Module 3 – Energy Assessment
Identifying opportunities for improvements

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

FABRIC Asia

At the end of this module you will be able to…

- Relate to Energy Assessment/ Audit Methodology as per ISO50002
- Develop audit plan to conduct deep-dive energy efficiency assessment in the factories

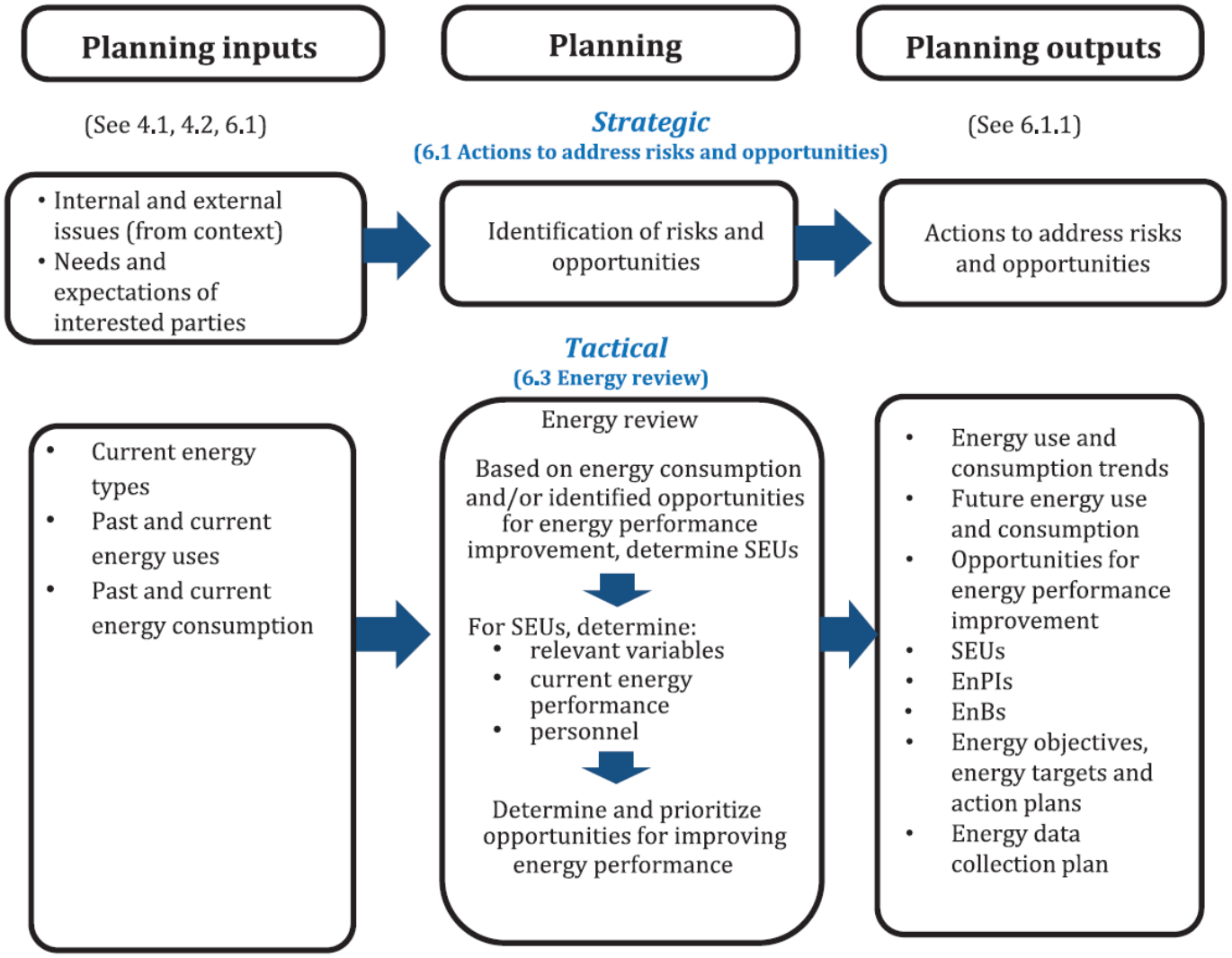
Resources

- ISO50002:2014 Energy Audits — Requirements with Guidance for Use
- IFC EHS guidelines on Energy conservation
- Best Available Techniques (BAT) reference document on Energy Efficiency

Content

- Energy Review requirements by ISO50001
- Levels of energy audit as per ISO50002 and basic requirements
- Methodology / scope of deep-dive energy assessment by prominent programs like PaCT, CbD
- Energy Audit Plan / Protocol
- Practical Exercise – The Textile Company

