Adopting the ISO 55000 Asset Management Framework for the Power Industry

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What Happens When You Don't Have a Good Strategy?

Wheel of Despair

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ISO 55000 for Power – Today's Discussion

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RISK AND RELIABILITY

ADOPTING THE ISO 55000 ASSET MANAGEMENT FRAMEWORK FOR THE POWER INDUSTRY

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ISO 55000 – What is it?

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Why ISO 55000? – Environmental Pressures

“The capacity that variable resources contribute to serving peak electricity demand differs from thermal generation because output depends on the environment, climate, and local weather conditions”

NERC 2020 Long-Term Reliability Assessment December 2020

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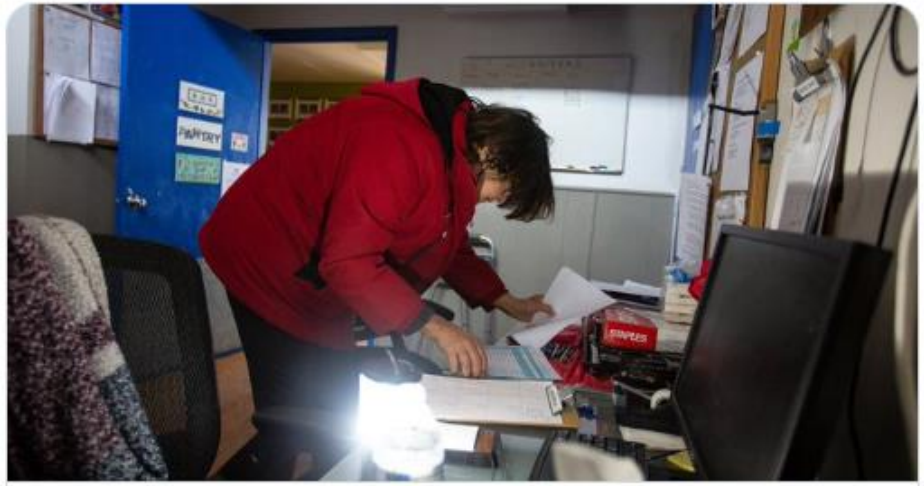
Why ISO 55000? - Social Pressures

Texas Tribune @TexasTribune · Apr 1

A study found that almost 70% of Texans in **ERCOT**'s service area lost power during **February**'s winter storm. And these Texans went an average of 42 hours without it.



Almost 70% of ERCOT customers lost power during winter storm, stud...

Texans in ERCOT's service area who lost electricity were without power for an average of 42 hours, according to the study. They had been told...

texastribune.org

Analyses showed that 70% of generators that were offline for maintenance between June 12-17, 2021, in Texas, had also been forced offline during the winter storm in February.

ERCOT @ERCOT_ISO

Alert: Due to a combination of high gen outages typical in April & higher-than-forecasted demand caused by a stalled cold front over TX, ERCOT may enter emergency conditions. We do not expect customer outages. Declaring an emergency would allow us to access additional resources.

4:39 PM · Apr 13, 2021

1K 1.4K Share this Tweet

Tweet your reply

ERCOT @ERCOT_ISO

Tight grid conditions expected due to high number of forced generation outages, grid operator requests energy conservation: ercot.com/news/releases/...

1:01 PM · Jun 14, 2021 · Twitter Web App

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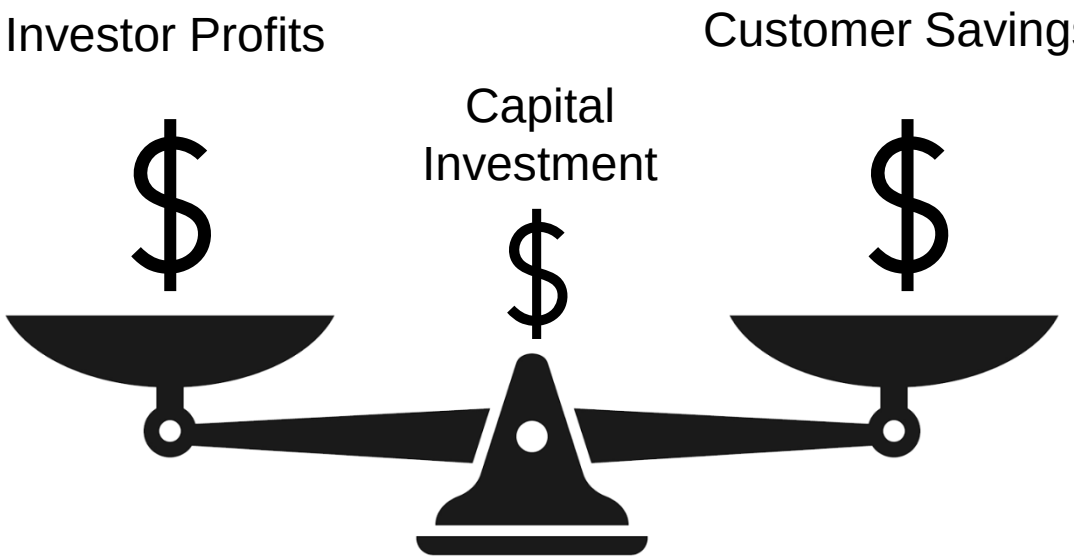
Why ISO 55000? - Governance Pressures



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Why ISO 55000? - Technical Pressures

- Transformation to interconnected digital technologies
- Asset Health Index development
- Use of Machine Learning or Asset Performance Management tools

