Portfolio Energy Management: 5 Strategies for Decarbonizing Industrial and Commercial facilities

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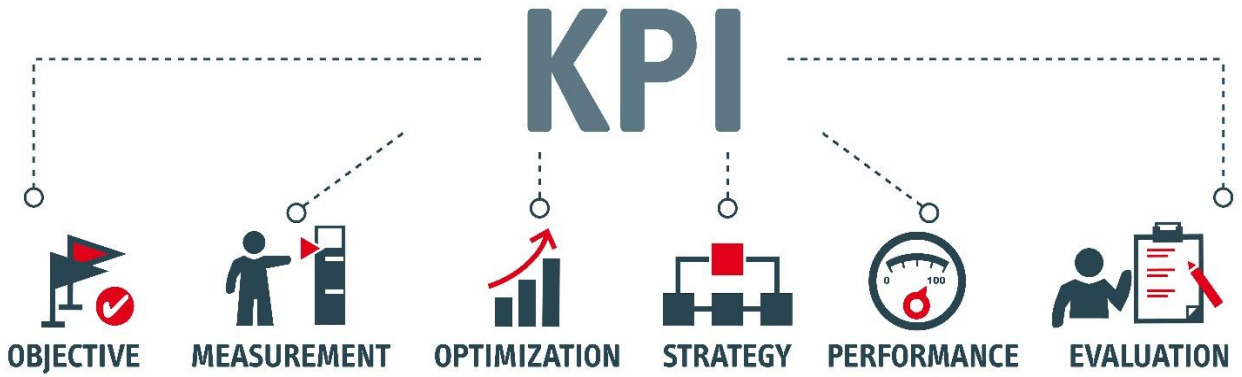
- Understand and use Energy KPI’s
- Implement Energy Management System (ISO 50001)
- Optimize Building Space & Industrial Processes
- Carry out Energy Audit and implement ESO
- Integrate Renewable sources of energy

Understand Energy and use KPI’s

- **Energy KPI:** Indicates what an organization seeks to do and how to measure success.

Benefits

- Provides clarity and support to strategic goals
- Provides signpost and triggers
- Provides way to communicate understanding of success



Energy KPI's for consideration

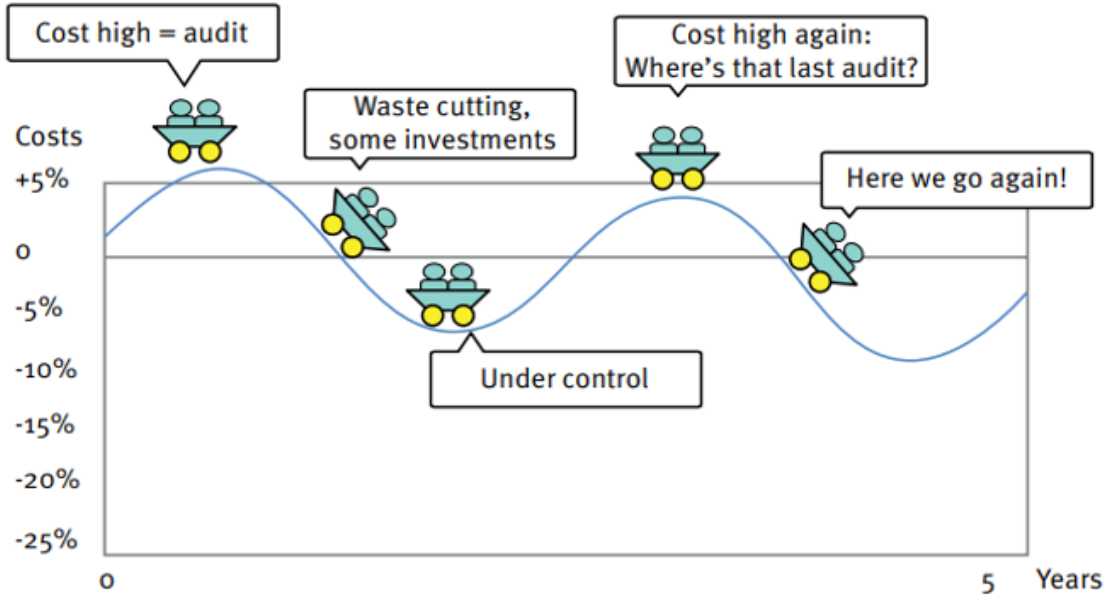
- Energy Consumption and Cost
- Energy Use Intensity
- Energy Cost Intensity
- Peak energy demand
- Solar PV system performance
- Project economic analysis