Energy planning process as per ISO 50001



Energy Audit – ISO 50002

Level-1 – Walkthrough energy audit

- Suitable for small organizations or as preliminary assessment for large organizations
- Identify focus areas, improve management awareness, basic training of facility team
- Data collection - Basic energy profile; variables for normalizing EnPIs, list of equipment, estimated loads
- Analysis – Basic energy balance, SEUs, high level energy profile, comparison with benchmarks
- Opportunities – Low hanging fruits, low-cost measures; basic capital requirements
- Prioritization – Indicative savings, typical payback, elementary implementation plan

Energy Audit – ISO 50002

Level-2 – Detailed Energy Audit

- Suitable for single sites
- Data collection – detailed energy consumption data; variables for normalizing EnPIs, monitoring equipment data, Design and O&M documents, future plans, production data
- Analysis – Current & historical energy profile, EnPIs, detailed energy and mass balance, energy performances, evaluate design and configuration, evaluate equipment and processes
- Opportunities – low-, medium-, and high-cost measures; indicate non-energy gains, further data requirements, benchmark comparison
- Prioritization – detailed savings reconciled with balance, basic capital and labour cost assessment, payback period, implementation plan

Energy Audit – ISO 50002

Level-3 – Comprehensive Energy Audit

- Suitable for whole site
- Data collection – detailed energy consumption data, sub-meter load profile, consumption of key processes, detailed analysis of variables, monitoring equipment data, Design and O&M documents, future plans, production data, how is energy performance managed, quotes for saving opportunities from suppliers
- Analysis – Current & historical energy profile, EnPIs, details energy and mass balance, energy performances, evaluate design and configuration, evaluate equipment and processes, effect of variables
- Opportunities – low-, medium-, and high-cost measures; quantified non-energy gains, further data requirements, detailed analysis sing advanced techniques, vendor evaluation
- Prioritization – detailed savings reconciled with balance, detailed capital and labour cost calculation, detailed economic analysis, implementation plan

Requirements by Higg FEM

Level - 1 Requirements

- Track all energy sources
- Track and measure its energy use from the sources
- Standardize methods and frequency to track each energy source

Level - 2 Requirements

- Establish energy baselines
- Identify energy intensive processes or operations
- Set targets for improving energy use
- Set targets for reduction of GHG emissions (Scope-1 and Scope-2)
- Develop implementation plan to improve energy use and reduce GHG emissions
- Demonstrated continual improvements compared to baselines

Level - 3 Requirements (not mandatory yet)

- Calculate and report Scope 3 emissions
- Develop Science-Based Targets

Deep-dive energy assessment by brands and international organizations

- Typically a trade-off between Level-2 and Level-3 Energy Audits
- Critical aspects are
  - quantification of saving potential in processes (especially investment grade)
  - de-carbonization strategy e.g., replacing fossil fuel
  - improving management practices, (iv) energy team formation
- Feasibility studies are usually conducted only for selected investment grade measures
- Implementation monitoring (2 – 6 months) is usually part of the scope
- Vendor evaluation is usually included in monitoring phase on need basis
- Final impact assessment on completion of monitoring period

Clean by Design 10 best practices - example

Sr.	Best Practices	Attained Score	Total Score	Comments
1	Measurement and management	19	40	Basic data management is being done. Electricity generation data is logged and live. Other data manually entered.
2	Condensate water collection and recycling	2	15	Condensate recovery is very low due to contamination in condensate from leaking heat exchangers in dyeing machines.
3	Cooling water reuse efficiency	1.5	10	Significant potential in cooling water recovery.
4	Process water and wastewater reuse efficiency	3	12	Condensate and other process water are discharged.
5	Discharged Hot water heat recovery	0	10	No wastewater heat recovery system installed. Need to separate the hot and cold-water discharge lines.

