Strategic and Innovative Approach for Energy Management for Operational Excellence

Innov8 ProTech Solutions
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For

NGS conclave on Innovation 2026

6th - 7th August 2026

By Joy Shah

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ISO 50001 Auditor and Energy Auditor,

Early professional in climate change and environment sustainability, Safety and Risk Management Professional,

GreenCo Assessor Excellence Award 2026 by CII,

Bronze winner of 2026 Hydrogen Safety Challenge by CHS,

Sustainability Ambassador 2026 in Green Category by SPSC

Former Sr. VP- Head of Technical Services, Energy and QA/QC, Chairman of Process safety Management Committee, Leader of Risk Management element of OMS

Safety and Sustainability Management Consultant

Energy Contact - Cell phone charger

- 70 crores cell phone users in India
- Assuming 10% of cell phone users are habitual of leaving chargers on i.e., 7 crores

- Assuming the charger is left on for 10 hrs for 365 days a year

- 65,000 MWh / year

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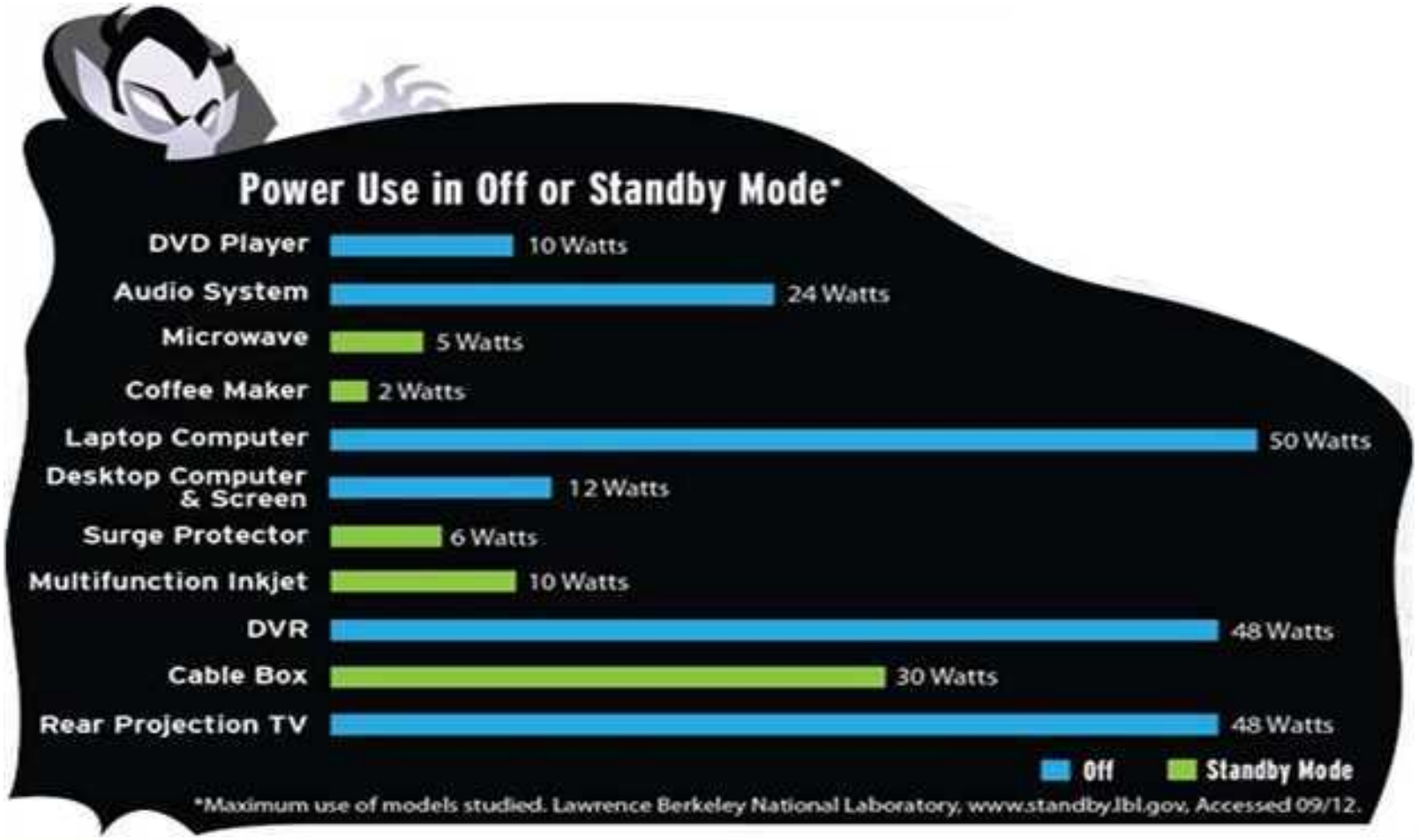
Vampire energy



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Misconception

We are generator of Energy and therefore our cost of Energy is very low.

Most of our scheme is uneconomical due to low cost of Energy.

Our priorities are different.

Share of Cost of Energy in variable cost is almost 70% in any Chemical, Petrochemicals and Refinery sectors.

Even 10% reduction in energy cost can reduce variable operating cost by 7%.

It is first step to achieve net zero carbon.

