CHIYODA SYSTEM TECHNOLOGIES CORPORATION

Topic 1-1

Superiority of MS ISO 50001 and its EnMS operation

Continual Energy performance Improvement

Section 1-5

Green Initiative Seminar

4 July 2018

Hotel Casuarina @ Meru

Topic 1-1: Session Contents

Section 1	Session Overview
Section 2	Most important energy: PEOPLE
Section 3	Superiority of MS ISO 50001 EnMS Operation
Section 4	Reviewing your Energy Use
Section 5	Energy Treasure Hunt Overview

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Section 1

Session Overview

Green Initiative in…
Improving your performance

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Word "ENERGY" is very sensitive

Many in the organization tend to segregate "ENERGY" from daily business operations.

Many are falsely convinced that:

- **Energy is a matter of the utility department**
- **EnMS would increase their workload therefore increasing cost.**
- **Maintenance people are responsible when something goes wrong**
- **Energy cost is so little compared to the revenue amount and therefore energy matters are low on their top management's priority**
- **"Energy" is a technical matter so an energy manager should have engineering degree**

Business could not run without energy including workforce.

EnMS is one of the important elements of Business Management

EnMS: Sustainable business development

It is growing recognition among successful companies that implementing enhanced and effective "Energy Management System" (EnMS) yields significant business advantages and building up competitive edge globally.

- **Shift from "energy saving" era to "efficient energy use" era.**
- **MS ISO 50001 Intl Guideline for EnMS was launch to help organizations pursue "continual energy performance improvement" to upgrade the "Best Practice"**

Optimum use of existing facility, minimizing investment at first

Green and Sustainability

Green incentive Seminar

What is "Green"

"Green" is all positive actions to make business "Sustainable"

It is to conduct business in consideration of global environment in favor of human prosperity

This is the core of success…

Sustainable business development

Energy Treasure Hunt to make Greener

Green Technology

The technology is there

How to utilize the green technology to ensure "Green"

Green Operation

Continual Performance Improvement

The 50001 Energy Treasure Hunt

The 50001 Energy Treasure Hunt

Management System

To continually improve performance

You need to seek "OPPORTUNITY" to improve

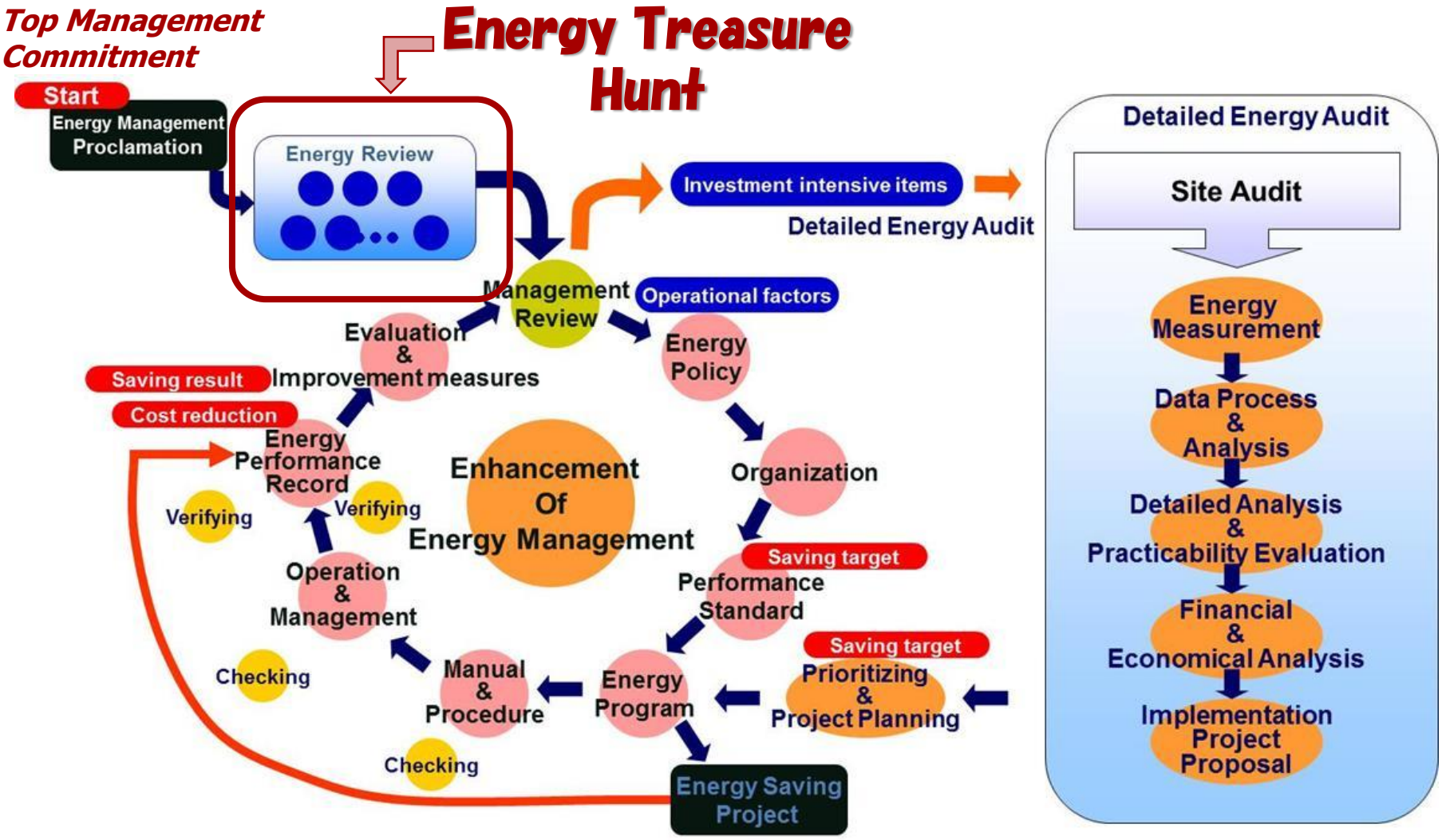
"OPPORTUNITY" is a "Treasure"

