

City of Sydney Grant Applicant Name
Audited Site Name

ENERGY AUDIT REPORT

Energy auditor company name

Draft report/final report – delete as appropriate

Date of report– update for each version of the report

Instructions:

Text highlighted in **yellow** is guidance on City of Sydney (CoS) reporting requirements to meet City of Sydney Energy Audit Grant Scope of Work.

Text highlighted in **blue** simply requires relevant figures or information to be inserted.

Un-highlighted text should remain in the report. Auditors may expand on and/or enhance un-highlighted text where appropriate. Please discuss any major changes with your CoS Sustainability Programs team contact.

PLEASE DELETE THESE INSTRUCTIONS PRIOR TO SUBMITTING REPORT

Auditor commitment

This report is prepared in accordance with the CoS Energy Audit Grant Scope of Work which is based on and in some areas exceeds the Australian and New Zealand Standard for Energy Audits - AS/NZS 3598:2014. The scope of work has been agreed between **grant applicant name**, and City of Sydney (CoS).

REPORT QUALITY ASSURANCE REVIEW				
Rev	Date of Review	Description	Author	Reviewer
Insert Rev no.	Insert date	Insert whether interim or final report	Insert name	Insert name
Report content follows template requirements			Insert signature	Insert signature
Spelling and grammar checked			Insert signature	Insert signature
Input calculations reviewed			Insert signature	Insert signature

City of Sydney Energy Audit grant applicant details

Name of applicant organisation	
Address of site	
ABN	
Name of site manager	
Name of nominated project leader	
Main phone number	
Main email address	

Auditor details

Name of auditing company	
Nominated individual/s	
Date of proposal acceptance	
Date of audit completion	
Phone number	
Email address	

City of Sydney Sustainability Programs team contact

Name of CoS contact	
Phone number	
Email address	

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1. EXECUTIVE SUMMARY

NB. Do not insert numbered headers eg. "1.1 Background" – as this will alter the table of contents

Insert auditor company has been engaged by applicant to perform an energy audit funded by CoS at **insert site location** in accordance with the CoS Energy Audit Scope of Work.

This energy audit report:

- evaluates overall energy consumption
- illustrates current energy use
- identifies and outlines potential areas of energy and cost savings.

ENERGY CONSUMPTION BASELINE

The overall energy consumption of the site is summarised as follows:

Insert a copy from the energy audit spread sheet template – do not change the table heading below

Table 1.1 - Energy Baseline Reporting Period: **month/year - month/year**

Energy Type	MWh per year	GJ per year	%	Cost \$ per year	Cost \$/MWh	Cost \$/GJ	GHG tCO ₂ per year
Electricity							
Gas							
TOTAL							

Provide summary of appropriate KPIs and benchmarking for the site from Section 3.5.1 of the report.

RECOMMENDATIONS

Based on site observations, data analysis and discussion with **insert** applicant about their operational priorities and plans, **insert audit company name** recommends the following options to improve **insert** participant's energy efficiency and performance:

- **Insert Energy Conservation Measure 1**
- **Insert Energy Conservation Measure 2 etc.**

Provide bullet points with a sentence description of each recommended ECM. If at interim stage there are alternative options for an ECM please make a recommendation of the most suitable option.

Implementation of these opportunities is expected to deliver ongoing annual savings of \$?.

This equates to:

- annual cost savings of **\$?**
- **?MWh** of electricity savings annually
- **?GJ** of gas savings annually
- **?%** reduction of annual site energy consumption annually
- **?tonnes** of greenhouse gas emissions reductions annually
- Possible **no. of stars** improvement of NABERS rating (if applicable)

The estimated capital cost to implement these opportunities is **\$?**, with a simple payback of **? years** and net present value of **\$?**. **Ensure any additive actions have been accounted for.**

Summarise any additional business operational issues, costs or benefits around the opportunities eg timing of retrofits with planned upgrades, production increasing/decreasing and any future trends, staff behavioural training, lost production during installation, additional water savings, decreased maintenance etc.

Within the final report executive summary discuss opportunities that were not recommended and the reasons why, eg. outside of business target paybacks, insufficient capital available etc.

Recommended opportunities are listed below in Table 1.2 in order of **insert payback, technology, or area** as requested by **insert participant**. The table includes both energy efficiency opportunities and energy performance opportunities. Energy performance opportunities are still valuable energy management tools but do not necessarily provide a direct reduction in energy

consumption eg, fuel switching, renewable electricity generation, peak shifting, renegotiating energy contracts, power factor correction.

At Draft Report stage, this table should include all potential opportunities, regardless of capital cost or payback period. The interim meeting must include a discussion of all identified opportunities.