Category	Level	Example
Cat. 1 KPI's	Macro	YTD kWh, kWh/ton, MJ/ton, kWh/m2, Energy Cost/m2, etc.
Cat. 2 KPI's	Sub-Meter	MTD kWh/m2, kWh/ton, MJ/ton, etc.
Cat. 3 KPI's	Day to Day	kWh/SCFM of compressed air, MJ/kg of steam, kWh/ton of refrigeration, etc.
Cat. 4 KPI's	Macro	SP, NPV, ROI, IRR, LCC etc.

Energy Management System (ISO 50001)

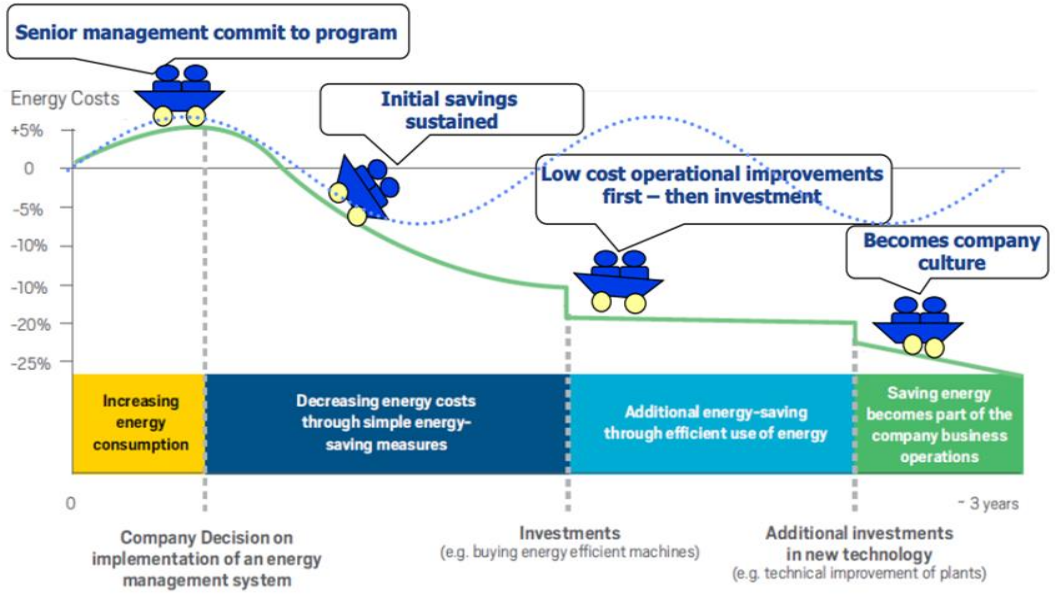
Proven best practice methodology for proactive and effective energy management.