Then Why to wait for such a noble cause?

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National Mission on Enhanced Energy Efficiency (NMEEE)

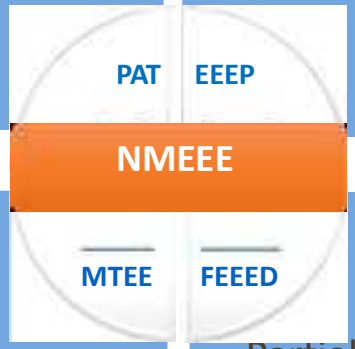
Four Initiatives under NMEEE

Perform, Achieve and Trade (PAT)

Energy conservation Act 2001.
Mandatory Energy Saving Targets for Energy Intensive Industries

Energy Efficiency Financing Platform (EEFP)

Stimulate Funding for Energy Efficiency Projects



Market Transformation for Energy Efficiency (MTEE)

BLY - UJALA
SEEP (Super Energy Efficient Products)
Standards and Labelling

Framework for Energy Efficient Economic Development (FEEED)

Partial Risk Guarantee Fund (PRGFEE)
Venture Capital Fund (VCF)
Demand side management

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Energy Management System

Need of an hour

Energy Management Self Assessment

Quadrant 2

Integrated approach

Design EE measure

Pinch analysis, Advance technology and tools

Quadrant 1

Transformative Approach

Circular economy, Digital and nano initiatives, IIoT, Energy Productivity

Quadrant 3

Must Do

MEA, EE measures, WHR, Insulation, Combustion Control, EnMS

Quadrant 4

First Aid

Reactive approach, Leak reduction, vent and flare reduction, House keeping,

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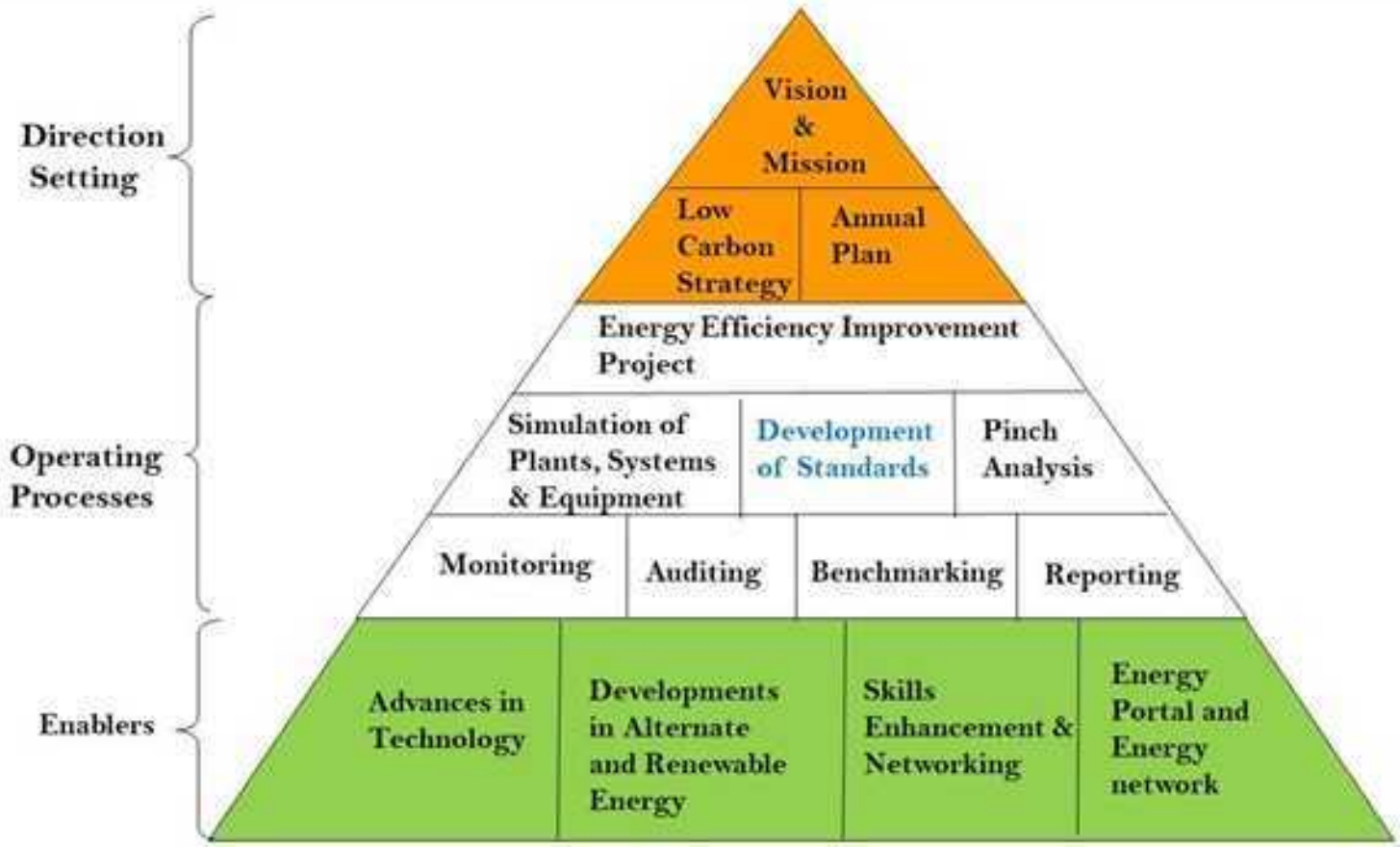
Energy Management Pyramid for Innovation



Energy Management Pyramid forms the basis for all activities in the Energy Management.