At Final Report stage, this table provides a list of those opportunities that are recommended by the auditor for the participant to implement, including all business case opportunities. This recommendation should be based on discussions with the participant with what is viable and realistic to implement, and this discussion should have been an ongoing dialogue since the site visit.



Table 1.2 - Summary of insert either Energy Conservation Measures (if Draft Report) or Recommendations (if Final Report)

Description of ECM	Electricity savings MWh p.a.	Gas savings GJ p.a.	Energy cost savings \$ p.a.	Other cost savings (e.g. maintenance) \$ p.a.	Total cost savings \$ p.a.	Capital cost \$ total	Simple Payback Period years	NPV \$ total	GHG savings tonnes CO ₂ p.a.	Energy Saving Certificates (ESCs)	Section / Page reference and Business Case no.
Eg. HVAC or Building A											
Eg. Change set points											
Eg. Business Case 1: Chiller upgrade											
Eg. Lighting or Building B											
Eg. Refrigeration or Production Line 2											
TOTAL							Insert average payback	Insert total NPV			

2. BUSINESS CASES

Business cases can assist your organisation to further consider the merit of energy conservation measures identified in this audit.

Insert the following text for the Draft Report

This section will be completed for the Final Report and will include a selection of energy conservation measures to be identified and prioritised for further investigation at the Interim Meeting.

Insert the following text for the Final Report

The business cases below provide further detail on the energy conservation measures that were selected and prioritised at the Interim Meeting.

Include the following details and business cases for the Final Report.

The number of business cases is agreed at the proposal stage and usually ranges from 3 to 5 depending on the nature of the site and organisational preference. Business cases should not include tariff review, peak shifting or power factor correction or any other zero cost opportunities, eg. simple behavioural change.

Business cases should be projects for which:

- quotes are required
- more accurate savings calculations are required
- implementation tasks need to be described in more detail
- ESCs are likely to be generated and would therefore require a detailed M&V plan.

Business cases should be chosen by the participant at the Interim Meeting and added to the final report.

The business case should provide sufficient detail to enable the project to be approved. Please provide the following in the template provided:

- Detailed description of proposed project
- Operation benefits associated with the recommendation
- Risk management procedures/issues that should be planned for during project implementation
- Major assumptions used and reference to calculations in Appendix B, specialist reports in Appendix C, any data logging results in Appendix D
- Estimate and breakdown of upfront and ongoing costs and savings for the life of the project. This should include all upfront capital, engineering, installation and commissioning costs, as well as expected ongoing incremental costs/savings from changes to energy use, maintenance regimes etc. Include any revenue from the generation of renewable energy certificates where relevant. Include copies of all quotes received in Appendix E.
- Product specification
- Calculated energy savings, energy cost savings, other savings, total savings and estimated accuracies
- Payback period, IRR, NPV, GHG reduction
- Implementation plan containing a list of tasks to be completed and also highlighting any potential disruptions to business operations. The Implementation Plan must enable the participant to:
 - proceed with the recommendation
 - obtain additional quotations if required
 - brief a contractor or specialist consultant.
- Measurement and verification plan specifying:
 - what and how to measure
 - the periods of measurement
 - adjustments to be made for occupancy, units of production, temperature etc.

