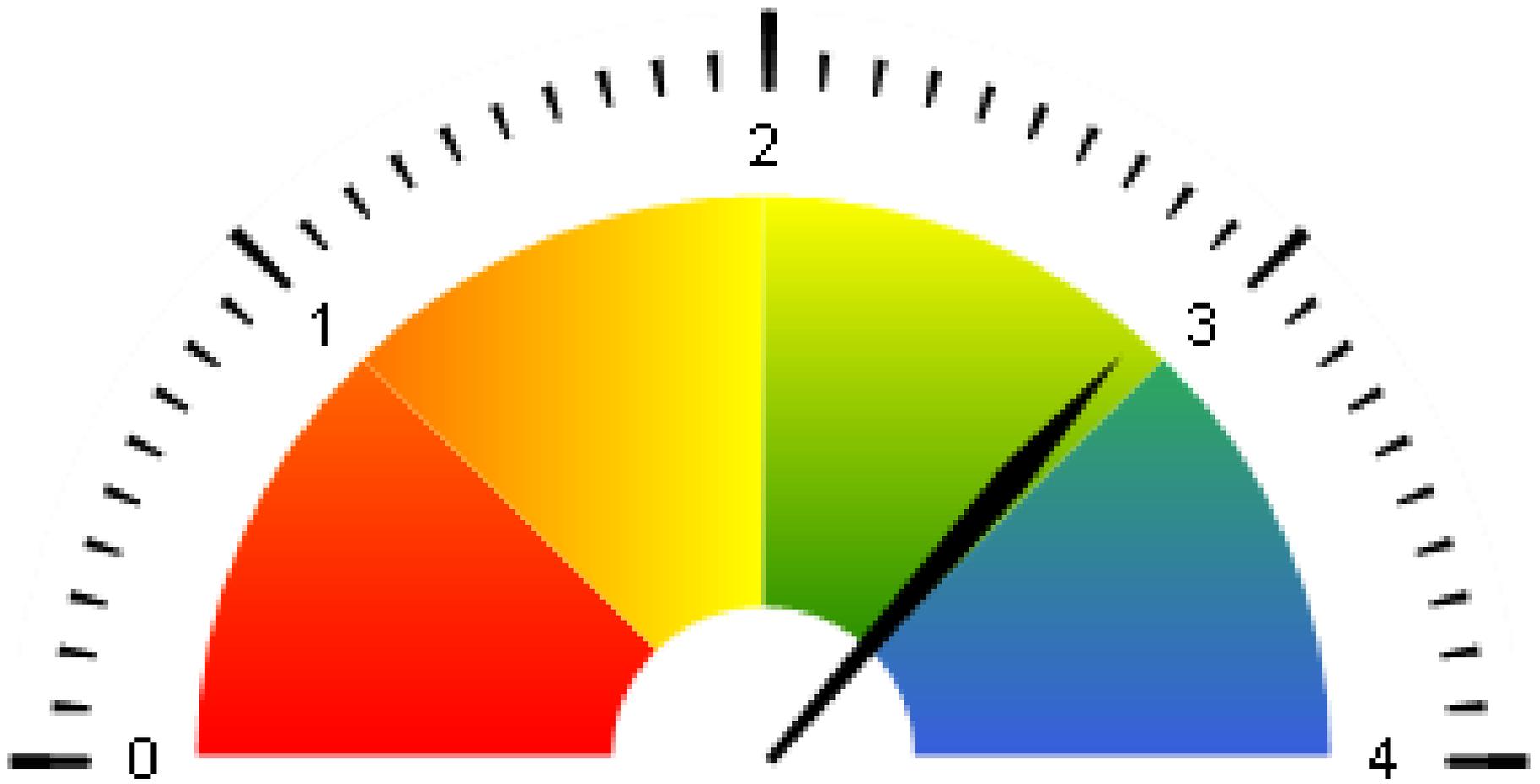


- Lagging indicators driven wholly by incident and near miss investigations
  - **Process Safety Incident** – major equipment damage or injury
  - **Loss Of Containment** – significant of energy or hazardous matter
  - **Near Miss** – eg demand on safety system or process upset

## Application of Swiss Cheese model to drive out lagging indicators...



- **Treatment Of Leading and Lagging Indicators**



# Weighted KPIs

Application of risk based weightings to KPIs...