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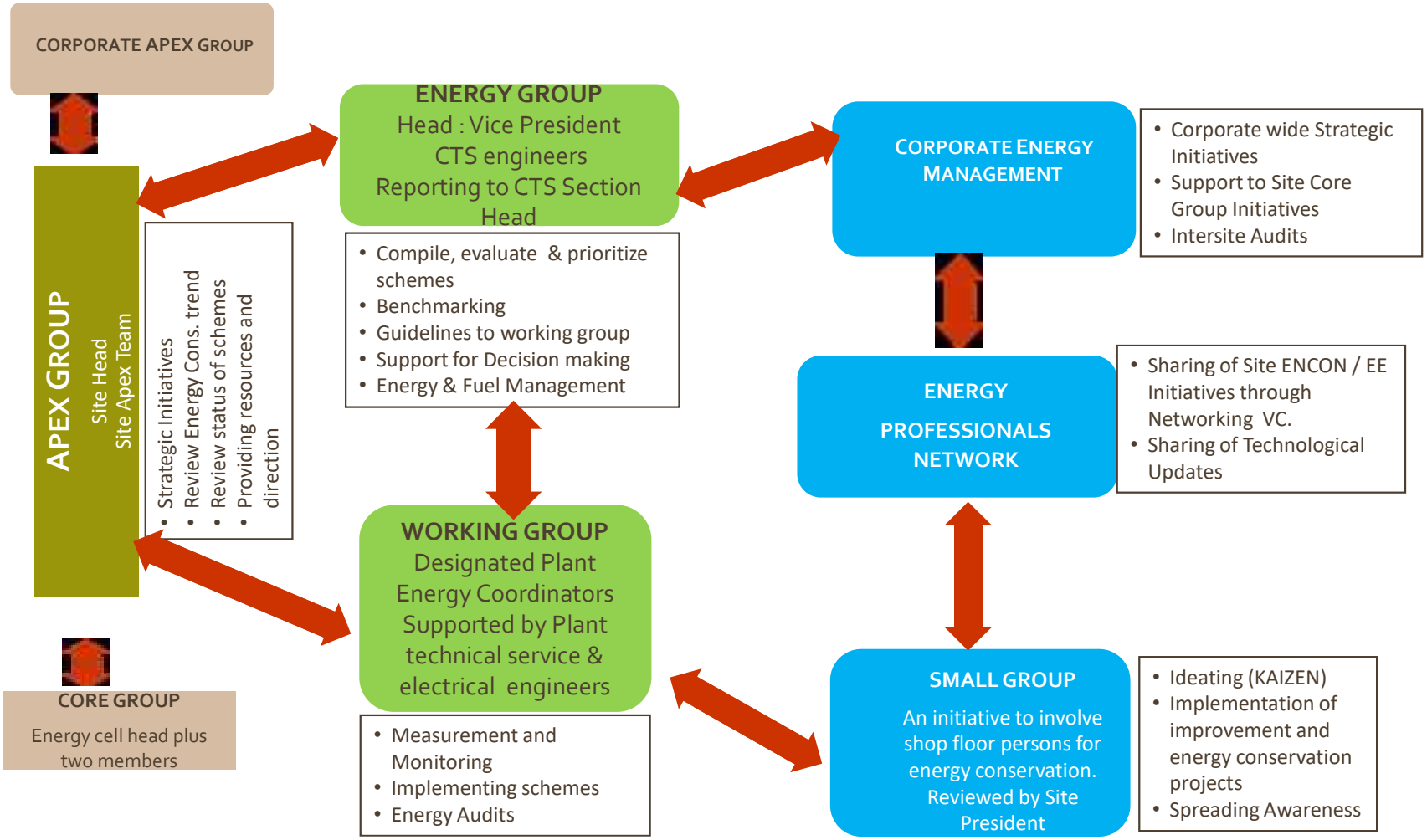
TYPICAL ENERGY MANAGEMENT STRUCTURE



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ENERGY MANAGEMENT STRATEGY

SITE POLICY & OBJECTIVES

BENCHMARKING MONITORING GAP ANALYSIS

PEOPLE ENGAGEMENT

KAIZEN | ENERGY MONTH | SPOT THE ENERGY LOSS

Documentation

Ideas Generated

PROJECT HOPPER

TOOLS

- Detailed Pinch Analysis
- Total Site Analysis
- Sigma Fine
- Statistical Analysis Tool
- Process Simulators

