20IP742

ENERGY AUDIT

Unit 3 - Energy Management

Energy Management

Energy Management

Defined as method of achieving quality product at least energy cost without affecting environment.

- 1970-started thinking
- 1980- seriously thinking
- 1992—Energy Policy Act-1992 -Federal USA
- India EC ACT 2001

Energy Management

Definition

"The judicious and effective use of energy to maximize profits (minimize costs)and enhance competitive positions“

Or

"The strategy of adjusting and optimizing energy, using systems and procedures so as to reduce energy requirements per unit of output while holding constant or reducing total costs of producing the output from these systems"

Energy Management

Objectives

The objective of Energy Management is to achieve and maintain optimum energy procurement and utilization, throughout the organization and:

- To minimize energy costs / waste without affecting production & quality.
- To minimize environmental effects.
- Increase efficiency
- Reduce carbon emission & climate protection
- Find superior energy alternatives

Energy Management

Necessity of energy management

- Energy cost which affects the company profitability & competitiveness in the world market
- Energy supply- demand balance the nation
- Financial balance of a nation
- Environmental issues
- Occupational safety and health

1. Loss prevention and waste disposal
2. Productivity
3. quality

Energy Management

Principles of Energy management

i) Control the cost of energy service provided and not the BTU

ii) Manage energy function as a product cost and not as a general expenses

iii) Manage only major energy functions

iv) Concentrate energy management program on installing contracts and achieving results

Energy Management

- **Key elements of Energy management**

The steps:
STEP 1: Make Commitment
STEP 2: Assess Performance
STEP 3: Set Goals
STEP 4: Create Action Plan
STEP 5: Implement Action Plan
STEP 6: Evaluate Progress
STEP 7: Recognize Achievements

Figure Steps in Energy Action Planning

Energy Management

STEP 1: Commit to Continuous Improvement

- Organizations seeing the financial returns from superior energy management continuously strive to improve their energy performance. Their success is based on regularly assessing energy performance and implementing steps to increase energy efficiency.
- **Form a Dedicated Team**

Energy Management

- **1.1 Appoint an Energy Director:** Sets goals, tracks progress, and promotes the energy management program.
- **1.2 Establish an Energy Team:** Executes energy management activities across different parts of the organization and ensures integration of best practices.
- **Institute an Energy Policy**
- **1.3 Institute an Energy Policy:** Provides the foundation for setting performance goals and integrating energy management

Energy Management

STEP 2: Assess Performance

- Understanding current and past energy use is how many organizations identify opportunities to improve energy performance and gain financial benefits. Assessing performance is the periodic process of evaluating energy use for all major facilities and functions in the organization and establishing a baseline for measuring future results of efficiency efforts.

Energy Management

- Key aspects include in assessment:
- Data Collection and Management
- 2.1 Gather and track data — Collect energy use information and document data over time.
- Base lining and Benchmarking
- 2.2 Establish baselines — Determine the starting point from which to measure progress.
- 2.3 Benchmark — Compare the energy performance of your facilities to each other, peers and competitors, and over time to prioritize which facilities to focus on for improvements.
- Analysis and Evaluation
- 2.4 Analyze — Understand your energy use patterns and trends.
- 2.5 Technical assessments and audits — Evaluate the operating performance of facility systems and equipment to determine improvement potential.

Energy Management

- Assessing your energy performance helps you to:

Categorize current energy use by fuel type, operating division, facility, product line, etc.

- Priority to do poor performing facilities for immediate improvement.
- Understand the contribution of energy expenditures to operating costs.
- Develop a historical perspective and context for future actions and decisions.
- Establish reference points for measuring and rewarding good performance.

Energy Management

STEP 3: Set Goals

- Performance goals drive energy management activities and promote continuous improvement.
- Well-stated goals guide daily decision-making and are the basis for tracking and measuring progress. Communicating and posting goals can motivate staff to support energy management efforts throughout the organization.
- The Energy Director in conjunction with the Energy Team typically develops goals.

Energy Management

- **To develop effective performance goals:**
- 3.1 **Determine scope -** Identify organizational and time parameters for goals.
- 3.2 **Estimate potential for improvement -** Review baselines, benchmark to determine the potential and order of upgrades, and conduct technical assessments and audits.
- 3.3 Establish goals - Create and express clear, measurable goals, with target dates, for the entire organization, facilities, and other units.

Energy Management

STEP 4: Create Action Plan

- Successful organizations use a detailed action plan to ensure a systematic process to implement energy performance measures. Unlike the energy policy, the action plan is regularly updated, most often on an annual basis, to reflect recent achievements, changes in performance, and shifting priorities.

Energy Management

STEP 5: Implement Action Plan

- **To implement your action plan, consider taking the following steps:**
- 5.1 **Create a communication plan -** Develop targeted information for key audiences about your energy management program.
- 5.2 **Raise awareness -** Build support at all levels of your organization for energy management initiatives and goals.
- 5.3 **Build capacity -** You can expand the capacity of your staff through providing training, access to information, sharing of successful practices, procedures and technologies, and sharing of lessons learned.
- 5.4 **Motivate -** Create incentives that encourage staff to improve energy performance to achieve goals.
- 5.5 **Track and monitor -** Use the tracking system developed as part of the action plan to track and monitor progress regularly.

Energy Management

STEP 6: Evaluate Progress

- Evaluating progress includes formal review of both energy use data and the activities carried out as part of the action plan as compared to your performance goals.
- 6.1 **Measure results -** Compare current performance to established goals.
- 6.2 **Review action plan -** Understand what worked well and what didn't in order to identify best practices.

