Introduction and purpose of this meeting

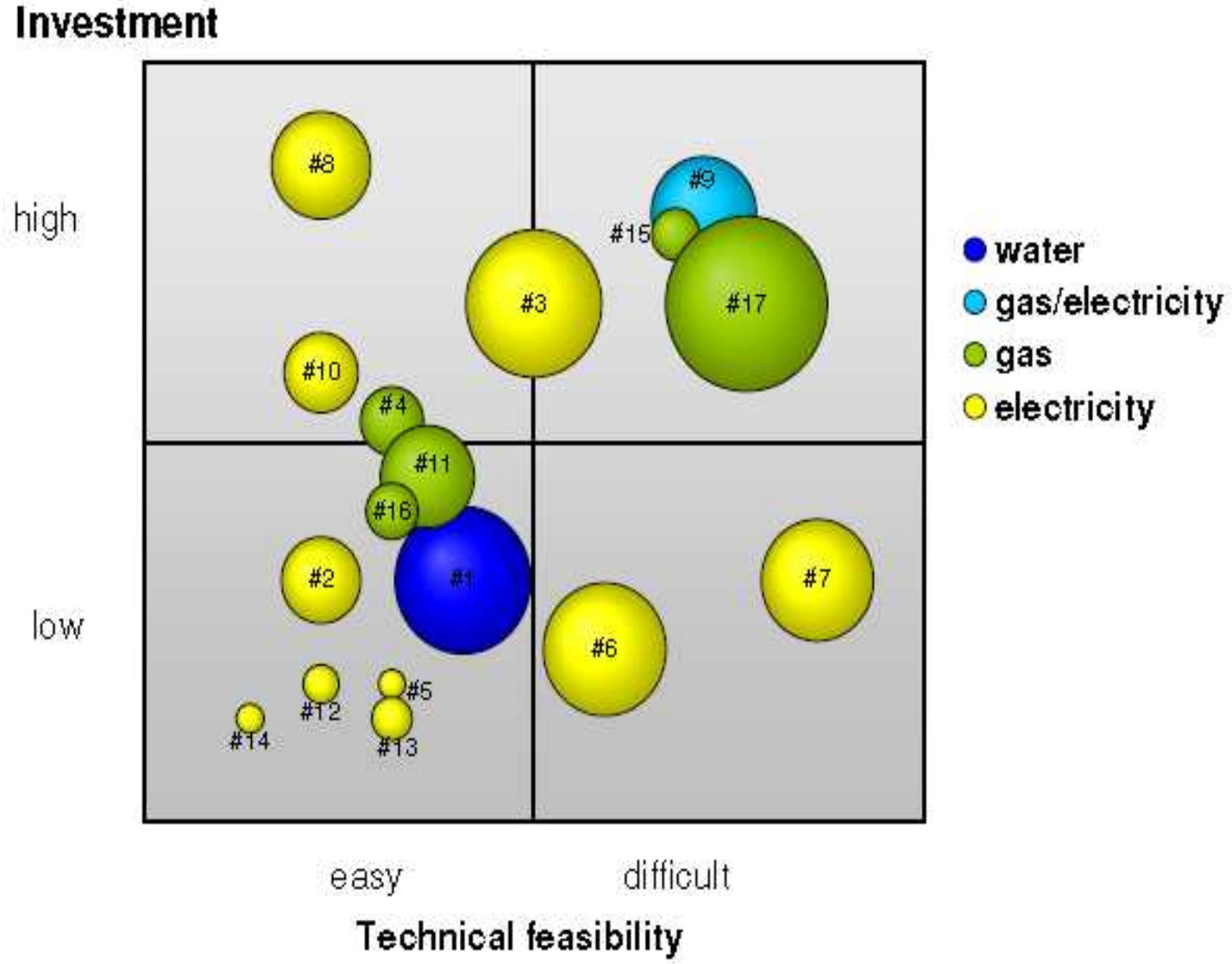
A New Day in Energy Management

Facilitator Names
UNIDO International Energy Efficiency Experts

Location
Date

Would you allow this man to make a $500 purchase on behalf of your company?

What about $10,000?



Which would you do first?

Introductions

- Name and company
- Interest in energy management
- What do you expect from this workshop?
- Your experience with EM/EE
- Current challenges

Why are we here?

Energy Management in Industry: Issues & Opportunities

Developing countries & Emerging Economies

Industrial energy use can be up to 50% of the total use and can produce supply problems → energy security

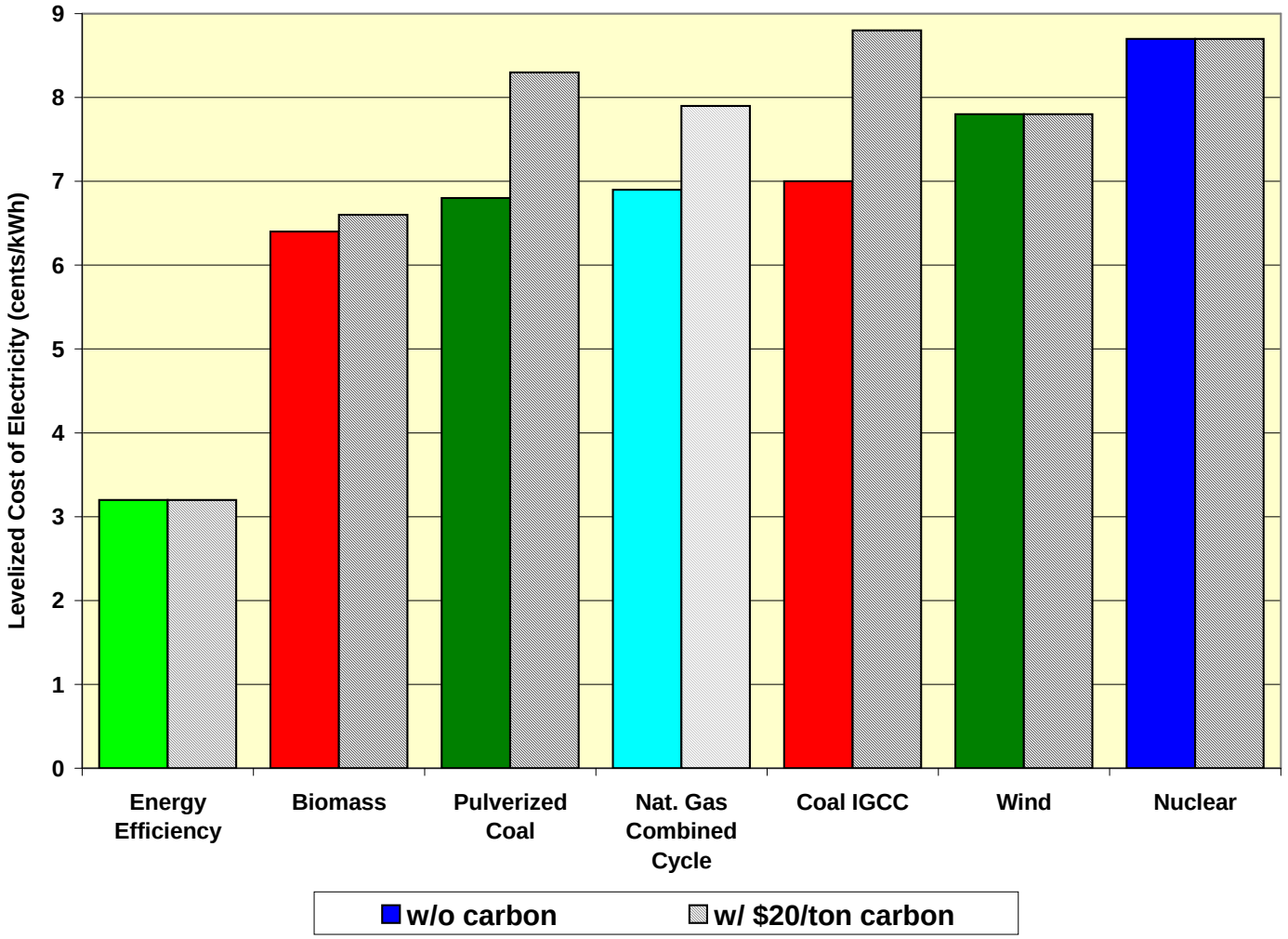
Non-OECD countries will continue to lead global growth of energy demand (87% until 2030 according to the IEA) with industry being the biggest user

Industrial sector growth requires many new facilities, rapidly built and expanded; including substantial growth in energy intensive sectors

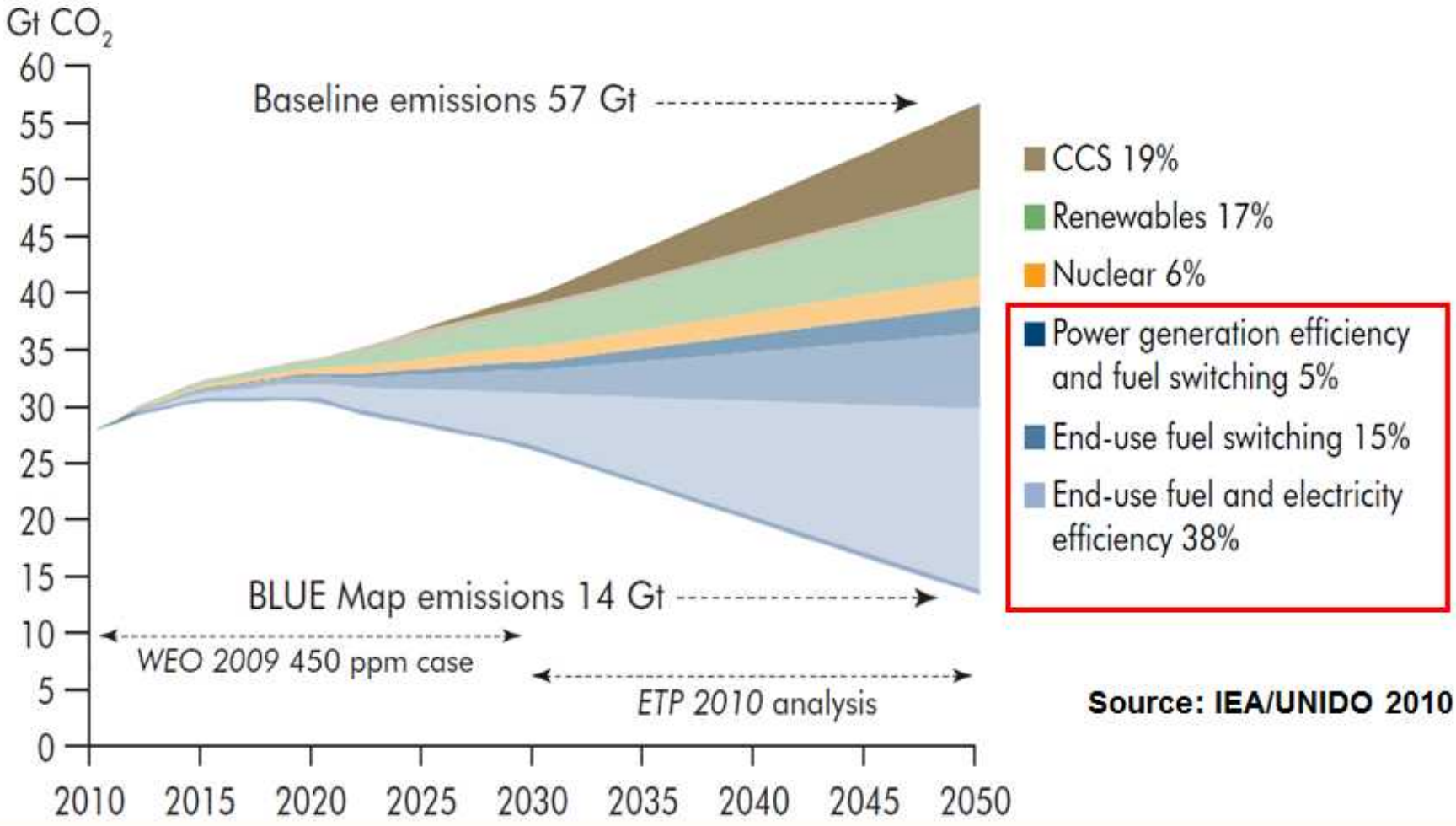
Building in energy efficiency the first time is much more cost-effective than retrofitting it later

Governments are increasingly aware, and concerned about, both energy security, industry competitiveness and climate change

Cost of New Electricity Resources



What needs to be done



Source: IEA/UNIDO 2010

Energy Efficiency a Major Opportunity

Existing technologies *with an attractive internal rate of return* can cut the growth in global energy demand by half or more within 15 years.

-- Curbing Global Energy Demand Growth, McKinsey & Co., May 2007

Industries around the globe can cut CO_2 emissions 19 to 31% using proven technologies and practices.