Continual Performance Improvement

To hunt treasure
in order to
improve

Treasure Hunt Positioning

The 50001 Class



Continual energy performance improvement effort with PDCA cycle

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Section 2

Most important energy:
PEOPLE

"Energy Management System" and business impact

Continual Energy performance Improvement

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What is Energy

Electricity

Heat

Air

Steam

Water

People

MS ISO 50001 class EnMS

	Active	Passive & reactive
Energy	**People**	**Electricity** **Heat** **Air** **Steam** **Water**
Strength	• Positive thinking • Act & improve • Recharge by itself • Management skill	• Obedient • Honest • Powerful • Provide productivity
Weakness	• Can be emotional • Negative thinking • Can be dishonest • Can be personal	• Keep moving • Weakness conscious • Can be dangerous • Not visible

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Section 3

Superiority of MS ISO 50001 EnMS operation

"Positive aspects in your business"

Continual Energy performance Improvement

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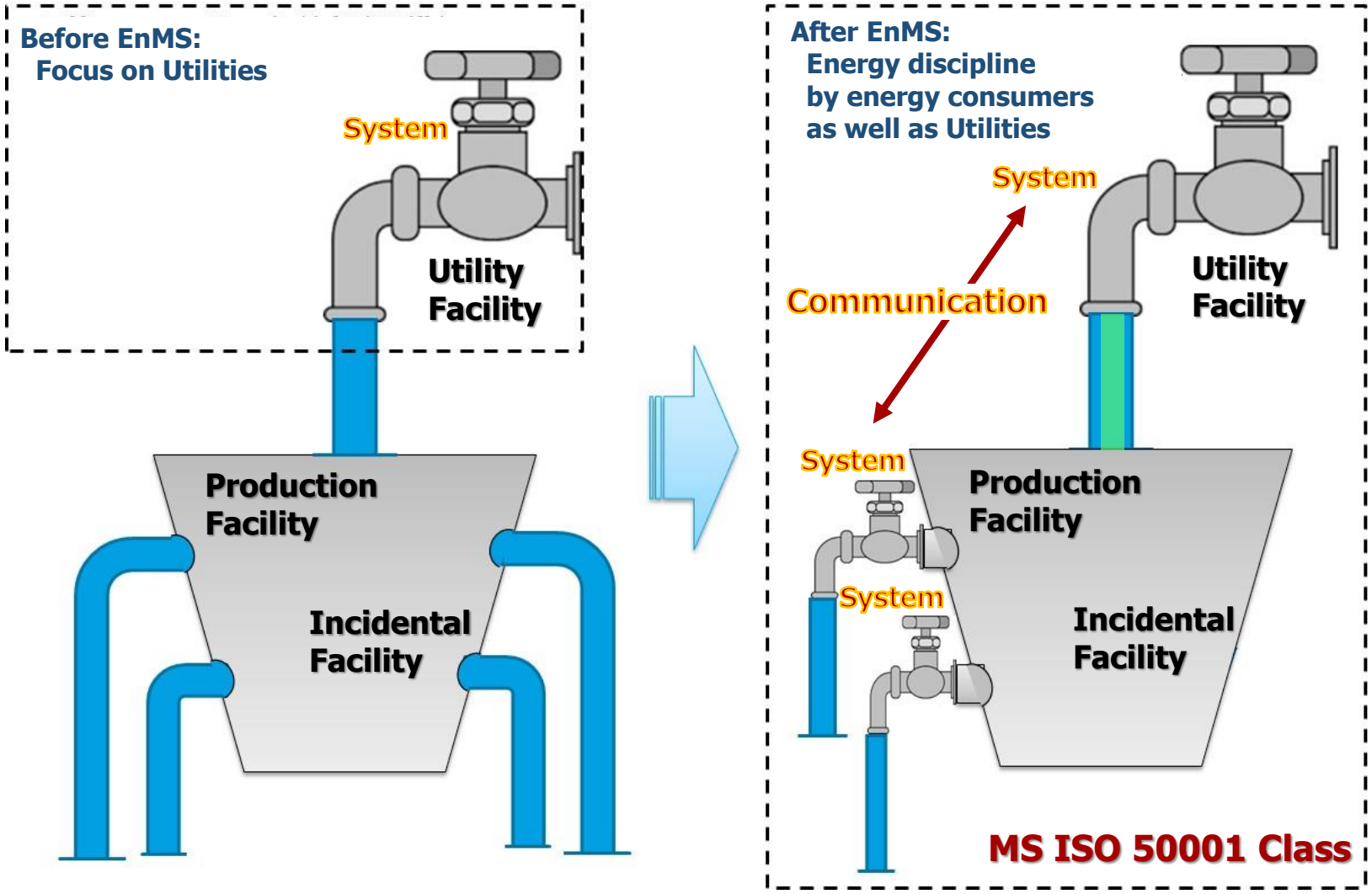
EnMS: Energy Management System