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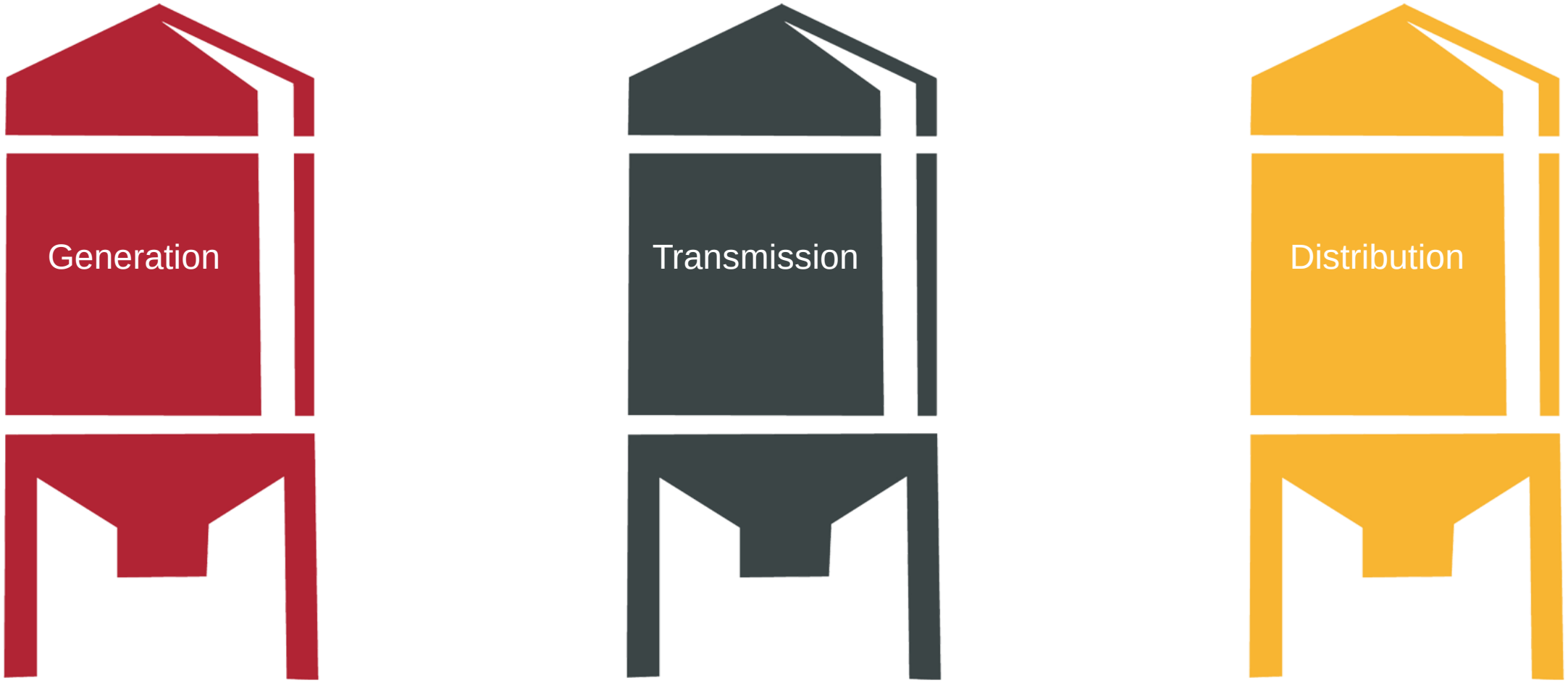
Issues Encountered - Silos



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Issues Encountered – Knowledge

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Issues Encountered – Leadership

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Issues Encountered – Governance

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Why ISO 55000?

It provides a framework in which all necessary tools and techniques for business controls are integrated

Pressures:
Environmental
Social
Governance
Financial
Technical

Issues:
Silos
Knowledge
Competence
Leadership
Resources

Tools
Asset Management Policy
Strategic Asset Management Plan
Roles, Responsibilities and Authority
Baseline, Measure, and Monitor
Analyze and Evaluate
Audit
Financial Controls
Capital Planning
Conformity and Corrective Action
Root Cause Analysis
Preventive Action
Operations Program
Maintenance and Spares Program
Operational Readiness
Management of Change
Demand Forecasting
Contingency Planning

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Benefits of Using ISO 55000

There are both internal and external benefits to good asset management.

External benefits tend to be the focus of most organizations because they directly impact customers, investors, constituents and regulators.

- Fostering stewardship and sustainability across all asset classes
- Reductions in operating costs to be more competitive or meet budget targets
- Improvements in safety results that reduce the likelihood and severity of accidents
- Advances in the performance and reliability of public works and private sector manufacturing and processing facilities
- Enhancing accountability and transparency for all stakeholders
- Extending the useful life and value of facilities and equipment

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Benefits of Using ISO 55000

It tells your customers and your investors that you have **planned** your business, **know** your risks, and are prepared to **manage** them!

