

PRACTICAL EXPERIENCE FROM IMPLEMENTATION OF ASSET MANAGEMENT SYSTEM IN HSE GROUP

Andrej Androjna, Slovenia

An Initiative by

Organized by



International Group مجموعة أكزيكون الدولية





Introduction

The case of AMS implementation in accordance with ISO 55001 in the largest Slovenian power generation utility, HSE Group, is presented.

Physical Assets of production infrastructure were included in the scope of the AMS.

The project was supported by the AM Consulting team, it was started in 2020 and finished end of 2022 with the formal certifications of companies within the HSE Group.

International standards (ISO, IEC, EN, ASTM, etc.), as well as guidelines (GFMAM, IAM, CIGRE, etc.) were used wherever feasible.





About the HSE Group

- Largest electricity producer in Slovenia (68%),
- 85% share of renewable sources in the production structure.















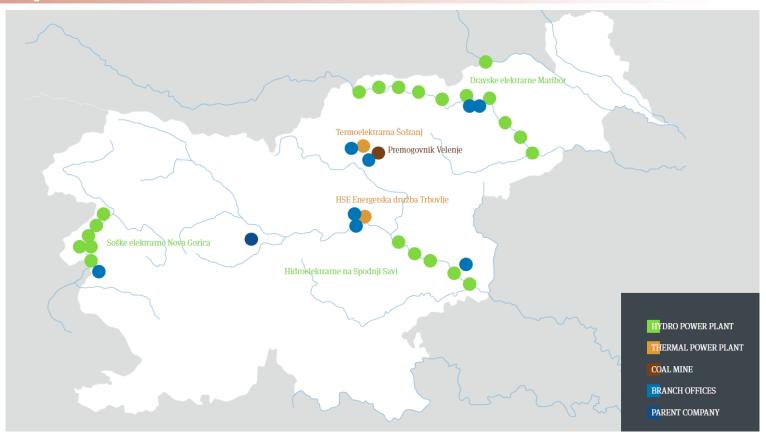




About the HSE Group

As of 2021:

- Approx. 2 GW installed power,
- Annual production **7,5 TWh**,
- **56**% hydro, **44**% thermal,
- Key pillar of **supply reliability**.







AM Consulting team



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Members of:

- GFMAM
- EFNMS
- ISEAM
- IAM
- FIDIC-EFCA (BIM)
- CIFE Stanford
- CEN
- CIGRE-CIRED
- BuildingSMART
- SIST
- IIBA
- DVS
- etc.







AM and AMS

The relationship between managing the organization, **AM and AMS**

Managing the organisation Asset Management ISO5501 Asset Management system ISO5500 ISO5502 **Asset portfolio Asset system Individual Asset** (Source: AM Consulting, adapted from ISO 55000)

Coordinated activity of an organization to realize value from assets.

A set of interrelated or interacting elements to establish an Asset Management policy, objectives and Asset Management processes to achieve those objectives.

Assets that are within the scope of the asset management system - AMS.

Grouping of assets having common characteristics that distinguish those assets as a group or class

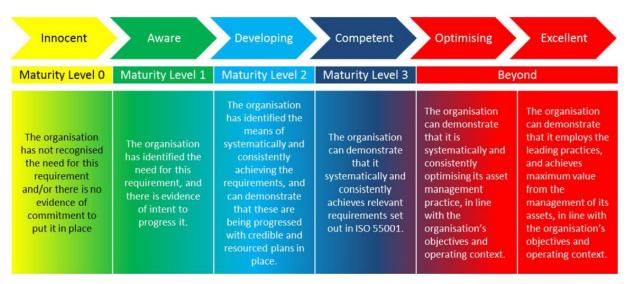
Item, thing or entity that has potential or actual value to an organization.

Component having potential to significantly impact on the achievement of the organization's objectives



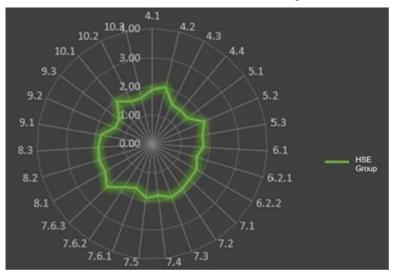
Initial Maturity Assessment

ISO 55001 Maturity Scale



(Source: The IAM, SAM+)

Initial AM maturity selfassessment results, averaged across the HSE Group







Strategic Implementation Framework

HSE GROUP STRATEGY

CURRENT STATE

IMPLEMENTATION PLAN

EXECUTION

FOLLOW UP

AM Project reporting and status

review at the top management

Business Plan

Strategic directions and goals for: Existing production facilities;

- · Development and investments in new production facilities;
- Trading, selling and new product development.