BUSINESS CASE TEMPLATE TO BE USED EXAMPLE 1

BUSINESS CASE 1		Upgrade of the Administrations building's HVAC system to a new system and reuse gas boiler							
Detailed Description		<p>This project involves upgrading the entire HVAC system at the administration building; reuse the existing gas boiler and redesign of the office zoning layout. It includes the replacement of all ductwork and diffusers, thermal plant and a new BMS control system. The full design and costing of a complete HVAC system upgrade is outside the scope of this audit. An estimated capital implementation cost and estimated energy savings from upgrading the entire HVAC system have been calculated conservatively.</p> <p>Calculations for this project were based on the following assumptions:</p> <ul style="list-style-type: none"> Sizing of the HVAC equipment was based on current level of energy consumption All old and inefficient lighting fixtures will be upgraded to new higher efficiency lighting fixtures The building insulation will be upgraded to meet the requirement of the Building Codes of Australia Cost for this project only includes mechanical work, all builders work costs were not included The upgrade work will be carried out during normal business hours. <p>It is important to note that the current HVAC system is at the end of life and is due for major upgrade. Therefore there are two ways to assess its payback period:</p> <ol style="list-style-type: none"> Determining the absolute cost of replacing the existing system with a completely new system (with new zoning which incorporates considerations for new office layout, approx. \$1.11M) and compare this against expected savings based on forecast energy prices to determine project payback (20.8 yrs). Assess the differential costs associated with replacing the existing HVAC system with a completely new HVAC system; this being the difference between what would have been spent on a like-for-like system (\$485K) and that of a completely new system incorporating energy efficiency measures (\$1.11M). In comparing this differential cost (\$625K) and the resultant savings (assuming that the like-for-like system will reproduce existing performance) a payback period of 11.7yrs is derived. <p>Refer to Table 3 Appendix B for calculations utilised in assessing this project.</p>							
Operational benefits		<ul style="list-style-type: none"> The current HVAC system is at the end of life and is due for major upgrade. This upgrade will make the building achieve the Property Council of Australia's design target energy consumption benchmark for existing buildings. Compliance: Indoor air quality improvements Productivity: Better air quality can contribute to improved productivity Zoning will result in fewer climate related complaints from tenants 							
Business Case assumptions		Project life (years)	XX						
		Inflation rate %	XX						
		Discount rate for NPV % (company cost of capital)	XX						
		Fuel cost escalation rate %	XX						
Business Case Results									
Electricity savings MWh p.a.	Gas savings GJ p.a.	Energy cost savings \$ p.a.	Other cost savings (e.g. maintenance) \$ p.a.	Total cost savings \$ p.a.	Capital cost \$	Payback period (years)	Net Present Value \$	GHG savings tonnes CO2 p.a.	ESCs (number of certificate)
X	X	X	X	X	X	X	X	X	X
Implementation Plan		<ul style="list-style-type: none"> Participant to determine if the internal usage of the building is going to change in the coming years. The zoning and ductwork of the system will need to reflect the internal fit-out and the planning usage of the building, separating zones with different uses If the primary plant location is moved then this will increase costs considerably and require major changes to ductwork and pipework. Prepare technical specification containing performance and quality control requirements using HVAC/BMS specialist Obtain quotations from nominated specialist contractors (refer to Appendix B for a list of potential contractors). 							

	<ul style="list-style-type: none"> • Asses tenders and appoint contractor • Prepare implementation plan for decommissioning of current equipment and installation of new systems • Optimise BMS settings to comply with operation schedules
Risk management	<ul style="list-style-type: none"> • Installation and commissioning will take approximately 1 week • Temporary measures will need to be introduced during this time – rental AC units for each zone • To minimise complaints, tenants will need to be engaged leading up to and during the installation and commissioning phase
M&V Plan	<ul style="list-style-type: none"> • Monitor plant operation for a period of 1 year including weekend operation before and after implementation of upgrades • Obtain BOM weather data for the monitoring periods before and after • Calculate difference between the average temperatures during the measurement periods before and after • Use ESS Rule Method 3 to calculate the following: <ol style="list-style-type: none"> 1. Normalised consumption 2. Normalised energy baseline 3. Baseline variability 4. Reduced electricity consumption 5. Confidence factor 6. Energy savings, and 7. The number of ESCs generated. • This method was chosen because it normalises energy consumption for a site to remove explainable variation from the baseline, for example, adjusting for variations in ambient conditions or variations in input characteristics. The factors chosen for the normalisation must cause the variability that is removed and not be the result of spurious correlations.

EXAMPLE 2

BUSINESS CASE 1	Voltage Optimisation	
Detailed Description	<p>The site voltage averages 246 - 248Vac. The project involves reducing the voltage by approx 20volts; while still keeping the Voltage within the statutory limits of AS60038 (216 - 253Vac). There are 2 MSBs onsite; each would require voltage optimisation units. Integral Energy have been contacted regarding stepping down the voltage at the existing transformers – it is not something they would consider. The 2 options to proceed are as follows and are attached as Appendix F:</p> <ol style="list-style-type: none"> 1. Company Y has quoted 2 units. 1off 400kVA. 1off 300kVA – Install and switchboards upgrades have not been included at this time. 2. Company X has quoted 2 units. 1off 420kVA. 1off 280kVA – Install costs and switchboard upgrade have been considered. <p>Note: both options cover the potential increased Compressed Air use as indicated by Company Z.</p> <p>Savings are based on a projected usage of 1015MWhs (audited baseline) plus 125MWhs to cover the potential future increase in Compressed Air usage from a new blasting process = 1140MWhs</p> <ul style="list-style-type: none"> • Where 125MWhs is 2.5 times x 50MWhs (KS45 audited usage – supplying the current "Oval" line) <p>Optimising site voltage can generate savings of 11% and 13% respectively. The savings varies depending on the types of loads on the each MSB. The electricity savings figures are guaranteed by the contractors to 80% of the respective targets</p>	
Operational benefits	<ul style="list-style-type: none"> • Reduction in maintenance of fixtures and fittings and wear and tear of equipment. • Protection against potentially damaging transient spikes in the grid. • Increase power factor. • Increased site power quality. 	
Business Case assumptions	Project life (years)	XX
	Inflation rate %	XX
	Discount rate for NPV % (company cost of capital)	XX
	Fuel cost escalation rate %	XX
Business Case Results		