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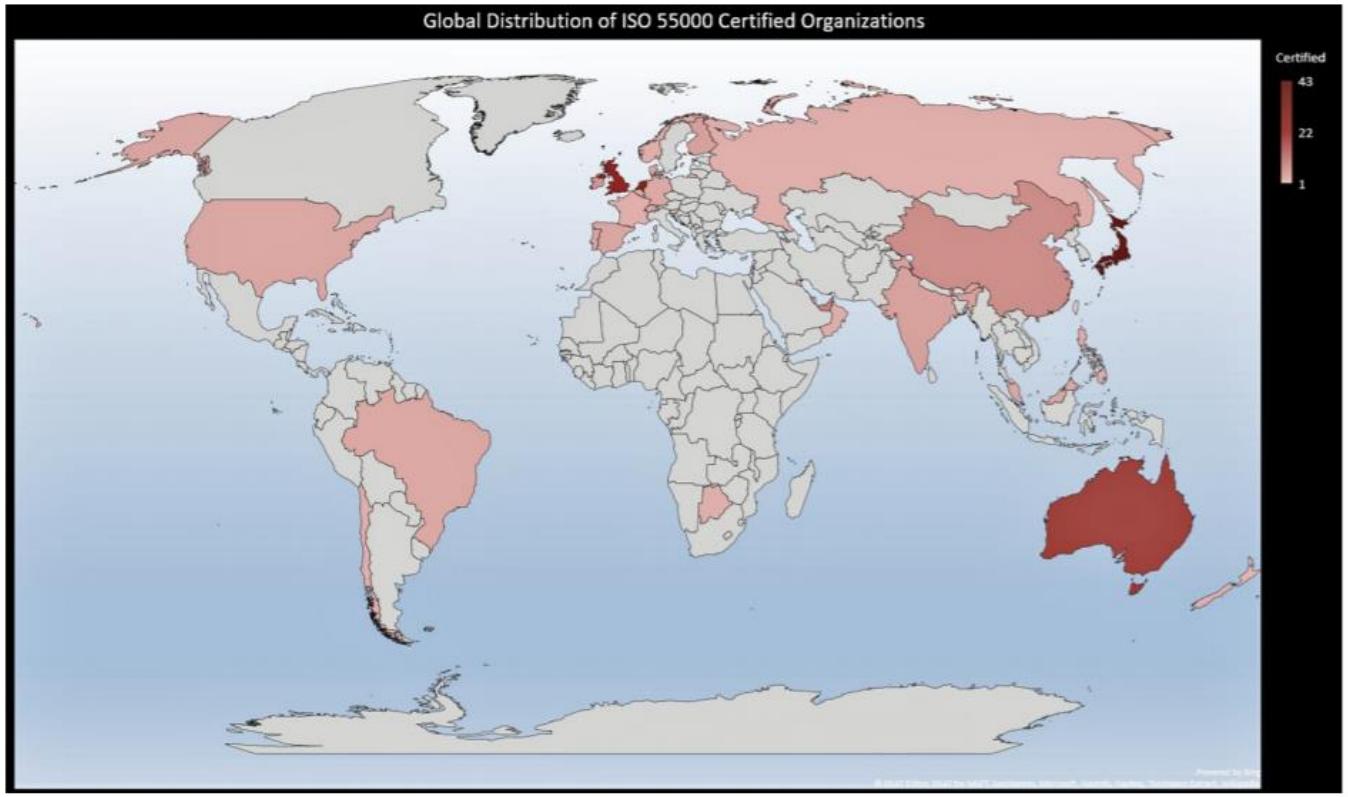
Moving to ISO 55000



Asset Leadership Network

www.assetleadership.net

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As of September 2021, the list of ISO 55001 certified organizations was 304 in 46 countries operating in 21 sectors (up from 168 organizations in 2018). https://committee.iso.org/sites/tc251/social-links/resources/known-certified-organizations.html

Australia has the highest number of certified organizations (60)

62 organizations are in the Electrical Sector

The most striking difference about these statistics is the poor showing by the Americas (12 electrical out of 26 total); however, in the US many organizations are aligning with ISO 55000 but not certifying.

Simplifying Physical Asset Management

Data Alignment
Establish data requirements to support organizational goals then capture the data, cleanse it and populate the systems

Performance Alignment
Visualize meaningful metrics and KPIs with line of sight to organizational objectives

Organization Alignment
Educate and engage leadership and stakeholders to align asset management objectives with the environmental, safety, and governance objectives of the organization

Process Alignment
Ensure consistent outcomes by standardizing asset management processes and training personnel

Future Alignment
Implement cost-effective APM and analytical capabilities and fully integrate systems to maximize knowledge while minimizing effort

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How to Implement ISO 55000

A Phased Approach to Implement ISO 55000 Practices

Phase I

- Conduct a gap analysis
- Identify opportunities to improve
- Achieve consensus
- Prepare communication plan

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How to Implement ISO 55000

- Phase II
  - Asset Management Policy
  - Strategic Asset Management Plan (SAMP)
  - Roles and Responsibilities
  - Project Plan
  - Execute the Communication Plan
  - Asset Management Plans (AMP)