TRAINING

CEM | CEA | ISO50001 | AWARENESS CAMPAIGNS | SOFTWARE | GUEST LECTURE

Ideas Screened

PROJECT REVIEW

Ideas Evaluated

PROJECT DEVELOPMENT

Detailed evaluation of shortlisted projects

Ideas Implemented & ideas carry forward

Execution

Ideas to Road Map

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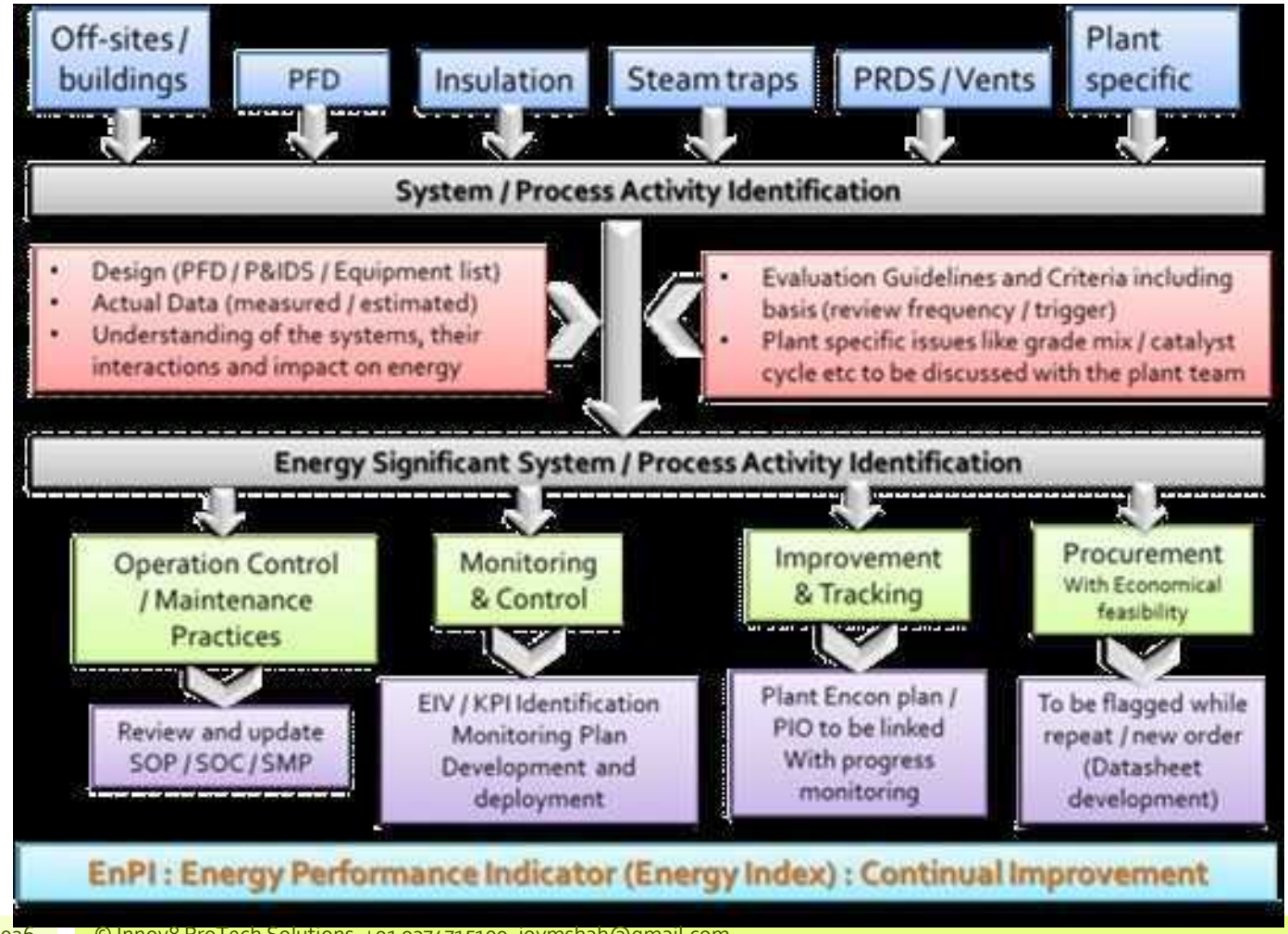
Strategic Initiatives

Bases of Energy Management System

STRATEGIC INITIATIVES 1 : ISO 50001 FRAMEWORK



- Adopt Energy efficiency in early Design and procurement stage of bidding.

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Energy Management System for Operational Excellence