EnMS Concept (1)

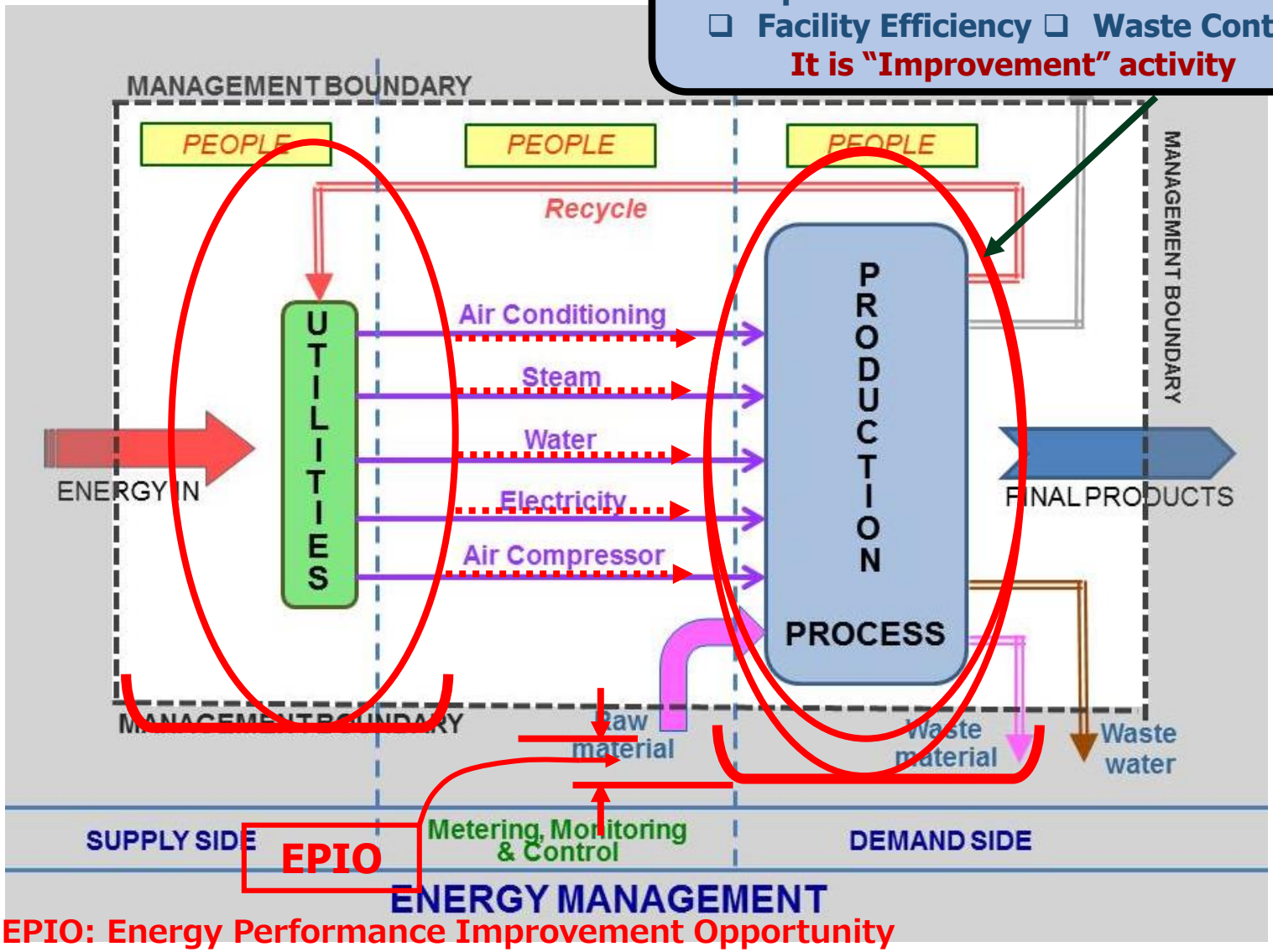


EnMS Concept (2)

EnMS needs Demand-side Coop!!