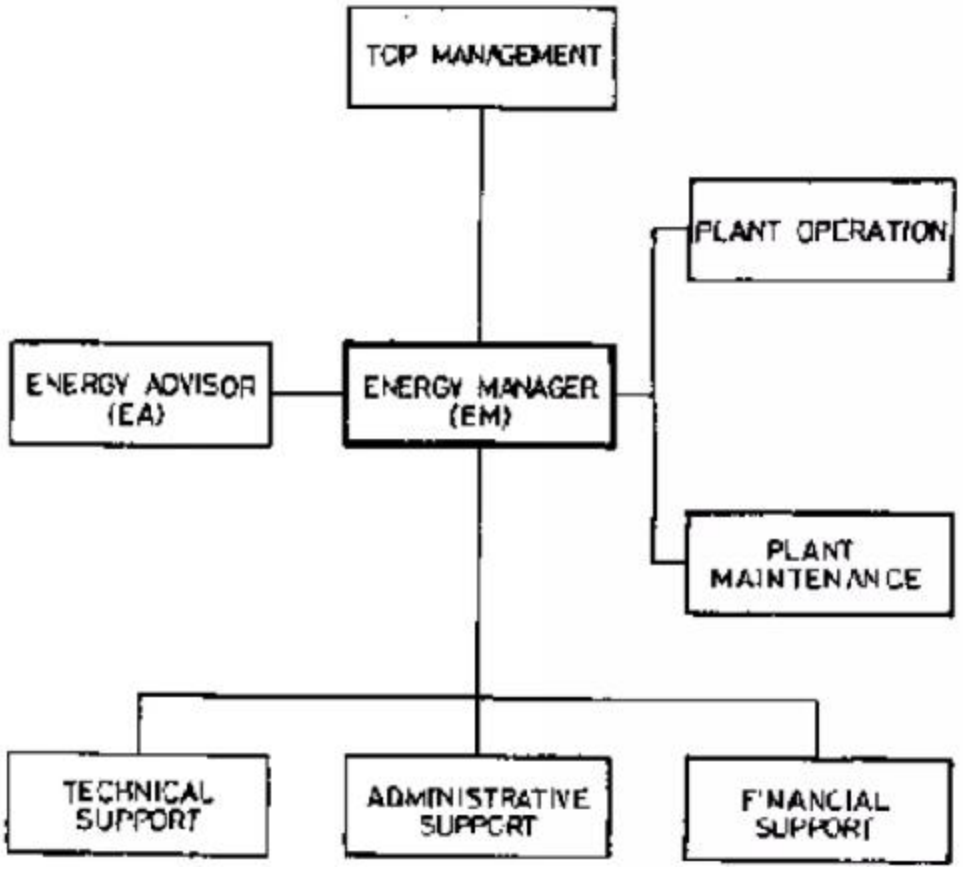
Energy Management

STEP 7: Recognize Achievements

- **7.1 Providing internal recognition** - to individuals, teams, and facilities within your organization.
- **7.2 Receiving external recognition -** from government agencies, the media, and other third party organizations that reward achievement.

Energy Management

ORGANIZATION STRUCTURE- ENERGY MANAGEMENT



Energy Management

Energy Manager

- **The tasks of energy manger are setting goals, tracking progress, and promoting the energy management program.**
- **An Energy Manager helps an organization achieve its goals by establishing energy performance as a core value.**
- Energy Manager understands how energy management helps the organization achieve its financial and environmental goals and objectives.
- Depending on the size of the organization, the Energy Manager role can be a full-time position or an addition to other responsibilities.

Energy Management

- **Location of Energy Manager**
- The energy management function, whether vested in one "energy manager or coordinator" or distributed among a number of middle managers, usually resides somewhere in the organization between senior management and those who control the end-use of energy. Exactly how and where that function is placed is a decision that needs to be made in view of the existing organizational structure.

Energy Management

Energy Manager Skills

- Have sufficient technical knowledge either to understand the implemented technology or to be able to get trained in the technology
- Able to establish the organization structure
- Plan energy survey
- Identify educational needs
- Development strategy of energy management
- Able to understand economic evaluations like payback, life cycle cost.
- Have ability to communicated effectively and motivated the team.