## Classification of indicators...

### Operational Control Indicators

#### Lagging Indicators

- Active Monitoring and Logging:
- Breaches Of Plant Limiting Conditions (eg overpressure, overspeed, over temp)
- Control Loops Out Of Control
- Equipment In Manual

#### Leading Indicators

- Inspection and Maintenance of Control Systems and Critical Systems
- Alarm Management
- Control Loop Performance
- Completion Of Operational Routine Checks / Testing

### Generic

#### Lagging Indicators

- Incident Reporting and Investigation:
- Near Misses (eg demand on safety system)
- Loss Of Containment (eg release of high pressure steam)
- Process Safety Incident (eg major equipment damage)

#### Leading Indicators

- Critical processes undertaken correctly
- Operations
- Maintenance
- Engineering

### Programme Indicators

#### Leading Indicators

- Statutory Inspections Completed (eg PSSR)
- Audits To Programme
- Action Closure
- Training and Competence
- Procedures Up To Date

## Three stage approach...

Apply Static Weightings To All KPIs Within Each RCA

Calculate Score For Each KPI

Apply Category Offset To Each KPI

### Maintenance Management

Work Prioritisation

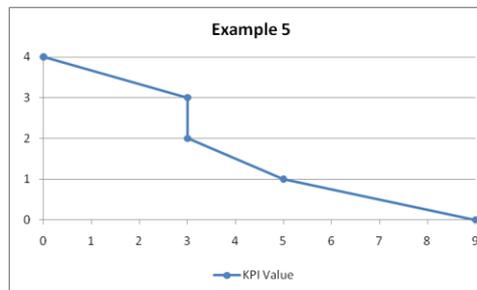
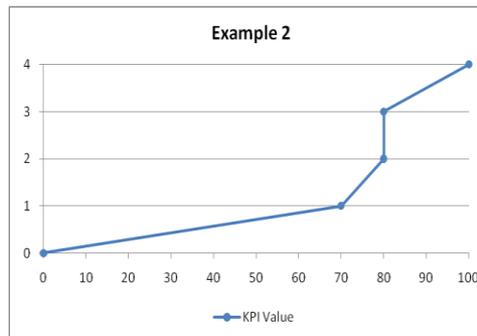
Work Identification, Routine Plant Inspections

Work Planning, Scheduling

Work Execution

Personal Risk Assessment

KPI	RCA Weighting
Backlog Size In Months	20%
Corrective Maintenance Compliance	10%
Outage Defects Backlog Size In Months	5%
Percentage of WOC With Failure Information	2%
Percentage of WOC With Hours Captured	2%
Percentage of WOC With Log Completed	2%
Percentage of WOC With Re-Work	1%
Percentage of WOC With Risk Assessment	10%
Safety Defects Backlog Size	3%
Percentage of PM to CM	30%
Preventative Maintenance Compliance	15%



Operational Control Indicators

Generic

Programme Indicators

## Top 10 Risk Rating Report

Filter

Date  Group  Business Unit  HSE Category

Site	KPI Name	RCA	Category	Score	Category Score
Blackburn	Percentage of PM to CM	Maintenance Management	Operational	2.40	2.40
Cockenzie	Corrective Maintenance Compliance	Maintenance Management	Generic	1.45	2.45
Cruachan	Main Protection System PM to CM	Critical Systems	Operational	2.60	2.60
Daldowie	Percentage of WOC With Risk Assessment	Maintenance Management	Generic	1.70	2.70
Galloway	Preventative Maintenance Compliance	Maintenance Management	Operational	2.75	2.75
Hatfield Moor	HV Electrical PMC	Critical Systems	Operational	2.80	2.80
Lanark	Main Protection System PM to CM	Critical Systems	Operational	2.85	2.85
Longannet	Percentage of WOC With Risk Assessment	Maintenance Management	Generic	1.95	2.95
Rye House	Percentage of PM to CM	Maintenance Management	Operational	2.98	2.98
Shoreham	Number of PSR High Risk Issues	Technical Risk Management	Programme	1.10	3.10

- **Weighted Risk Control Area Reporting**

Key learning points from ScottishPower's journey to date...

- **Introduction of Process Safety KPI's has delivered significant improvement across the business**
- **For the first time, gives senior management near time visibility of core processes**
- **Clear definition of each KPI is essential**
- **Buy in and commitment from senior management is key**
- **Delivery of sustainable solution can only be achieved using integrated IT platforms**
  - **Encourages common processes across all business units**
  - **Automatic generation of KPI's minimises resource requirements and ensures transparency of reporting**

# End Of Presentation