Clean by Design 10 best practices - example

Sr.	Best Practices	Attained Score	Total Score	Comments
6	Boiler efficiency improvement	11	20	Boiler rooms are very well managed. Boilers are for steam generation mainly and equipped with heat recovery systems. Potential for improving efficiency exists.
7	Steam traps and steam system performance	3.5	15	Steam traps are by-passed mainly due to back pressure on traps. Condensate discharged due to contamination.
8	Insulation Optimization	3.5	7	Steam and Oil Pipes are well insulated. Insulation of valves is proposed.
9	Setting machine efficiency optimization	5	15	Heat recovery is installed at 1 stenter and recommended on all remaining as well.
10	Compressed air system optimization	4.5	6	VFD Installed on both compressors. Need to develop leakage management program.
	Total	**53**	**150**	**35.3%**

Vietnam National Energy Efficiency Program for the period of 2019-2030 (VNEEP 3)

2019 - 2025

Save 5–7% from the national energy c onsumption.
T&G: to reduced 5%, compared to the period of 2015-2018

01

02

2025 - 2030

Save 8-10% from the national energy consumption
T&G: to reduced 6.8%, compared to the period of 2015-2018

Vietnam Regulation on EE implementation and EA - The Circular No. 25/2020/TT-BCT

4 Chapters, 19 Articles, prescribes :

- DEUs are responsible for mandatory energy audit every 3 years
- Reports on the implementation of annual/5-year plan for economical and efficient use of energy
- The DEUs must adopt energy management model in compliance with requirements specified under Article 8 of the Governmental Decree No. 21/2011/ND-CP

Plenary Discussion - Typical energy audit tasks

What are the typical energy audit tasks? What are the starting points and what commitments we must ensure from the top management?

Time: 15 minutes

Typical energy audit tasks

1- Define Audit and Energy objectives

2- Determine scope and criterion of the audit

3- Define energy audit tasks and responsibilities among auditors and facility

4- Formulate audit team based on identified tasks and required competencies

5- Secure top management support; break ice with key personnel (remember the formula for change)

6- Establish communication protocol

- Among auditors
- Between auditors and facility

7- Ensure access to

- Audit areas, processes, facilities
- Relevant personnel, systems and equipment (e.g. ensuring that measurement points are accessible)
- Documents, drawings, test reports, records, manuals etc.
- Monitoring data, calibration records,

8- Define measurement requirements and develop a measurement plan

- Stage-1: Point source measurement using equipment
- Stage-2: Data logging over representative period and interval; also including data of variables like production, operating parameters etc.
- Stage-3: Preliminary data treatment / organization
- Stage-4: Calculation and data visualization

Factors that influence Energy audit cost

- Level of uncertainty/ accuracy
- The extent to which investment grade, longer payback opportunities are investigated
- Scope and boundaries of audit
- Availability, organization, and details of energy data
- Availability of previous audit reports
- Complexity of facility
- Support provided by facility to the site
- Requirement for implementation support (monitoring, training, vendor evaluation, impact assessment)
- Distance to be travelled (Travel and accommodation)

Task – The Textile Company

As an energy service provider, you have received a request for energy services from "The Textile Company".

Your tasks as a groups are;

- Review the information provided to you
- Enlist the sustainability related requirements the company may have
- Develop a list of activities to provide required support to the company with timelines
- Identify how many experts, having which expertise, should be included in the team of service provider? And why?
- What type of equipment / gadgets you may need and why you need them?
- Enlist the key stakeholders that need to be involved in the company and identify what support is needed from the company during the project
- Enlist the information required from the company before starting the on-site assessment and other support activities

Task

Activity time

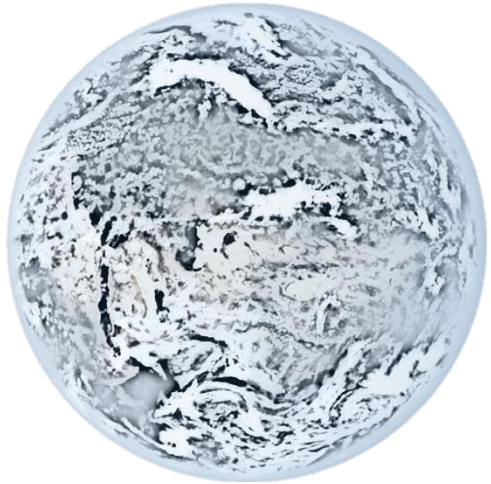
- Participants read the story and work on tasks (60 min)
- Present your plans to the company management (group presentations) (5 min each group)

Key takeaways

- ISO50001 requires Energy Review which is only a review of baseline energy performance whereas, ISO50002 requires much detailed look at energy flows, systematically identifying the energy losses.
- Deep dive energy assessment (as practiced by some brands and IFC PaCT) is a mixture of Level 2 and Level 3 energy audits
- Using any of the above assessment methodologies helps in conforming to requirements of Higg FEM Energy and GHG section as well
- Attaining correct and complete data on baseline energy consumption is critical in any level of energy assessment

Next steps

- Develop energy assessment plan, identify team, and attain necessary resources from management.
- Conduct energy assessment of your company using any of the presented methodologies (e.g., CbD 10 best practices tool)



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