YOUR COMPETITIVE ADVANTAGE
Energy efficiency solutions for
Australian transport and logistics SMEs

SUPPLY CHAIN & LOGISTICS ASSOCIATION OF AUSTRALIA

How to guide no.1
The importance of data

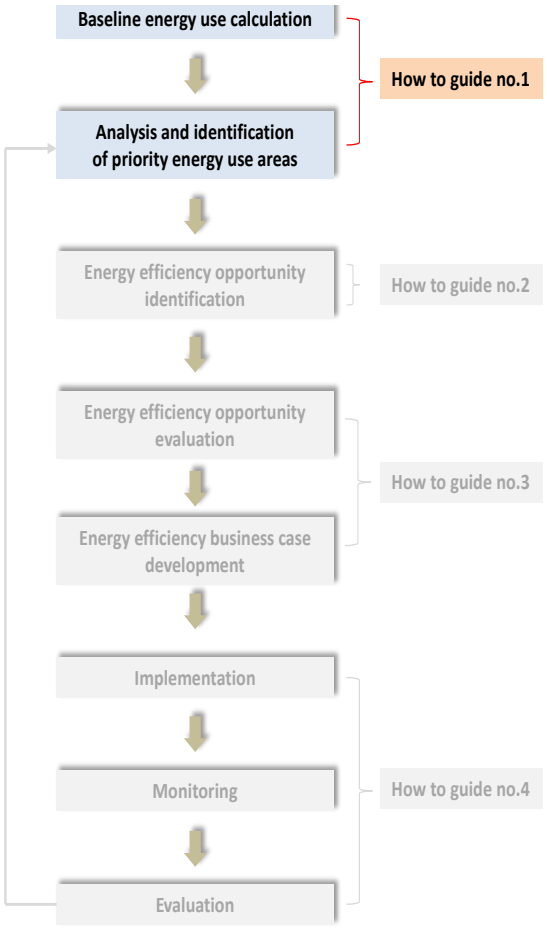
➤ Introduction

Within the context of the energy management process, this document covers the steps associated with calculating baseline energy use and analysing and identifying priority energy use areas.

This document provides information and guidance to help SMEs capture, analyse and report energy data.

It is one of four How-To Guides and other resource material developed by the Supply Chain and Logistics Association of Australia (SCLAA) and its project partners for SMEs in the supply chain and logistics sector.

The full suite of resources can help achieve energy efficiency improvements and energy cost reductions, and is accessible from http://energy-efficiency.sclaa.com.au



➤ Data: foundation of an efficient business

A well-used truism for improving business efficiency is 'if you can't measure it, you can't manage it'. In all industry sectors, good quality data is essential to good business management.

Finance and administration people understand this and apply it to the financial records and transactions. But most companies do not apply the same standards of accuracy or transparency to energy data. This is a mistake if a company wants to reduce costs, become more efficient, and increase its productivity.

Data is important at every step of the business improvement process. Whether trying to understand current performance, looking for or assessing improvements, or tracking the effect of changes: accurate, reliable and relevant data is essential.

➤ Performance metrics measure success

Before even starting to look for opportunities, a company needs to understand what data needs to be collected and analysed.

'Start with the end in mind' is a good philosophy for answering this question. The Overview of the Energy Management Process discussed the importance of a strategic vision and the big picture.

Clearly defined energy objectives as part of a business strategy will largely set what metrics need to be monitored; and the metrics themselves determine the data that needs to be collected.

Examples of performance metrics include energy use per unit of freight carried (MJ/tonne, or litres/tonne); energy per freight distance travelled (L/t-km); and electricity usage per area of warehouse (kW/m^2). Tracking these metrics requires electricity and fuel data, freight quantities, and building size.

The over-arching objective of setting a metric is so that performance (related to the objectives) can be tracked and assessed over time; and so that changes in the metric are relevant to changes in business performance.

➤ Data systems

Once we know what data needs to be collected, the systems and processes to collect and store relevant data need to be established.