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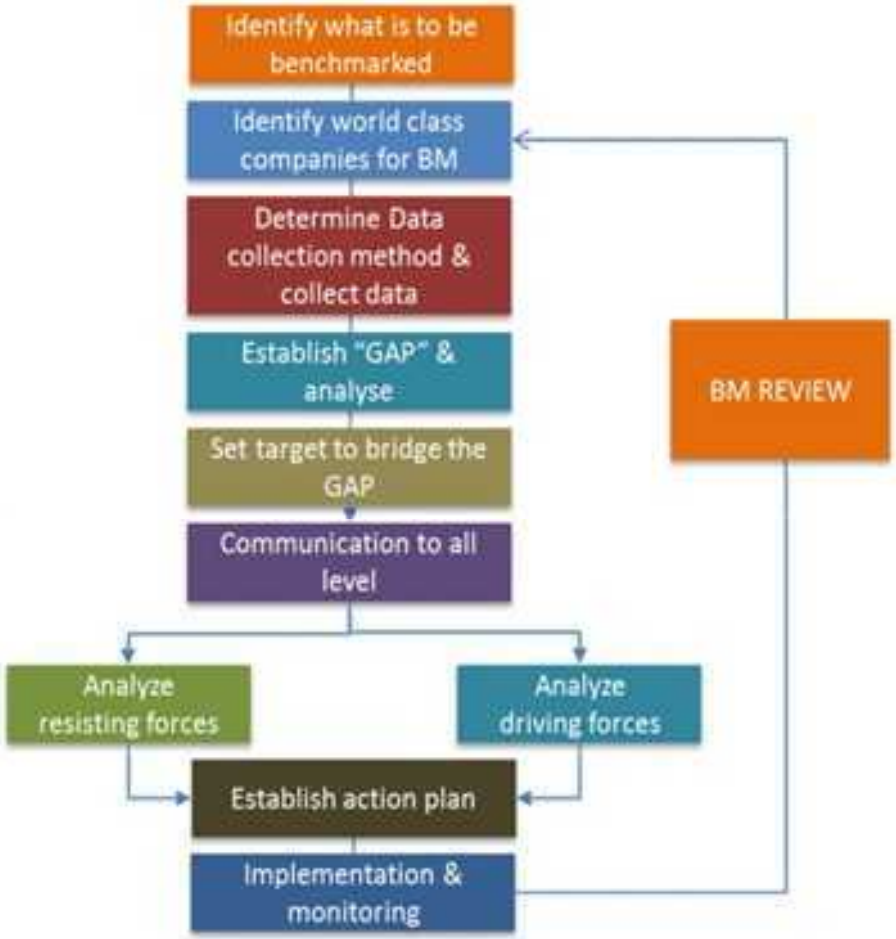
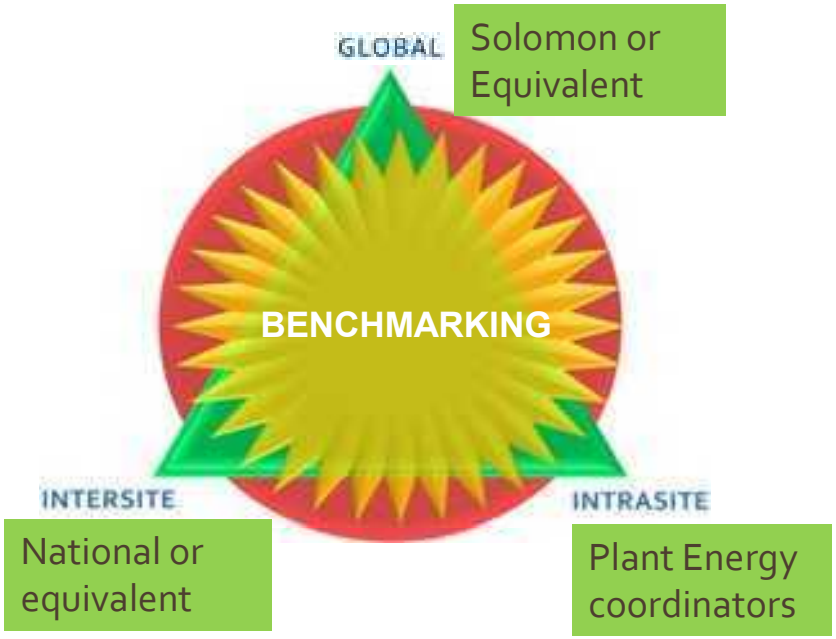
SI 2 : BENCHMARKING LEVELS



Benchmarking is a major process carried out as part of energy management strategy.



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SI 3 :ENERGY SYSTEM AUDITS

External Audits
Steam Trap Health Survey
Heat Integration Study

Statutory Audits :

Electrical Energy System
Power System

INTER-SITE AUDIT

Furnace audit

Cooling water system Audit

INTRA-SITE AUDITS

ISO 50001 internal Audit

Insulation health check audit

Steam leak audit

ISO 50001:2011
Periodic Audit by External Audit team

Steam / Hot oil Trap
Performance Audit and certification
Thousands of steam traps

Heat Integration Audit
Advance Technologies trained

Internal Energy (System) Audit

Audit Team members are recognized by
Best Energy Audit Team Award.

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SI 4 : MONITORING & REVIEW SYSTEM

Real Time | Daily | Weekly | Fortnightly | Monthly

EIV – Energy Influencing Variable

PROCESS

- Controllable
- Drive Continuous-Improvement

Monitoring to be done through State of the Art Systems.