Energy Management
force field analysis

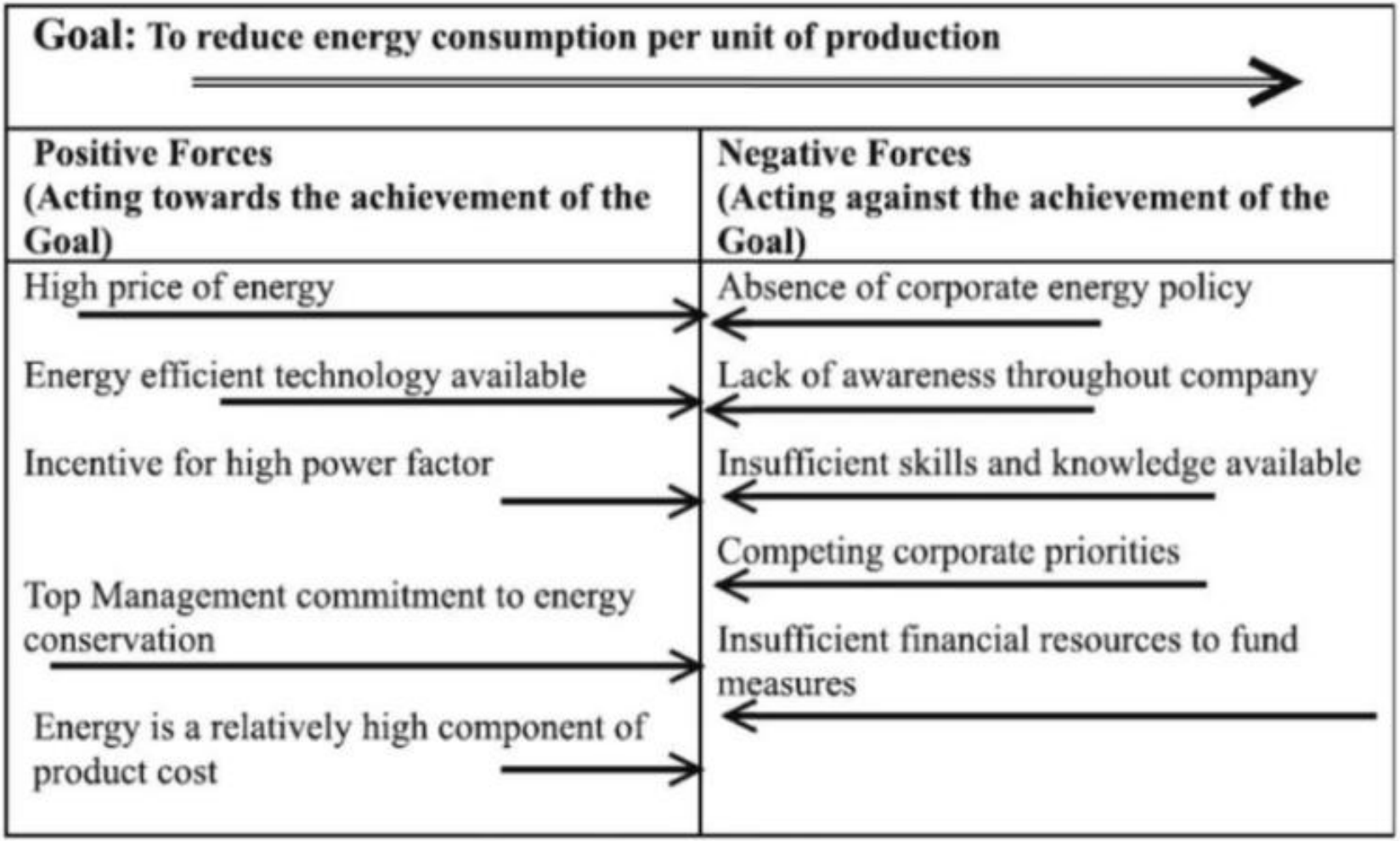


Figure 6.4 Force Field Analysis

Energy Management

energy policy

- **Energy policy** is the manner in which a given entity (often governmental) has decided to address issues of energy development including energy production, distribution and consumption.
- The attributes of energy policy may include legislation, incentives to investment, guidelines for energy conservation, taxation and other public policy techniques.

Energy Management

- **Typical Format of an Energy Policy**
- Declaration of top management's commitment to senior and middle management's involvement in, energy management.
- Statement of policy.
- Statement of objectives, separated into short and long-term goals.

Actions

- Have the CEO or head of the organization officially issue the policy
- Involve key people in policy development to ensure cooperation
- Tailor the policy to the organization's culture
- Make it understandable to employees and public alike
- Consider the skills and abilities of management and employees
- Include detail that covers day-to-day operations
- Communicate the policy to all employees, and encourage them to get involved

Energy Management

ENERGY POLICY

ENERGY POLICY OF THE CO----------

SUBJECT: Energy management program

Policy & procedure manual

OBJECTIVE
ACCOUNTABILITY
REPORTING
TRAINING

1--- POLICY-Energy management shall be implemented in all the areas of Company Operations

2--- OBJECTIVES- to use energy efficiently & provide energy security for the organization for immediate & long term range by:

1. by incorporating energy efficiency in to existing equipment's.
2 by complying government regulations---
3 by putting energy management program----

3--- IMPLEMENTATIONS—

ENERGY MANAGE
Committee
CO-ORDINATOR

4.REPORTING:

Employee—energy coordinator—energy manager—top management

5. TRAINING:

The energy manager will provide training to all levels of the company

6 POLICY UPDATING:

The energy manager & energy committee will meet ------- & review the policy --- annually ? & make recommendations for updating or changes

7. POLICY STATEMENT.

XYZ co is committed to effective & cost effective & environmentally responsible use of energy though out world wide operations . ------- will also promote energy efficiency by implementing cost effective programs that will maintain or improve the quality of the work environment ,optimize service reliability, increase productivity & enhance the safety of work place & operations.

Energy Management

KIRLOSKAR OIL ENGINES LIMITED

Enriching Lives

ENERGY POLICY

We, the KOEL, leading manufacturer of Diesel Engines, Gensets, and Pumpsets in the country are committed towards Nation's Mission for Enhanced Energy Efficiency by making continuous efforts to optimize use of energy and to bring about improvement in the energy efficiency in all our manufacturing processes and products.