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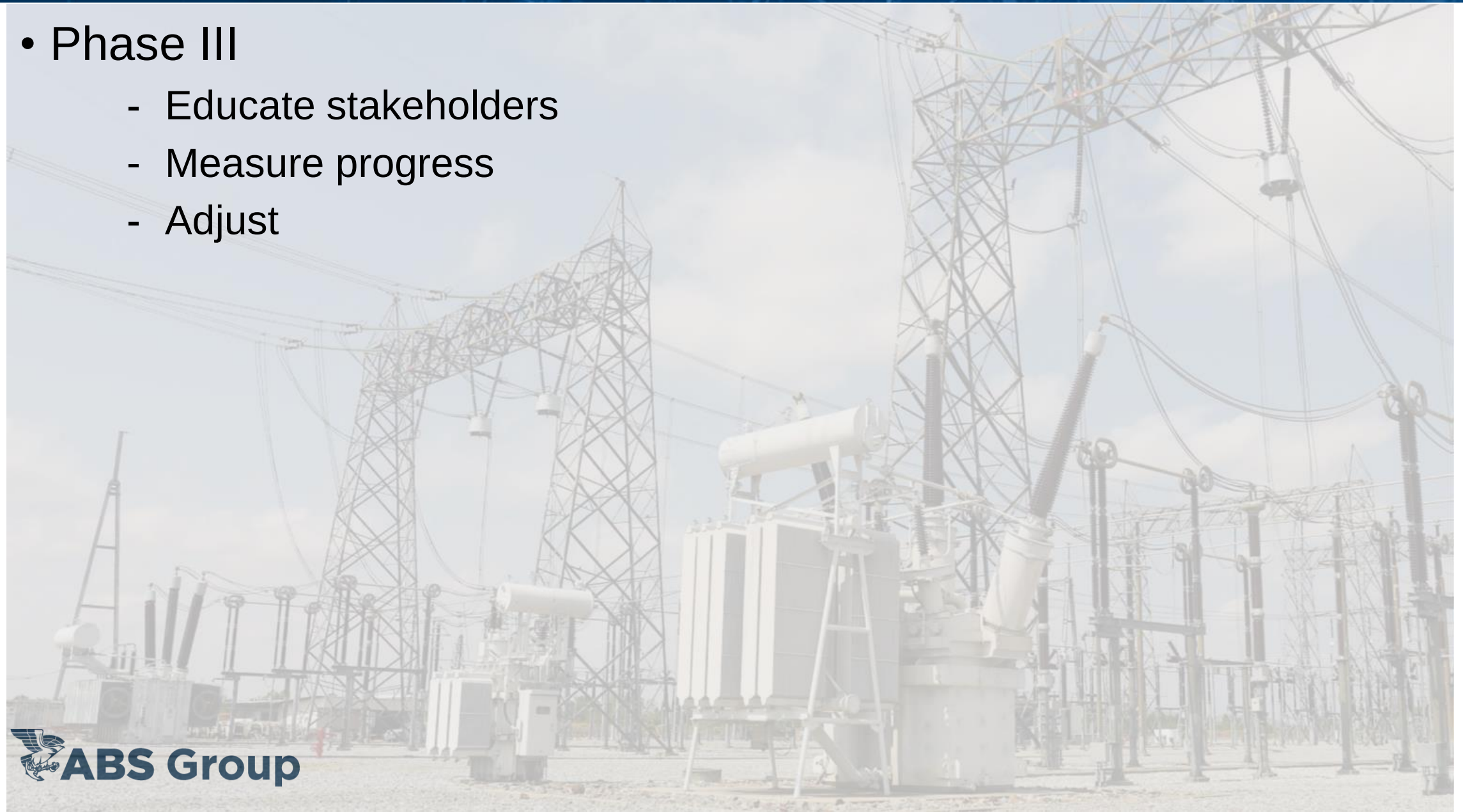
How to Implement ISO 55000

- Phase III
  - Educate stakeholders
  - Measure progress
  - Adjust



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How to Implement ISO 55000

- Phase IV
  - Certification
  - Continuous Improvement Process

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Implementing ISO 55000 – Transformational Change

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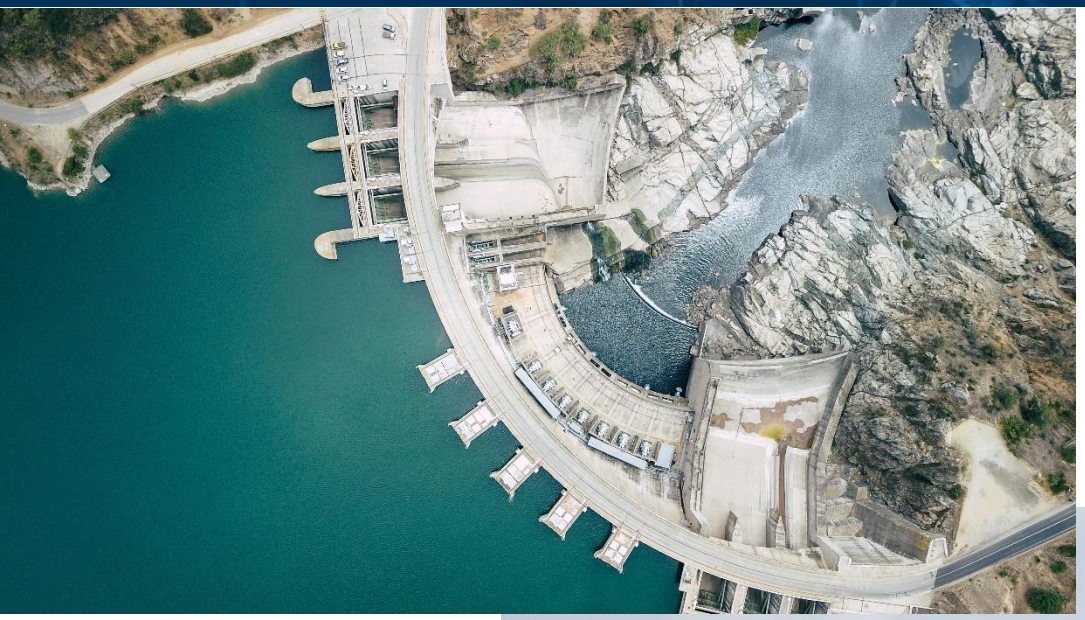
Case Study – Physical Assets Description