- Controllable
- Measurable
- High Energy Impact

- Strategic
- Promote Investigation/ Analysis

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SI 5 : TOOLS/ SOFTWARE USED FOR ENERGY CONSERVATION

Sr.No	Application	Tools / Software
1	Utility system modeling tools a) Logic-based tools for less-complex utility systems b) Optimizers for more-complex utility systems	a) PROSTEAM® b) (Ac Aspen DMCplus ; Control)
2	Pinch analysis software	SUPERTARGET™
3	Monitoring and targeting Tool	aspentech Aspen IP-21 Process Explorer
4	Statistical Analysis Tool	Minitab 16 Statistical Software
5	Process simulators	aspentech
6	Heat exchangers Design /Rating /Simulation	HTRI
7	Training Simulators	Plant Specific Dynamic Training Simulators
8	Utility Reconciliation Tool	Sigma fine

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SI 6 : UTILITY SYSTEM MODELING TOOL

Energy and Utilities Software for
"Modeling Steam and Power" ***(On-line / off-line)***

Identification of Most Profitable operation

Demand Forecasting, Production Planning & Operating Strategy

Optimize New facility design

Identify Retrofit projects

Energy Optimized Operation of Site Utility System

(Reduced Operational & Capital Utility cost)

Pro-Steam Tool Training

Site Utility Model Development (RIL-Hz)

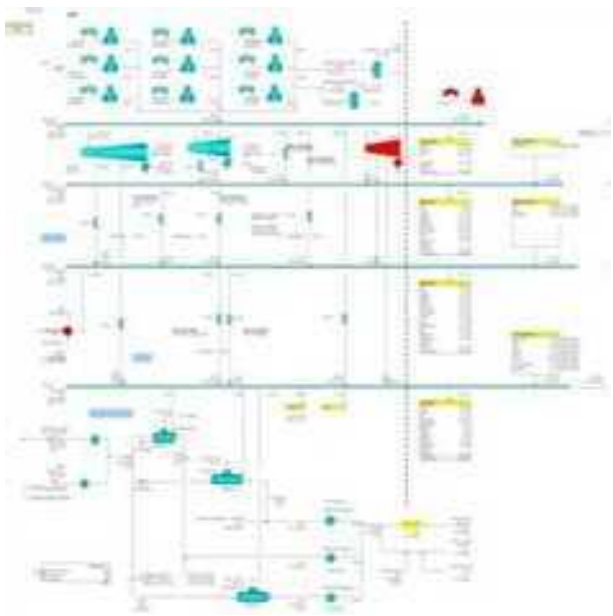
Site Utility Model Testing / Validation

Site Utility Model Fine-Tuning

Super User Training

Site-Utility Model Application (RIL-Hz)

Typical Utility Model Snapshot



Pushing Site Utility System to work in Most Energy Efficient way.

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SI 7 : ADVANCED HEAT INTEGRATION (PINCH ANALYSIS) TOOL

Super Target Tool Training

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Super Target I/P Data Collection

↓

Energy Targeting & Pinch Analysis (All Plants)

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Opportunity Identification & Feasibility Check

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Total Site Pinch Analysis

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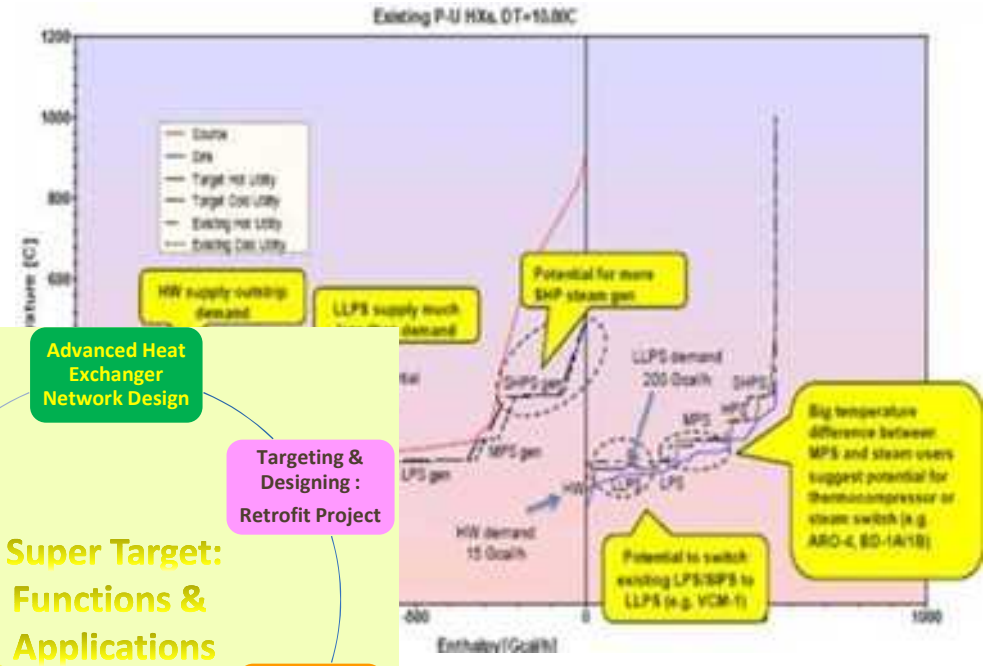
Application of Super Target & Models