We shall strive to achieve the above by:

- Benchmarking all our products for energy consumption by comparison with the regional and national best.
- Procuring and Using highly energy efficient products and technologies in our operations to reduce carbon footprint.
- Eliminating wastage of energy and promoting reuse and recycling of resources, and be environmental friendly in our operations.
- Promoting and increasing use of renewable energy resources, within and outside KOEL.
- Adopting national energy conservation norms and codes in new Building constructions as well as in existing buildings.
- Conducting periodic energy efficiency improvement studies and implementing all improvement measures and continuously monitoring gains obtained through Energy Management System.
- Involving all stake holders including employees in the energy conservation efforts through training & awareness programs. Recognizing employee's efforts through competitions and schemes.
- Sharing and enriching our experiences on energy conservation with our group of companies and other organizations
- Complying with National Energy legislations and other related legislations.

KOEL, as a part of our energy efficiency improvement strategy, will make every effort to reduce our specific energy consumption by 2-5% per year by promoting culture of innovation, creativity and aligning commitments at all levels.

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Atul Kirloskar
Chairman & Managing Director

Energy Management

Energy Managers Responsibilities

- Prepare an annual activity plan and present to management concerning financially attractive investments to reduce energy costs
- Establish an energy conservation cell within the firm with management's consent about the mandate and task of the cell
- Initiate activities to improve monitoring and process control to reduce energy costs
- Analyze equipment performance with respect to energy efficiency
- Ensure proper functioning and calibration of instrumentation required to assess level of energy consumption directly or indirectly
- Prepare information material and conduct internal workshops about the topic for other staff
- Improve disaggregating of energy consumption data down to shop level or profit center of a firm
- Establish a methodology how to accurately calculate the specific energy consumption of various products/services or activity of the firm

Energy Management

- Develop and manage training program for energy efficiency at operating levels
- Co-ordinate nomination of management personnel to external programs
- Create knowledge bank on sectorial, national and international
- development on energy efficiency technology and management system and information denomination
- Develop integrated system of energy efficiency and environmental up gradation
- Wide internal & external networking
- Co-ordinate implementation of energy audit/efficiency improvement projects through external agencies
- Establish and/or participate in information exchange with other energy managers of the same sector through association.

Energy Management

Duties of energy manager

- Report to BEE (Bureau of Energy Efficiency) and State level Designated Agency once a year. The information with regard to the energy consumed and action taken in the recommendation of the accredited energy auditor, as per BEE format
- Establish an improved data recording, collection and analysis system to keep track of energy consumption
- Provide support to Accredited Energy Audit Firm retained by the company for the conduct of energy audit.
- Provide information to BEE as demanded in the Act, and with respect to the tasks given by a mandate, and the job description
- Prepare a scheme for efficient use of energy and its conservation and implement such scheme keeping in view of the economic stability of the investment in such firm and manner as may be provided in the regulations of the Energy Conservation Act

Energy Management

Energy Monitoring and Targeting

- Energy monitoring and targeting is primarily a management technique that uses energy information as a basis to eliminate waste, reduce and control current level of energy use and improve the existing operating procedures.
- It builds on the principle **"you can't manage what you don't measure".**
- **It essentially combines the principles of energy use and statistics.**

Energy Management

Energy Monitoring and Targeting

- While, monitoring is essentially aimed at establishing the existing pattern of energy consumption, targeting is the identification of energy consumption level which is desirable as a management goal to work towards energy conservation.
- Monitoring and Targeting is a management technique in which all plant and building utilities such as fuel, steam, refrigeration, compressed air, water, effluent, and electricity are managed as controllable resources in the same way that raw materials, finished product inventory, building occupancy, personnel and capital are managed.

Energy Management

Energy Monitoring and Targeting

- It involves a systematic, disciplined division of the facility into Energy Cost Centers.
- The utilities used in each centre are closely monitored, and the energy used is compared with production volume or any other suitable measure of operation.
- Once this information is available on a regular basis, targets can be set, variances can be spotted and interpreted, and remedial actions can be taken and implemented.
- The M & T programs have been so effective that they show typical reductions in annual energy costs in industrial sectors between 5 and 20%.

Energy Management

- **Elements of Monitoring & Targeting System**

The essential elements of M&T system are:

1. **Recording** - Measuring and recording energy consumption
2. **Analysing** - Correlating energy consumption to a measured output, such as production quantity
3. **Comparing** - Comparing energy consumption to an appropriate standard or benchmark
4. **Setting Targets** - Setting targets to reduce or control energy consumption
5. **Monitoring** - Comparing energy consumption to the set target on a regular basis

Energy Management

Elements of Monitoring & Targeting System

6. **Reporting -** Reporting the results including any variances from the targets which have been set
7. **Controlling** - Implementing management measures to correct any variances, which may have occurred.

Energy Management

Elements of Monitoring & Targeting System

Particularly M&T system will involve the following:

1. **Checking** the accuracy of energy invoices
2. **Allocating** energy costs to specific departments (Energy Accounting Centres)
3. **Determining** energy performance / efficiency
4. **Recording** energy use, so that projects intended to improve energy efficiency can be checked
5. **Highlighting** performance problems in equipment or systems

