Energy Management Training:
Developing the Site Walk-Around Survey Report.

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Content

- To understand the goals for the energy walk-around survey report.
- To understand the subtleties involved in positioning the report.
- To understand how to gather information to build the report.
- To understand the structure of the report.

2. OVERVIEW OF REPORT STRUCTURE

The business cases emerge from site survey reports

1. Executive summary of business case
2. Introduction
3. Review of production process
4. Energy consumption & production analysis
5. Review of industry best practices
6. Walk-around findings
7. Gap analysis and opportunities
8. Conclusions and next steps

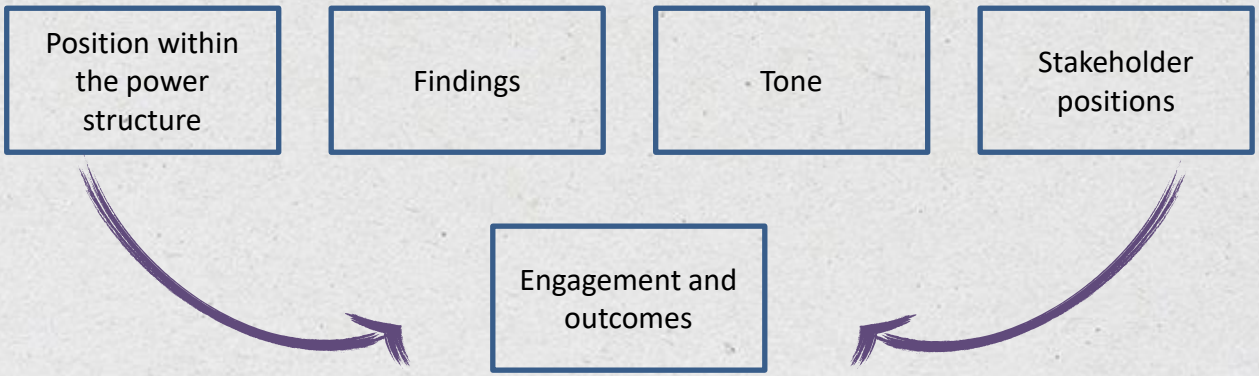
The survey report structure

Executive Summary of Opportunities

1. Survey Report Structure:
   - 1.1. Rationale and responsibility.
   - 1.2. Structure
2. Overview of the Production Process.
   - 2.1. Product range and mix
   - 2.2. Process flow diagram
   - 2.3. Definition of steps/energy consumption activities.
   - 2.4. Key equipment capacities.
3. Industry Best Practice Review (can be a separate document):
   - 3.1. International best practice exemplars and energy benchmarks.
   - 3.2. Feasibility mapping of best practice onto process.
4. Walk-Around:
   - 4.1. Involvement in survey.
   - 4.2. Observations of processes.
   - 4.3. Observation of utilities.
   - 4.4. Observation of infrastructure.
   - 4.5. General observations
5. Energy Consumption and Production Analysis (can be a separate report):
   - 5.1. Energy Consumption.
   - 5.2. Production Throughput.
   - 5.3. Energy Intensity Against Benchmarks
   - 5.4. CUSUM Analysis
   - 5.5. Findings.
6. Best Practice Gap Analysis
   - 6.1. Best practice mapping and opportunities table.
   - 6.2. Best practice commentary.
7. Recommendations:
   - 7.1. Next steps for the energy manager/executive.
   - 7.2. Requested senior management actions.
8. References
   - 8.1. Key metrics and calculation assumptions.
   - 8.2. Sources.

The importance of this report

- This report kicks off the site's organised, practical involvement with energy efficiency.
- It is crucial to ensure that the report and energy efficiency as a topic are properly positioned.
- The report must reflect reality but it must also enlist support.
- In some cases the status quo that the report describes will not look very good.
- The report can be a tool to help drive change and build alliances – and if insensitively presented can achieve the opposite effect!
- Careful design of the messages is vital!
- Align the report with helping others to deliver <u>their</u> goals, and they will help you to deliver yours.



3. REPORT SECTIONS

Executive summary

- The executive summary gives an overview of the findings and the scale of the opportunity.
- Gives a digest of energy consumption and costs.
- Gives the key energy intensity metrics and trends.
- Identifies the scale of the gap against best practice.
- Identifies the approximate savings and paybacks.
- Explains next steps.