Ad-hoc Energy Management



Source: Sustainable Energy Authority of Ireland

Systematic Energy Management



Source: Kahlenborn et al. (2012), based on Lackner & Holanek (2007)

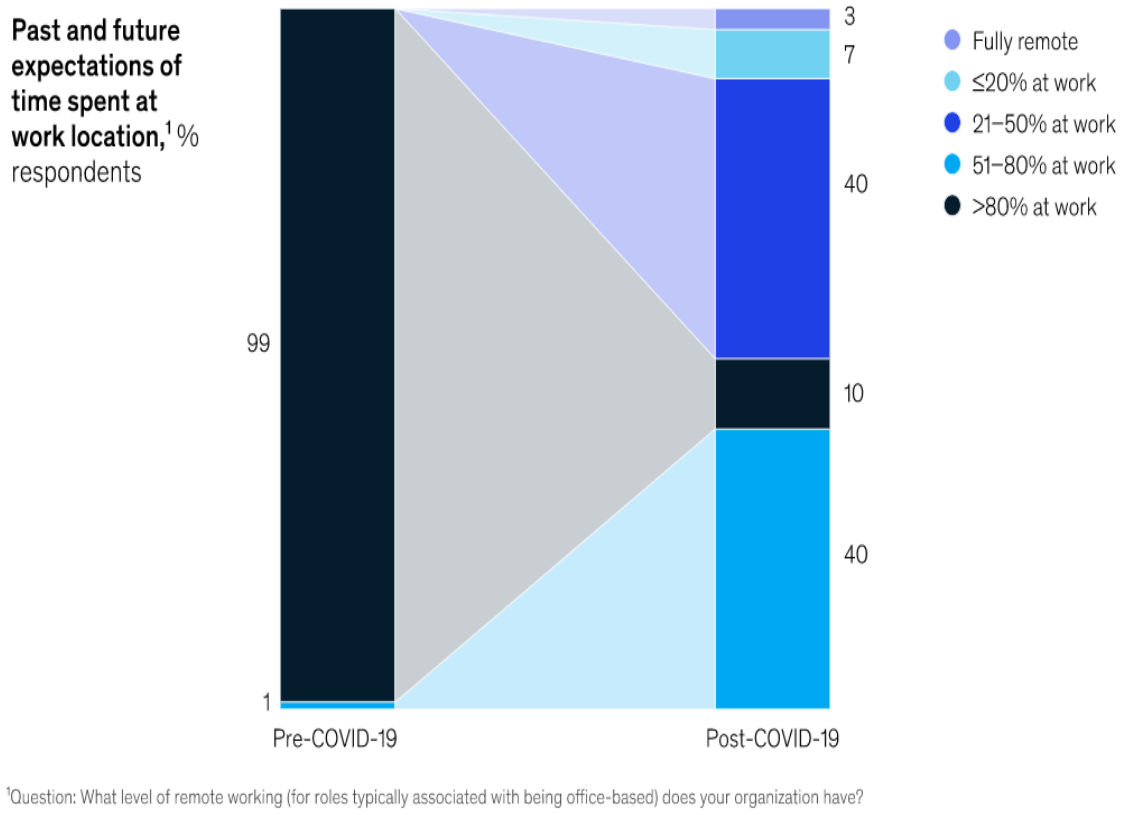
Implement Energy Management System (ISO 50001)

- Offers a systematic approach for integrating energy efficiency into an organizations management culture an daily practice.
- P-D-C-A approach to energy management.
- Can be integrated with existing management standards like ISO 9001, ISO 14001

Source: Industrial Energy Efficiency, eere.energy.gov

Optimize Building Space

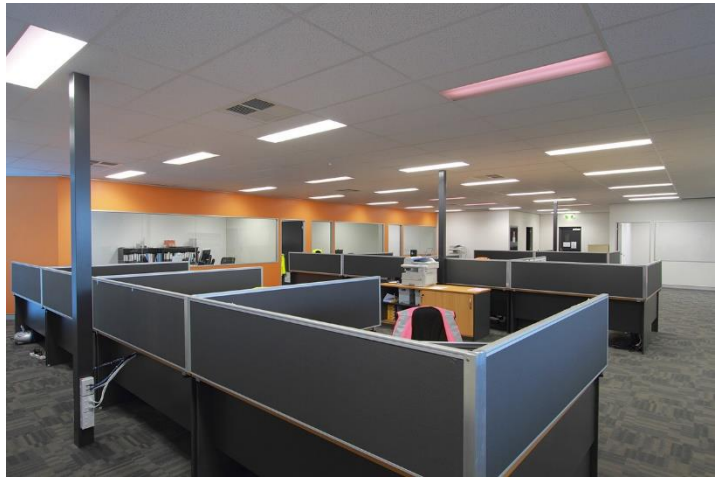
- Office space vacancy to increase due to growth of hybrid, flexible working and new office construction.
- Space are underutilized due to changes in employee behaviours and digitization.
- 50% Space utilization are not tracked hence energy wastage are unattended.
- Space utilization = People count + Active occupancy + Passive occupancy