Energy Management

Monitoring & Targeting System

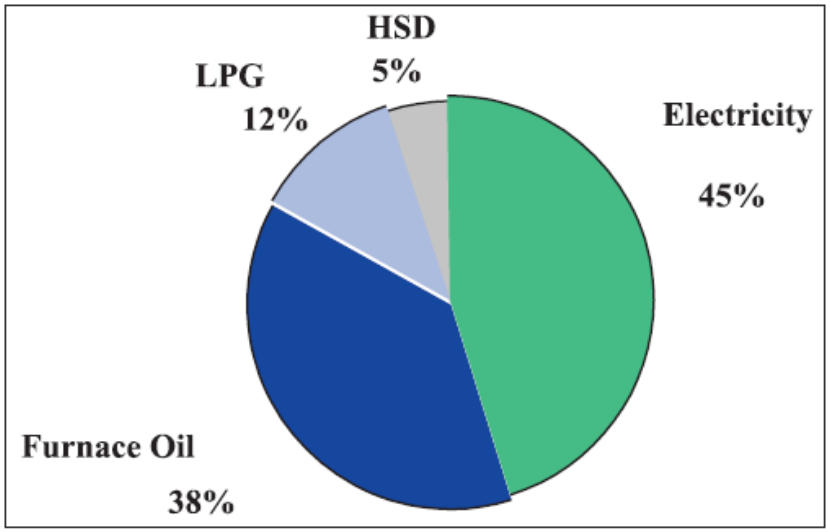
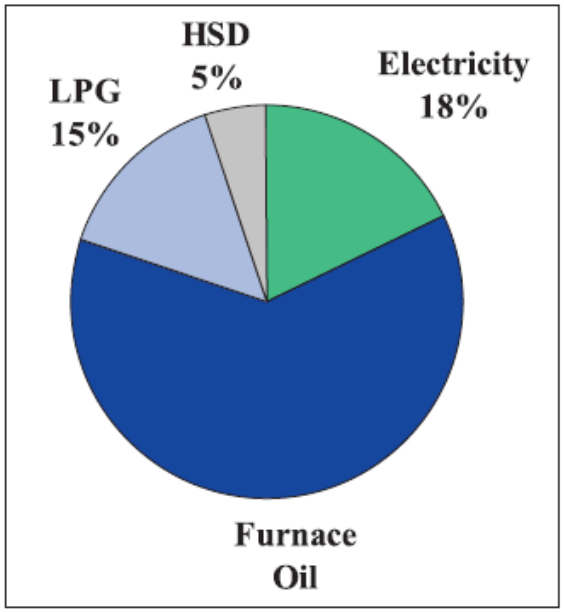


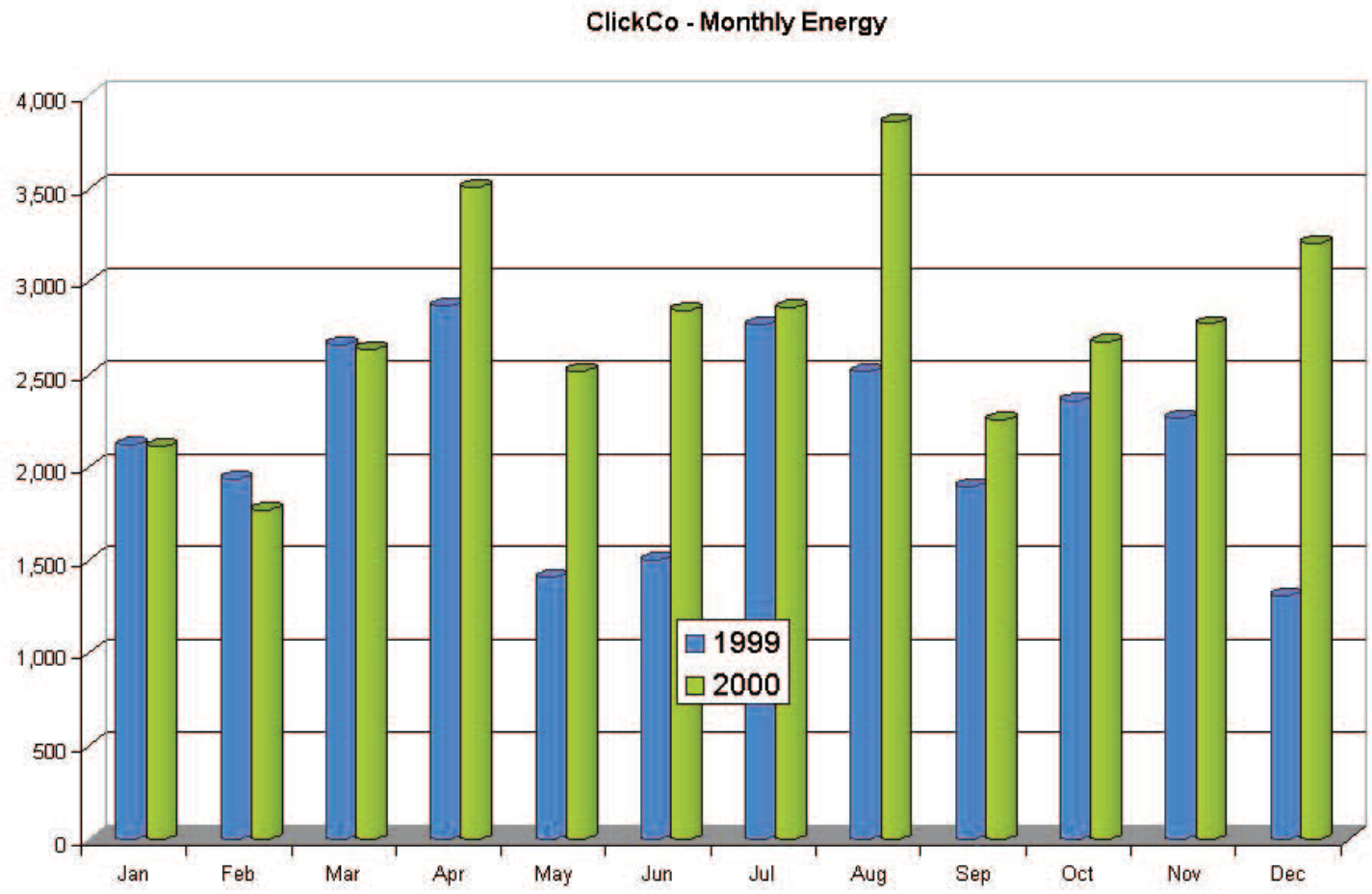
Figure 8.1 % Share of Fuels Based on Energy Bill