Electricity savings MWh p.a.	Gas savings GJ p.a.	Energy cost savings \$ p.a.	Other cost savings (e.g. maintenance) \$ p.a.	Total cost savings \$ p.a.	Capital cost \$	Payback period (years)	Net Present Value \$	GHG savings tonnes CO2 p.a.	ESCs (number of certificate)
Quote 1: X	X	X	X	X	X	X	X	X	X
Quote 2: X	X	X	X	X	X	X	X	X	X
Implementation Plan		<ul style="list-style-type: none"> Consider Monitoring and Verification Plan below Decide on preferred option (including option to roll out project incrementally – install MSB2 first) If necessary arrange selected contractor or other to install sub-metering to confirm loading on each MSB is as expected Supplier installation process should be as follows <ol style="list-style-type: none"> Visit to site to begin planning the logistics of moving the unit into position Discussions with parties involved in the power shut-down and co-ordination of timing Confirm installation plan and any additional required works and confirm price Discussions with all stakeholders and relevant parties to answer any questions and ensure a thorough understanding of the project Particular attention to any required work on switchboards Submission of paperwork to electrical authorities Provision of all required safety documentation 							
Risk management		<ul style="list-style-type: none"> Undertake and confirm full site asset inventory to understand risks associated with voltage drop on equipment Installation requires electrical shut down of around 4-6 hours. Request standby generation if applicable and for the shut down to occur over a weekend/holiday break. Contact lift contractor to ensure lifts are ready to accept new voltage level. 							
M&V Plan		<p>Since the total projected site savings are in excess of 10%; it is suggested that all projects be combined and verified using a metered baseline approach – where the metered data is simply the billed usage. The advantage of this approach will be that sub-metering will not be required, M&V will be implemented through use of baseline and KPI setting. A 12 month baseline will have to be set with production data (Sept 2010 to Aug 2011) It should be noted that future major changes to production will also require resetting of the baseline.</p> <ul style="list-style-type: none"> Analysis of utility meter data using techniques from simple billing comparison to multivariate regression analysis. A site-wide KPI for Electricity use as a function of pieces produced was established during the audit– this benchmark was based on whole-site billing data. Note: Production data was only available for Sept 2010 to March 2011 (7 months) The KPI had an R2 value of 0.87 which is a good correlation. However; ahead of the project the baseline should be recalculated for a 12 month period (Sept 2010 to Aug 2011) Furthermore baseline and KPI should be re-set in the following cases: <ul style="list-style-type: none"> If significant changes to production occur – i.e. the possible reduction in working hours. If the project is implemented incrementally (MSB2 followed by MSB1), then new KPIs need to be established based on the pro-rata savings. Project validation can be included as part of the Voltage Optimisation offerings from both contractors; however it is suggested that analysis be implemented independently to ensure compliance with ESCs requirements. Measurement and verification should be conducted as per Energy Efficient Business and ESCs requirements. Frequency of measurement and verification can be monthly on receipt of electricity bill. 							

3. BACKGROUND

Audit company has been engaged by the applicant to perform an energy audit funded by CoS at **insert site location**.

CoS provides energy audit grants to building owners and managers in the CoS local government area.

Conducting an energy audit and assessing energy efficiency opportunities can provide many benefits to businesses¹, including:

- reduced expenditure on energy, capital and maintenance
- increased profits
- improved productivity, product quality and staff engagement
- closer alignment of energy procurement with actual energy needs
- improved awareness of CO2 emissions resulting from energy use
- awareness of external funds and grants to assist with implementing energy efficiency projects.

3.1 Site Description

Complete all required details in the "site details" tab of the Energy Audit Template.

Discuss background of participant's business and operations. Including (where applicable):

- services provided
- production processes
- different business units occupying premises and purpose
- different sites being audited or no. of separate buildings
- site location
- other NSW sites or national operations
- building floor space area (m2) audited
- site plan
- no. of staff
- no. of users (if public facility eg. swimming pool, registered club membership)
- hours of operation.

3.1.1 Audit Limitations

Discuss site constraints and any future operational directions that may have limited the scope of this energy audit and influenced the assessment of energy efficiency opportunities.

Operational direction:

- CapEx limits
- acceptable hurdle-rate
- planned expansion or relocation from current site
- planned restructuring
- electricity supply limitations.

Site constraints:

- auditing only select parts of site (eg. buildings A & B, but not C)
- auditing production processes not office consumption
- recent refurbishment or upgrade just completed, e.g., no examination of recently upgraded lighting

3.2 Methodology

Briefly summarise the approach taken and give an overview of the audit process including data collection methods (e.g. sub-metering, logging, engineering calculations). Include Table 3.1:

Table 3.1 – Key Audit Dates

Auditor appointment date	
Site inspection	Insert no. of days and dates
<i>Draft Report</i> presentation date	
<i>Final Report</i> date	

4. ENERGY CONSUMPTION

4.1 Energy baseline

Discuss the site's energy baseline using two years' consumption data. The most relevant 12 month period is to be summarised in Table 3.1. Note: A copy of this table should also be placed in the executive summary.