- ❑ Productivity
- ❑ Operation Rate
- ❑ Facility Efficiency
- ❑ Energy Control
- ❑ Eliminate "waste"
- ❑ Waste Control

It is "Improvement" activity



EPIO: Energy Performance Improvement Opportunity

The 50001 class EnMS benefits

Active Energy

1. Top Management Commitment
2. Management Representative & EnMS Team
3. Energy Review *Energy Treasure Hunt*
4. Energy Monitoring and procedure **EM&V**
5. Action Plan
6. Management Review
7. Training
8. Communication
9. Design aspects
10. Procurement aspects
11. Maintenance aspects
12. Continual performance improvement

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Section 4

Reviewing Your Energy Use

Continual Energy performance Improvement

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Energy Treasure Hunt Fundamentals (1)

Energy Treasure Hunt is to conduct various analysis works so the review fundamentals must be stated upfront as the review factors

Company basic Information

(Sample)

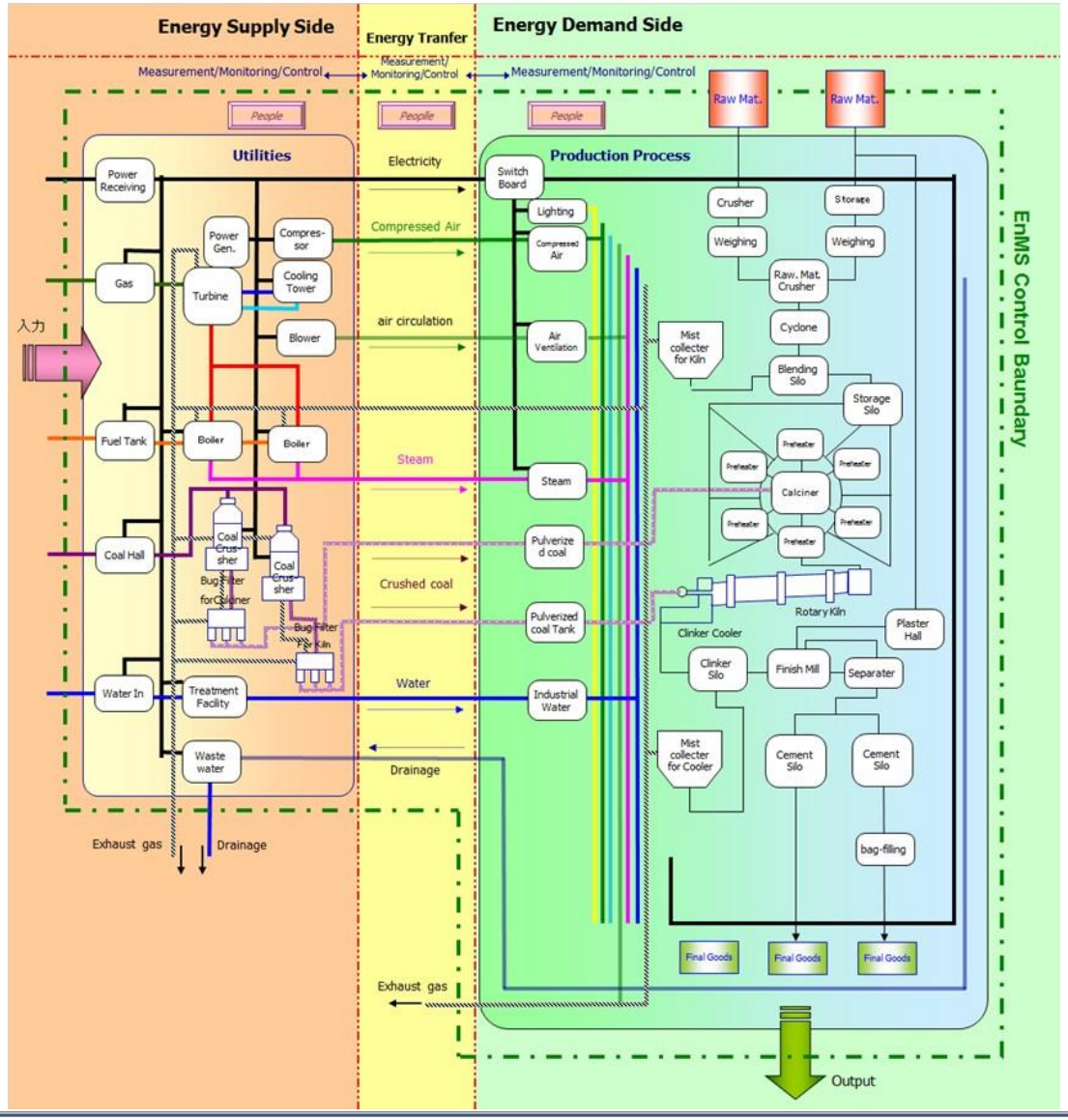
Type of Business	Manufacturing and sales of processed goods from raw material
Annual revenue	130,920,000 $
Energy consumed in BY2011	21,360 GJ (Crude oil conv. 5,582 kL or 205.1 million BTU)
Energy cost in BY2011	2,780,000 $
CO2 emission in BY2011	12,000 t-CO2
Factory designation	Class-1 designated energy management factory (ENCON Act of Ministry of Energy and Environment)
Number of Employee	423 people
Working hours	Production related workers (Two shifts): 1st shift 07:00 - 16:00 2nd shift 15:00 - 24:00 Non-production related workers: 08:30 - 17:20

Energy Treasure Hunt Fundamentals (2)

(Sample)