-- International Energy Agency, 2007

"Energy Efficiency is the most promising means to reduce greenhouse gases in the short term."

-Yvo de Boer, Exec. Secretary UNFCC

Industrial Energy Efficiency Benefits

- Energy efficiency has demonstrated, time and again, that
  - ✓ It saves industrial firms money
  - ✓ It increases reliability of operations
  - ✓ It has a positive effect on productivity and competitiveness
  - ✓ It can offer attractive financial and economic returns
  - ✓ Improved security of supply
  - ✓ ….

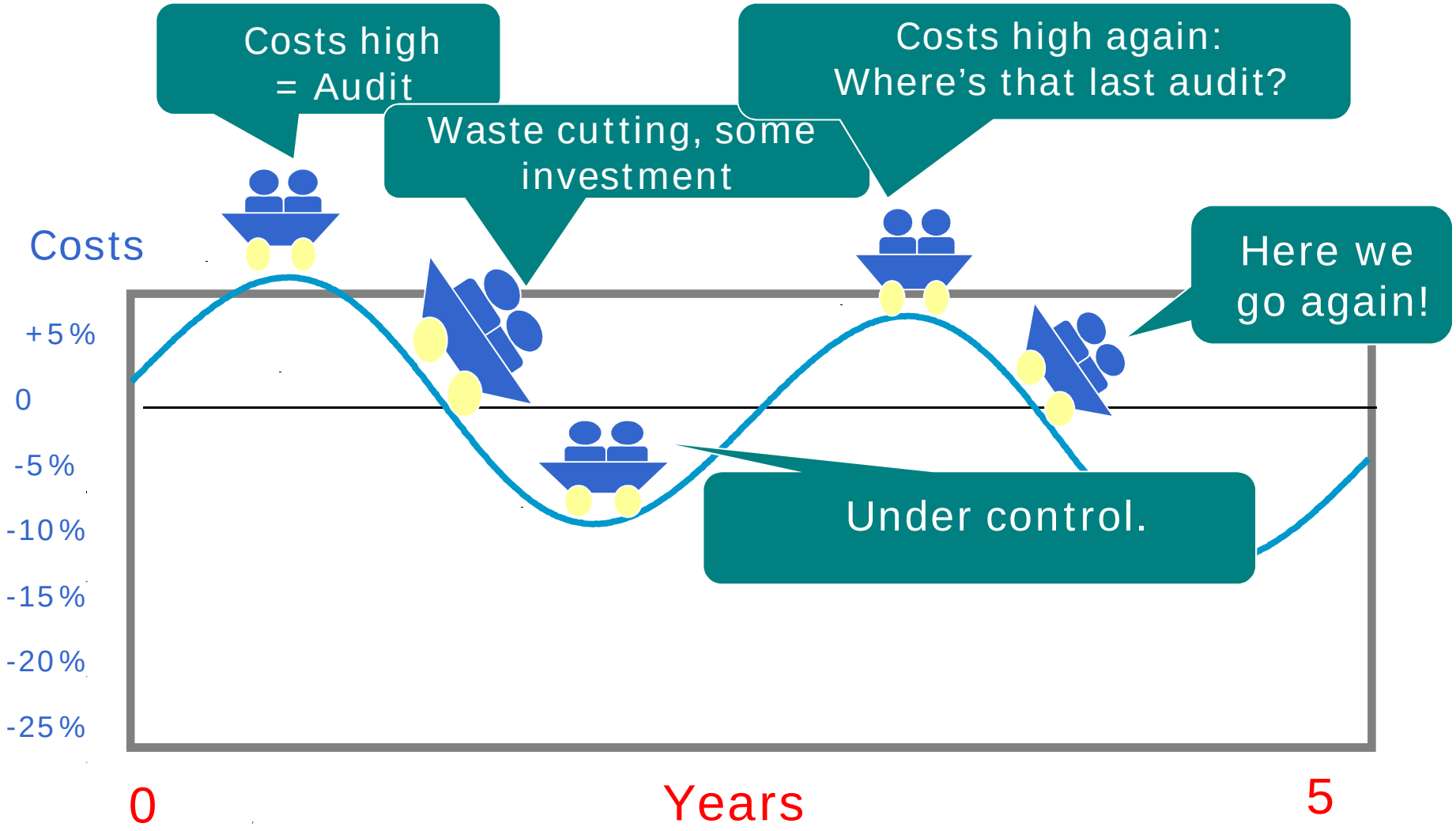
Then

Why it is not happening?

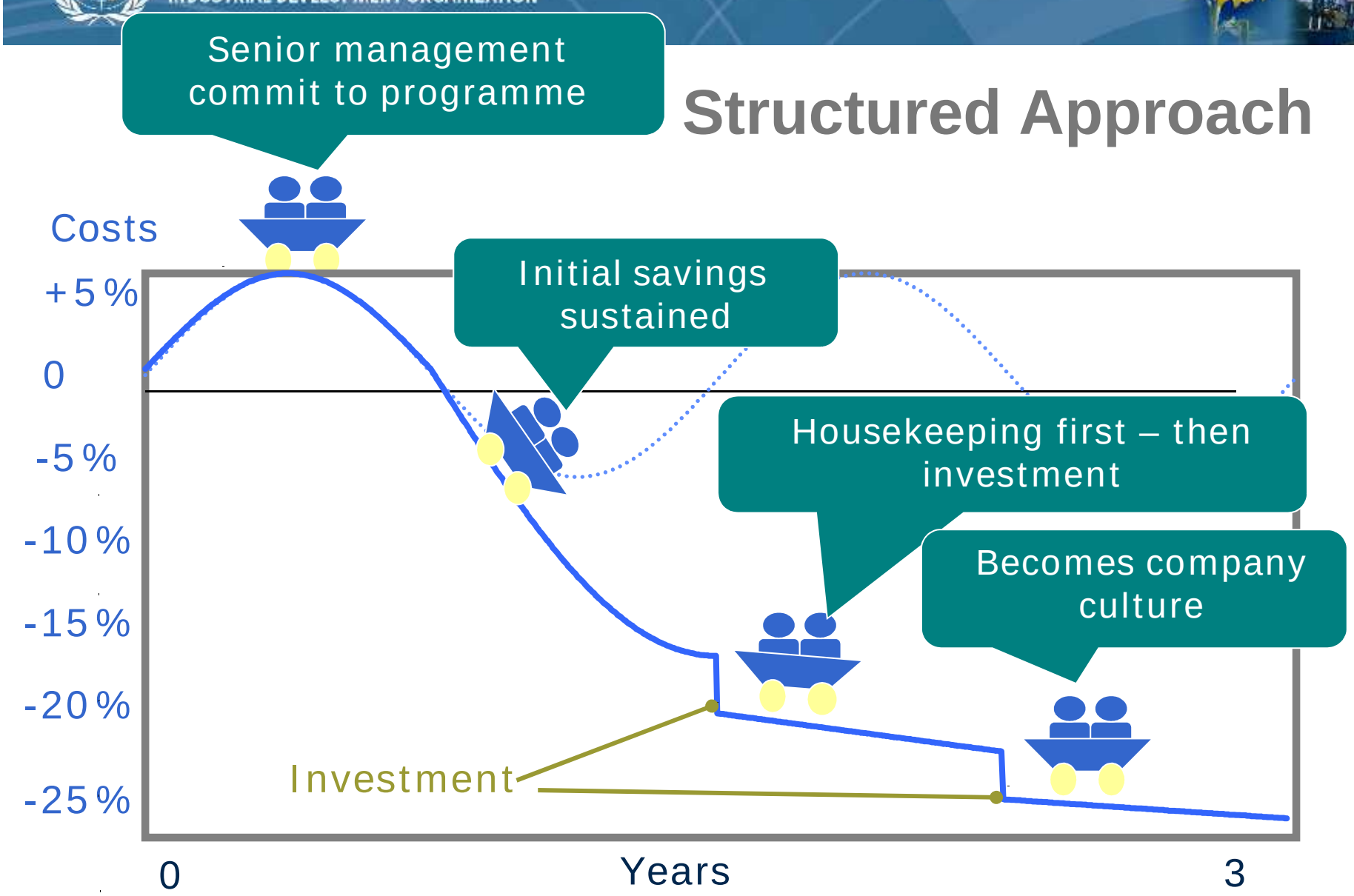
Barriers to Industrial Energy Efficiency

- Management focus is on production and not on energy efficiency
- Lack of information and understanding of financial and qualitative benefits
- Lack of adequate technical skills to assess performance, developing and implementing EE measures and projects
- First costs more important than recurring costs → disconnection between capital and operating budgets
- When EE knowledge exists it very often resides with individuals rather than with the company/organization → sustainability risk
- Poor realization among senior management of the scale of the opportunity
- ……

Ad hoc approach to energy management…



Structured Approach



What can an EnMS achieve?

Source: SEAI (www.seai.ie) 2010 LIEN report.

LIEN = general large industry

Energy Agreements = ISO 50001 group of companies

Based on improvement in energy intensity.

Year	LIEN-Only	Energy Agreements
2007	1%	7%
2008	4.7%	6%
2009	1%	5%*
2010	-0.3%	7%

Energy Management Systems Standards

Energy Management Systems Standards provide policy as well as market-driven tools and mechanisms to disseminate energy management best-practices and support implementation

Existing standards

- Nationals: USA, Denmark, Sweden, Ireland, South Korea, Spain, Thailand, South Africa, The Netherlands*
- Regional: EN 16001 – European Energy Management Standard
- **International: ISO 50001 – Energy Management Standard**

(15 June 2011)

ISO 50001 and Trade

- Companies will demand participation by their suppliers- this is already happening for environmental and lean manufacturing (i.e.--Wal-Mart, Toyota)
- Uptake of ISO 9001 in the supply chain was driven largely by Western European countries and Japan
- Uptake of ISO 50001 will be driven by the US, Canada, the expanded EU, Japan, Korea, China, Brazil, and probably India
- Exporters that position themselves now will be at a competitive advantage

Energy Management

The Business Case

Content/ Structure

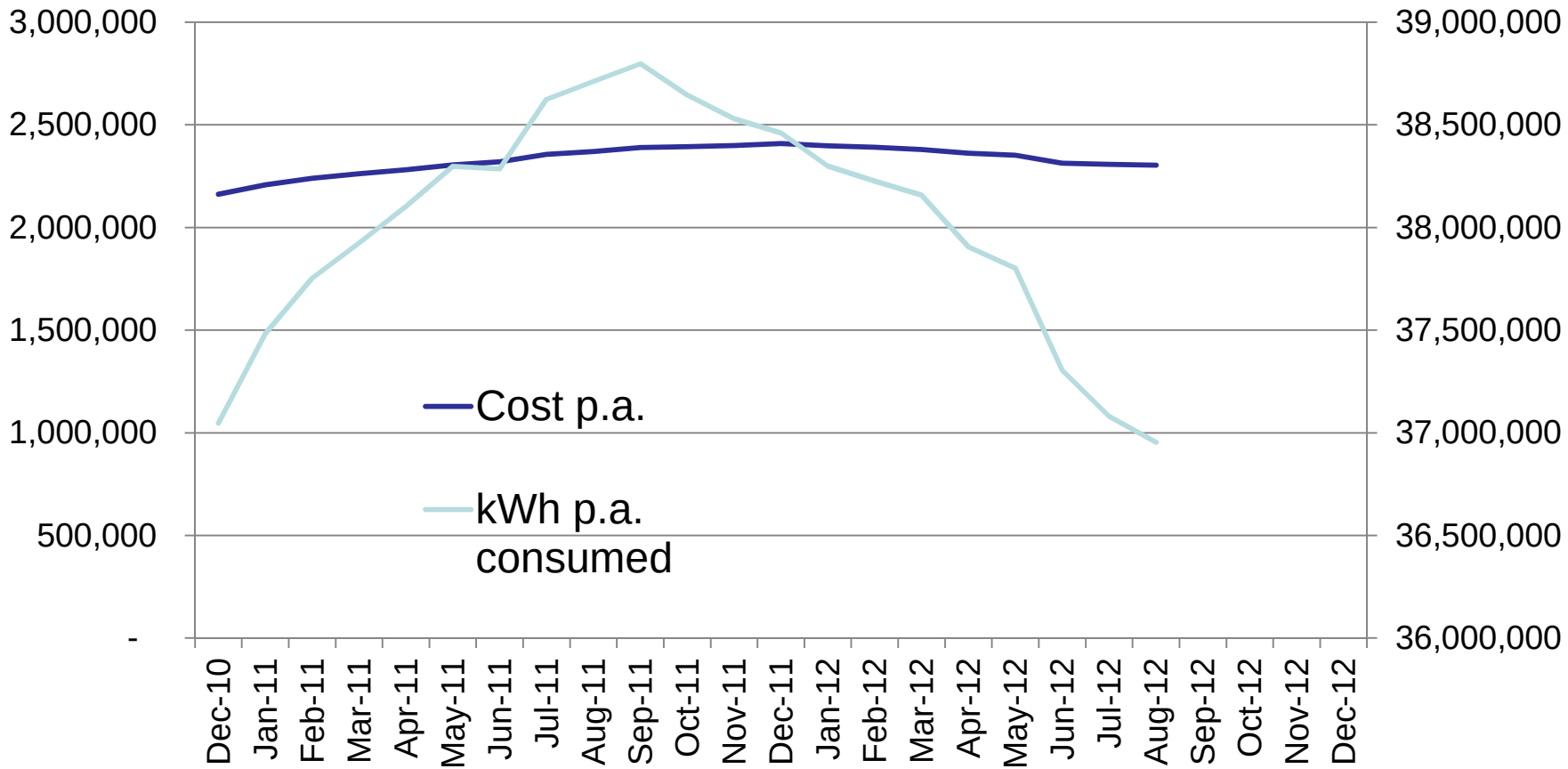
1. What is being proposed?
2. The Current Situation
   - Energy consumption and costs
   - Energy cost trends
3. What is Energy Management?
4. What can be achieved?
5. What could/can we achieve?
6. How does it work?
7. What do we do next?