Total Site Pinch Analysis



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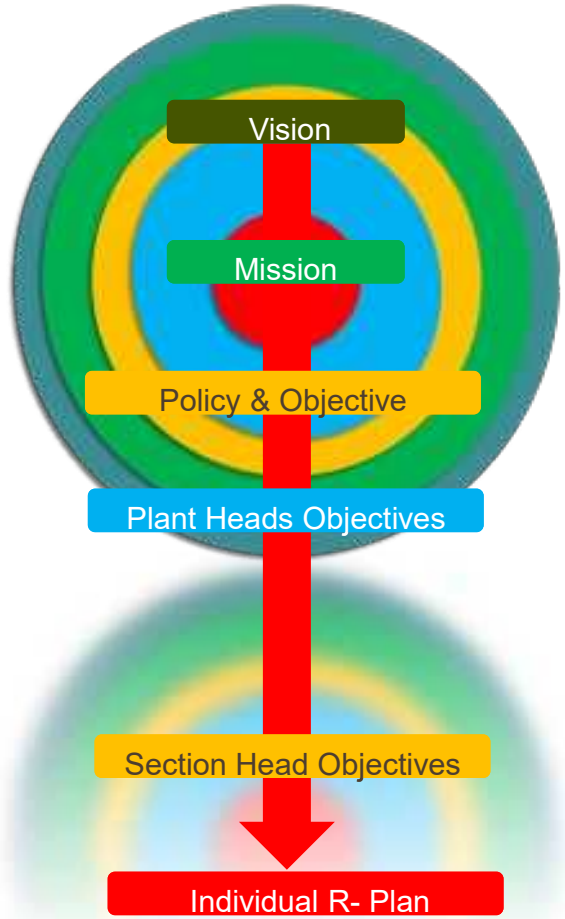
SI 8 : TOTAL EMPLOYEE INVOLVEMENT



Policy Deployment

CAPABILITY BUILDING

ENCON Suggestions	Engineers Meet	ENCON MONTH PARTICIPATION
Kaizen ENCON Month	Engineers	Nos of Employees
Pinch Analysis Utility Modeling PFD Review	SIX SIGMA PROJECTS (ENCON)	Completed Under Progress
ISO 50001:2011	BEE certified EM/EA	Business Transformation in Energy Mgmt.
Internal Auditors Complex : Awareness Program	Utility modelling	Pinch Analysis Utility Modeling PFD Review

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Energy Conservation vs. Energy Efficiency

- Energy Conservation:
  - Any action that results in the use of less energy.
  - Example : Turning the lights off when you leave the room
- Energy Efficiency:
  - Is the use of technology that requires less energy to perform the same function.
  - Example : A LED bulb that uses less energy than a CFL to produce the same amount of light is an example of energy efficiency

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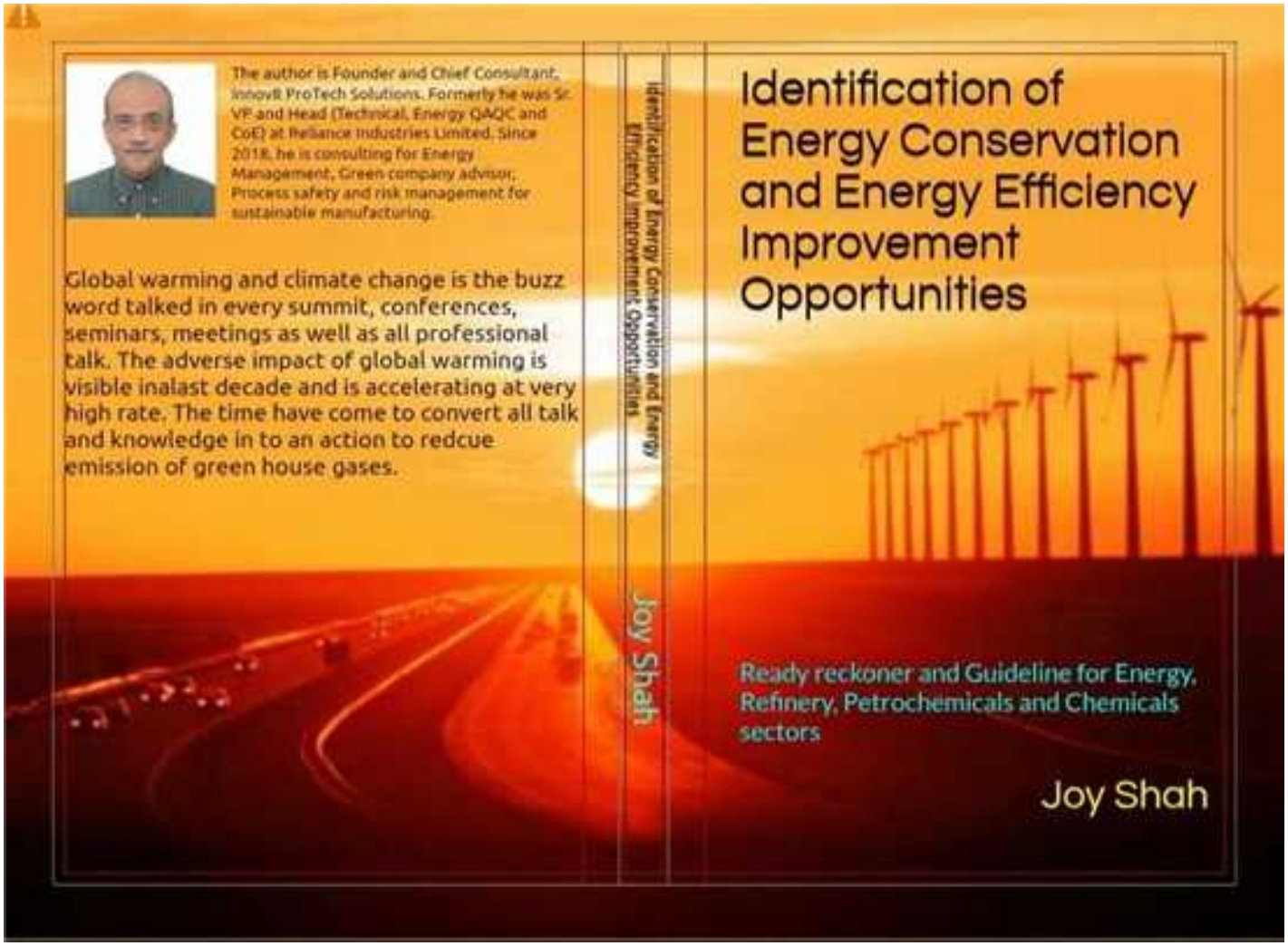