- Energy and production units used for energy Treasure Hunt
  - Electricity in KWh, Fuel, heavy oil type A in liter, Natural gas in kg, Water in ton, Business output: Production in $,
- Energy cost
  - Electricity: 0.12588 $ / kWh
  - Fuel, heavy oil type A: 0.4882 $ / Liter
  - Natural Gas: 0.530 $ / m3 or 0.6400 $ / kg
  - Water: 0.7412 $ / Ton
- CO2 emission factors
  - Electricity: t-CO2 = kWh x 0.000333
  - Fuel, heavy oil type A = 1000 L x 39.1 x 0.0189 x 44/12
  - Natural Gas = 1,000 m3 x 45.1 x 0.0136 x 44/12 or 1000kg x 54.6 x 0.0135 x 44/12
- Energy performance analysis
  - State which period of energy performance is used for baseline
  - State which period is used for energy performance verification
  - State which period is used for energy performance target
- Energy saving project investment payback period guideline
  - Investment up to 50,000 $ 1-year or less
  - Investment over 50,000 $ up to 200,000 3-yeasr or less
  - Investment over 200,000 $ 5-years or less

Energy Flow


Energy Supply Side
Energy Tranfer
Energy Demand Side
Measurement/Monitoring/Control
Measurement/ Monitoring/Control
Measurement/Monitoring/Control
People
People
People
Raw Mat.
Raw Mat.
Utilities
Production Process
EnMS Control Baundary
Power Receiving
Power Gen.
Compres-sor
Gas
Turbine
Cooling Tower
Blower
入力
Fuel Tank
Boiler
Boiler
Coal Hall
Coal Crus-sher
Coal Crus-sher
Bug Filter for Cooler
Bug Filter for Kiln
Water In
Treatment Facility
Waste water
Exhaust gas
Drainage
Electricity
Compressed Air
air circulation
Steam
Crushed coal
Water
Drainage
Exhaust gas
Switch Board
Lighting
Compressed Air
Air Ventilation
Steam
Pulverize d coal
Pulverized coal Tank
Industrial Water
Crusher
Storage
Weighing
Weighing
Raw. Mat. Crusher
Cyclone
Mist collecter for Kiln
Blending Silo
Storage Silo
Preheater
Preheater
Preheater
Calciner
Preheater
Preheater
Preheater
Rotary Kiln
Clinker Cooler
Plaster Hall
Clinker Silo
Finish Mill
Separater
Mist collecter for Cooler
Cement Silo
Cement Silo
bag-filling
Final Goods
Final Goods
Final Goods
Output

Understand who, what & how much

Energy Treasure Hunt

a) Analyze energy use based on measurement and other data

b) Based on energy use analysis, identify the areas of significant energy use and consumption

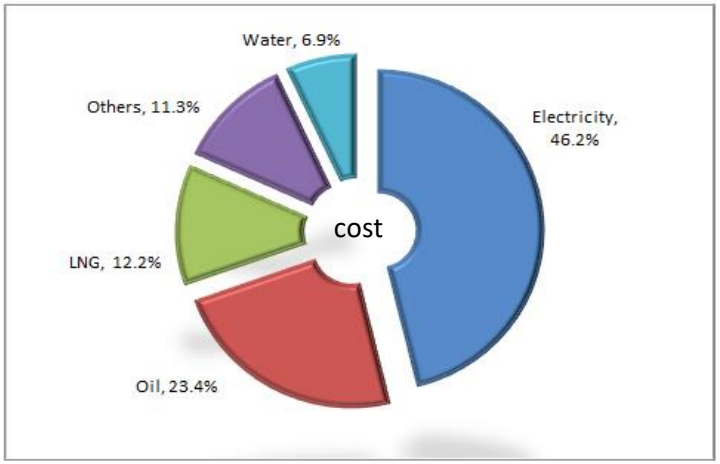


Fig. Sample-1

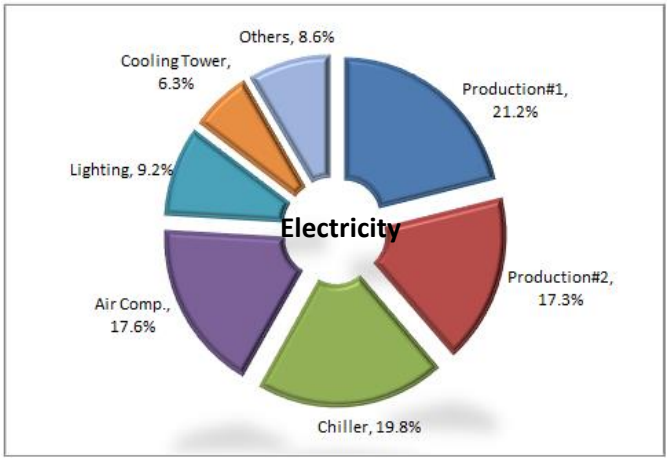


Fig. Sample-2

c) Identify, prioritize, and record opportunities for improving energy performance, including, where applicable, potential energy sources, use of renewables, or alternative energy sources

Energy Performance Improvement Opportunity EPIO

Facility/equipment classification

Facilities of significant energy use in the premises are classified as Utility facility, Production facility and Incidental facility.

Utility facility:

The utility facilities such as chiller, cooling tower, air handling unit, air compressor, power substation and in-house power generator using the primary energy and convert into the secondary energy (transformed electricity, chilled water, cooled water) for the purpose to supply to demand side.

Production facility:

The main facilities such as production facilities of large consumer of the secondary energy being supplied by the Utility facilities.