1. Overview of survey report and structure

- 1.1. Rationale and responsibilities:
  - Defines the context.
  - Shows relationships with other initiatives.
  - Shows high level alignment with corporate goals.
- 1.2. Structure:
  - List of key sections and a single sentence description of each.
  - Where to find key information:
    - Energy consumption and cost.
    - Energy trends.
    - Total opportunity.
    - Recommendations.

2. Overview of production process

2.1. Overview of product range and product mix.

2.2. Process flow diagram.

2.3. Key process components and breakdown.

2.4. System electrical capacities.

2. Overview of production process – 2.1

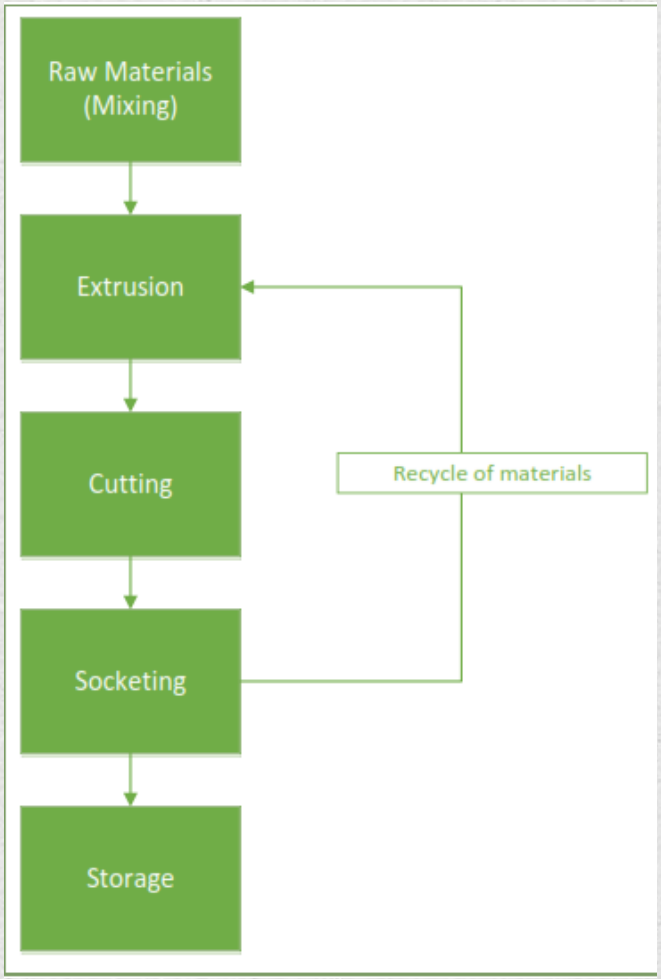
Overview of product range and product mix.

- Product types and annual breakdown.
- Differences not explicit in throughput figures – such as differences in finish, additional processing steps, longer processing steps etc.
- Likely influence on energy consumption.

2. Overview of production process – 2.2

Process flow diagram.

- High level view.



2. Overview of production process – 2.3

- Process energy breakdown:
  - Gives a systematic breakdown of where and how energy is used in main process steps.
  - If equipment is duplicated, eg. Multiple injection moulding machines, then the characterization would be for the different examples found in the plant, not each individual machine.

Core Process	Sub-Process	Energy Consuming Area
Injection moulding	Die motions and clamping	Fixed speed hydraulic pump
	Heating & Injection motions	Variable speed DC extruder drive
	Ejection motions	Compressed air utility
	Die thermal control	Die cooling water
	Die thermal control	Die cartridge heater
	Barrel thermal control	Barrel cooling water
	Barrel thermal control	Barrel cartridge heater

2. Overview of production process – 2.4

- Capacities of key equipment:
  - Gives a breakdown of the capacities of pieces of equipment.
  - Helps to clarify the potential magnitudes of consumption.

Item	Equipment	Installed Power (kW)	MDB 1	MDB 2	MDB 3
1	Drier	15	*		
2	Chiller	120	*		
3	Air compressor	80		*	
4	Mixer 1	15		*	
5	Mixer 2	25			*
6	Mixer 3	25	*		

3. Industry best practice review

Can be a separate report to simplify the structure and maintain focus.