Complete "consumption" tab of the Energy Audit Template.

Table 4.1 – Energy Baseline: Reporting Period: month/year - month/year

Energy Type	MWh per year	GJ per year	%	Annual Energy Cost \$	Cost \$/MWh	Cost \$/GJ	GHG tCO ₂ -e per year
Electricity							
Gas							
LPG							
Total			100				

Provide a pie chart of split between electricity and gas consumption as GJ.

Provide a pie chart of split between electricity and gas costs in \$ per annum.

Discuss and compare these two pie charts.

4.1.1 NMI and gas meters

Add list of NMI and gas meters and what areas / functions each of these meters supplies. Provide annual consumption totals for each meter.

Table 4.2 – NMI and gas meters

NMI Number / Gas Meter	Area / Function Supplied	Annual Consumption of Meter

4.2 Electricity consumption analysis

In the relevant sections below, provide graphs showing annual, monthly, weekly and daily consumption data. Use MWh rather than GJ units. Include graphs which highlight where energy consumption varies and which help identify the factors that may affect these variations. All graphs must be discussed not merely described.

4.2.1 Annual comparison

Compare yearly totals between at least two years of data, has electricity consumption increased or decreased? Discuss reasons why.

4.2.2 Monthly/Seasonal comparison

Graph consumption data by month for the two years data provided. Compare the two years data and identify any monthly/seasonal trends and correlate them to factors so their causes can be understood.

- Identify the maximum electricity demand of the site over the year and its potential causes.
- Identify whether the site has power factor correction installed or not. If not, and there are potential savings in relation to its installation, discuss this in section 5.

4.2.3 Weekly analysis

Graph typical weekly load. Is this in line with production schedule/ business operations? Repeat this for other sample weeks if energy use varies noticeably for different times of the year or different operating modes.

- Is participant using energy when production is nil eg. weekend, Easter, Christmas.
- Discuss base load. What could be causing this?
- Is additional analysis required to investigate factors influencing energy use?

4.2.4 Daily analysis

Graph hourly energy consumption over a day and discuss how the changes in consumption reflect the business operations eg. start-up of HVAC, kitchen operational hours, switching between different production lines, shift turnover.

- Discuss base load. Discuss the impact of large base load on total annual energy cost.
- Are there differences between daily load patterns between summer and winter, why? Discuss.
- Are there any significant energy use peaks that attract peak tariffs? Refer to tariff analysis (Section 3.4) to discuss potential peak shifting.

All specific opportunities identified to reduce base load profile need to be mentioned here and ensure they are linked to section 5.

3.3 Gas consumption analysis

Repeat the above analysis for gas consumption. Explain limitations to the data if an in-line meter is not installed and either utilise records from fuel dispensing systems or discuss with client the possibility of manually reading an existing meter at the same time each day for a month.

4.3.1 Annual comparison

Repeat for gas if applicable

4.3.2 Monthly comparison

Repeat for gas if applicable

4.3.3 Weekly analysis

Repeat for gas if applicable

4.3.4 Daily analysis

Repeat for gas if applicable

4.4 Tariff analysis

Complete "consumption" tab of Energy Audit Template.

Insert applicant name pays an average price of ?c/kWh (exc. GST) for electricity and ?\$GJ for gas. This figure was used in payback period calculations in this report.

Discuss this price in relation to other industries as well as past price rises for electricity and gas.

4.4.1 Electricity Tariff

Analyse tariff to determine the following:

- % split of electricity spend between peak and off peak/shoulder and discuss any opportunities and constraints for peak shifting and potential cost savings
- outline annual cost of demand charges to the participant (is it a set or rolling 12 month period) and is there potential to reduce this demand. Refer to section 6 to discuss power factor correction.
- Suitability of supply contract to participant organisation type and operations and whether another type of tariff would provide savings.

Complete Table 4.3 using data from the Energy Audit Data Template.

Table 4.3 Electricity Tariff Structure for Insert year

Time	Retail (c/kWh)	Network (c/kWh)	Other (c/kWh)	Total (c/kWh)
Peak Times				
Shoulder Times				
Off Peak Times				
Additional Items				
Capacity charge (\$/kVA/month)				

4.4.2 Gas Tariff

Discuss gas tariff. Flag any potential fuel switching opportunities that could reduce the participant’s total energy cost.