What is being proposed?

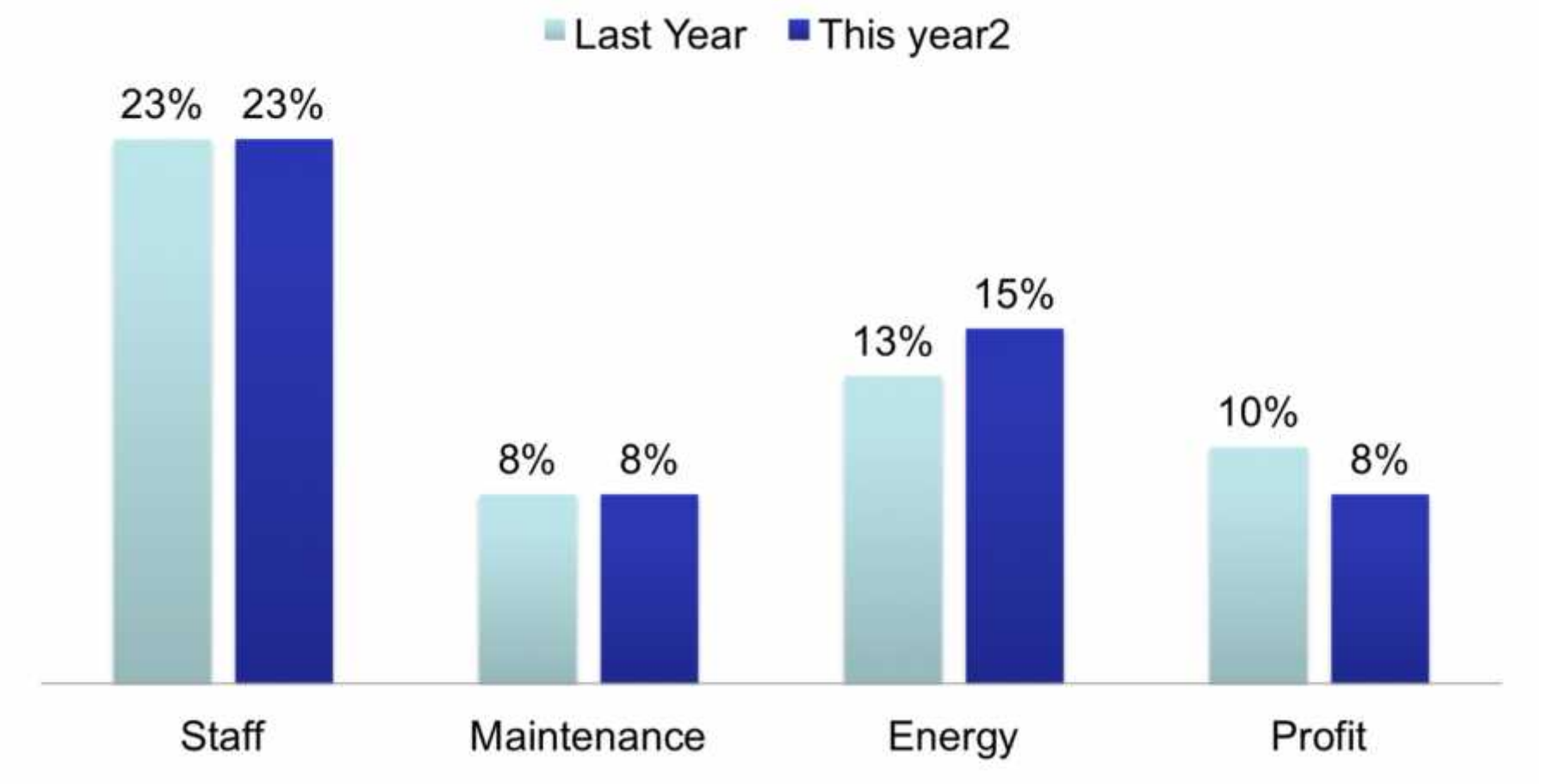
- ✓ Reduced operating costs
- ✓ Reduced exposure to rising energy costs
- ✓ Improved reliability and productivity
- ✓ Reduced environmental impact
- ✓ Improved corporate image
- ✓ Alignment with ISO 50001

Initially based on low cost improvements

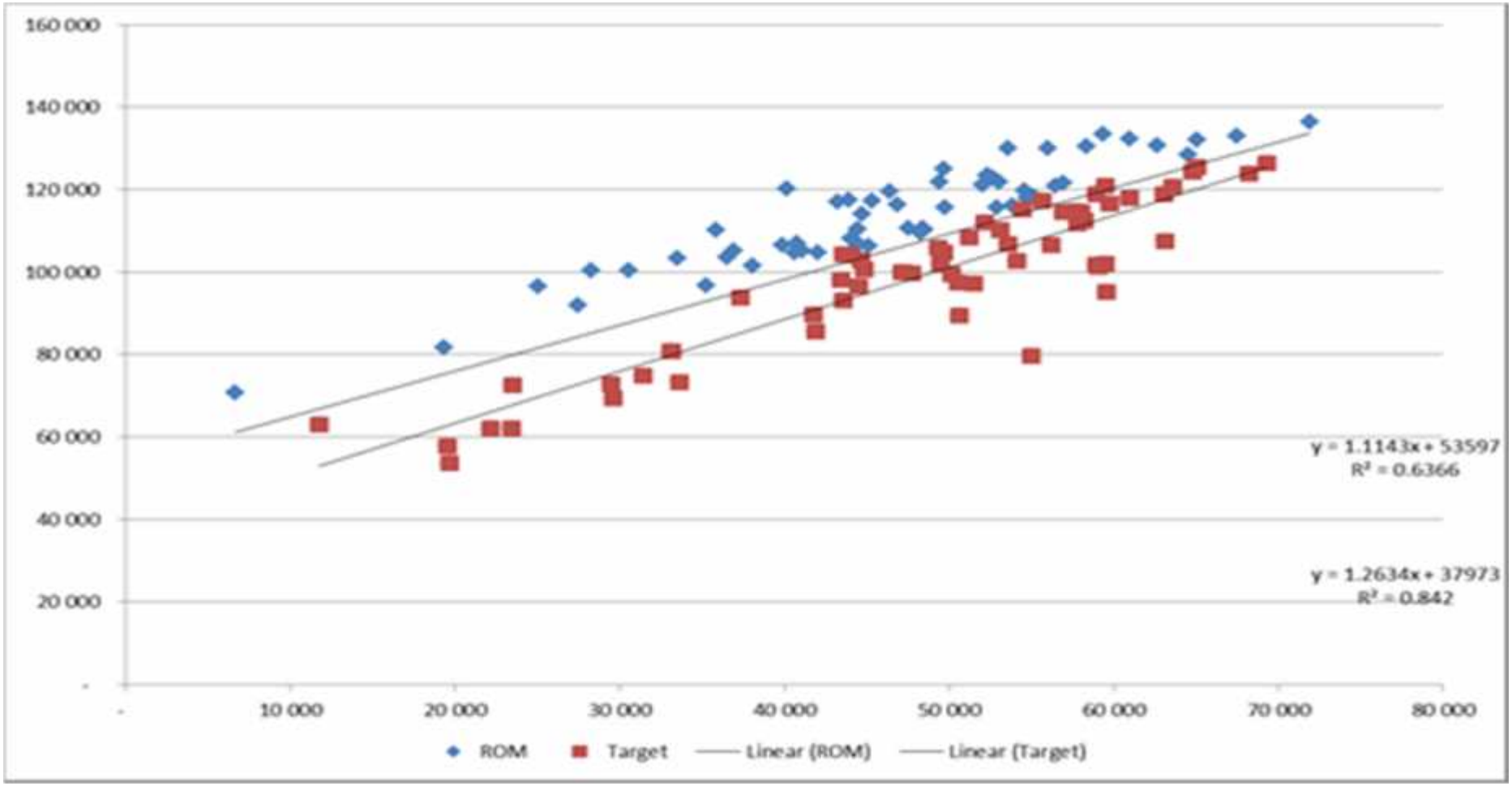
The current situation – energy trends



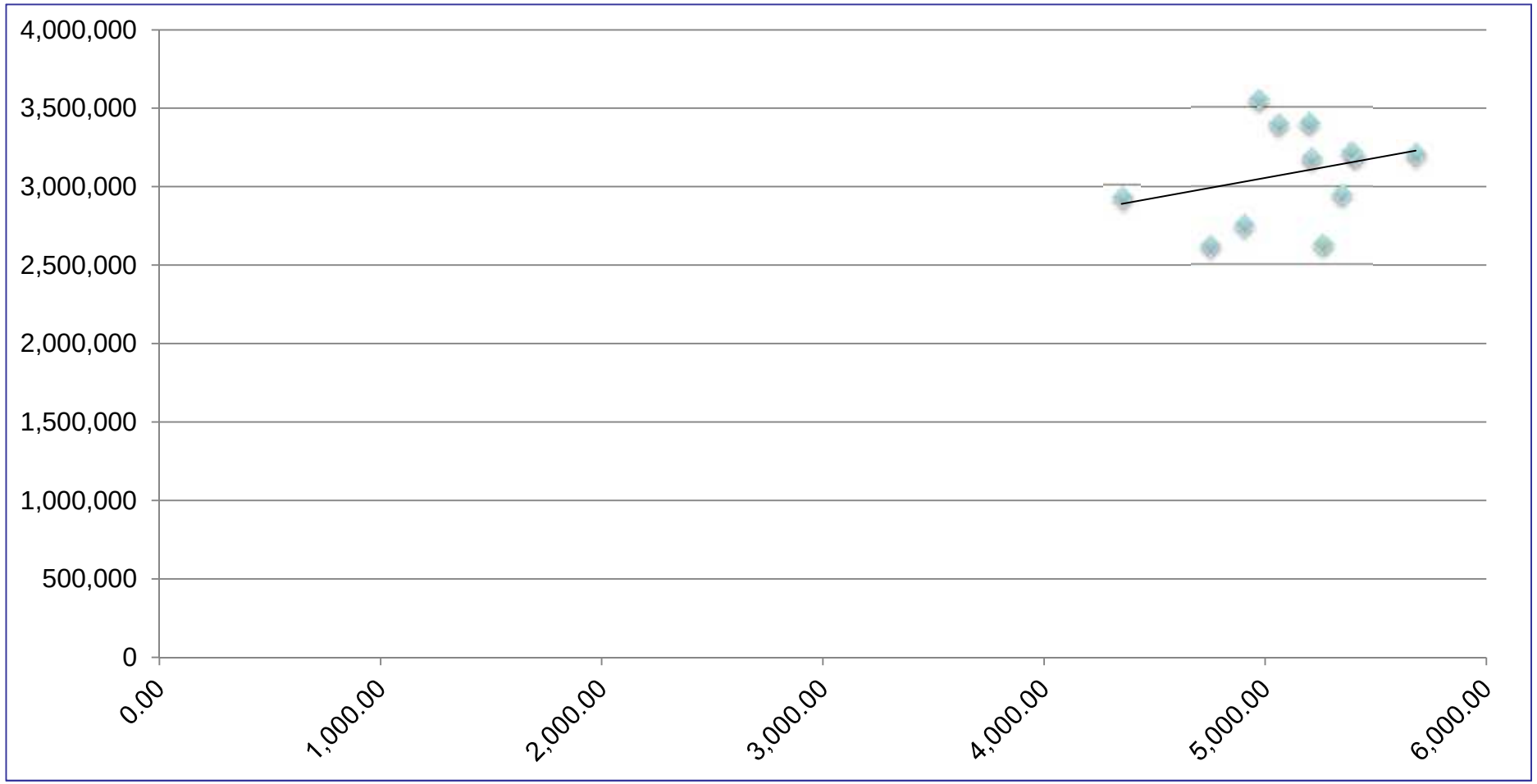
Relative % of turnover



What can be achieved?