AM Policy

- Improvement of value creation from physical assets in all phases of asset life cycle:
- External and internal compliance: Coordination of all processes and
- functions impacting AM:
- · Decision making process supported by LCC, Risk & Opportunity management;
- Adequate resources for achievement of AM goals:
- Appropriate personnel & competences:
- RCM and digitalization;
- Continual improvement.

Long-term strategy and goals for:

- Investments in new and existing nhysical assets
- Operations and maintenance;
- · Support processes;
- Asset Management System.

Challenges As identified by AM maturity

assessment:

- · Scope of AMS;
- Development of AMS: · Leadership and commitment;
- AM goals;
- General documented information:
- Internal audit;
- Management review: Corrective actions:
- · Continual improvement.

Other Challenges:

- Long-term strategic planning; Cooperation among processes
- and functions: Harmonization of asset hierarchy.
- spare parts, procedures... Definition and use of criticality
- criteria; Development of Condition-based
- Maintenance:
- Improvement of preventive maintenance program:
- Better utilization of EAM (SAP PM. MAXIMO):
- Seizing synergies within HSE Group (knowledge, experience, best practices, ...)

AM Maturity in HSE Group: Self-assessment average: 1,8

Implemented AMS and associated processes for value generation from physical assets

FUTURE STATE

Improved availability of information and analytics with IT support and digitalization (EAM, APM).

Systematic coordinaton of investments, procurement, operations and maintenance functions in all phases of asset life cvcle

Harmonized asset hierarchy and coding within SAP EAM.

Risk & opportunity management and use of crticality for prioritization and coonsequent improvement of preventive maintenance programs.

Improved decision-making.

Effective use of sinergies within HSE Group.

AM Maturity in HSE Group: Self-assessment average: 3 and

AM Plan

- AM workshops: Update IMS manuals:
- Develop system documents on
- Developm methodology on physical asset hierarchy;
- Develop methodology on risk and opportunity management:
- Prepare SAMP: Prepare AMPs for pilot systems;
- Develop detailed AM
- implementation plan for each HSE Group member company;
- Training of project team and key personnel of processes and functions supporting AM;
- Revision of supporting processes descriptions to encompass AM; Training of internal auditors;
- Selection of external auditing institution;;
- Internal audit
 - Execution of correctove actions from internal audit and preparation for external audit;

Other activities in accordance with

Two-step certification.

directions from SAMP

Approval of AMS documents in 2022

meetings.

Preparation and implementation of Monitor implementation and AMPs in all HSE Group member achievemnts of SAMP goals companies for pilot systems.

ISO 55001 certification for specific

Monitor implementation and asset portfolios in 2022 achievemnts of AMP goals

Preparation and implementation of AMPs za remaining asset poortfolios in 2023

Monitor implementation and achievements of Business Plan goals

by processes

Monitor KPIs on AM and reporting

ISO 55001 certification for remaining asset portfolios in 2024

SAMP - Phase II (2025 and on): Management review.

- Physical asset hierarchy;
- Risk & Opportunity management Condition-based Maintenance:
- RCM/FME(C)A:
- Digitalization;
- Implementation of APM within the HSE Group.

Long-term activities in accordance with SAMP.

Internal and external AMS audits

Implementation of corrective actions and continual improvements.