4.5 Key drivers of energy use change

Analyse factors that influence energy use and create energy performance indicators (EnPI’s), using regression analysis, with variable such as degree-day and/or production/business data. Note the strength of the correlation and typical variation. Graphically illustrate the relationship between drivers of energy consumption and discuss the analysis. Temperature data for the area should be obtained from the Bureau of Meteorology. Other data will be dependent on business records.

EnPI’s must be shown to be statistically valid ($R^2 > 0.75$ between dependent and independent variables within the targeted investigation area) and the strength of any correlation shown. If no indicators are proven to be valid after several variables are investigated, then the auditor is to provide guidance on metering of sub-processes that might mean that relevant KPIs can be developed in future, and/or why the correlation was not found.

Complete Regression section in the “KPIs” tab of the Energy Audit Template.

4.6 Key performance indicators

From the discussion of key drivers identify key performance indicators suitable for electricity and gas, so that performance can be measured in the future. Identify the measurement requirements and timeframe needed to establish or measure the indicators. Indicators can be developed for a whole site, or targeted sub-system in line with industry benchmarks.

Complete business measures section in the “KPIs” tab of the Energy Audit Template. These include identified indicators for different sectors. If you have identified an indicator that sits outside of these measures then please define in the bottom of the table as “Other”.

For example, some factors can be easily monitored monthly or annually but others are only relevant for real-time data monitoring. A number of indicators may be suitable if they are closely correlated to energy performance and each tells a different ‘story’ about the participant’s business.

Complete Table 4.4 based on the KPIs tab in the Energy Audit Data Template.

Table 4.4 – Energy Key Performance Indicators (ENPIs)

Sector	Indicator	Quantity	ENPI / Electricity MWh	ENPI / Gas GJ
E.g. Agriculture	Eg. Water pumped kL			
	E.g. Tonnes of product			
	E.g. Heat of stock carried/year			

Compare the key performance indicators against any available benchmark eg. industry specific or against the participant's other sites.

5. BREAKDOWN OF SITE ENERGY USE

This breakdown of site energy use provides **insert applicant name** with an understanding of where and how energy is used on site. This helps to identify the largest energy users on site and what areas, equipment or processes should be the highest priorities for achieving energy efficiency.

A breakdown of the site’s energy use was calculated for all energy consuming assets using the following inputs:

- estimated hours of operation for each asset
- discussions with site staff
- equipment name plates and output ratings
- tong testing readings of **insert equipment / circuits**
- data logging of **insert equipment / circuits**
- sub-metering of **insert equipment / circuits**.

An equipment inventory and each of the variables utilised in these calculations is provided as Appendix A. Table 5.1 provides reconciliation between this inventory and the total billed energy use and the total energy consumption estimated by this audit. A 10% or less difference between the billed and audited totals provides assurances that all equipment has been included in the audit and that there are no obvious billing errors.

Complete “equipment inventory” tab in the Energy Audit Template outlining all equipment in the scope of the audit. All columns need to be completed for each piece of equipment, including how the inventory was compiled (e.g. metered power or rated power). Any end uses consuming greater than 10% of total energy need to be attributed and not categories as “other” or “miscellaneous”.

If an energy end use clearly sits outside the categories provided in the Energy Audit Template please contact your assigned CoS Sustainability Programs team member.

Table 5.1 – Reconciliation of Site Energy Use

	Estimated Energy Usage	Actual Billed Energy Usage	Variance in MWh/GJ	% difference
Electricity				
Gas				

Provide a pie chart of total energy use breakdown, showing the relative contribution of total energy use of each part of the operation. These pie charts can be copied and pasted from the “end use breakdown” tab of the Energy Audit Template. This breakdown should be defined in discussions with the participant, and could be by building, site area, process or equipment type.

As stated, it is essential to discuss this breakdown with participant early on during the audit process to identify their needs. This discussion should also cover whether sub-metering or data logging is required. The participant may want the breakdown by building as well as by equipment type.

Complete Table 5.2 and list in descending order of % of total energy use, this can be copied and pasted from the “end use breakdown” tab of the Energy Audit Template.

Table 5.2 – Energy end use breakdown

Energy End Use	% of Total Energy Use	GJ	Cost
Insert HVAC etc.			

Discuss the information provided in the pie chart and table.

5.1 Electricity use breakdown

Similar to above, provide a pie chart of electricity use breakdown, showing the relative contribution of electricity use of each part of the operation. This breakdown should be defined in discussions with the participant, and could be by building, site area, process or equipment type. Label the pie chart with % use per segment. This information can also be taken from the “end use breakdown” tab of the Energy Audit Template.

Complete Table 5.3 and list in descending order of % of total electricity use using the tables from the end use breakdown tab of the Energy Audit Data Template.