Source: www.mckinsey.com

Optimization of Building Space

- Carry out space functional analysis: Usage, HVAC, Lighting, Geysers etc.
- Review energy consumption to understand the trends.
- Use technology or data to understand employee preferences and behaviours.
- Make adjustments to match the needs and usage of the space.
- Optimize energy end use by: downsizing equipment, AC thermostat control, use of Occupancy sensors, VSD and etc.

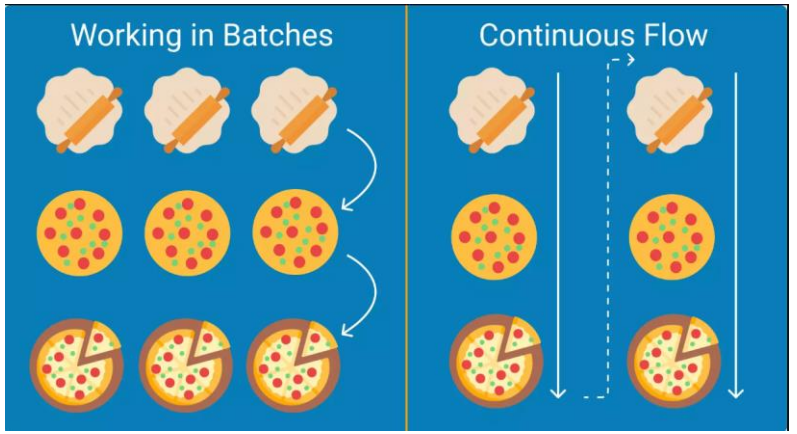


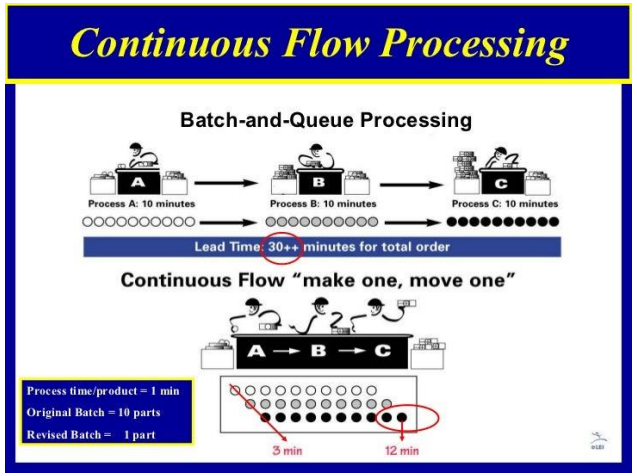
Optimize Industrial Processes

- Over processing and Overproduction are the major contributors of energy wastage in Industry.
- They contribute to the other types of waste in manufacturing.
- If waste is eliminated in Production and Processing, energy consumption will be reduced and GHG will be lowered.

Optimization of Industrial Processes

- Review the production process per product of your factory.
- Evaluate the time for processing a product from start to finish.
- Identify the source of waste in the value stream of the process i.e. bottlenecks, delays and interruptions.
- Eliminate or minimize the waste.
- Evaluate the energy input streams for the process.
- Supply energy according to need of process.