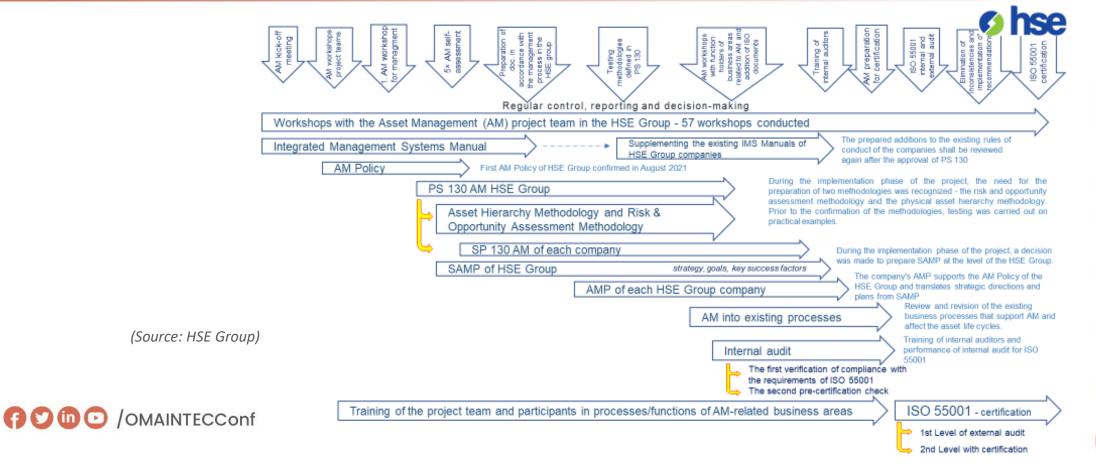
Change Management

Project Management and AM Process Management





Project Roadmap





Project Organization



(Source: AM Consulting, adapted from ISO 21502)





Change Management

- Utilization of the Prosci® PCT™ Model,
- Dealing specifically with the employees' side of the change.



(Source: www.prosci.som)



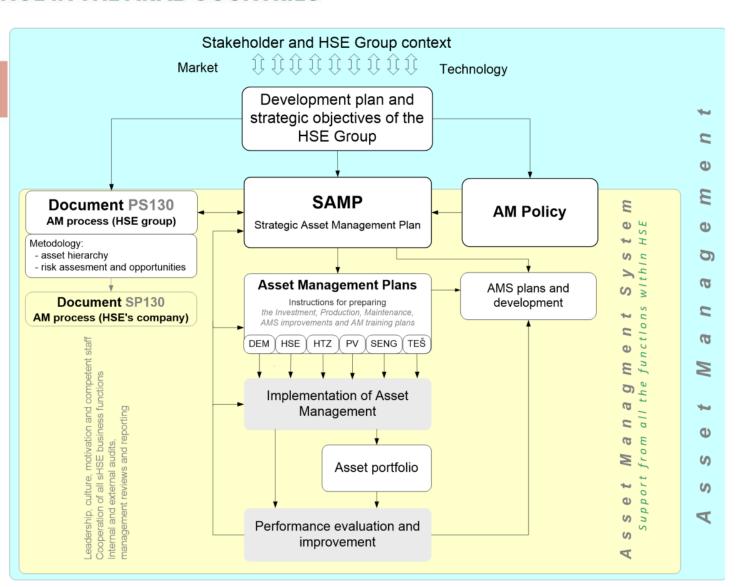




Deliverables

 Documents and activities of AMS in the HSE Group

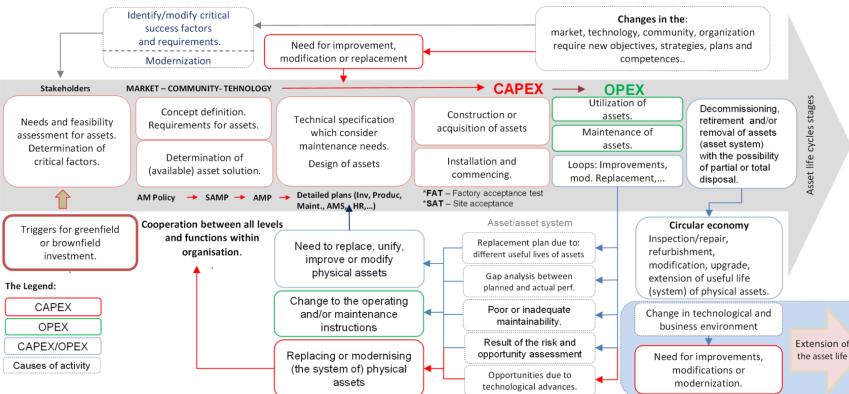






Deliverables

 Training and Workshops (> 60) on different aspects of AM, AMS and Life Cycle Delivery



(Source: AM Consulting, adapted from EN 17485)





Deliverables (Cont'd)

- Asset Management Policy
- Updated Integrated Management Systems (IMS) Manual
- Strategic Asset Management Plan (SAMP)
- ISO 55000 series handbooks
- AM process description RACI Matrix

