An Introduction to Energy Management

Presented By

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for

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Notice

Introduction

- What is Energy Management ?
- Why Do It ?
- Financial Impact
- How is it Done ?
  - ISO 50001
  - Strategic Framework
  - Potential Actions
  - Assessment & Selection
- Other Issues
- Framework for the Future
- Questions

What is Energy Management ?

- Planned and Implemented Measures
  - Use minimum possible energy while meeting the true needs of facility.

- To save and/or make efficient use of energy through:
  - Energy Conservation
  - Energy Recovery
  - Energy Substitution

Source: Summarised from “Energy Efficiency Office (UK)”

Why do Energy Management ?

- Reduce Costs
  - Utility Costs
  - Non-Energy Related Costs (i.e. O&M)
- Improve Revenues
  - Improved Plant Utilisation
  - "Re-invest" Savings in New Processes
- Control Risks
  - Control of Emissions / Reduce CO2
  - Reduce Exposure to Market Volatility

Financial Impact

1 AED Saved = 1 AED Operating Profit

Example:
Unit/Product Price = AED50
Profit Margin = 10%

If Energy Saving = AED100,000 then:

$$\frac{\text{AED100,000}}{10\%} = \text{AED1,000,000 Revenue Equivalent}$$

Saving **AED100,000** has the same impact as selling **20,000** more units

Financial Impact

Smaller Margins = Greater Revenue Equivalent

Example:

Unit/Product Price = AED50

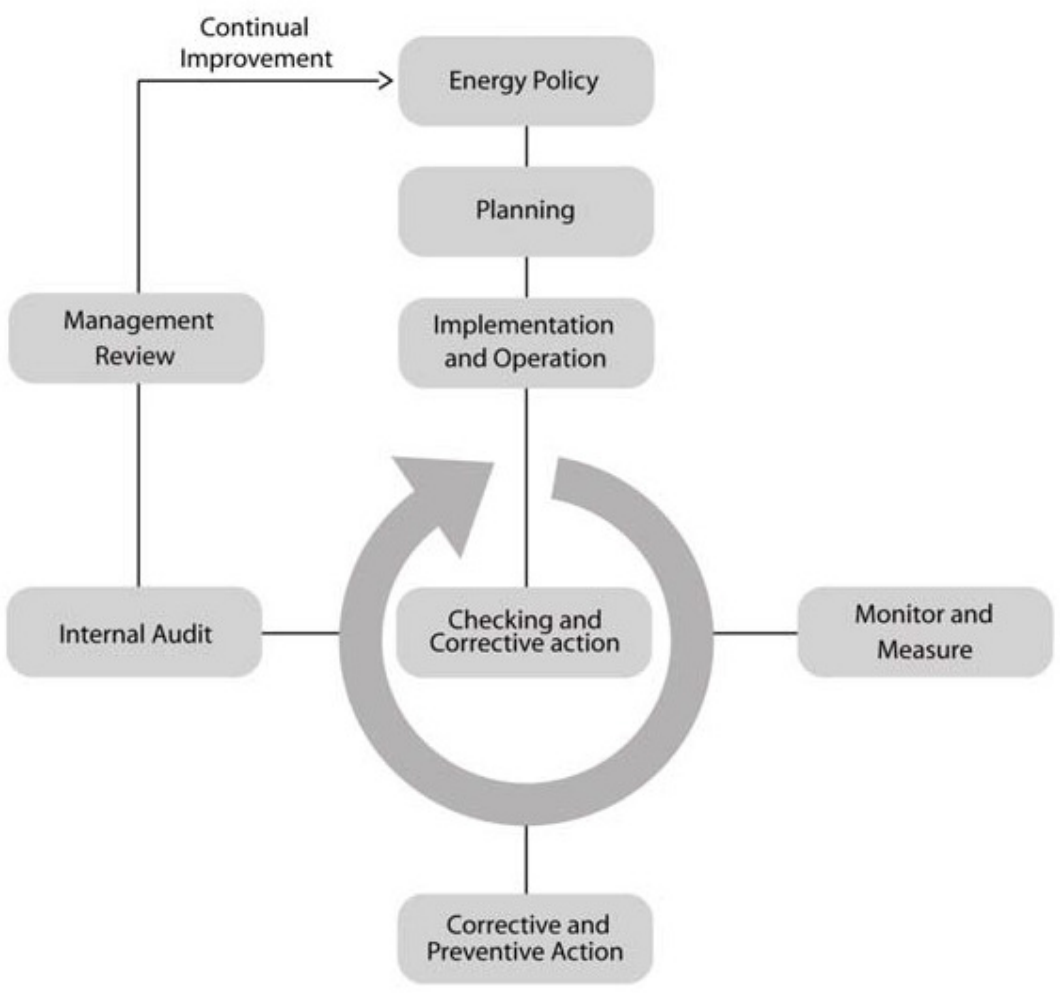
Savings = AED100,000

Profit Margin	Revenue Equivalent	Unit Sales Equivalent
20%	AED 500,000	10,000
15%	AED 666,666	13,333
10%	AED1,000,000	20,000
5%	AED2,000,000	40,000

How to Do It ?