Incidental facility:

The incidental facilities within the premises buildings necessary for the organisation to practice business (i.e., lighting, packaged air conditioning, etc.).

Significant Energy Use (SEU) guideline

Significant energy use, the recommendation to be listed in the EnMS Facility/Equipment List is the following:

1. **Facilities or defined groups of equipments with significant energy user ranking from the top to the order of lists total estimated consumption forming 80% of the total energy consumption in each primary or secondary energy category.**
2. **The rest of 20% should be defined case by case with the conducted business operation**

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Section 5

Energy Treasure Hunt Overview

"Energy Treasure Hunt" exercises to identify Energy Performance Improvement Opportunities (EPIO)

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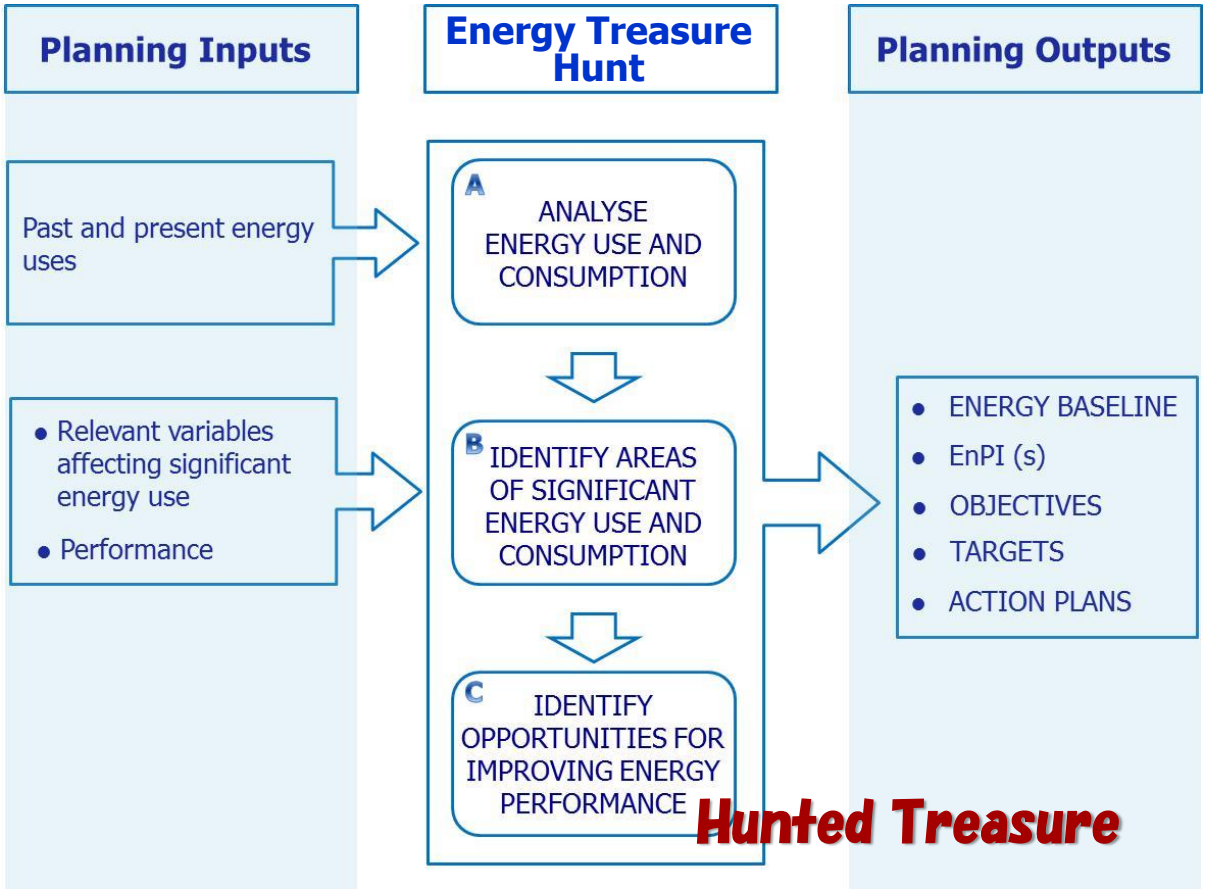
Energy Treasure Hunt for Planning

Energy Planning Process



Energy Planning Process Concept Diagram

Excerpt form "ISO 50001:2011 (E)" page 16

Scope of Energy Treasure Hunt

Top management endorsement

↓

Active energy in action

↓

Team building exercise

↓

Creating treasure by ideas

↓

Any ideas are good ideas

↓

Ideas to create performance improvement

EPIO Perspectives

Case Study
Company K

EPIO by enhancing EnMS Operation

№	EPIO Items	% gain	№	EPIO Items	% gain
1	"EnMoS" operation & procedure	5.9%	2	Air leak action procedure	0.8%
1-1	Baseline and target		3	Steam leak action procedure	0.2%
1-2	All workforce energy awareness		4	Waste mgmt. at product change	0.5%
1-3	Improvement procedure		5	Fine tuning cleansing efficiency	0.3%
1-4	Preventive maintenance drive		6	°C setting review in all rooms	1.3%
1-5	Communication improvement		7	Improved lubricant specifications	0.4%
1-6	Energy/production transparency		8	Aircon 1°C up with new uniform	0.8%
1-7	Quality check thru energy use		9	Air ventilation review	0.7%
1-8	Production planning enhancement		10	Top management leadership	Inc. gain
1-9	Evaluation transparency		11	EnMS training for all workforce	Inc. gain
1-10	Management review		12	Define Aircon use procedure	0.9%