(Source: I	HSE (Grou	p)
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	Activity and/or process	HSE top management	O of key function	HSE management representative for AMS	HSE Group AM process owner	Owners of other HSE Group processes	Management of the HSE Group company	Managers / heads of individual areas of HSE Group companies	HSE Group company management representative for AMS	AM process owner at HSE Group company	5 5
	Activity allow process	HS	CEO	HSI	HSE G	Ow Gro	Mau Gro	Mau indi Gro	HS] mar	AM p HSE	th of
1.	Corporate Management of AM, SAMP development	v	I		SI	SI	sv*	SI**		SI*	SI*
2.	Development and planning of investments and maintenance of physical assets		v		SI	I	V*	sv*		SI*	I*
3.	Managing the risks and opportunities of physical assets			SI	V, SI	I			SI*	V*, SI*	I*
4.	Defining the operational objectives of physical asset management		v	SI	SI	I	V*	sv*	SI*	SI*	I*
5.	Creation of Asset Management Plans – AMP's		v		SI	I	V*	SV*		SI*	I*
6.	Inclusion of the asset management plans into the preparation of the yearly business plan of the HSE Group	v	SV SI		SI	I	V*	SV* SI*		SI*	I*
7.	Operation, maintenance and investment in physical assets		v		SI	I	V*	sv*		SI*	I*
8.	Procurement and warehousing operations for physical assets		v		SI	I	V*	SV*		SI*	I*
9.	Removal of physical assets		V		SI	I	V*	sv*		SI*	I*
10.	AM monitoring, measuring, analysing and evaluating and continual improvement		v	sv	sv	I		V*	SV*	sv*	I*

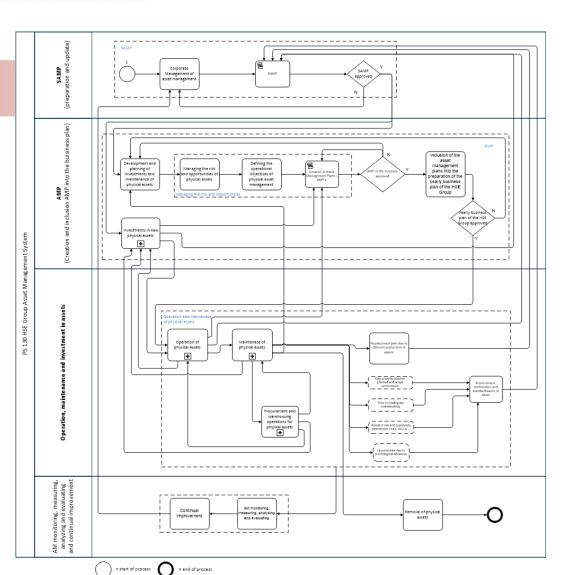




Deliverables (Cont'd)

• AM process description - Process Flow Diagram







Deliverables (Cont'd)

- AM process description Integration of Functions and Processes
- Recommendations on AM-related upgrade of existing processes
- Guidelines on Maintenance Requirements for investments and hand-overs

- ✓ Corporate governance,
- ✓ Investments,
- ✓ Operations,
- ✓ Maintenance,
- ✓ Risk management,
- ✓ Controlling,
- ✓ Procurement and warehousing,
- ✓ Human resources,
- ✓ Finance and accounting,
- ✓ IT.



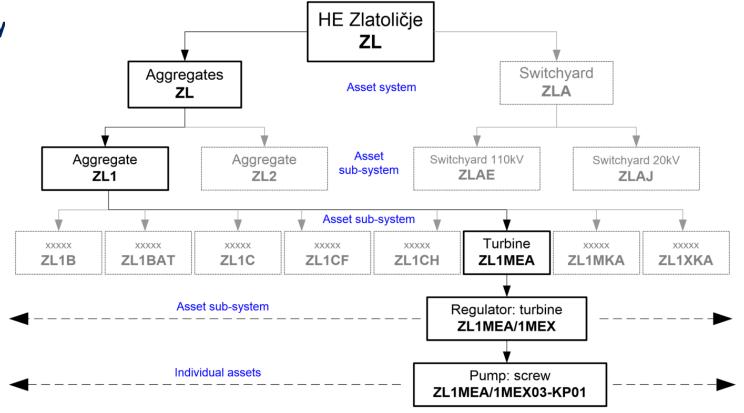


Deliverables (Cont'd)

• Guidelines on Asset Hierarchy

(Source: HSE Group)

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Asset portfolio



Deliverables (Cont'd)

- Methodology on Risk & Opportunity Assessment
- Guidelines on Asset Group PM tasks, criticality based
- Specific Maintenance Guidelines