What can we achieve?



What is energy management?

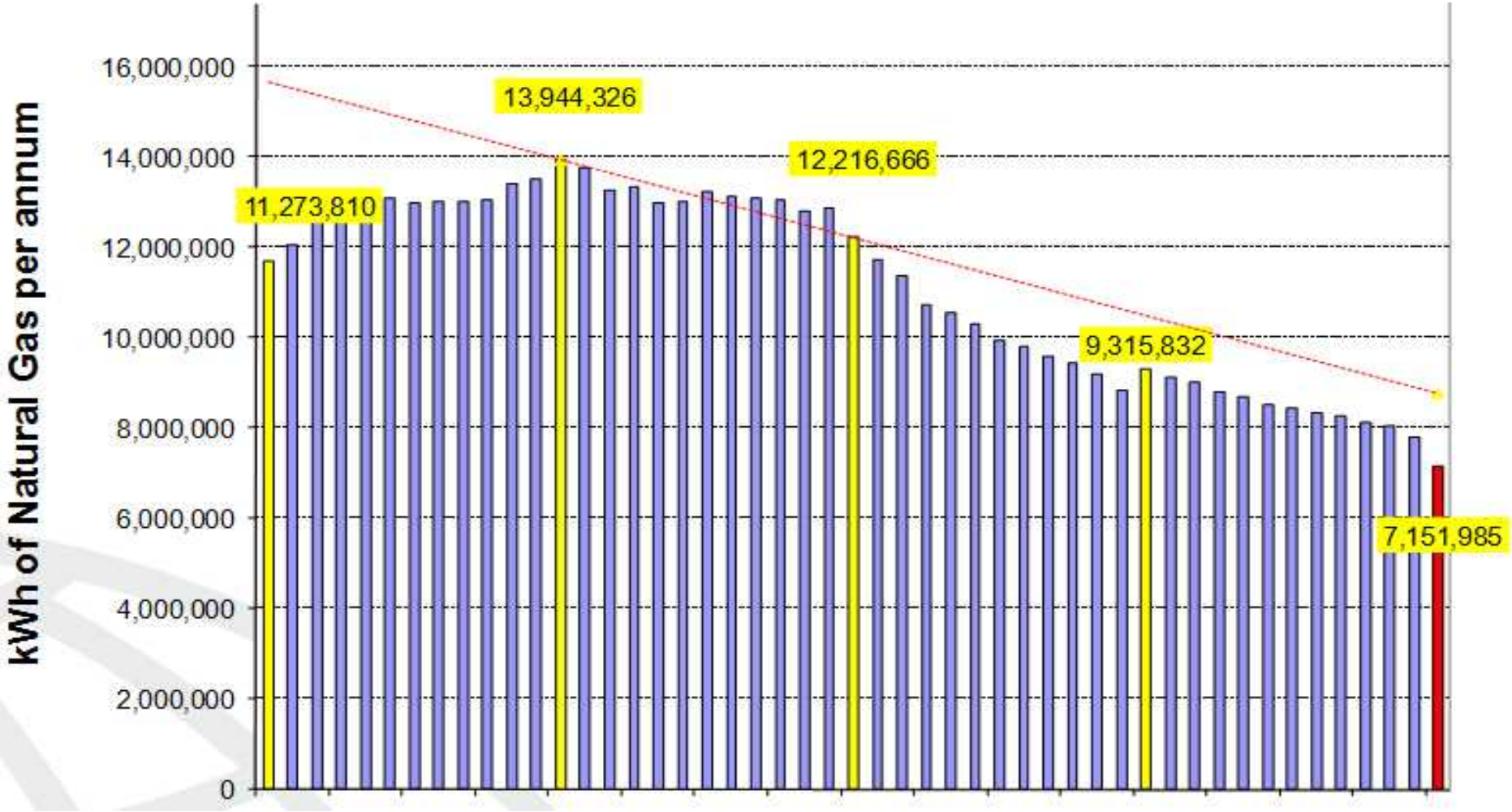
It is how we propose to manage our use of energy!

We want to be more systematic

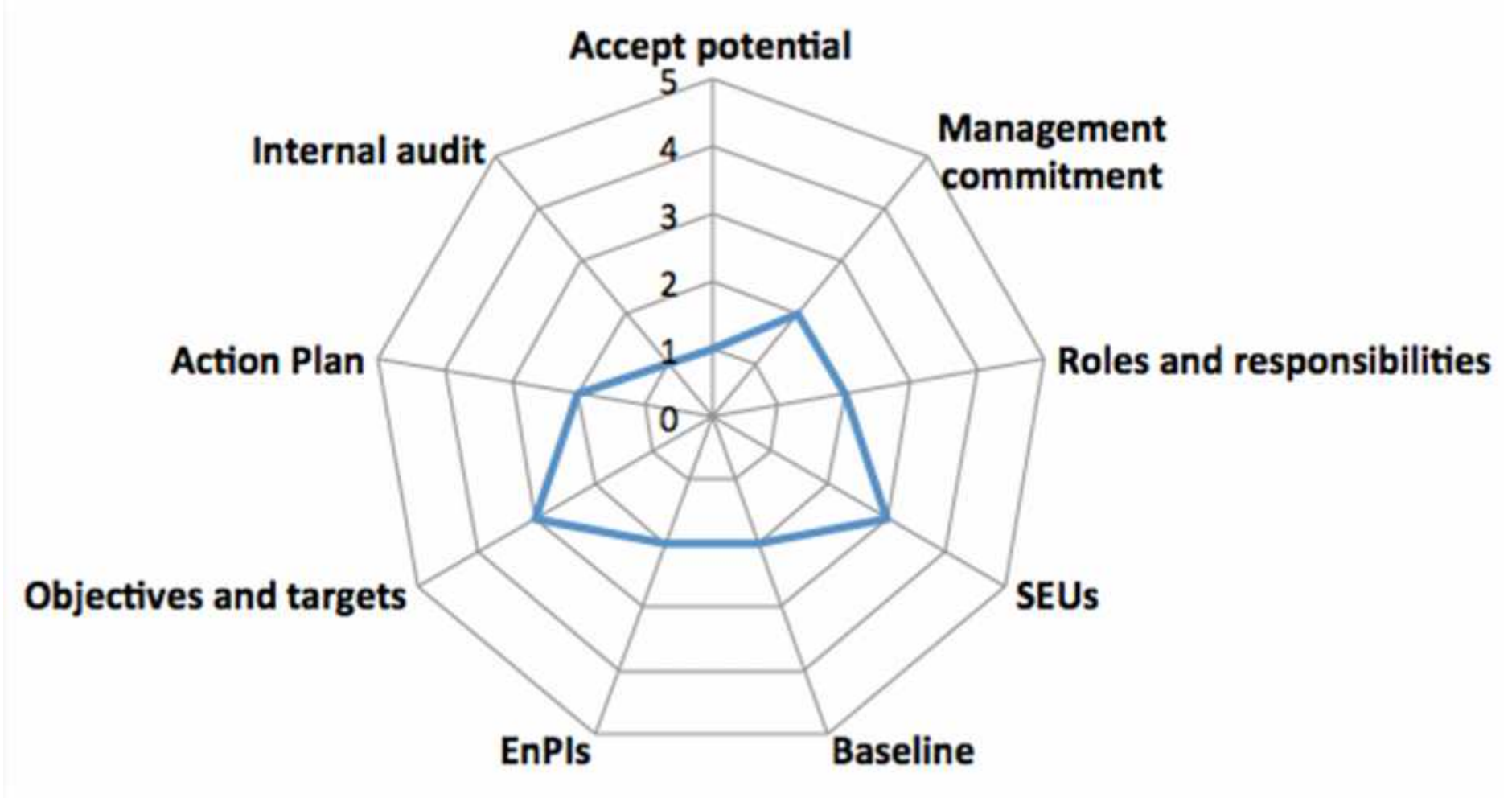
We will combine the following:

- Behaviour change among all employees
- Behaviour change among management
- Objective use of data to show performance
- Technical improvement
- Low cost operation and maintenance of existing equipment

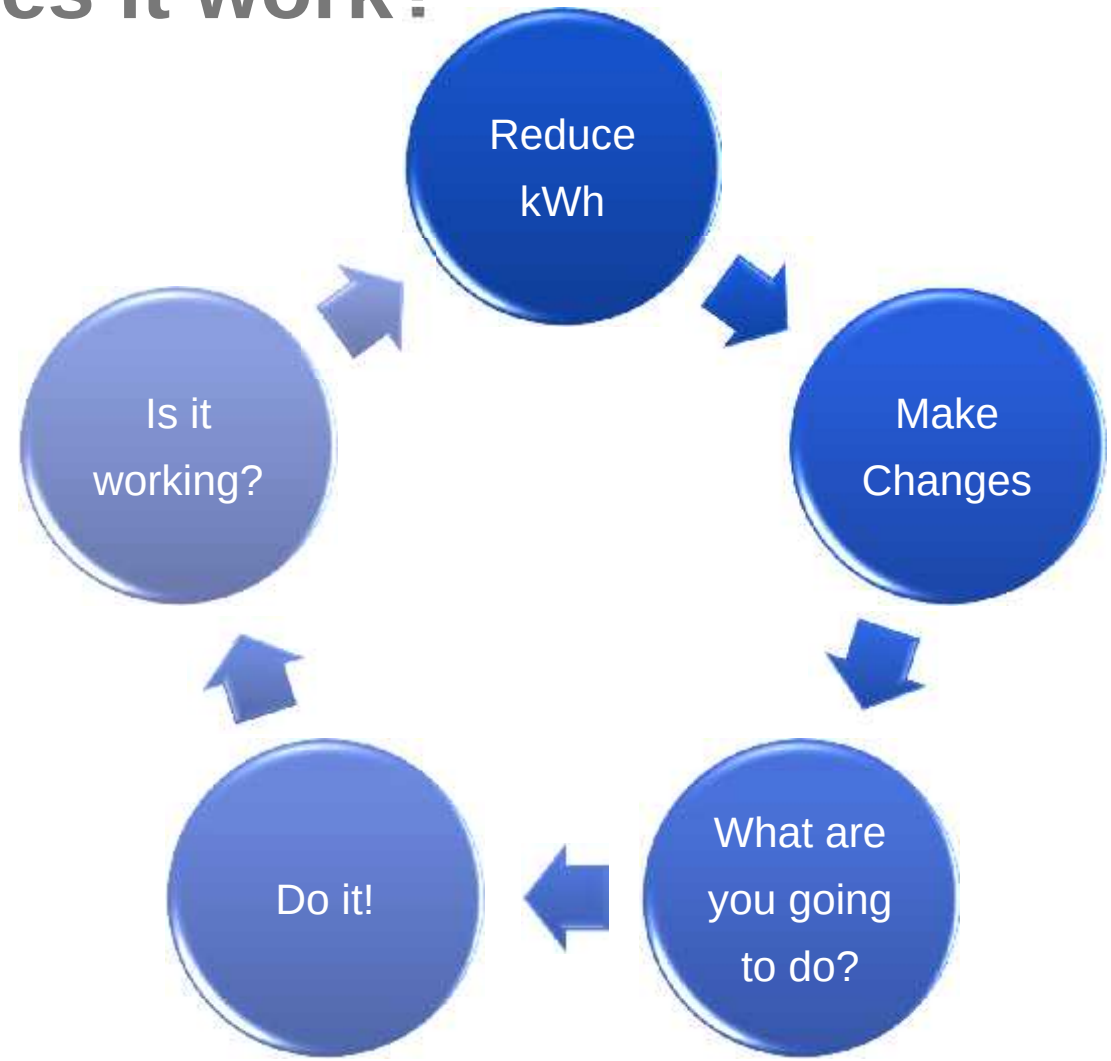
What can be achieved?



Our current level of energy management



How does it work?



What sort of actions will we take?

Operation and maintenance initially

- Fix leaks
- Fix insulation
- Switch off
- Run optimum equipment
- Optimum settings
- Check controls
- Training
- Maintain improvements

What do we do next?