Hunted Treasure requiring no/low investment

Note: "% gain" can be varied by site to site
Inc. gain: Incalculable gain

EnMoS: Energy Monitoring System

EPIO: Energy Performance Improvement Opportunity
ROI: Return on Investment

EPIO Perspectives

Case Study
Company K

EPIO requiring Investment (EnMS vastly improves ROI)

№	EPIO Items	% Gain	№	EPIO Items	% Gain
1	Boiler & steam distribution	2.5%	6	PV System for kWh own use	TBD
2	Chiller/Cooling Tower	2.2%	7	Steam ΔP energy recovery	1.7%
3	Motor/Pumps renewal	2.8%	8	Steam purchasing	0.9%
4	HVAC facilities	1.3%	9	Power receiving/distribution	0.7%
5	Compressed air system	2.1%	10	Use of economizer (heat recovery)	TBD

Note: "% gain" can be varied by site to site
TBD: To be determined

Hunted Treasure requiring investment

HVAC: Heating Ventilating & Air Conditioning
EnMoS: Energy Monitoring System
EPIO: Energy Performance Improvement Opportunity
ROI: Return on Investment

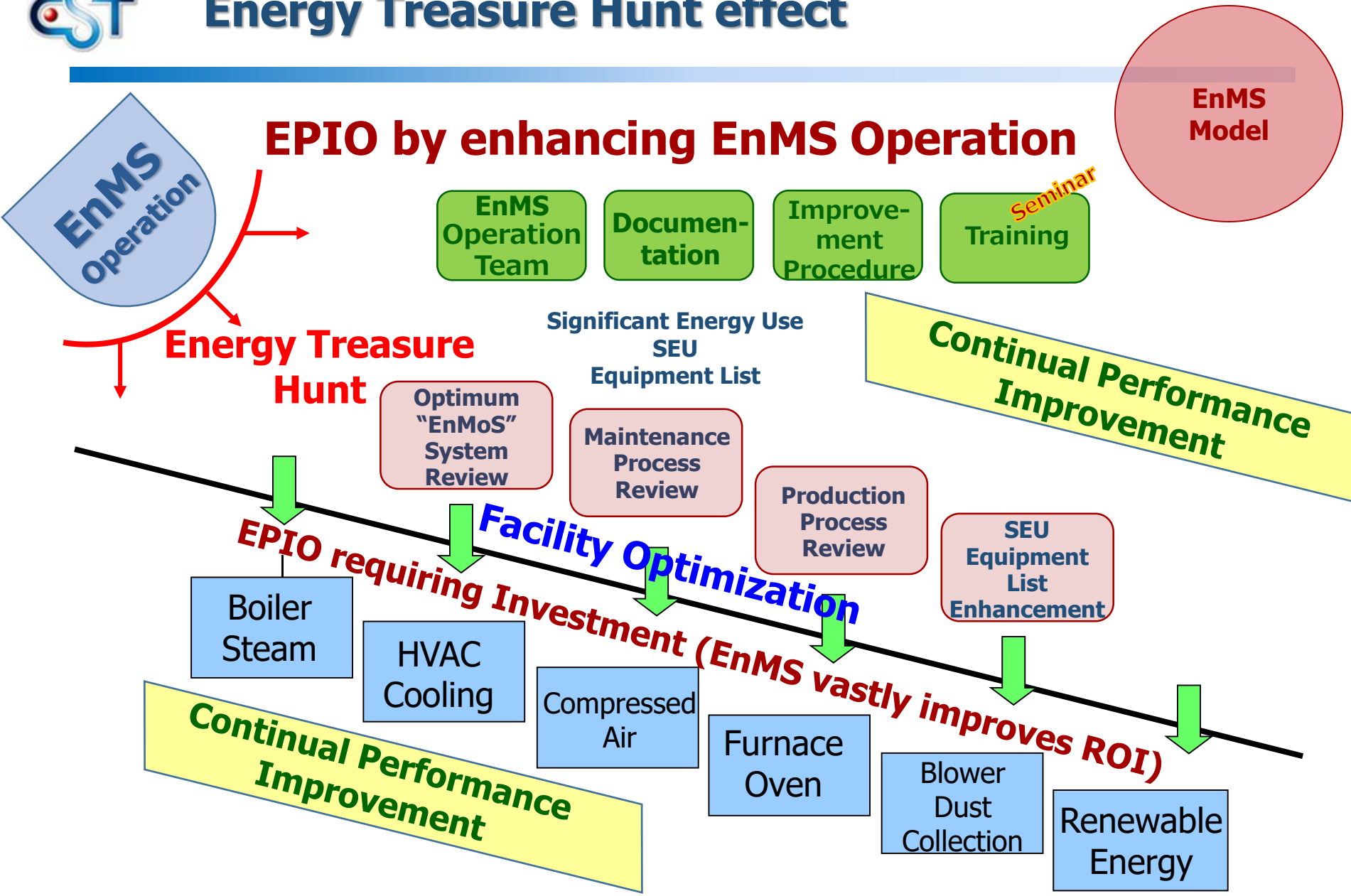
Proper Maintenance Ensures Best Practice