Purpose of Publication – To Democratize Energy conservation and Energy efficiency improvement initiatives.

Available free of cost for Kindle Unlimited members,

Kindle edition for personal use,

Paper back edition as Table book and

Hard cover edition for Library

is available on AMAZON.COM

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Our credentials – Energy and Sustainability Management

- **Qualification:**
- BEE Certified Energy Auditor
- IRCA certified ENMS (ISO 50001:2018) Auditor
- CII certified GreenCo Assessor
- CII certified early professional for climate change and environment sustainability
- Led Energy and Water conservation drive of Petrochemical complex for 20 years
- Published one book on Identification of Energy conservation and Energy efficiency improvement opportunities
- Published 9 articles on Climate change and Sustainability.

- **Energy Management:**
- Bench marking and Gap analysis.
- Complex level energy integration optimization along with KBC
- HENA/ pinch analysis of MEG and BD.
- Conceptualised and designed 52 nos of Power, steam and water conservation schemes.
- Credited for proposing and implementing PIO for annual saving US$ 30 million for Energy conservation
- Hand holding for certification for ISO 50001:2018 for Chemical industries in Saudi Arabia and India
- Advisor to 2 nos of Petrochemical company for energy conservation
- Technical Adviser to BEE/CII for Performa finalization and M & V for PAT scheme of of GoI

- **Sustainability Management:**
  - Development of road map for Zero Liquid Discharge and Net Zero Carbon for petrochemical and refinery
  - Completed 5 nos Energy and water audit in Chemical, petrochemical and refineries
  - Assessed 54 nos of Site for GreenCo certification by CII
  - Mentored and trained 76 Engineers for certification of Energy Manager / Energy Auditor

How can we HELP you to improve Energy Efficiency?

- Energy and Water mapping of your manufacturing facilities
- **Energy and Water Audit** of your site, identify gap and suggest improvement measures
- Energy and Water optimization study
- Green Building energy optimisation
- Adoption of best practices and best technology
- Training and Capability Development for Energy Management
- Training for Energy Conservation opportunities for equipment
- Reduce Carbon and Water foot print and improve triple bottom line of your site
- Support to build image of Green company and help to get certification
- Support Adoption of ISO 50001 EnMs
- Achieve Operational Excellence for Energy Management and Sustainable Manufacturing

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Our credentials – Safety and Risk Management

- **Qualification:**
- Trained by M/S. Dupont for Process Safety Management and by M/s. BP for Risk Management
- Practicing Process safety and Risk management professional since last 20 years
- Member of Chemical Process Safety Committee of IIChE from 2018 to 2025
- IISC team member to review CCPS 3rd edition Guideline Investigating Process Safety Incidents in 2019 published by AIChE.
- Member of Loss Prevention Panel of IChemE
- Published more than 23 articles on Safety and Risk Management

- **High Hazards sectors:**
  - Led PSM and VFL implementation at Large site.
  - Provided training to more than 300 engineers on Process Safety and risk management
  - Chairman of PSM Committee
  - Leader of Risk Element under OMS
  - Team leader and member of many PHA, HAZOP, QRA, Incident investigation, Risk assessment, ERP studies, Safety audit and PSSR of many plants
  - Training, developing procedures and handholding for PSM and its elements.
  - Support Developing Safety system and culture.

- **New Energy Sectors:**
  - PSSR of Hydrogen storage and refilling station
  - HSE audit and design review of Bio Methanol Reformer
  - HSE audit and HAZOP/SIL study of Hydrogen Fuel Cell
  - HSE audit of Electrolyser
  - Selection, operation and technical service of
    - Hydrogen Electrolysers
    - PSA for Hydrogen recovery from off gas
    - Several Hydrogenation reactions
    - Battery back up for large Petrochemical plants.
  - Several training on Hydrogens Safety

How can we HELP you to improve Safety Culture?

- PSM, OHS, Electrical and Fire audit of your Site, identify gaps and suggest improvement measures
- Training and capability development for Safety
- HAZOP study of site/plant/changes
- Pre Start up safety review of the plant
- Risk Management system development
- Process Safety Management System development
- Process Safety Competency Management System Development
- Preparation, Review and Updation of Process Safety Procedures
- Adoption of best practices and best technology
- Incident Investigation and Root cause analysis
- Hand holding for improving safety culture
- Achieve Operational Excellence for Sustainable Manufacturing

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Let’s work together for the noble cause of Energy Reduction

Joy Mahendrakumar Shah

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