Make a decision to go ahead

We do not need financial investment until **AFTER** we start to show savings

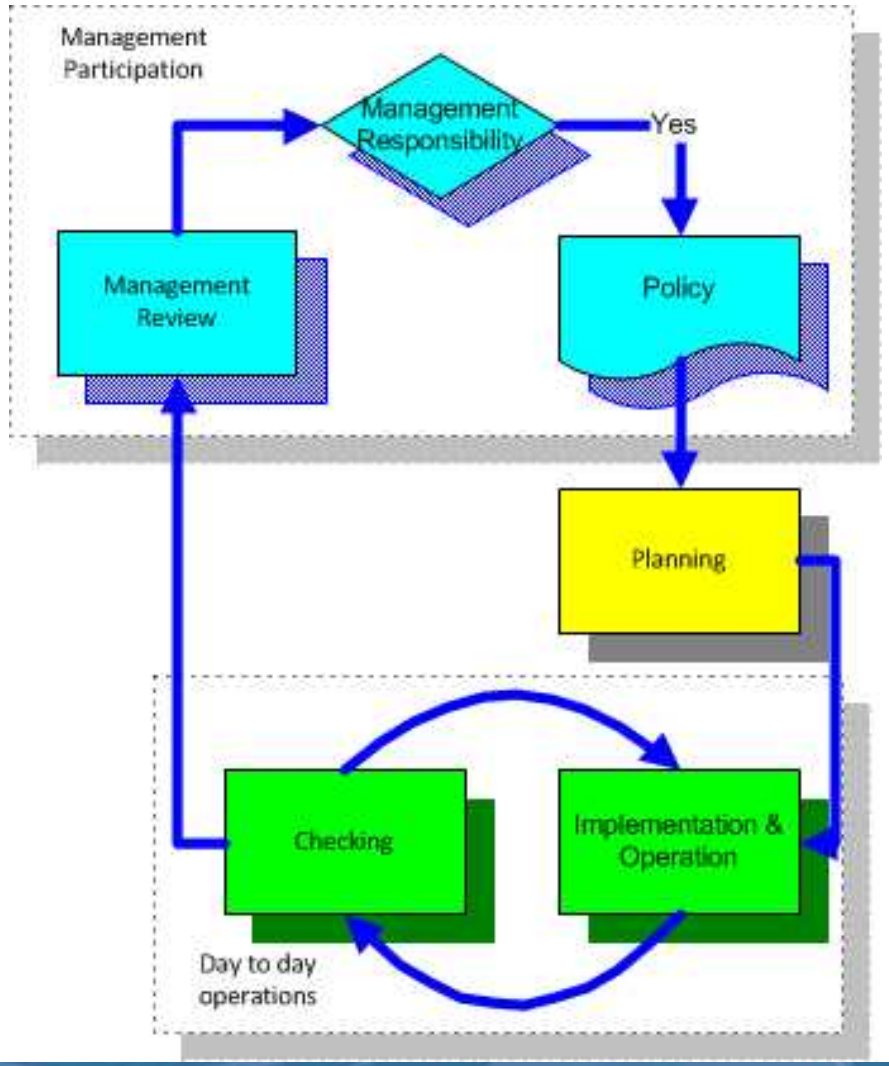
Viable investment projects may follow later

We do need management commitment to improve

- Some staff need to help
- Some staff need to change behaviour
- Some staff need training

6 Key concepts from the UNIDO EnMS program

Six Key Concepts

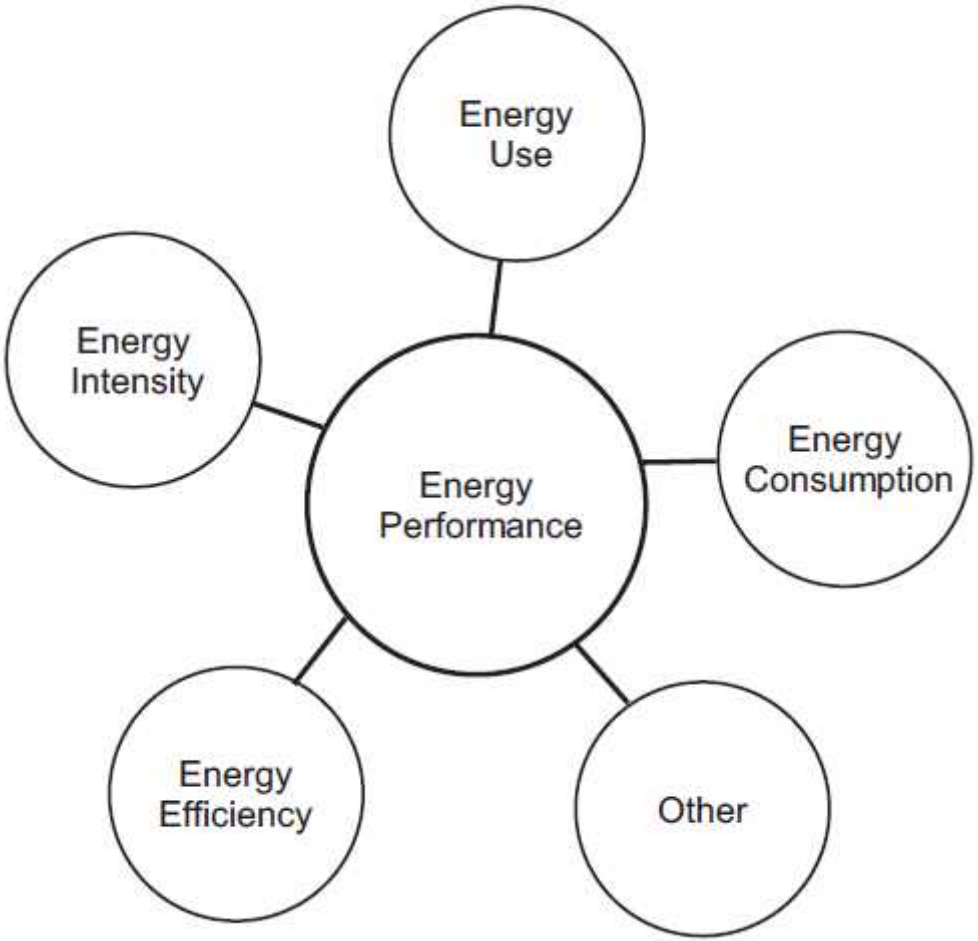


1. Commitment

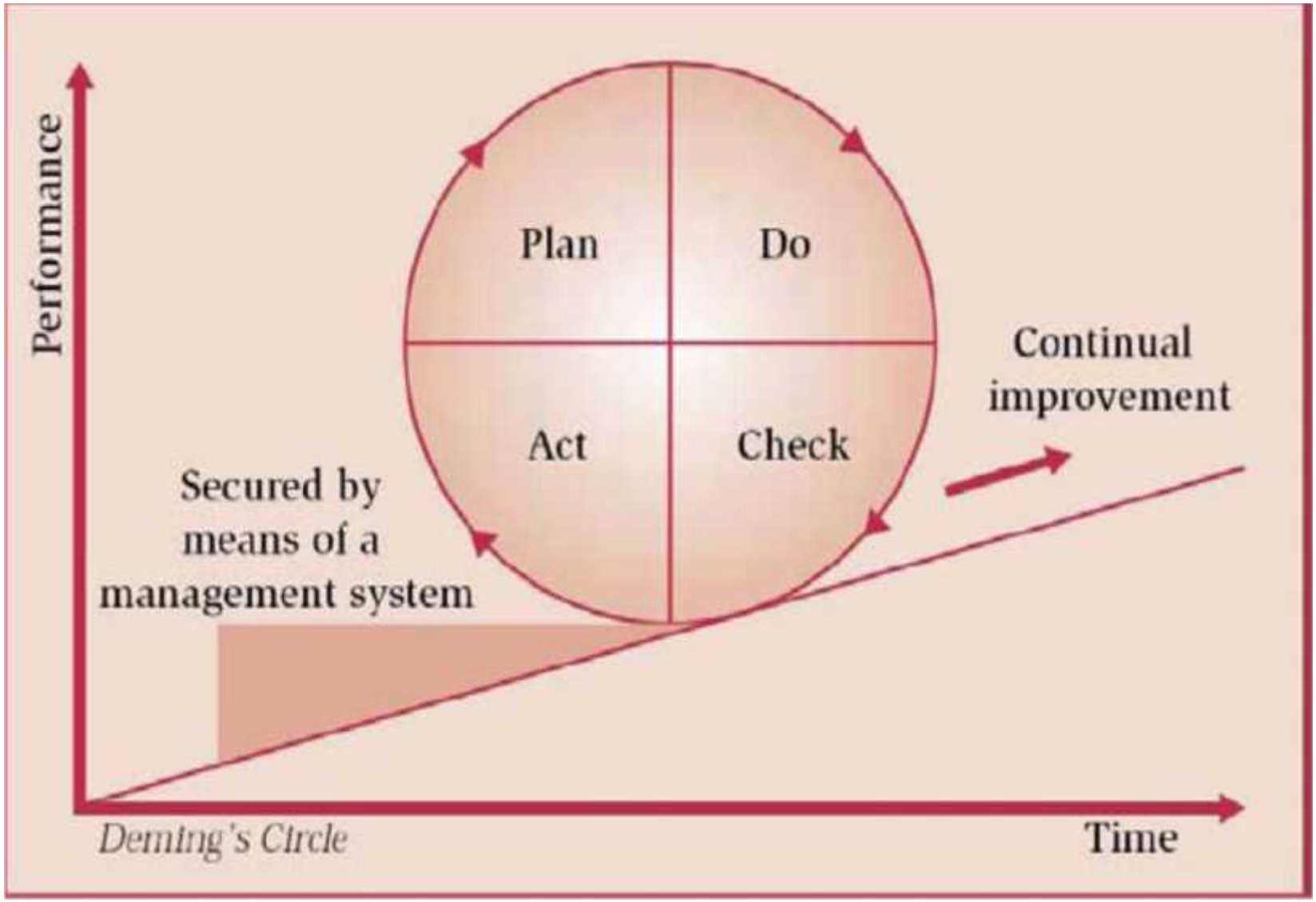
   Roles and Responsibilities

2. Significant Energy Users (SEUs)
3. Energy Performance Indicators (EnPIs)
4. Opportunities List
5. Operational Control
6. Review

It’s all about improving performance



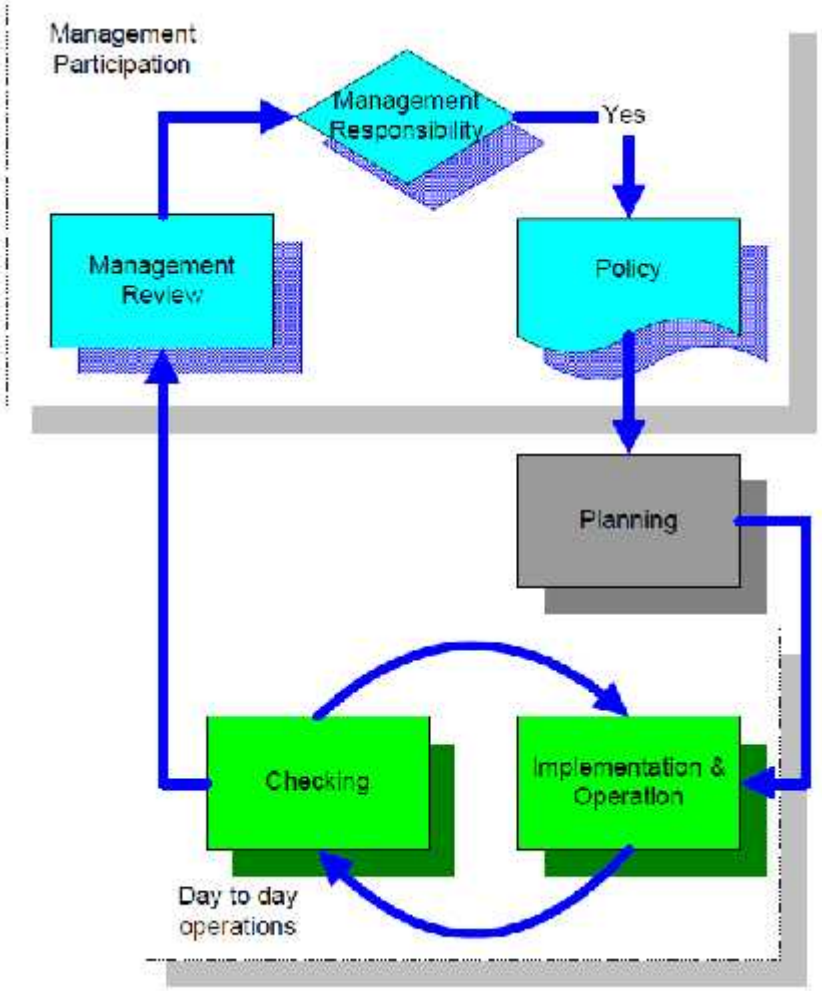
Source: ISO 50001


Performance
Plan
Do
Act
Check
Continual improvement
Secured by means of a management system
Deming's Circle
Time