Table 5.3 – Electricity end use breakdown

Electricity End Use	% of Total Electricity Use	MWh	Cost
Insert HVAC etc.			

Discuss the information provided in the pie chart and table.

If the participant has requested this breakdown by area, building or production process, please provide a full inventory of the energy using equipment that has been included within each segment.

5.2 Gas use breakdown

Repeat the above breakdown for gas use.

6. CURRENT ENERGY USE AND OPPORTUNITIES

The following section discusses the energy uses on site. For each of these end uses all potential energy efficiency opportunities and energy performance opportunities are outlined. Energy efficiency opportunities include optimising or upgrading energy efficient equipment and improving practices. Energy performance opportunities can include fuel switching, renewable electricity generation, power factor correction and sub-metering. Calculations and assumptions for each ECM are provided in Appendix B.

Complete the “opportunities” tab in the Energy Audit Template completing all columns for each ECM. Each row in the Template represents a new energy conservation measure. Please ensure all columns are completed for each ECM. This information can then be used to populate Table 6.1.

Calculations and assumptions can be provided as part of the final report.

All opportunities are discussed at the draft report stage and summarised in Table 6.1. The text in Section 6 should be updated between the interim and final reports to reflect those opportunities that will not be proceeded with. Details of capex, savings and payback should remain but text should be added discounting the ECM and reasons why.

6.1 Building Envelope (example only)

Discuss the existing building envelope including:

- building material and aspect
- building layout
- insulation
- shading and glazing
- skylights
- natural ventilation.

6.1.1 Identified building envelope opportunities (example only)

Discuss each identified ECM and bullet point the following:

- capital cost
- annual savings
- payback.

Also identify any other business benefits to this ECM eg. decreased maintenance, decreased OHS risk.

From here, discuss whether you would recommend this ECM to be implemented and what further information might be required to:

- identify appropriate equipment/products
- develop a full capital cost breakdown
- to achieve the required accuracy for capital cost and savings calculations.

Or discuss the reasons why you would not recommend the company to proceed with it, eg. too high a payback etc.

Repeat for all opportunities in this section

Reference Appendix B and calculation table appropriate to this ECM.

6.2 Lighting (example only)

Discuss the existing lighting technology on site and any controls in place.

Discuss lux levels and assess them against the Australian Standard. Complete Table 5.1.

Table 6.1 Site Illuminance Levels

Area and task	Illuminance (Lux)	AS 1680 Requirements	Underlit / overlit

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6.2.1 Identified lighting opportunities (example only)

Discuss each identified ECM and bullet point the following:

- capital cost
- annual savings
- payback.

Also identify any other business benefits to this ECM eg. decreased maintenance, decreased OHS risk.

From here, discuss whether you would recommend this ECM to be implemented and what further information might be required to:

- identify appropriate equipment/products
- develop a full capital cost breakdown
- achieve the required accuracy for capital cost and savings calculations.

Or discuss the reasons why you would not recommend the company to proceed with it, eg. too high a payback etc.

Repeat for all ECMs in this section

Reference Appendix B and calculation table appropriate to this ECM.

6.3 HVAC (example only)

Discuss the existing HVAC technology on site, its condition, observed performance and any controls in place.

6.3.1 Identified HVAC opportunities (example only)

Discuss each identified ECM and bullet point the following:

- capital cost
- annual savings
- payback.

Also identify any other business benefits to this ECM eg. decreased maintenance, decreased OHS risk.

From here, discuss whether you would recommend this ECM to be implemented and what further information might be required to:

- identify appropriate equipment/products
- develop a full capital cost breakdown
- achieve the required accuracy for capital cost and savings calculations.

Or discuss the reasons why you would not recommend the company to proceed with it, eg. too high a payback etc.

Repeat for all opportunities in this section

Reference Appendix B and calculation table appropriate to this ECM.

6.4 ?

Continue discussing current use and opportunities for all other applicable energy end uses:

- Refrigeration
- Compressed Air
- Boilers
- Motors and Pumps
- Hot Water
- Etc.

7. SUMMARY OF **INSERT EITHER 'OPPORTUNITIES' (IF DRAFT REPORT) OR 'RECOMMENDATIONS' (IF FINAL REPORT)**

Complete Table 6.1.

At *Draft Report* stage, this table should be titled 'summary of opportunities' and should include all potential opportunities, regardless of capital cost or payback period. The interim meeting must include a discussion of all identified opportunities.

At *Final Report* stage, this table should be titled 'summary of recommendations' and should provide a list of those opportunities that are recommended by the auditor for the participant to implement. This recommendation should be based on discussions with the participant with what is viable and realistic to implement, and this discussion should have been an ongoing dialogue since the kick-off meeting.