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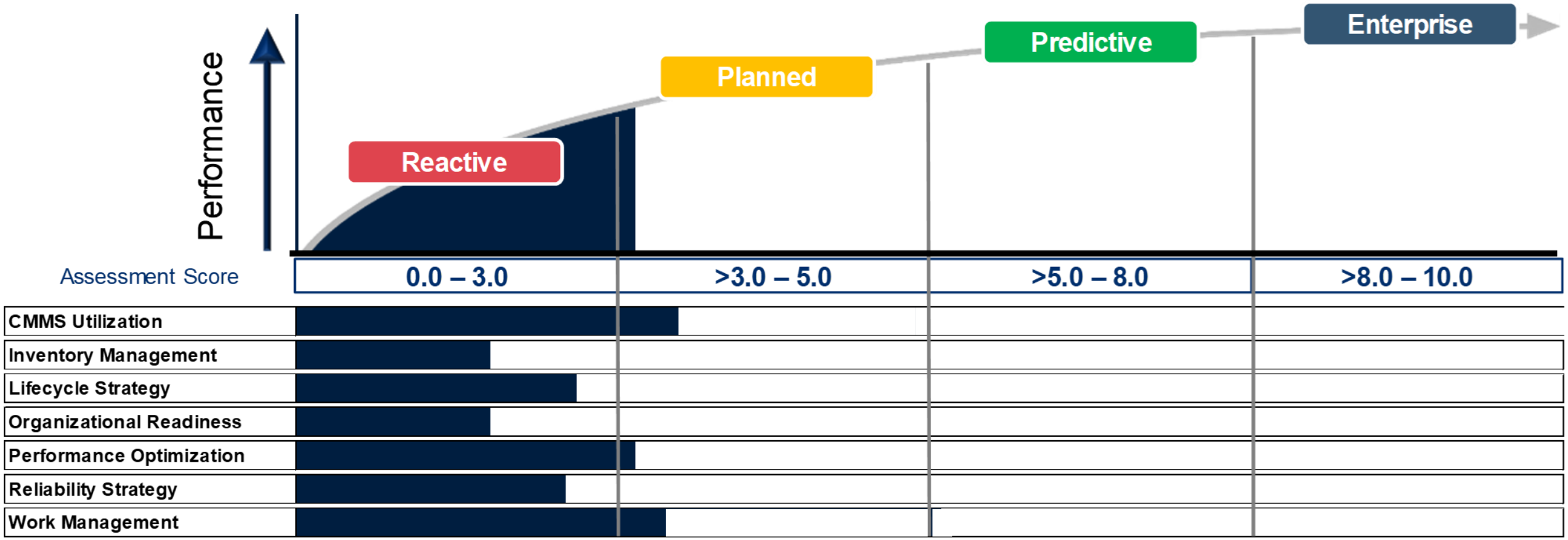
Case Study – Gap Analysis, Opportunities, Consensus



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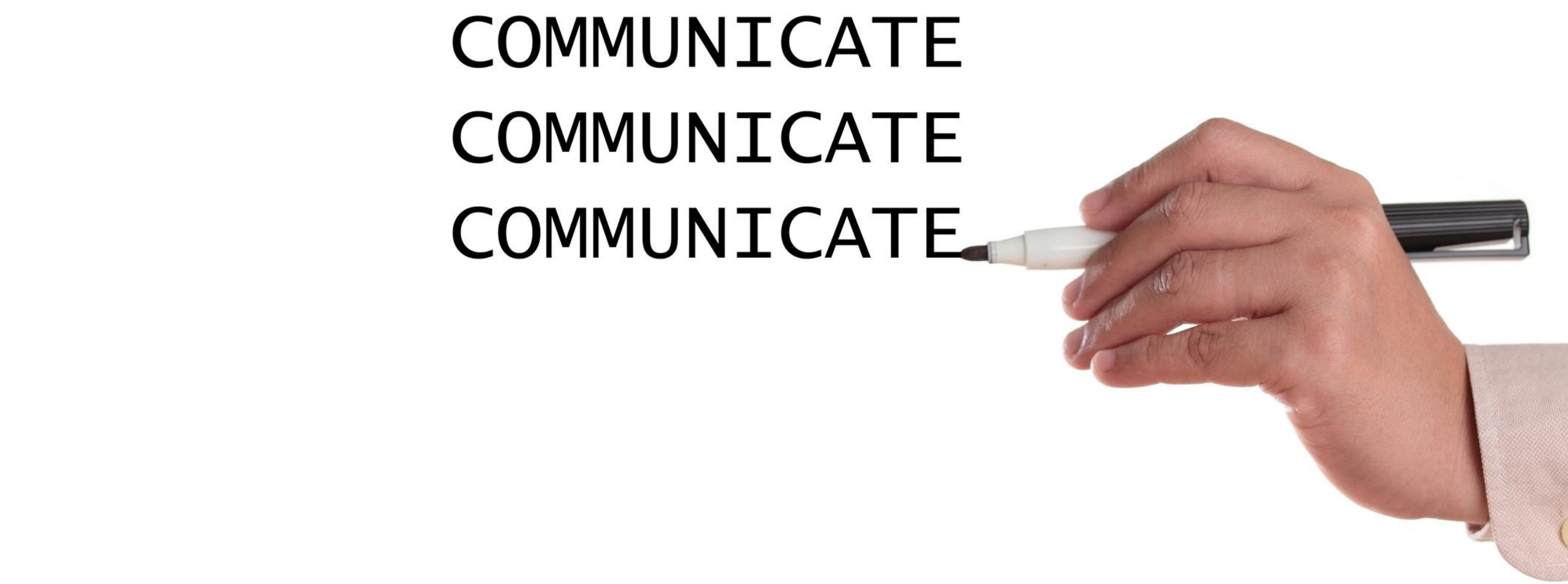
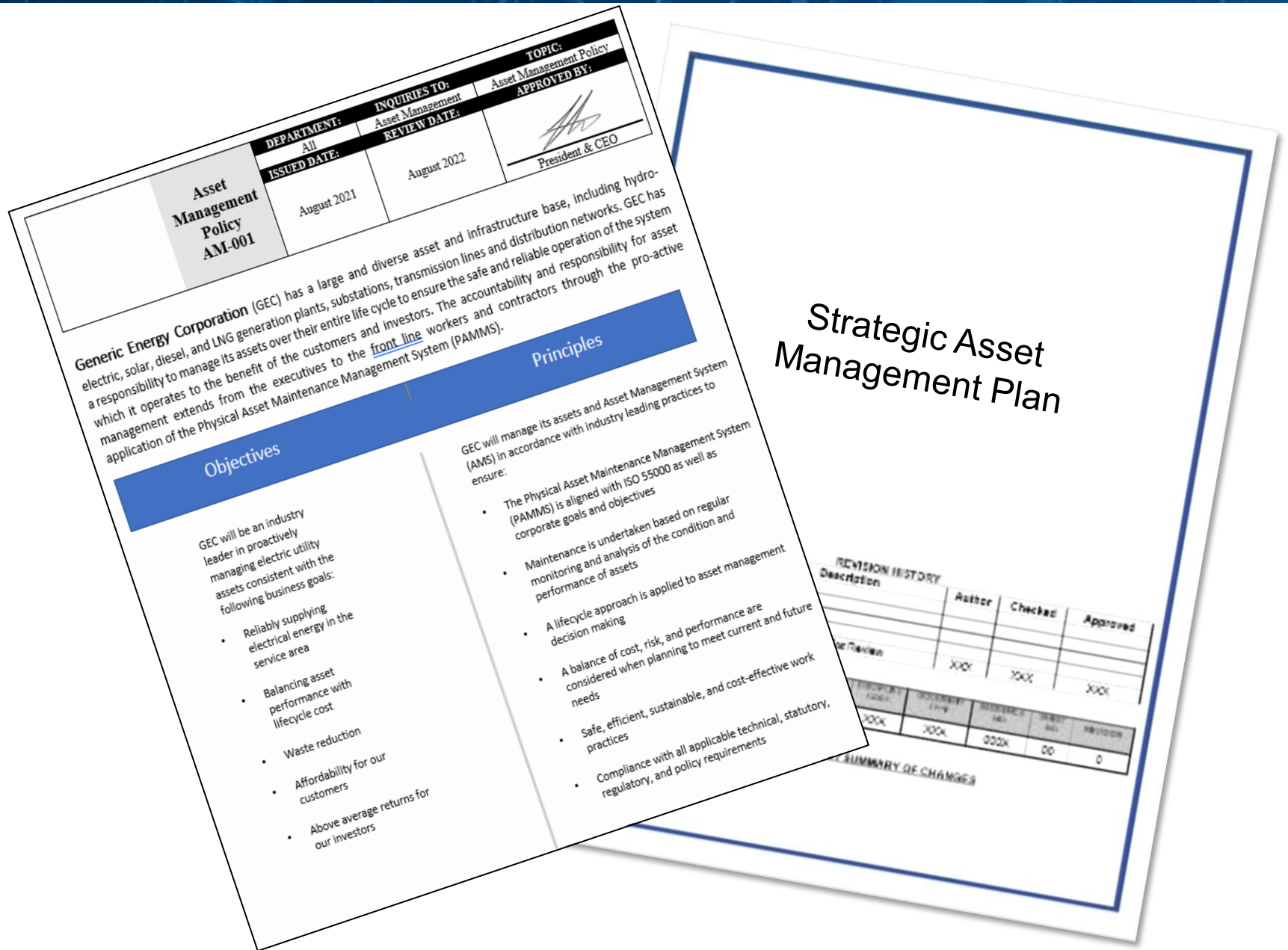
Case Study – Prepare a Communication Plan