Overview of an EnMS

(based on ISO 50001)

ISO 50001 Energy Management Standard



Based on the concept of:

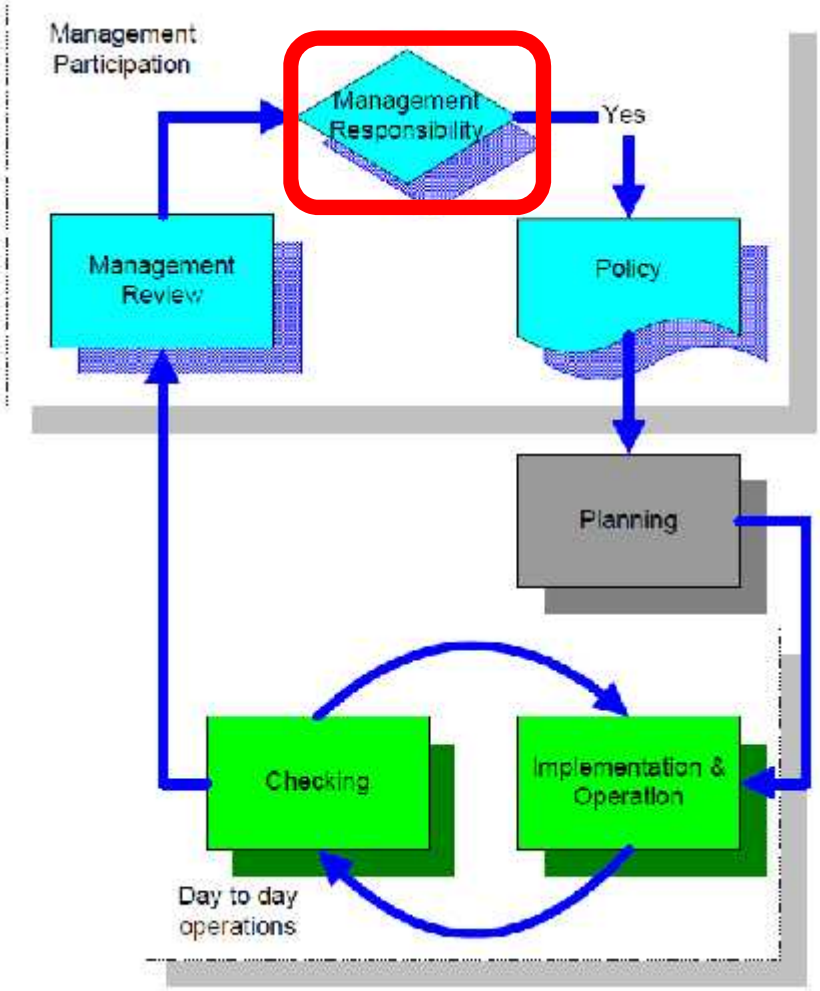
Plan

Do

Check

Act

Management Responsibility



Is the top management really comitted?

Will you support the system?

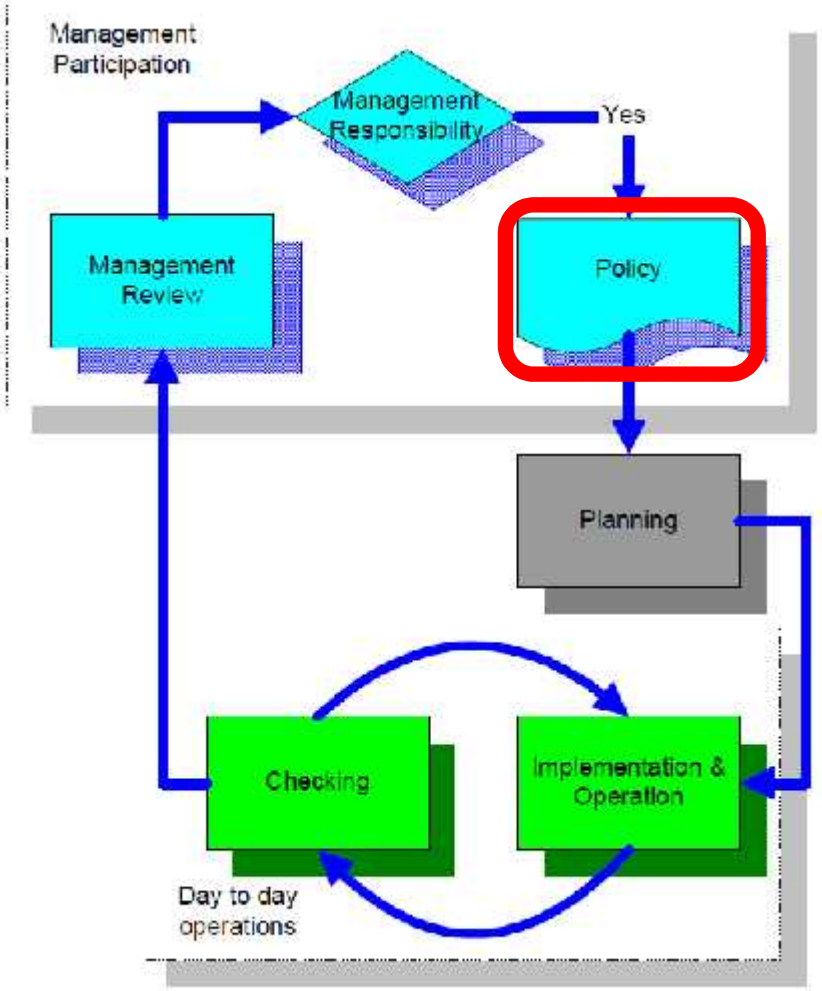
This is a decision point!

If not, we can all go for more coffee now!

Will you make the necessary resources available (technical, financial and human)

We assume you will if you believe there is an adaquate return on your effort or investment

Policy



Management commitment

Not just a signature!

Define scope of EnMS

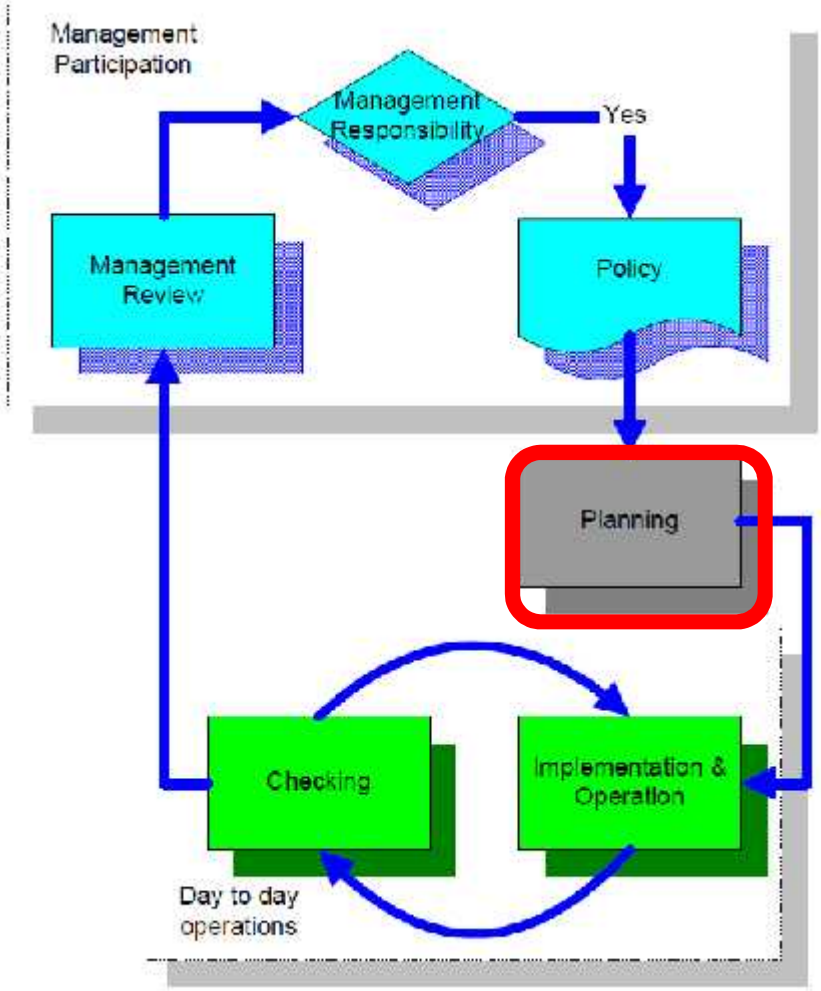
Appropriate to scale

Commitment to continual improvement

Make resources available

Framework for target setting and review organizations

Planning



How much energy are you using?

Where are you using it?

What is driving this use?

What is your baseload?

Who is influencing its use?

Is an energy audit required – focus it?

System Optimization

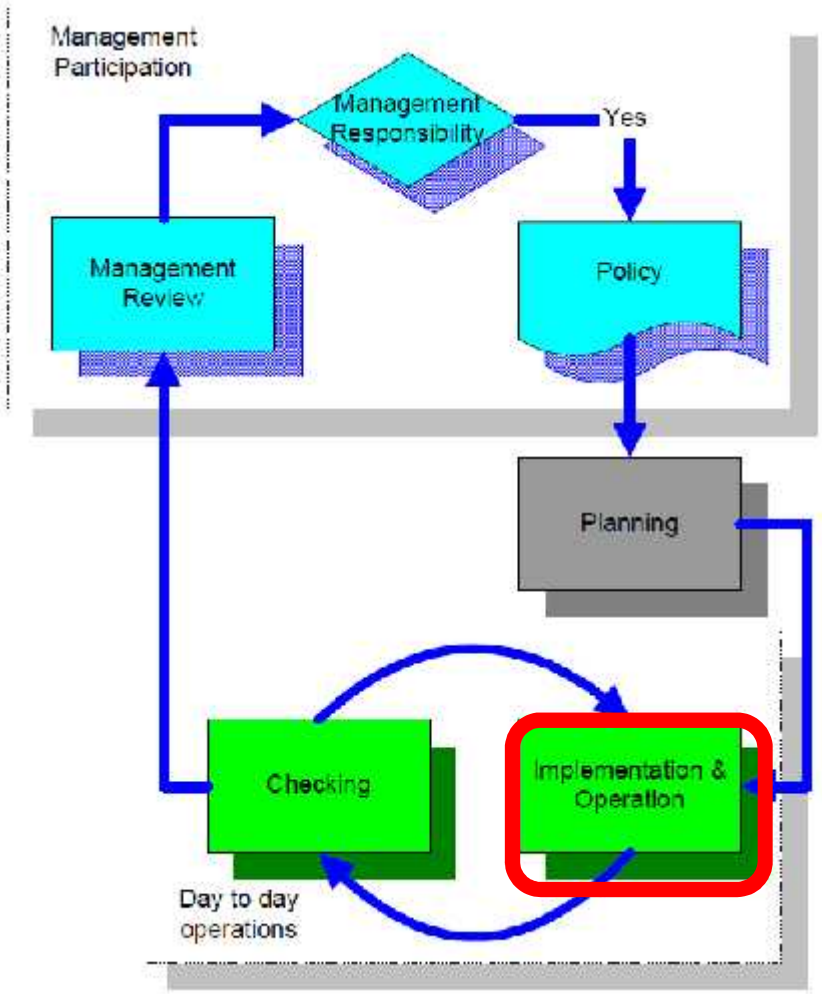
Renewable energy options

Develop baseline & indicators

Set objectives and targets

Action Plan

Implementation & Operation



Competence, training and awareness

Documentation

Operational control

- **KEY AREA**
- **Operation & Maintenance**
- **Service contractors**
- **Training**
- **Implement your action plan**