(Source:	LICE	Groun
130urce.	DDE	GIOUDI

% hse	MAINTENANCE PROGRAM (320)			
	PR PA-320-1-2 Asset group PM tasks - TRANSFORMERS			

HSE - Preventive maintenance tasks		Criticality based (RAM) task execution period					
Task	Comment	Critical	Important	Less important	Non-critical		
1. ROUTINE INSPECTIONS (daily, weekly, monthly)							
Oil level inspection	oil TR only	1W	1W	1M	1M		
Cooling system inspection		1W	1W	1M	1M		
Air dryer inspection	oil TR only	1W	1M	1M	1M		
Oil sump inspection	oil TR only	1W	1M or as needed	1M or as needed	1M or as needed		
Inspection of fire extinguishing CO2 bottles		1W	1W	1M	1M		
Inspection of water quantity in fire extinguishing tar	k	1W	1W	1M	1M		
Thermo meter in spection		1W	1W	1M	1M		
2. TRANSFORMER OIL ANALYSES							
Gas chromatography oil analysis (GC)		1Y	2Y	6Y	6Y		
Liquid chromatography oil analysis (LC)		1Y	2Y	6Y	6Y		
Physical and chemical oil analysis, infrared	1 x 6 yrs for TR up to 12 yrs, 1 x 3 yrs						
spectroscopy (C + IR)	for TR older than 12 yrs	1Y	4Y	6Y	6Y		
Prebojna napetost olja in voda v olju (Pn + v)		1Y	2Y	6Y	6Y		
3. ELECTRICAL MEASUREMENTS							
Isolation resistance		1Y	5Y	6Y	8Y		
Magnetizing currents	*as needed, based on the GC/LC						
	analyses results.	4Y	5Y	6Y	8Y		
Resistance measurement at all stages	*as needed, based on the GC/LC						
-	analyses results.	4Y	5Y	6Y	8Y		







Deliverables (Cont'd)

- Asset Management Plan (AMP) Preparation Procedure, including harmonized plans on:
 - ✓ Investments in new physical assets,
 - ✓ Investments in existing physical assets,
 - ✓ Operations,
 - ✓ Maintenance,
 - ✓ AMS improvements, and
 - ✓ Human resources.
- Subordinated documents within HSE Group's companies







Certification

- Internal audits
- 1st level external audit
- 2nd level external audit with certification

Note: management system audits were integrated wherever possible.

(Source: HSE Group)



Building trust together.

Certificate

SIQ Ljubljana has issued an IQNET recognized certificate that the organization:

HOLDING SLOVENSKE ELEKTRARNE d.o.o. Koprska ulica 92, 1000 Ljubljana, Slovenia

has implemented and maintains an Asset System

for the following scope:

Asset management in production infrastructure

which fulfils the requirements of the following standard:

ISO 55001:2014

Issued on: 2022-11-11
First issued on: 2022-11-11
Expires on: 2025-11-11

Registration Number: SI - AM-003

Alex Stoichitoiu

Gregor Schoss
Managing director of SIQ Liubliana



This attestation is directly linked to the IQNET Member's original certificate and shall not be used as a stand-alone document

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Lessons Learned - Achievements

- Very active project management team with regular communication,
- Clear ownership of the project,
- Excellent cooperation with external consultants,
- Improved alignment of functions and processes,
- AMS aligned with current maturity,
- Support of top management where necessary,
- Risk and opportunity introduced to asset system and individual asset levels,
- Implementation of AMS as a learning process,
- Utilization of existing documents and standards as much as possible.







Lessons Learned - Challenges

- Very ambitious initial time goals,
- Availability of managers during the project,
- Implementation of AMS in several companies of the HSE Group simultaneously,
- Some practices in different processes / functions were not easy to align,
- Change management methods were underutilized,
- The decision-making practices not as harmonized as expected.





Lessons Learned – Future Opportunities

- Further alignment of relevant processes, especially investments and maintenance.
- Introduction of more in-depth methods focusing on risks and reliability for critical and important assets, such as RCM and/or FMECA.
- Further development of condition-based maintenance, together with asset health monitoring.
- Upgrade the work ordering process with better utilization of SAP EAM and APM.
- Improve the integration of asset information from different IT systems or their modules.
- Further optimize plant outages in the context of AM using modern approaches.
- Continuous improvement of AM maturity in order to generate more value from the assets at levels > 3.







THANK YOU!

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