%Share of Fuels Based on Consumption in kCals

Energy Management

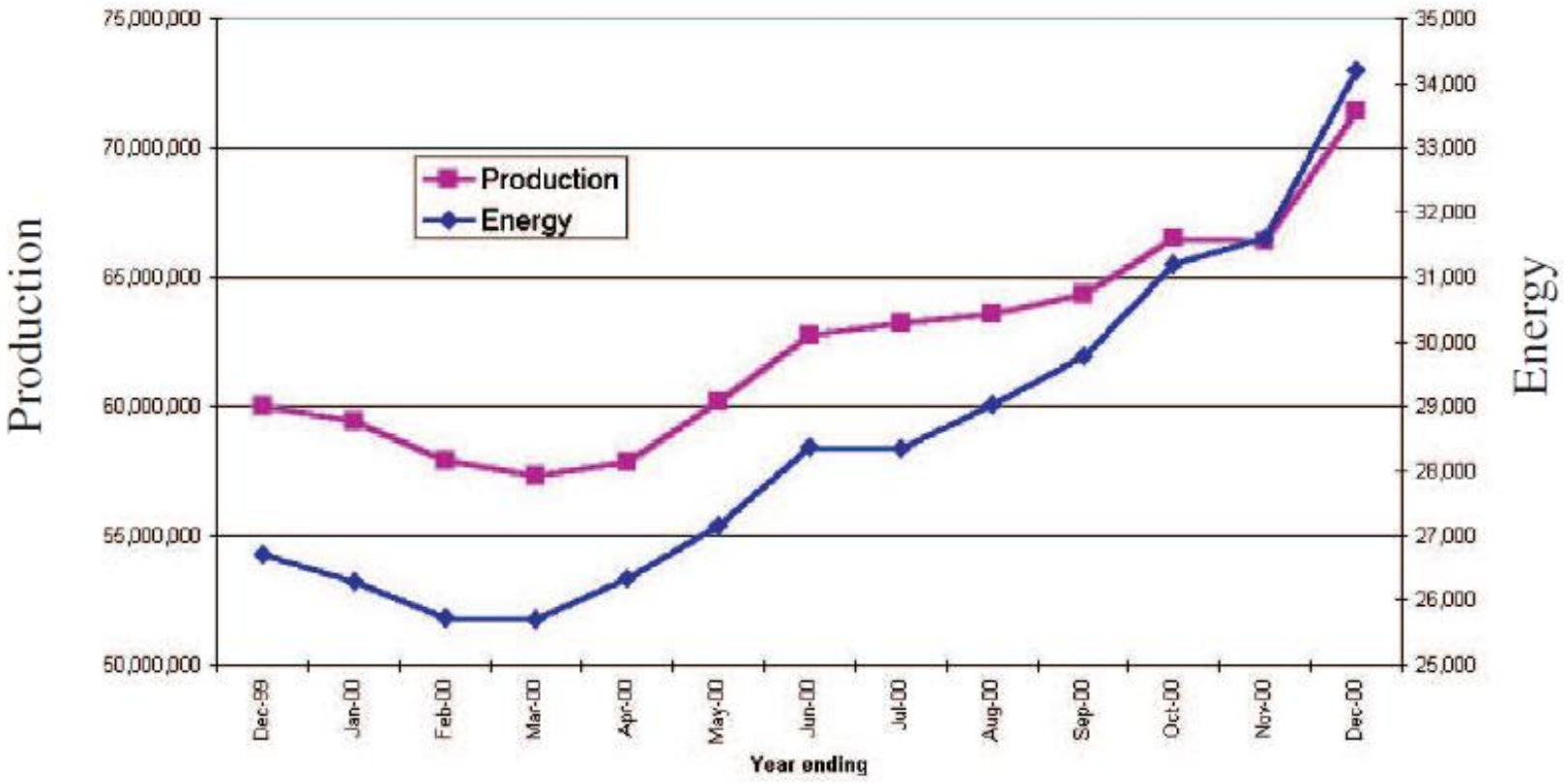
Monitoring & Targeting System



Energy Consumption :Current Year(2000) Vs. Previous year(1999)