- Review Energy Strategy
  - Current & Future Energy Usage
  - Energy Distribution & Generation
- Energy Audit
  - Where & How Energy Used
  - Calculate Energy Baseline
- Action Plans to Reduce Energy

ISO 50001 - Overview



Source: ISO 50001 Standard

Plan-Do-Check-Act

- Energy Policy
- Energy Planning
  - Audits
  - Baseline
- Action Plans
- Check
  - Monitor, Measure & Evaluate
- Review & Reset

Strategic Framework

- What is our Future at this location ?
- What are the limitations of the facility ?
- Are there any legal/technical restrictions?
  - Specific Business Objectives / Issues
  - Are we allowed to generate our own electricity?
  - Is there an open Electricity Market ? … etc.
- What Energies do we use & how do we buy?
- What are our investment & borrowing criterion ?

Typical Systems

Dwellings

- Lighting
- Cooling (Splits)
- Hotwater
- Dom. Appliances
- Heating (N-Hemi)

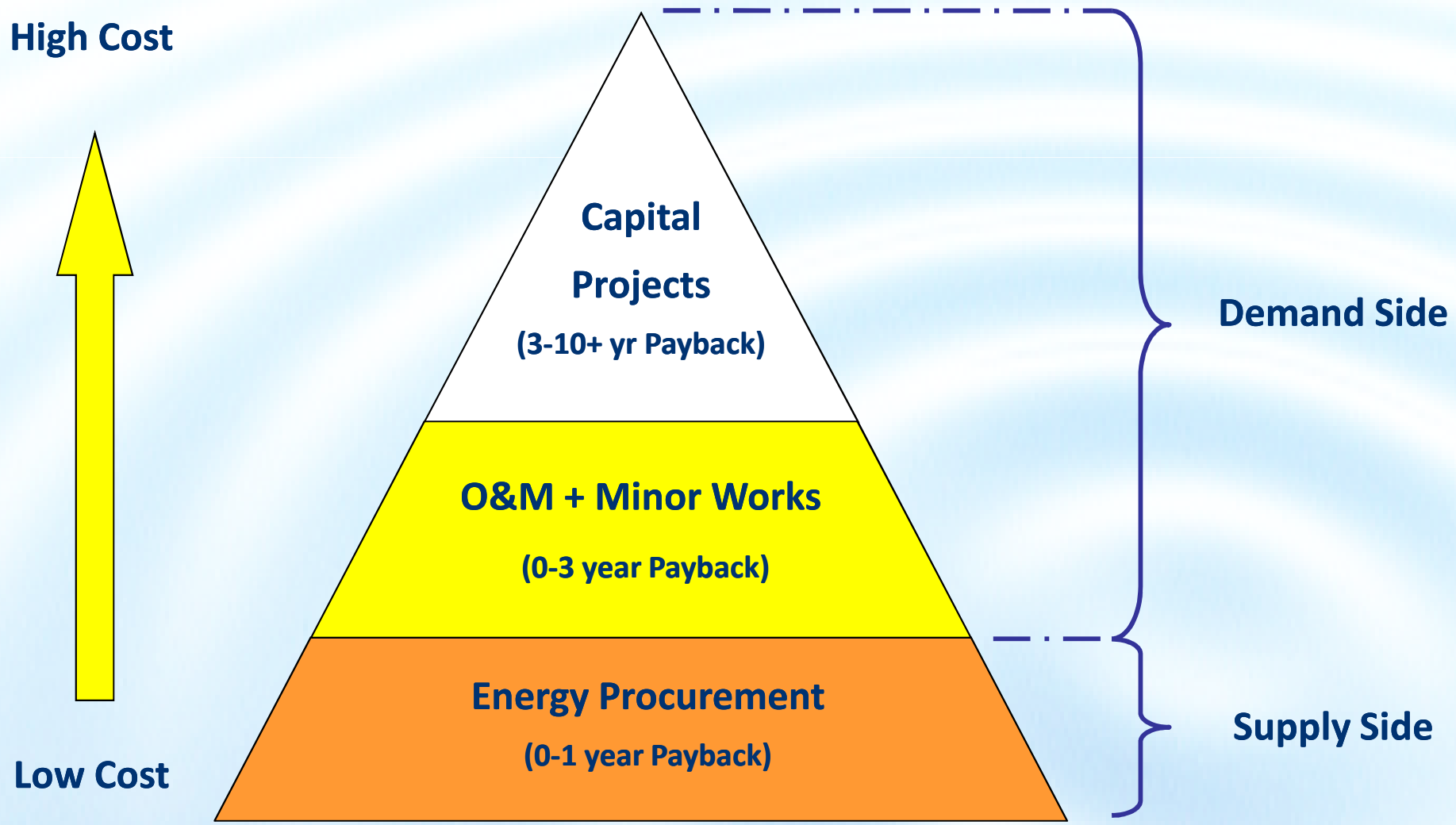
Commercial

- Lighting
- AHUs & Ventilation
- Cooling / Chillers
- HWS
- Lifts / Elevators
- Office Equipment
- IT / Server Centre
- Controls / BMS
- Heating (N-Hemi)

Industrial

- Lighting
- HVAC Systems
- Process Chillers
- Process Steam / Heat
- Compressed Air
- HWS
- Generators
- Controls / PMS
- Process Machinery
- Heating (N-Hemi)

Cost Benefit Ratio



Approach to 'Actions'

- No / Insignificant Cost
  - Review Energy Supply Contracts
  - Energy Usage & Reduction Awareness Programme
  - Perform Energy Survey
  - Review Design & Operation Parameters
- Low Cost ***(Requiring Little or No Design Change)***
  - Consumables Replacement
  - Optimisation of Plant & Equipment
  - Energy Usage Monitoring & Targeting
- Medium Cost ***(Requiring Some Investment and/or Design Change)***
  - Energy Recovery Systems and Plant Optimisation
- High Cost ***(Requiring Significant Investment and/or Design Change)***
  - Plant & Equipment Renewal and/or New Installation

Action Examples

- Low Cost
  - Use Low-Energy Light-fittings when Replacing Lamps