Findings will be referenced when best practice is considered later in the report.

3.1. International best practice exemplars and energy benchmarks

- The shape of efficient sector case study companies and their associated energy intensities.

3.2. Feasibility mapping of best practice onto process.

- Guidance for carrying out the actual walk-around – identifies the points of focus.
- Makes a judgement on what is a priority for examining now.
- Judgement is re-examined in future cycles of the energy improvement plan.

3. Industry best practice review – 3.2

Feasibility mapping of best practice onto process

No.	Process Stage	Best Practice	Applicability	Carry Forward?
1	Injection moulding best practice	All-electric	Only by replacing servohydraulic machines	No
2	Servohydraulic injection moulding	Variable displacement hydraulic pump	Potential upgrade for current machines	Yes
3	All – Compressed air generation	Variable speed compressor	Potential to replace current machines	Yes
4	All – Compressed air leakage control	Monthly leak survey, weekly walk-around & leak alert tags	Yes	Yes
5	Chilled water	100% pipework & valve insulation	Yes	Yes
6	Resin drying	Heat wheel drier/vacuum drier	Potential to replace current machines	Yes

4. Observations from the walk-around

Tips on the technical points to look out for can be found in Energy Management Training slides: "Walk-Around Surveys"

4.1. Involvement:
- Date, who did it, who else was involved.
- What were we looking for.
- Methods for data gathering - photos, notes, measurements.
- Can use characterisation checklists and tables based on findings during best practice research.

4.2. Process observations.

4.3. Utilities observations.

4.4. Infrastructure Observations.

4.5. General Observations.

5. Energy consumption and production analysis

Can be a separate report to simplify structure and maintain clarity.

5.1. Energy consumption
- Total energy.
- Energy across the year.
- Energy across the week.
- Weekday/weekend/shut down/shift pattern energy profiles.

5.2. Production throughput.
- Assessment of likely influence of product mix, if any.

5.3. Energy intensities:
- Plotted for different representative periods.

5.4. CUSUM Analysis

5.5. Findings:
- Discussion of trends.
- Cause and effect explanations – and unexplained happenings.

6. Best practice gap analysis

Combines the best practice feasibility mapping with the observations from the walk-around and includes estimates of the potential savings.

6.1. Best practice mapping and opportunity table

- Lists applicable measures.
- Identifies best practice standard against current practice.
- Gives estimate of savings percentage.
- If consumption can be identified for equipment, allows kWh and cash saving to be identified.

6.2. Best practice commentary.

- Discussion of priority areas, overall scale of opportunity

6. Best practice gap analysis – 6.1

Best practice mapping and opportunity table

No.	Target Process	Best Practice	Current Practice	Practice Met?	Recommendation	Savings	Risk H/M/L	Payback (Months)
1	Machine cooling	Recirculation	Recirculation	Y	-	-	L	-
2	Cooling water circulation during idling	Shut off	Always on	N	Add valves	2% chilled water	L	6
3	Distribution of cooling water	Zoned use of cooling water	Cooling water directly to and from cooling mains	N	Change routing	2% chilled water	L	12
4	Distribution of cooling water	All pipes and valves insulated	Some insulation	N	Insulate pipes and valves fully	5% chilled water	L	12
5	Chiller maintenance	Evaporative cooling tower	Air blast cooling	N	Evaporative cooling tower or adiabatic cooling pads	10% chilled water	L	18
6	Chiller maintenance	Heat exchanger kept cleaning	Cooling fins dirty	N	Weekly cleaning during summer	5% chilled water	L	Instant

6. Best practice gap analysis – 6.2

Commentary

- Gives a statement of the filters that are being applied to prioritise measures for further investigation.
- Lists the measures filtered for further investigation.
- Provides a list of the deprioritised measures for future rounds of investigation.

7. Recommendations

7.1. Next steps for the energy manager/executive:

- Planned outcomes and dates.
- Responsibilities.
- Clear identification of internal data needed and who will deliver.

7.3. Requested senior management actions:

- Enablers/budgets/permissions.

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