Opportunities with an unacceptably high capital cost or long payback period which are unlikely to be implemented should not be included in this table. For example, if a Solar PV array has a payback of 20 years, it should only be included as a recommendation if the participant has stated that Solar PV is a top priority, and such an extended payback period is acceptable.

The table can include energy efficiency, renewables and energy performance opportunities.

Table 7.1 - Summary of insert either Opportunities (if Draft Report) or Recommendations (if Final Report)

Description of Energy Conservation Measure	Electricity savings MWh p.a.	Gas savings GJ p.a.	Energy cost savings \$ p.a.	Other cost savings (e.g. maintenance) \$ p.a.	Total cost savings \$ p.a.	Capital cost \$ total	Simple Payback	NPV \$ total	GHG savings tonnes CO ₂ p.a.	Section / Page reference and Business Case no.
Eg. HVAC or Building A										
Eg. Change set points										
Eg. Business Case 1: Chiller upgrade										
Eg. Lighting or Building B										
Eg. Refrigeration or Production Line 2										
TOTAL							Insert average payback	Insert total NPV		

)

8. ENERGY SAVINGS CERTIFICATES

Project costs can be reduced if your energy efficiency project is eligible to generate NSW Energy Savings Certificates (ESC).

You can transfer your project's electricity savings to an Accredited Certificate Provider (ACP) who will create ESCs on your behalf and then register and trade them.

One ESC is equivalent to one tonne of carbon dioxide equivalent saved. Determining the number of certificates varies depending on the technology used to save the energy and because savings can be brought forward, in some instances up to 10 years. The ACP will undertake these calculations for you. They may also require data logging or meter data to measure and verify the savings.

The price of a certificate is open to market fluctuations and the ACP will negotiate with you a proportion of these costs to cover their expenses. Projects must be located in NSW to be eligible for ESCs.

For information:

Web: www.ess.nsw.gov.au

A list of Accredited Certificate Providers can be found here:

<http://www.environment.nsw.gov.au/energyefficiencyindustry/service-providers-acp.htm>

9. FUNDING AND FURTHER IMPLEMENTATION SUPPORT

This section should be specifically tailored to each audit, highlighting the best options for additional support and project funding.

- Use the text below as a guide only, modifying for the client's requirements as required
- Please add in any additional funding and support options that are relevant to the client
- Please delete any options that are not relevant to the client
- Please also reorder the funding options to match the audit requirements

Office of Environment and Heritage- Training Courses

A variety of training courses are available for NSW businesses and subsidised by the NSW government, giving you access to valuable training and support.

Learn more and book now at www.environment.nsw.gov.au/training

Building Upgrade Finance

Building Upgrade Finance is a voluntary financing program in which:

- a building owner of a commercial building can carry out works to improve the energy, water or environmental efficiency or sustainability of the building (environmental upgrade works)
- a finance provider (i.e. a bank) agrees to provide funds to the building owner to finance those environmental upgrade works
- the council agrees to levy a charge on the subject land which is then used to repay the funds to the finance provider (the environmental upgrade charge).

The agreement allows commercial building tenants to contribute to the costs of the upgrade. However, these additional costs must be offset by their reduced energy and water bills.

For more details contact City of Sydney's Sustainability Programs team.

The Clean Energy Finance Corporation provides a handy guide on additional sourcing of funding for building upgrades and energy efficient assets at <https://www.cefc.com.au/where-we-invest/asset-finance/>

Please note: This funding information is only a guide; it is not exhaustive, nor specific to any organisation. CoS provides this funding information as a first step to organisations undertaking their own investigation into capital funding for energy efficiency. These programs may change and it is the organisation's obligation to contact the funding body directly for current eligibility criteria and updated information.

APPENDICES

APPENDIX A: Energy Audit Data Template

To provide transparency in the calculations of the breakdown of site energy use and the type of investigation that was undertaken, an inventory of the energy using equipment is required. Please complete and insert the provided Energy Audit Template (Equipment Inventory table) when submitting an Draft Report.

APPENDIX B: Specialist reports (if applicable)

APPENDIX C: Data logging results (if applicable)

APPENDIX D: Quotes

Attachment 1 – Data Logging Collection Plan

Data required	Data source	Logging period	Party responsible for collecting data	Data logging costs (\$)	Date that data is required	Likely data availability (L/M/H)	Impact on project if not supplied in the timeframe, or errors occur (L/M/H)	Remedial actions for Med & High impacts if data not obtained
<i>(e.g. flow rate of chilled water, temperature of process flow)</i>	<i>(e.g. Site SCADA, BMS, data logging, sub-meter)</i>	<i>(e.g. 1 day/week /cycle/ season etc...)</i>	<i>(e.g. site environment manager)</i>					<i>e.g. Engineering estimates will be made using conservative approach.</i>
				Total Costs (\$)				