  - Re-commission and Set-up Systems (i.e. Hydraulic Balancing of HVAC)
  - Install Motion Sensors to Lighting Control or Time Clocks for External Lights
  - Installation of Variable Speed Drives on Motors
- Medium Cost
  - Building Management or Plant Management System Installation
  - Thermal Recovery Wheels on Air-conditioning Systems
  - Heat Recovery/Run Around Coils etc. (i.e. AHUs, Compressed Air etc.)
  - Boiler Economisers, Condensing Economiser
- High Cost
  - Check/Replace/Update Building Fabric (Cladding, Windows etc…) Installations
  - Co-generation Plant Installation
  - Renewable Energy Plant Installation (i.e. Bio-gas, Wood, Solar etc…)
  - Overnight Cooling /Ice Storage

Financial Returns

Payback & Internal Rates of Return		DO the Project if your cost of borrowing is lower than this IRR					
Simple Payback (Years)	8						0%
	5					0%	12%
	4				0%	8%	13%
	3			0%	13%	20%	29%
	2		0%	23%	35%	41%	48%
	1	0%	62%	85%	93%	97%	100%
Equipment Life, or Project Timescales (Years)		1	2	3	4	5	8

SOURCE: U.S. EPA: "Putting Energy into Profits"

Selecting Solutions

- Implement ‘No Cost’ Options First
- Select optimum combination of Actions
- Multiple Action Savings are NOT always added
- Cumulative Savings on inter-dependent actions must be assessed CAREFULLY...!!
- Do NOT prioritise from ‘Low Cost’ to ‘High Cost’

Other Issues

- Expertise in UAE / GCC Market
- Degree Days Data in UAE
- Contractual Issues
  - Consultancy Fee
  - Shared Savings
- ESCOs
- Contract Energy Management
- Impact of O&M of Facility

Framework for Future

- Energy Managers Register
  - Set minimum standards for Consultants & ESCOs
- Model Contracts
  - Consultancy, Shared Savings etc.
- Data & Resources
  - Degree Day Data
  - Benchmarks
  - Energy Management Guidance Handbook
- Develop Client Competence
  - Selecting Partners / Consultant
  - Implementing Contracts
  - Reviewing Recommended Solutions / Projects
  - Measuring Performance
  - Benchmarking & Reporting

Thank You

Presented By

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