Source: 460 Operations – 4.20

Energy Audit – Know your energy efficiency potential

- An important step for improving the energy efficiency & utilization in Commercial and Industrial facilities.
- It Identifies, Quantifies and Prioritizes Wasted & Lost Energy and recommends actions to minimize or eliminate them.
- **Input Energy** = **Energy used (useful)** + **Energy wasted** + **Energy lost**

Types of Energy Audit

Standards: ASHRAE, BS, ISO and EN

Types of ISO 50002:2014 Energy Audit

- **Type 1**: Smaller organizations or preliminary audit for a larger organizations or facility.
- **Type 2:** Detailed audit for single site or process. Not cost effective for organizations with smaller energy budget.
- **Type 3:** Comprehensive audit for large facilities, process and energy system. Applicable to organizations with high energy spend or with targeted capital investment grants.

Integrate Renewable sources (Solar energy)

Solar Thermal Systems

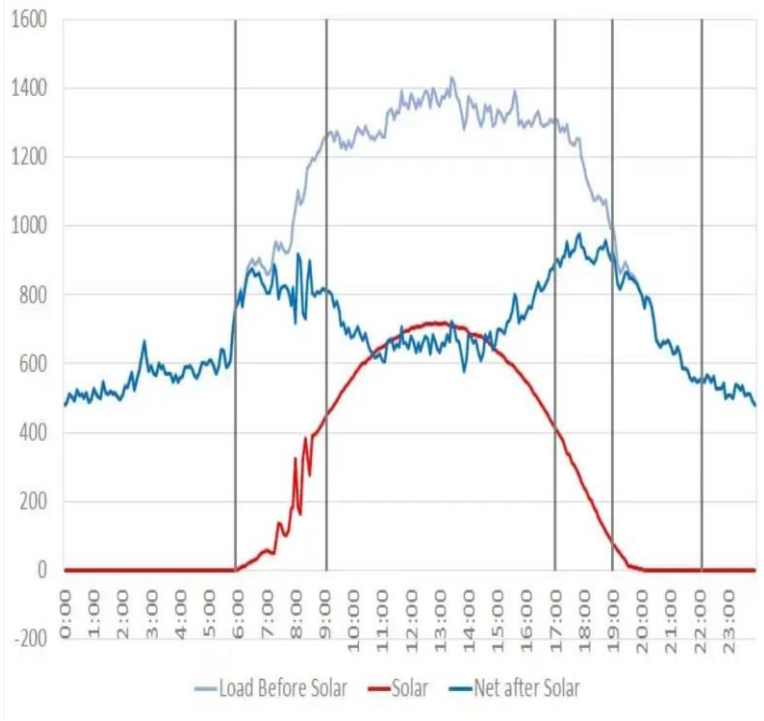
- Can provide about 50% of the heat demands in Agricultural food and Industrial processes.
- Can provide day to day warm water needs for facilities, Hotels, Restaurant, Hospitals, Laundry, etc.
- Advance in technology has made some applicable for heating water above 250°C.
- Applicable for sterilizing, drying, pasteurizing, evaporation, distillation etc.

Solar PV Systems

- Grid Interactive.
- Grid interactive with batteries for entire load.
- Grid interactive with batteries for dedicated loads i.e. Lighting, Water pumping, Air Conditioning, etc.
- Can be used as an Uninterruptible Power Supply.

Integration of Solar Energy

- Evaluate your need of Solar energy. Do you have high thermal energy load or high electrical energy load.
- Are there power quality concerns: Data Centers and advance manufacturing.
- What is your peak load vs base load
- Is there space for installation and what is the environmental air quality.



Conclusion

- Understand and use Energy KPI’s.
- Implement Energy Management System (ISO 50001).
- Optimize your Building Office Space and Industrial Processes.
- Carry out Energy Audit and implement the Energy Saving Opportunities.
- Integrate Renewable sources of energy.

Thank you!

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