Case Study – AMP & SAMP



Asset Management Policy AM-001	DEPARTMENT: All	INQUIRIES TO: Asset Management	TOPIC: Asset Management Policy
	ISSUED DATE: August 2021	REVIEW DATE: August 2022	APPROVED BY: President & CEO

Generic Energy Corporation (GEC) has a large and diverse asset and infrastructure base, including hydro-electric, solar, diesel, and LNG generation plants, substations, transmission lines and distribution networks. GEC has a responsibility to manage its assets over their entire life cycle to ensure the safe and reliable operation of the system which it operates to the benefit of the customers and investors. The accountability and responsibility for asset management extends from the executives to the front line workers and contractors through the pro-active application of the Physical Asset Maintenance Management System (PAMMS).

Objectives

GEC will be an industry leader in proactively managing electric utility assets consistent with the following business goals:

- Reliably supplying electrical energy in the service area
- Balancing asset performance with lifecycle cost
- Waste reduction
- Affordability for our customers
- Above average returns for our investors

Principles

GEC will manage its assets and Asset Management System (AMS) in accordance with industry leading practices to ensure:

- The Physical Asset Maintenance Management System (PAMMS) is aligned with ISO 55000 as well as corporate goals and objectives
- Maintenance is undertaken based on regular monitoring and analysis of the condition and performance of assets
- A lifecycle approach is applied to asset management decision making
- A balance of cost, risk, and performance are considered when planning to meet current and future needs
- Safe, efficient, sustainable, and cost-effective work practices
- Compliance with all applicable technical, statutory, regulatory, and policy requirements

Strategic Asset Management Plan

REVISION HISTORY

Description	Author	Checked	Approved
	XXX	XXX	XXX

SUMMARY OF CHANGES

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Case Study – Roles and Responsibilities

Example RACI (not accurate)	Senior Vice President, Operations	General Manager, Maintenance	Reliability Manager	Reliability Engineer	Maintenance Engin	CM				
CMMS Management										
Inventory Management										
Lifecycle Strategy										
Asset Lifecycle guidelines and strategies	A	R		C	C					
Validation of Asset lifecycle management throughout asset lifecycle	A	R		C	C					
Acceptance of assets from projects	A									
Guidelines for how to dispose of assets	A	R								
Asset operational checklists			C							
Risk Management (requirements, roles and responsibilities, process, assessments)	A	R	C	C						
Regulated activities (regulatory, industry standards)		R	C							
Supplier activities (management of suppliers for compliance)										
Maintenance activities (roles and responsibilities, guidelines for change control, etc)	A	C	C							
Replacement and retirement plan (replacement plan based on asset lifecycle)	A	C	R							
Cyber security (operational technology)	A	C		C	C					
Maintenance strategy digitalisation	A	C	R	C						C
Service provider digitalisation	A		R	C				C		
Maintenance system refinement using digital technologies		A		R						
Performance Optimisation										
Organisational Readiness										
Reliability Strategy										
Work Management										