Energy Management

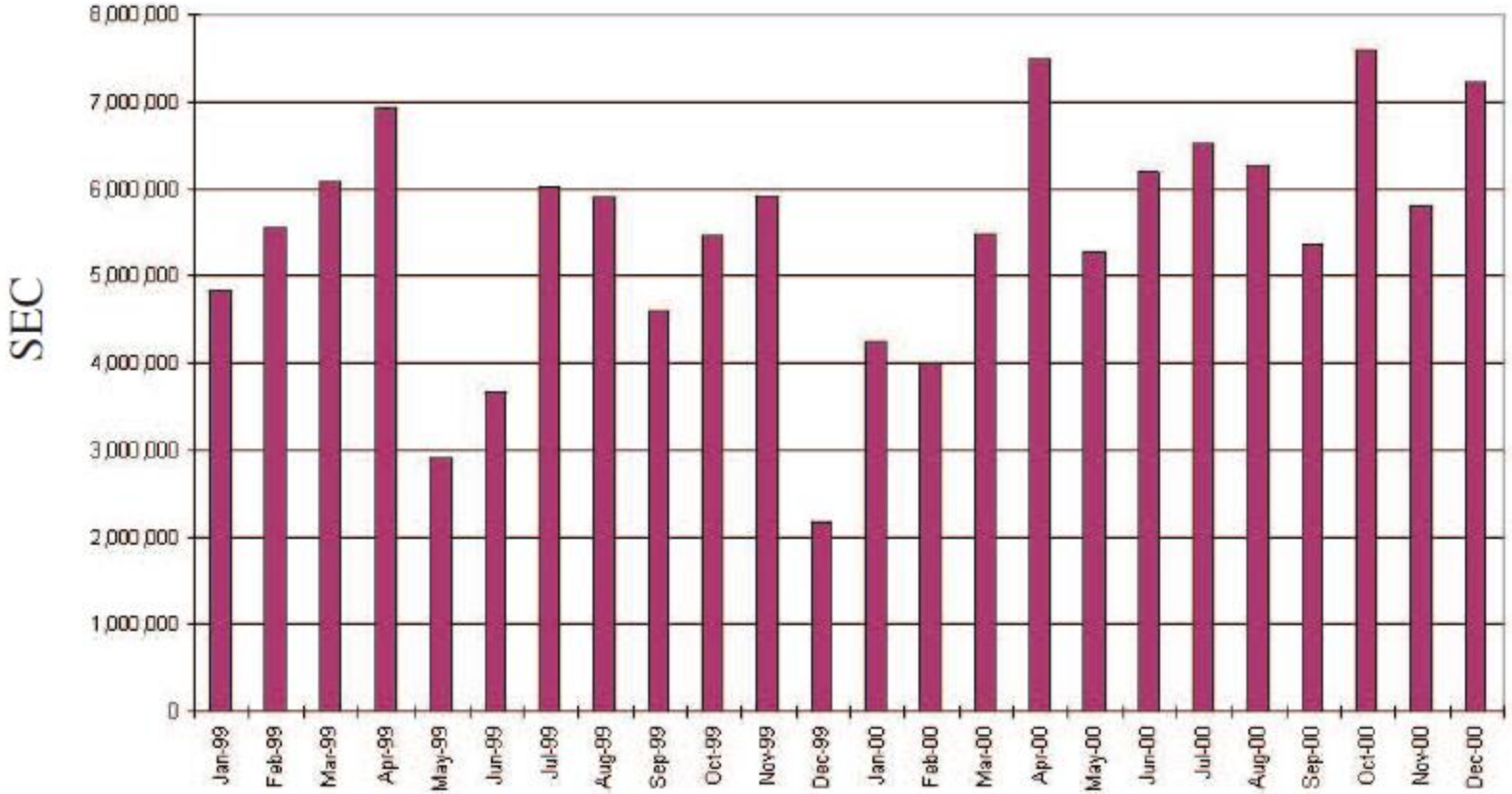
Monitoring & Targeting System



Moving Annual Total - Energy and Production

Energy Management

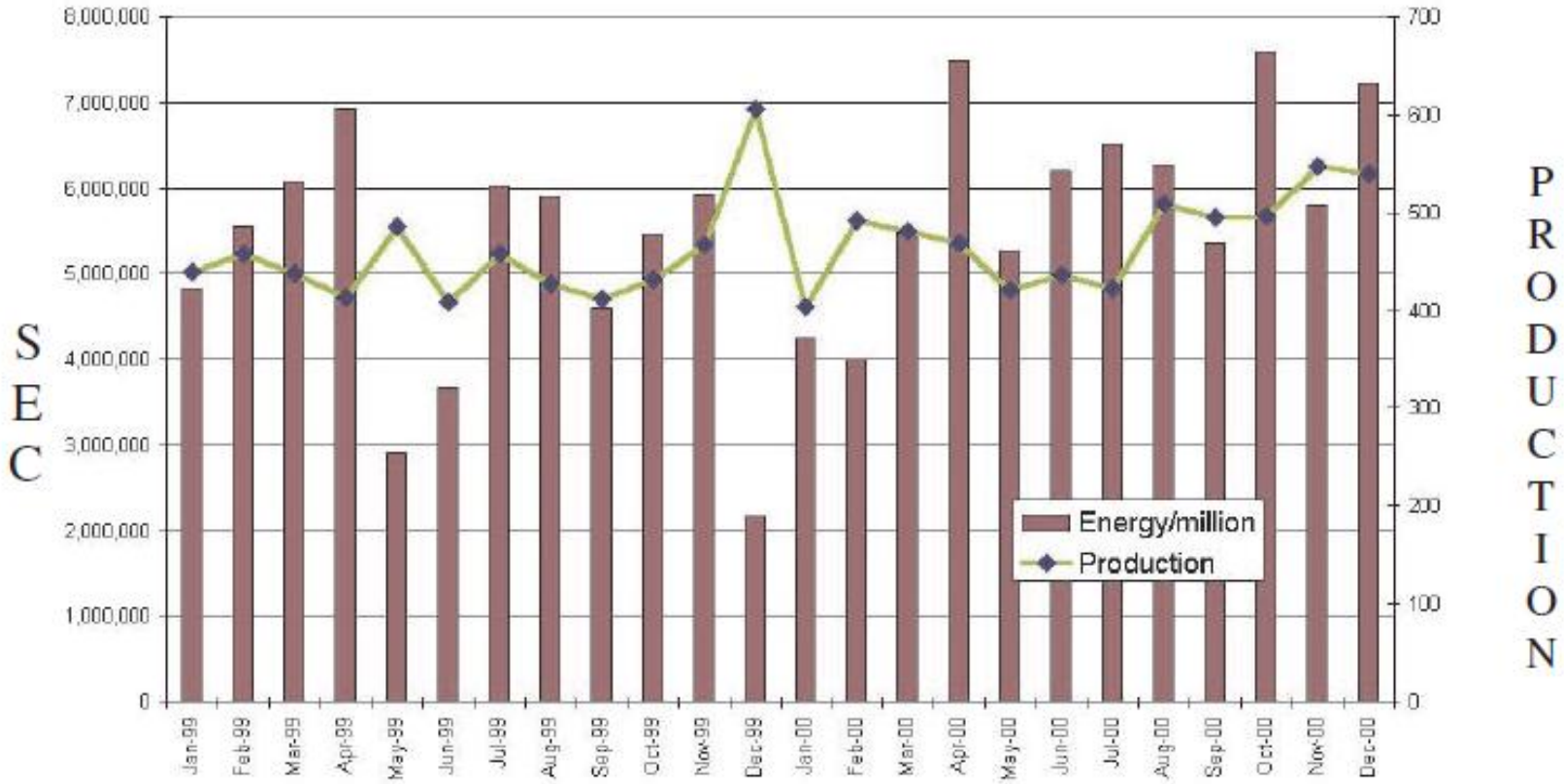
Monitoring & Targeting System