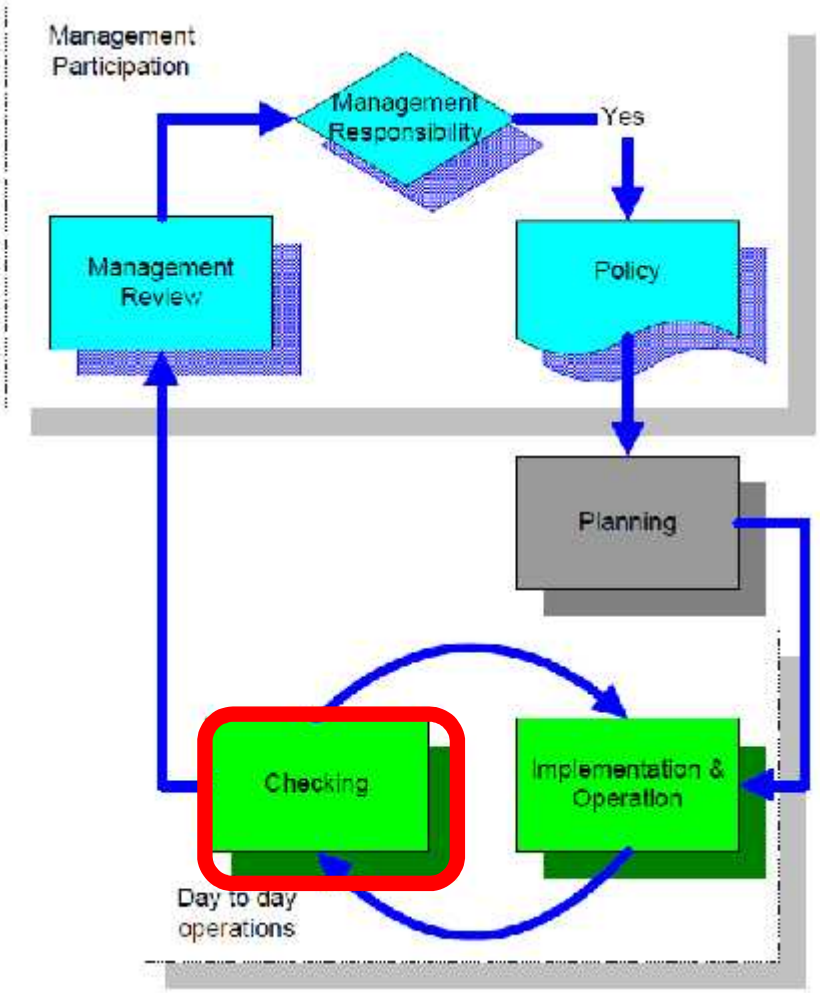
Communication

Design

Energy Efficient Design (EED)

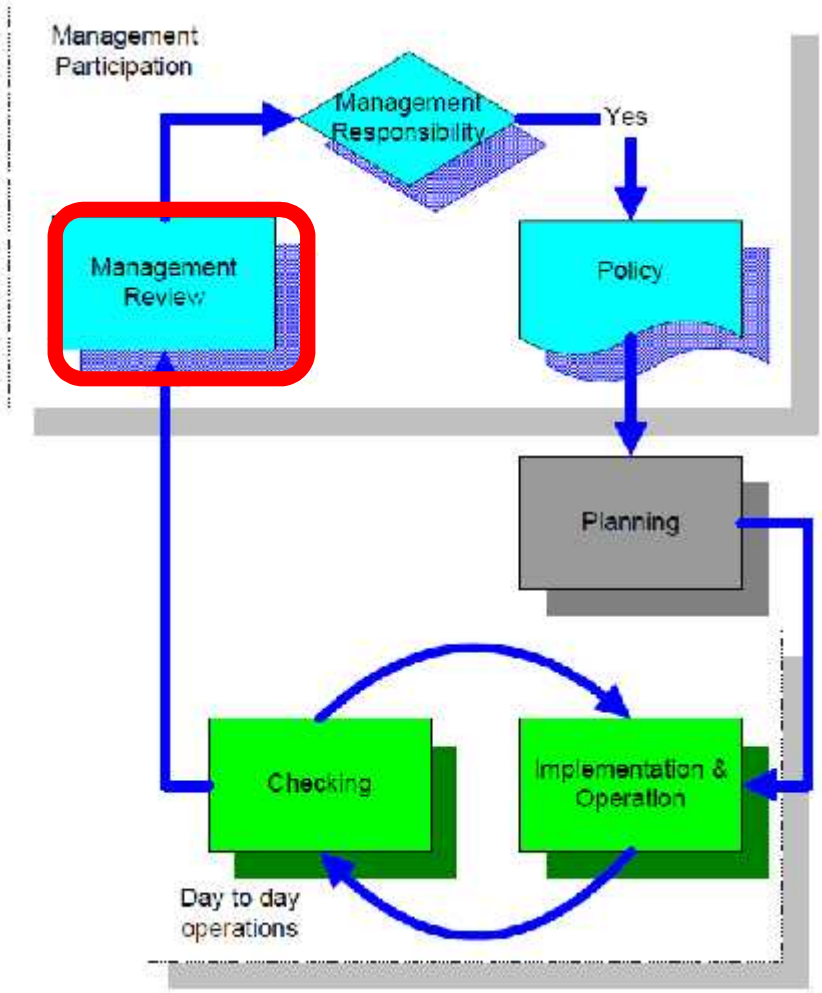
Purchasing energy, services, goods

Checking



- Technical checking
  - Monitoring and targeting (software may be justifiable?)
  - Equipment checking
- System checking
  - Is everyone doing what is required?
  - Corrective and preventive action
  - Non-conformities
- Performance checking
  - Check Energy Performance Indicators (EnPIs)

Management Review



Regular presentation

- Frequency based on requirements

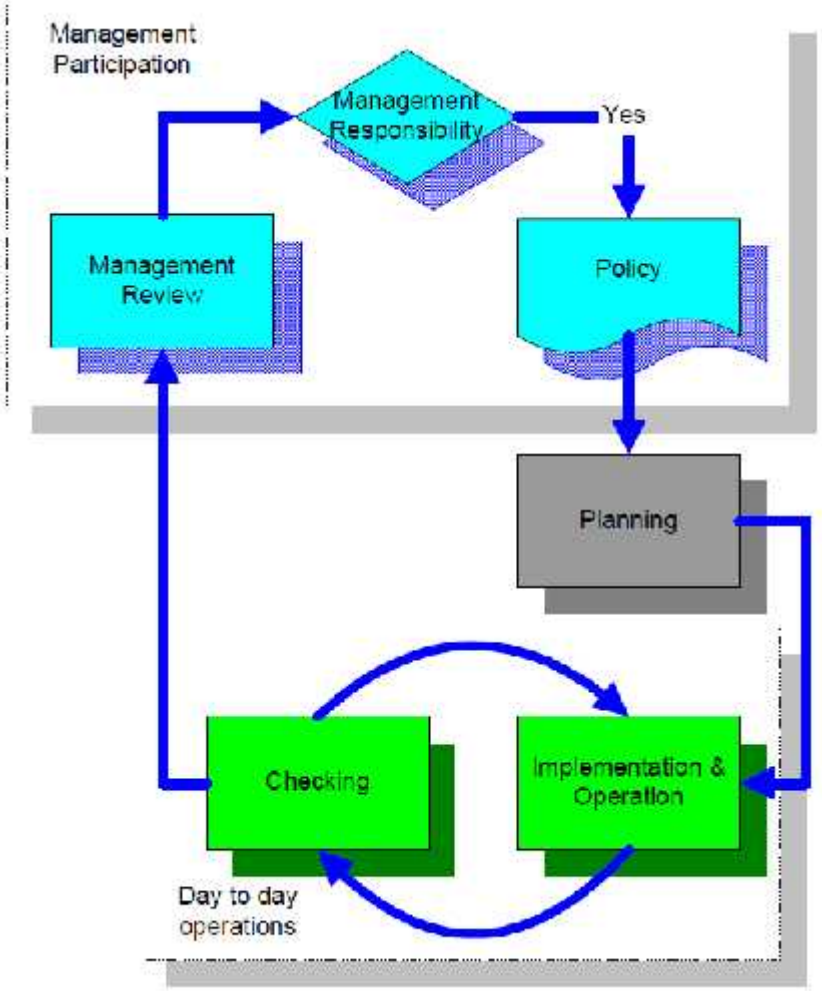
How are we getting on?

- Is performance improving as targeted?
- Problems and barriers to overcome?
- Achievements

What is the plan for next year?

- What do we need to achieve this plan?

You're not finished – this is not a project!



Then you start all over again!!

What does an EnMS achieve?