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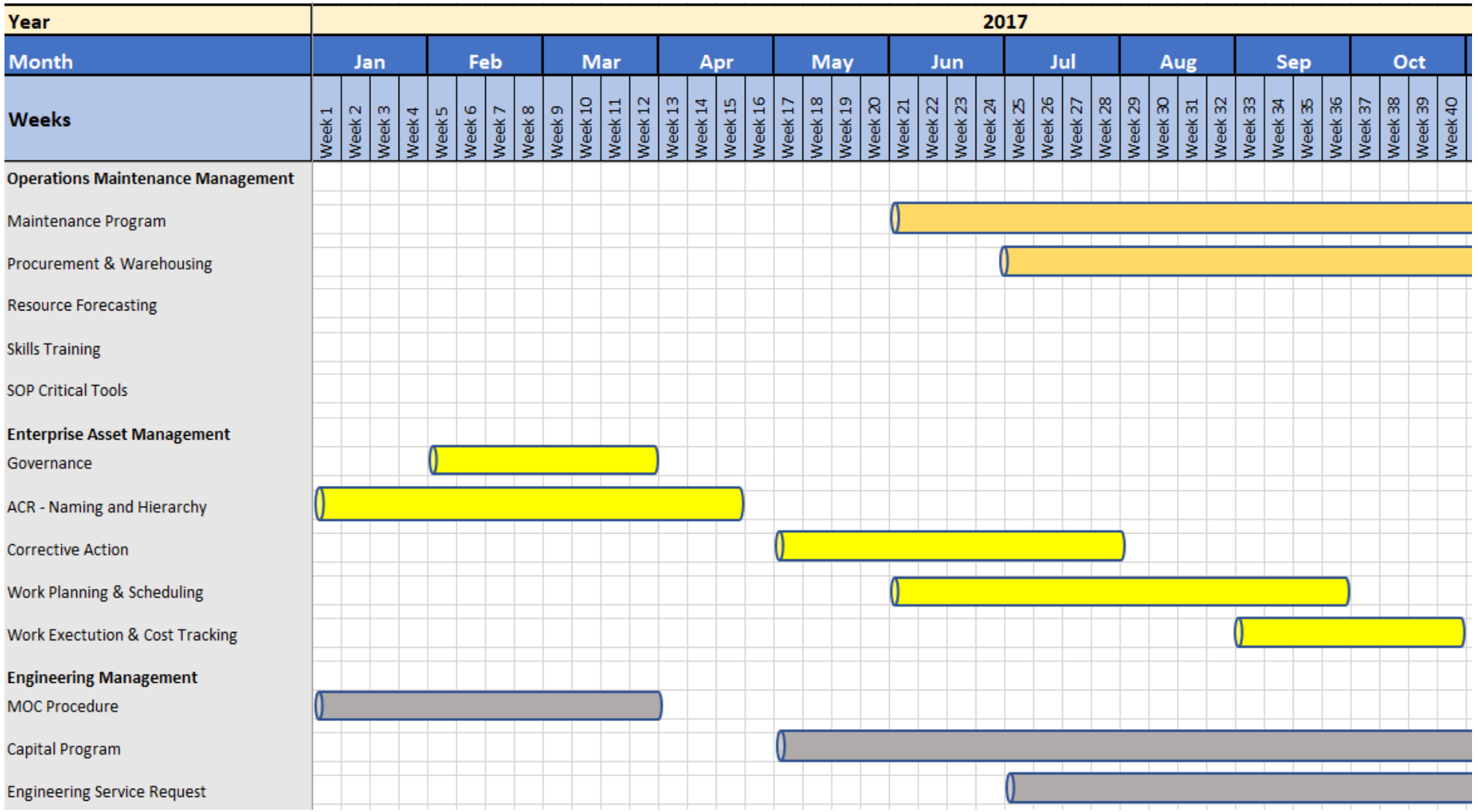
Case Study – Project Plan



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Case Study – Optimized Framework Sample

Physical Asset Maintenance Management System Framework			
Governance	**Maint. Management**	**Engineering**	**Performance**
AM Policy	Roles and Responsibilities	Management of Change	KPIs
SAMP	Maintenance Program	Capital Program	Metrics
PAMMS Governance Procedure	Procurement	Roles and Responsibilities	Audit
RACI	Warehousing	Root Cause Analysis	
	Skills Training	Asset Health Condition	
	Work Management		

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Case Study – Asset Management Plans