Monthly Specific Energy Consumption

Energy Management

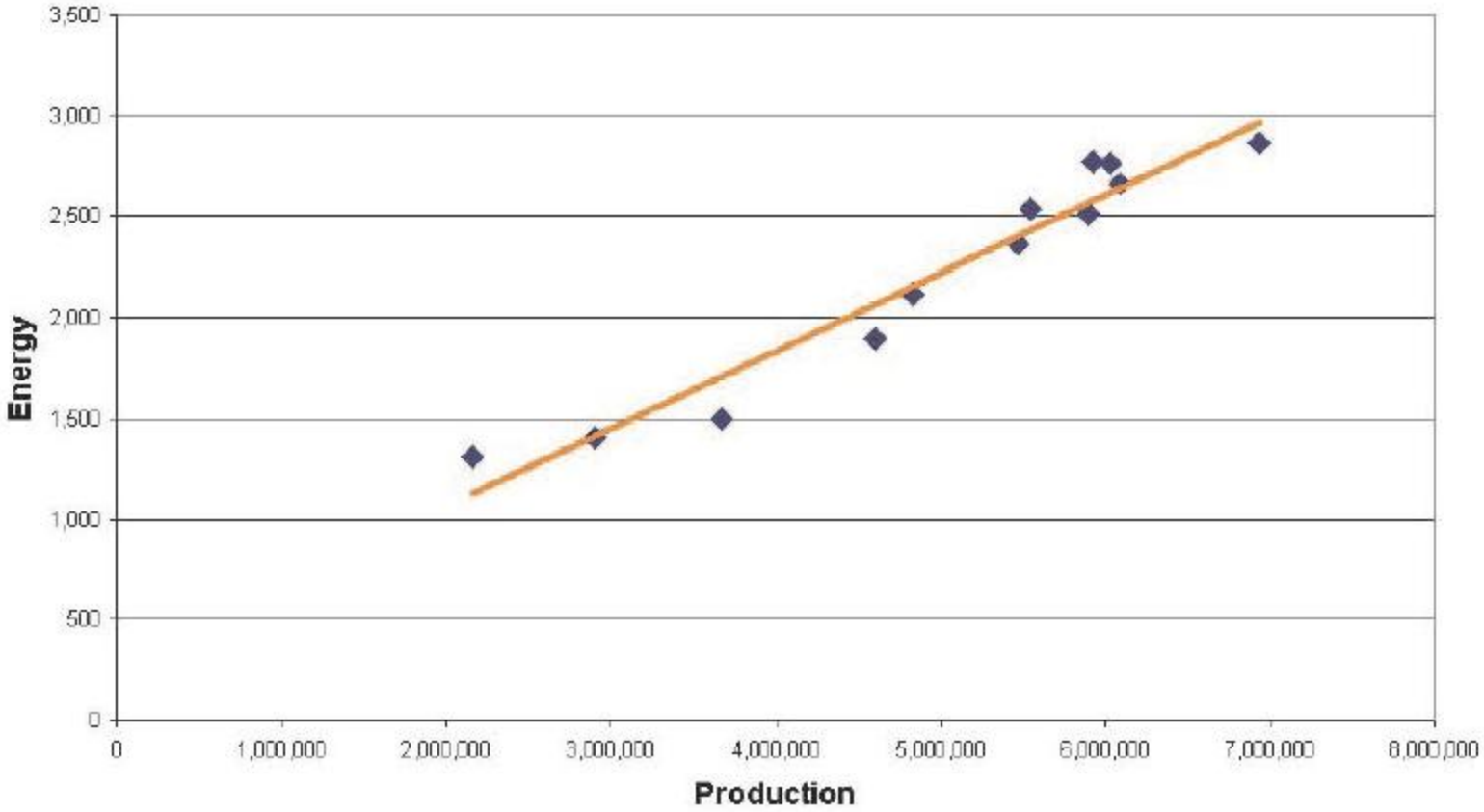
Monitoring & Targeting System



SEC With Production

Energy Management

Monitoring & Targeting System



Energy vs Production