Management focus

Systematic activity

Identify and focus on biggest users

Identify and focus on key people at all levels → Training

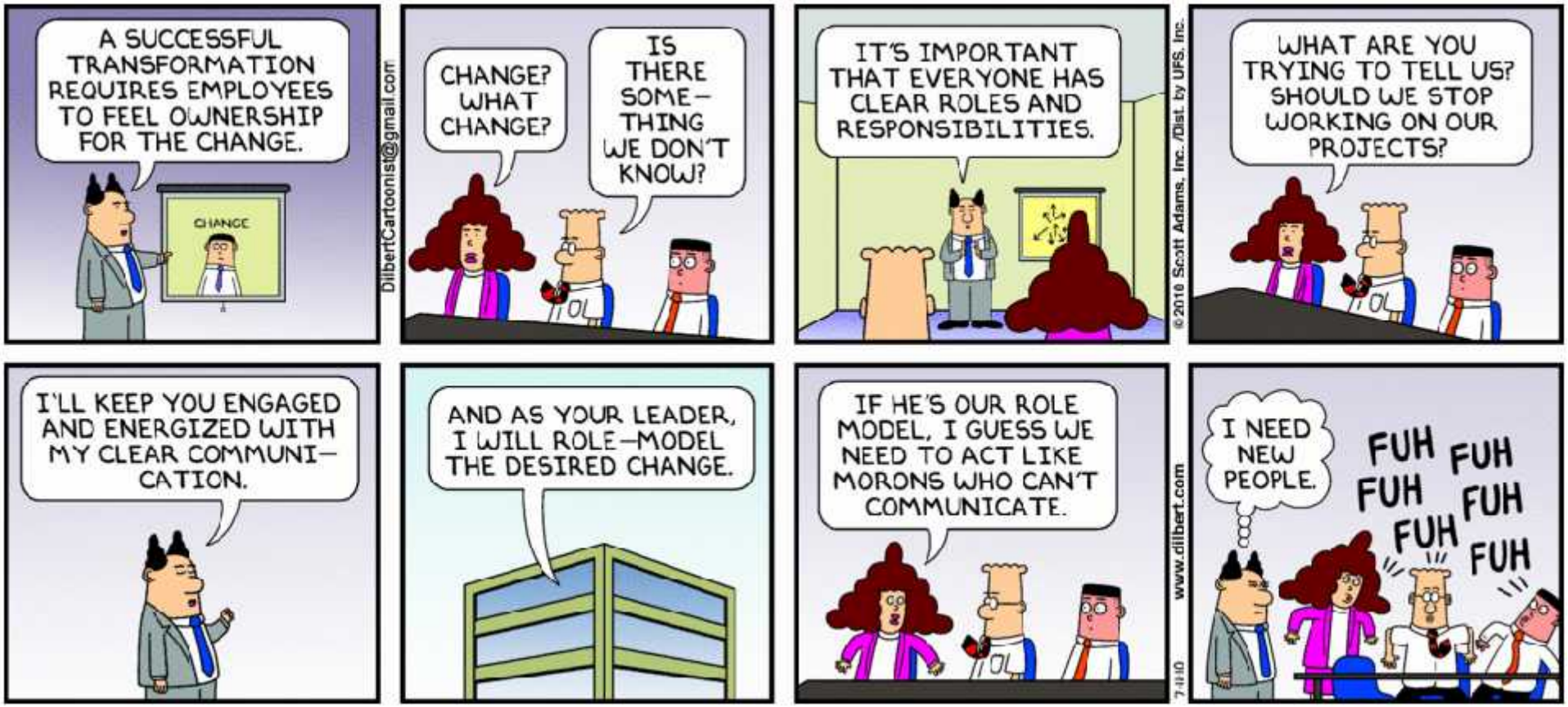
Focus on data and numerical methods

Integrated approach

- ✓ People
- ✓ Departments
- ✓ Budgets

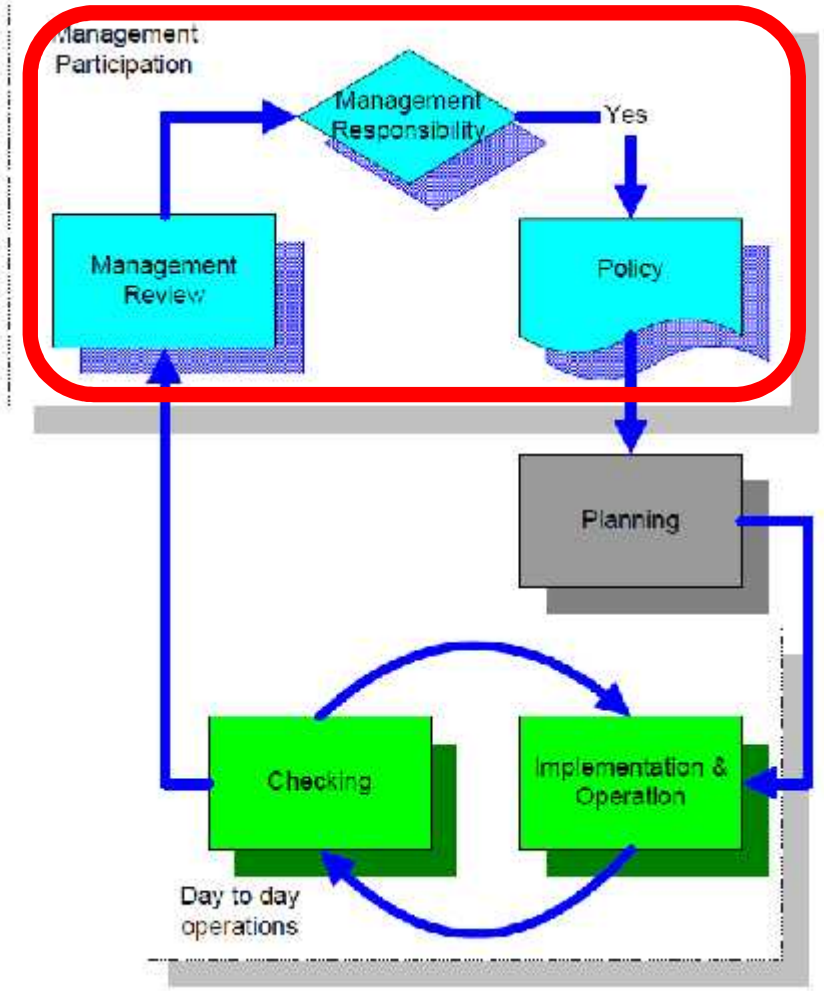
Continuity through changes of personnel

Continual improvement → <u>It is all about reducing energy costs!</u>


A SUCCESSFUL TRANSFORMATION REQUIRES EMPLOYEES TO FEEL OWNERSHIP FOR THE CHANGE.
CHANGE
DilbertCartoonist@gmail.com
CHANGE? WHAT CHANGE?
IS THERE SOME-THING WE DON'T KNOW?
IT'S IMPORTANT THAT EVERYONE HAS CLEAR ROLES AND RESPONSIBILITIES.
©2016 Scott Adams, Inc. /Dist. by UFS, Inc.
WHAT ARE YOU TRYING TO TELL US? SHOULD WE STOP WORKING ON OUR PROJECTS?
I'LL KEEP YOU ENGAGED AND ENERGIZED WITH MY CLEAR COMMUNI-CATION.
AND AS YOUR LEADER, I WILL ROLE-MODEL THE DESIRED CHANGE.
IF HE'S OUR ROLE MODEL, I GUESS WE NEED TO ACT LIKE MORONS WHO CAN'T COMMUNICATE.
www.dilbert.com
I NEED NEW PEOPLE.
FUH FUH FUH FUH FUH FUH

Building Management Commitment

Management Role



- Give commitment
- Sign policy
- Allocate resources
- Assign responsibility
- Top management representative
- Give support
- Participate in annual review
- Make decisions
- Clarify Priorities

Roles and Responsibilities

List all tasks that need to be completed in the EnMS

Assign and agree responsibility for each task

A tool is provided by UNIDO

For each task:

- How often?
- Who is involved?

Should fit with existing priorities of each participant

Energy System Optimization: Maximizing energy savings

Component v system approach

Component approach involves segregating components and analyzing in isolation

- Can result from education by particular technology sales engineer, e.g. variable speed drive, steam trap, etc

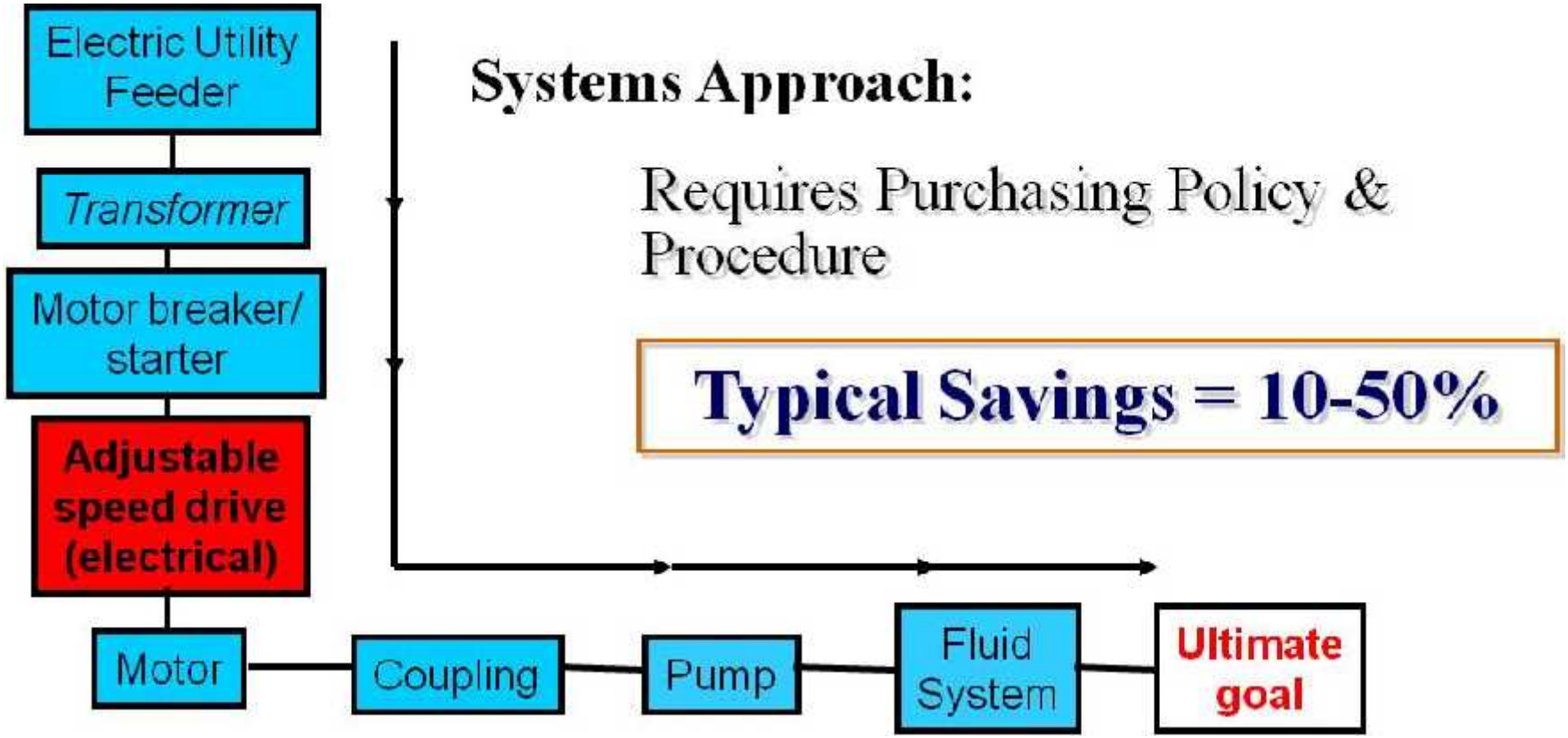
System approach involves looking at how the whole group functions together and how changing one can help or impact another

- Requires more knowledge of the system and its interactions

The energy savings opportunities from systems are far greater than from individual components

- 2-5 % efficiency gains for individual components against 15-30% average efficiency gains through system optimization

Pumping System



Why a system approach matters in industry

Industrial operations are more variable than commercial or residential

- Production schedules change
- Utilities need to follow production yet remain optimized
- Commercial heating/cooling system sometimes behave like this

Potential savings are much greater

Implementation costs are often lower through fast payback often measured in months.

Steam and motor driven systems account for over 50% of final manufacturing energy use worldwide

Why would you optimize a boiler efficiency at say 70% of output and then reduce output?

Why do opportunities exist?

Most energy systems are designed with:

- The assumption that more is better
- Little or no thought is given to system efficiency
- No plan for future change in system demand (up only!)
- “Lowest first cost” V life Cycle Cost (LCC)
- Separate budget for project and operation

Changes to existing systems face the same issues

Poor (=cheapest) commissioning

Improper operation

Poor maintenance

System requirements change over time

Typical system approach process

What does the user need?

- Consider variations, e.g. seasonal, occupancy, production schedules, alternative services, etc.

Optimise use of the service

- How is it used, operations, controls, etc.

Optimise distribution of the service

- Leaks, pressure drops, insulation, etc.

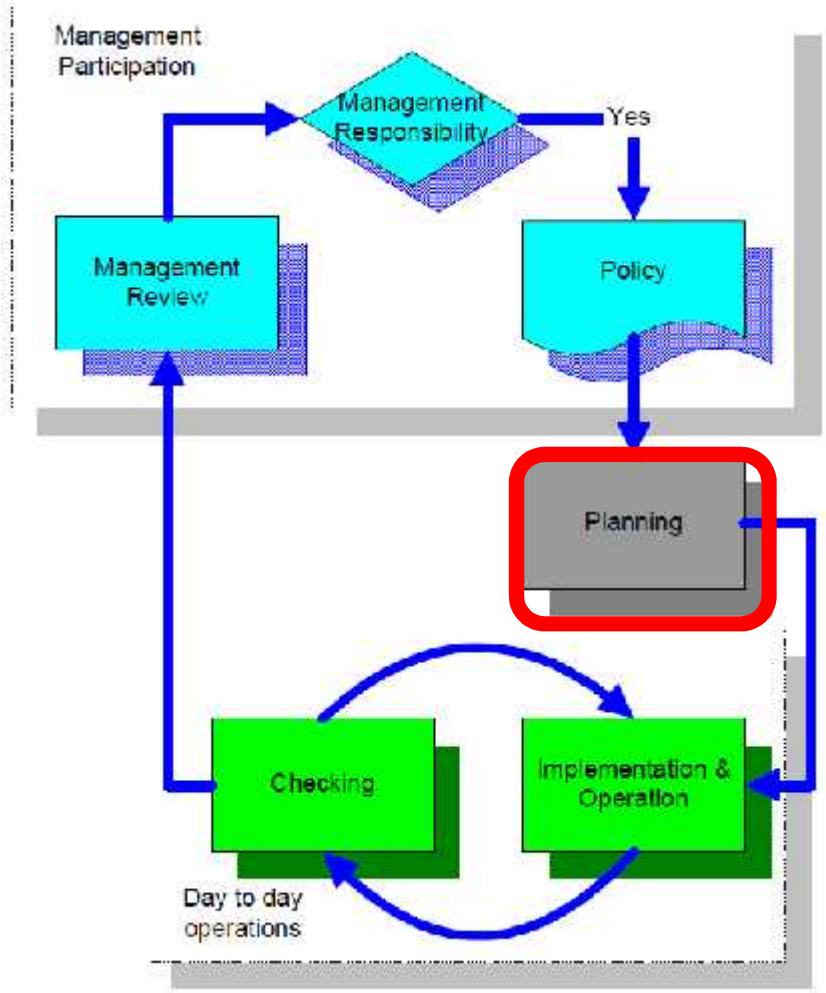
FINALLY optimise generation of the service

- Boilers, chillers, air compressors, pumps, etc.

Pump system example

1. Minimise user requirement
2. Shut bypasses
3. Determine actual flow and pressure requirement
4. Reselect motor and pump
5. Replace 150m3/h with 25m3/h
6. Save 75% or 176MWh p.a.

Planning



How much energy are you using?

Where are you using it? Which are significant?

What is driving this use?

What is your baseload?

Who is influencing its use?

Is an energy audit required – focus it?

Energy System Optimization

Renewable energy options

Are there legal or other requirements?

Develop baseline & indicators

Set objectives and targets

Action Plan

Energy Management plus System Optimization

Energy management standard provides:

A framework for understanding significant energy use

Action Plans to continually improve energy performance

Documentation to sustain energy performance improvements

System optimization provides:

A method of assessing systems to identify energy performance improvement opportunities

Actions that can provide significant energy savings with limited capital investments

More reliable operations

Energy Management + Systems Optimization = Winning Strategy for all Industrial Sectors & Sizes

ISO 50001 – Resource requirements to implement an effective EnMS

What resources are required?

Management Resources required

- Consider the opportunity
- Make the decision to go ahead
- Review and approve the policy
- Participate in the regular review meeting
- Make on-going decisions as required
- Offer encouragement and support

Operational resources

Implementation cost (for EnMS itself)

Capital Investment

What resources are required?

Management Resources required

Operational resources

- Completion of planning steps
- Training is probably the largest cost
- Support from other departments
- Some time for energy manager to focus on Energy

Implementation cost (for EnMS itself)

Capital investment

What resources are required?

Management Resources required

Operational resources

Implementation cost (for EnMS itself)

- Consultancy support (if required)
- Certification cost (if required)

Capital investment

What resources are required?

Management Resources required

Operational resources

Implementation cost (for EnMS itself)

Capital investment is straightforward!

- Either finance is justifiable and available or it isn't!
- The focus of the EnMS is on prioritising opportunities
  - Low Cost First
- Capital projects are also identified and justified

Overview of the UNIDO program

THANK YOU