MASTER ASSET LIST

ASSET CRITICALITY RANKING

ASSET STRATEGY OPTIMIZATION

SPARE PART ANALYSIS

MONITOR RELIABILITY ANALYTICS

CONTINUOUS IMPROVEMENT PROCESS

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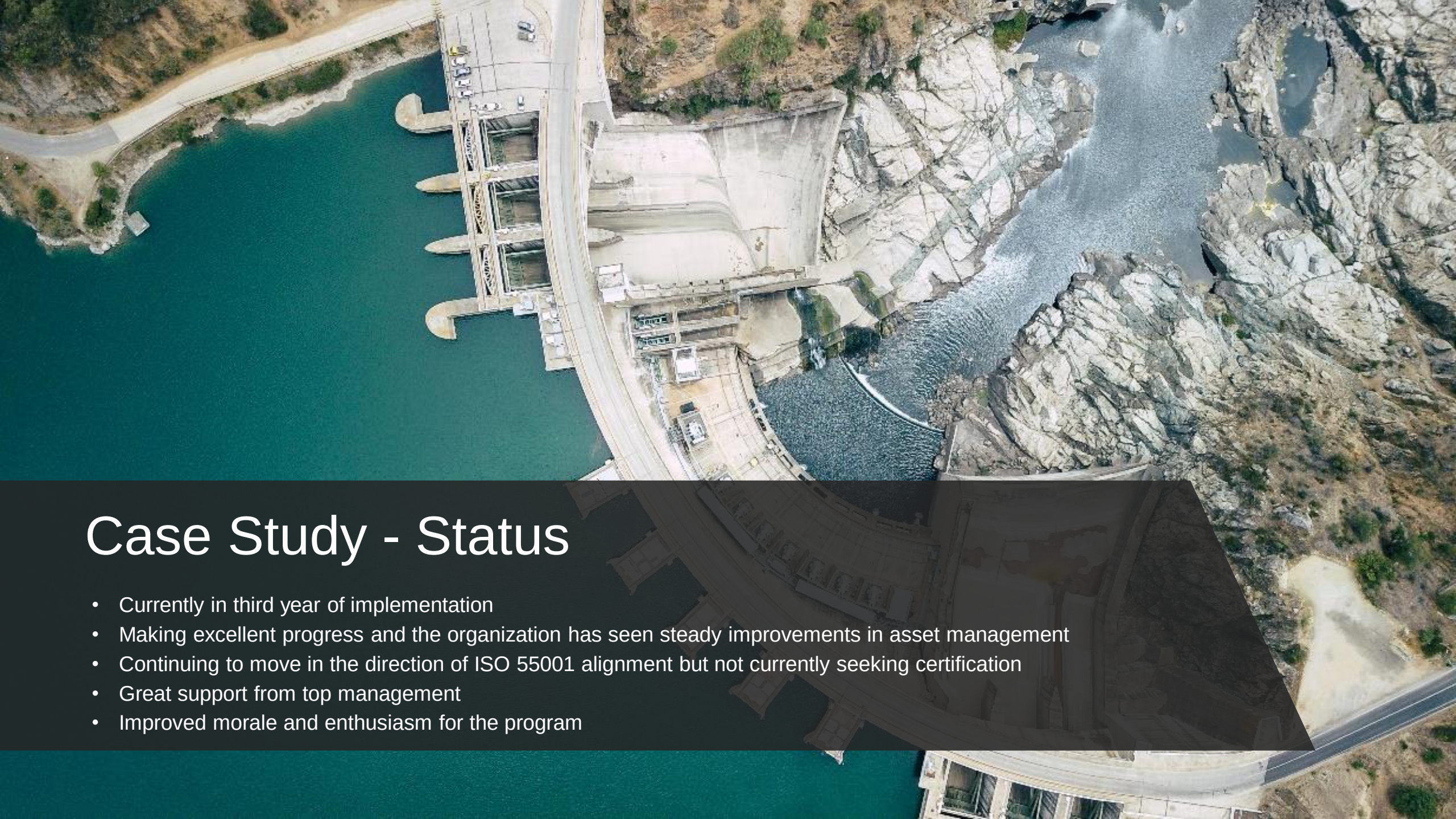

Case Study - Status

- Currently in third year of implementation
- Making excellent progress and the organization has seen steady improvements in asset management
- Continuing to move in the direction of ISO 55001 alignment but not currently seeking certification
- Great support from top management
- Improved morale and enthusiasm for the program

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Questions?

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End

Electrical Companies by Country with ISO 55001 Cert

- Argentina
  - YPF Luz
- Australia
  - ActewAGL
  - Ausgrid
  - Ausnet
  - Jemena
- Brazil
  - AES Tiete
  - Enel Distribuição São Paulo
- Canada
  - Hydro Ottawa
- China
  - State Grid Power Research Institute
- Colombia
  - AES Chivor
  - ISA Intercolombia
- Denmark
  - Dong
  - Energinet
- Dominican Republic
  - AES Dominicana
- Finland
  - Caruna
  - Elenia
  - Fingrid
- Germany
  - Amprion
  - Stromnetz Berlin
  - Stromnetz Hamburg
- India
  - Reliance Infrastructure
  - Vedanta
- Indonesia
  - PLN Transmisi Jawa Bagian Barat
- Ireland
  - Eirgrid
  - ESB Networks
- Italy
  - Terna
- Japan
  - Engineered Energy Co. / Shinsozagi Power Station
  - Koei Energy
  - Pacific Consultants
  - Tanabu Group
- Malaysia
  - TNB
- Mexico
  - AES Mexico
- Netherlands
  - Eneco Heat & Industrials
  - Eneco Solar & Wind
  - Enexis
  - Gemini Windpark
  - Joulz
  - Kenter
  - Liander
  - TenneT
- New Zealand
  - Pioneer Energy
  - Unison
- Norway
  - Statnett
- Oman
  - Oman Electricity Transmission Company (OmanGrid)
- Pakistan
  - Engro Powergen / Qadirpur Power Plant
- Panama
  - AES Centro America
- Peru
  - ISA REP
- Philippines
  - AboitizPower Oil BU
  - Hedcor/Aboitiz
  - SN Aboitiz - Benguet
  - SN Aboitiz - Magat
- Russia
  - Suek
- Switzerland
  - Alpiq
  - Altis
- UAE
  - Transco
- UK
  - National Grid Electricity Transmission
  - SP Energy
  - SSE
  - UK Power Networks
  - Western Power Distribution
- USA
  - AES Puerto Rico
  - New York Power Authority

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