In order to make full use of facility performance, maintaining the best condition of facilities under EnMS operation is critical

Energy Treasure Hunt identifies performance improvement of maintenance activities

1. **Is inspection work pressed for time?**
2. **Are drawings and documents Updated?**
3. **Can equipment locations promptly identified?**
4. **Is maintenance procedure known to all persons in charge?**
5. **Is spare parts properly managed and controlled?**
6. **Is paper record tidiness, search, and storage works takes up unnecessary man-hour ?**

Energy Treasure Hunt effect



Strategic Positioning

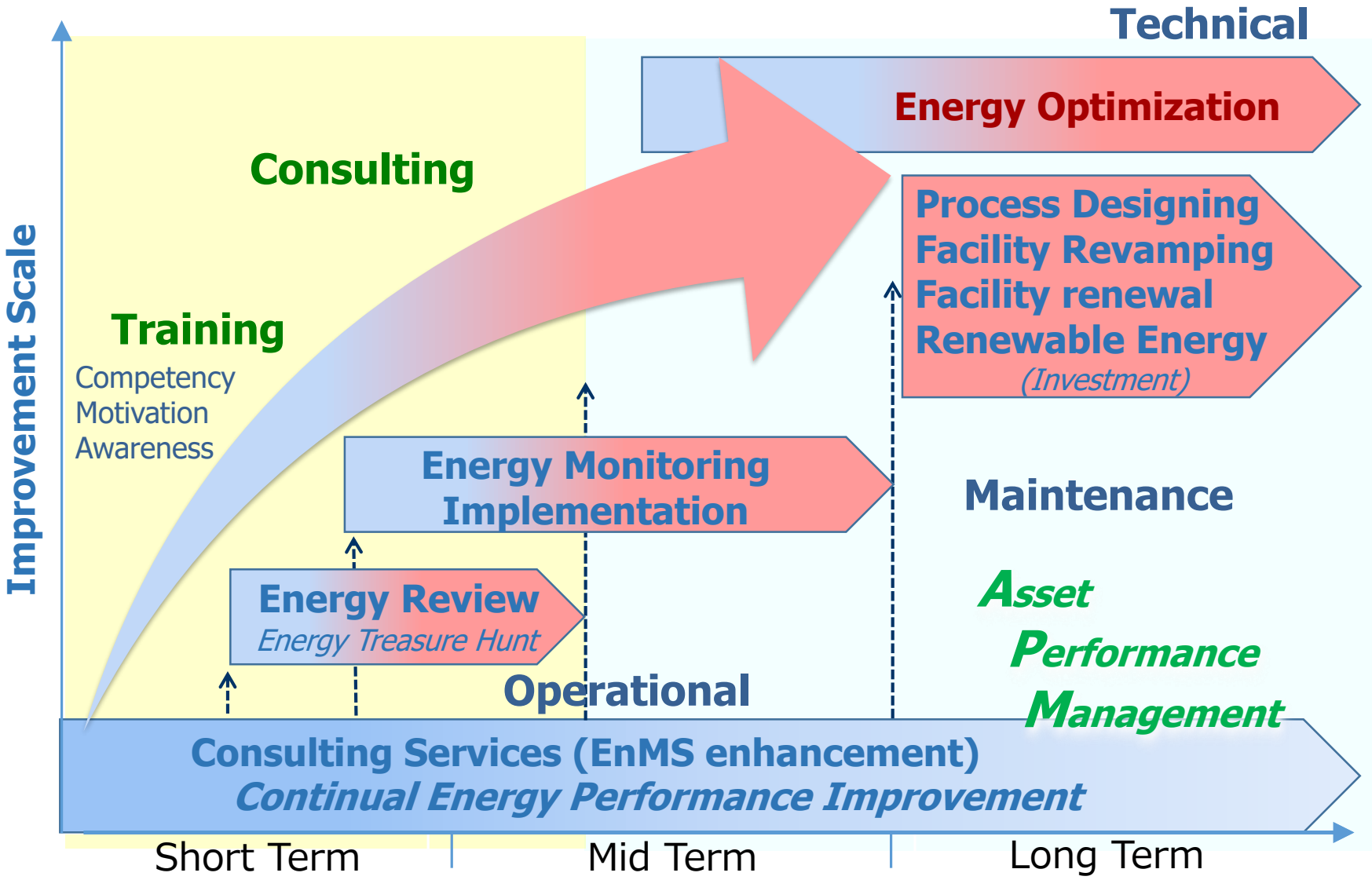
EnMS Operation requires proper strategic energy use planning with budget and resource.

Energy Treasure Hunt identifies:

- **business performance improvement**
- **quality business outputs**
- **optimum use of energy**
- **reduce carbon emission**

Energy Treasure Hunt ensure promoting actions for sustainable business development.

Sustainable Business Development



We are Engineering, Procurement, Construction/operation & maintenance provider…

Through the seminar acquaintance, we hope you find worth creating solution dialog and invite us to your site for further discussion

We are at your service in Malaysia…

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End of Session, Topic 1-1