While this issue can be seen as simply selecting a location and tool to store the data (e.g. Excel file saved to server), in reality there are detailed decisions that need to be made regarding reading, entering, analysing, and reporting energy data.

For example, whose responsibility is it? How often is it collected? And reported? What format should it be in? How is it presented?

If the objective and process of data collection is not established at the start, crucial data might not be collected and it is often impossible to go back and get the data for the required period.

Of course, most companies will not be developing a new data 'system', but will build on data they already have. The same principles apply. If existing data is used, it must be accurate and reliable; there must be a purpose in collecting it; and if new data needs to be measured or recorded, see if it can be combined with data already being collected.

To reduce administration, investigate whether energy data can be electronically transferred from either existing reports or automatically from sources like your Warehouse Management System.

➤ Where and how data is used

Energy data can be used for two very specific purposes in business improvement: understanding where in the company you use energy; and how and where you can reduce your energy use. Both contribute to a better managed, more resilient and more competitive business.

Looking at the typical process for energy efficiency improvement from the Overview of the Energy Management Process, data from either internal and/or external sources is required in nearly all steps of the process.

- Baseline energy use should be expressed in the agreed metrics, typically involving a ratio of inputs (energy use or fuel use) and outputs (kilometres travelled, tonnes delivered, or square metres lit). This means that 'output' or production data will usually need to be collected at the same level of detail or granularity as energy data. Although energy costs may be of most interest to management, it is important to base energy efficiency indicators on physical quantities (kWh, MJ, litres) rather than costs. This is because an increase in unit price by suppliers can easily make an efficiency improvement (input/output) look bad.

A critical step in developing baseline energy data is to structure it so that it can be analysed in a meaningful way. Data structure is discussed in more detail on the next page.

- Data most relevant to identifying specific opportunities are: the level of performance improvement a specific opportunity might achieve; which segment of the fleet or site it might apply to; what effect this has on overall energy consumption; and how valuable it is to the business overall. How-To Guide No.2 looks at identifying opportunities.
- Developing a business case requires data from several sources, including external data on equipment performance; internal data on costs and performance benchmarks; subjective judgement on energy costs and equipment or supplier reliability/quality.
- Implementation involves procurement (or process development, for non-capital projects) and commissioning. Important data during the implementation phase (procurement, process development, commissioning) includes all actual

costs (installation, training, downtime, etc.) and any changes in fuel efficiency performance (fuel use, mileage, productivity) that have resulted from implementation.

- During monitoring & evaluation, the same metrics as were used in the baseline should be compared.

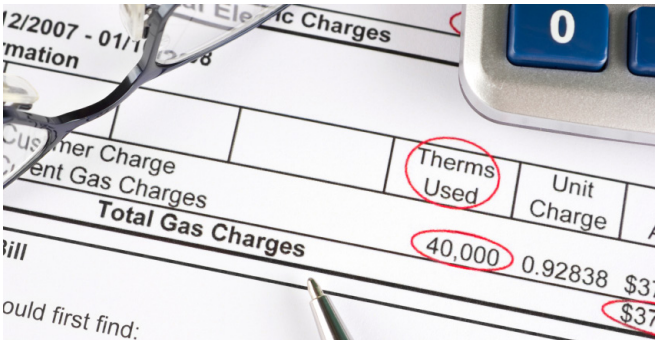
➤ Sources of relevant data

Energy efficiency data comes from a variety of sources, but most can be defined as either external or internal to the organisation.

By definition, internal data comes from within the company, or actual equipment. This doesn't mean it is easier to access (as it may not have been recorded in the past); but it means the company controls whether it is recorded or not. Sources of internal data include:

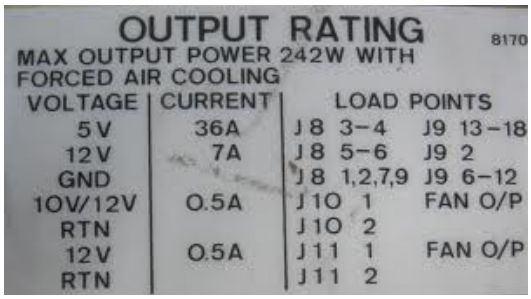
- Existing fuel/electricity reports: some operators monitor and report electricity and fuel use on a weekly, fortnightly or monthly basis. The source of data is likely one of those below, but if it is collected already it can be used to drive efficiency.
- Finance/invoicing records from suppliers of gas, electricity or fuel. Invoices for these will usually state the quantity supplied, which can be used to analyse periodic consumption or long-term trends. This may be enough to analyse total consumption, but not enough information for individual pieces of equipment.
- Most electricity and gas suppliers provide guidance on their websites for how to read the bill to identify the quantity of energy used. If you need assistance call the energy company as a first step.

Figure 1: Interpreting your energy bills to quantify energy use



- Telemetry/sub-metering: Ideally, energy data needs to be related to individual pieces of equipment, trucks, or areas on a site. The only way to accurately do this is with sub-metering. This is relatively simple but can be costly, and the data is still only helpful if it is recorded and used. On trucks, equivalent data can be obtained by fitting a telemetry unit or data logger to the CANbus of modern trucks.
- Equipment ratings: If sub-metering or telemetry is impractical or cost prohibitive, many pieces of electrical equipment have ratings labels from which power consumption can be estimated based on hours of operation and loading.

Figure 2: Equipment rating label example



- Suppliers can often provide energy ratings for equipment or (in the case of trucks) data files showing fuel used over a specific period. For investigations of new opportunities, suppliers will often indicate what sort of energy savings can be expected; however, these can be overly optimistic and should therefore be treated as such.
- Public information: Over the years, a range of government programs have tried to improve public information about energy savings through case studies, information tables, and websites. Average or nominal data is often available as a first step (and some has been included in Fact sheets 1 and 2) for the main opportunities in each sector.

➤ Data Structure

Generally speaking, the more detailed or 'granular' the energy data is, the more useful it is in identifying opportunities to improve efficiency.

Ideally, energy use should be available for each piece of equipment or, at a minimum, particular types of equipment or facilities.

This grouping of like equipment is called segmentation. Segmentation is important because it simplifies the analysis of energy use to groups of things that use energy in similar ways.

This is advantageous because opportunities for improvement relate mostly to particular types or kinds of equipment, especially in the transport sector.

Examples of the kind of segmentation that could be used for fleets, warehouses, and materials handling equipment are shown in Table 1 below.

Different energy sources can assist in quantifying energy use by different equipment (e.g. LPG for forklifts versus electricity for conveyors). Where the fuel is used for different equipment, some sub-metring maybe required.

Combining more than one type of segmentation (such as in Table 2 for fleets) allows better targeting of the main energy using activities or equipment across the company.

Table 1: Segmentation criteria for different sectors

Fleet	Warehouse	Refrigerated store	Materials handling
By vehicle type (see Table 2).	By building type (office, amenities, kitchen, warehouse)	By temp range (cold room, freezer)	By equipment type (forklift, conveyor, crane/ gantry)
By duty cycle (see Table 2).	By equipment type (lighting, water heating, fans and a/c, compressed air, pumps)	By equipment type (pumps, motors, compressors, lighting, controls)	By fuel type (electricity, LPG, diesel, natural gas).
By fuel (LPG, petrol, diesel)	By fuel type (electricity, gas, diesel, LPG)		By equipment size/rating (large fork/ small fork)

Table 2: Example segmentation & aggregation of fleet energy use

Fleet category	No. of vehicles	Average fuel consumption (DLE) (L/100 km)	Average annual mileage (km)
Ute/van	5	11.5	29,800
Rigid truck			
Local delivery	1	55.1	47,000
Urban haul	0		
Urban tipper	21	58.9	34,000
Regional line haul	0		
Interstate line haul	0		
Semi-trailer			
Local	1	54.1	84,400
Urban haul	0		
Regional line haul	4	57.2	205,000
Interstate line haul	0		
B-double			
Local	0		
Urban haul	0		
Regional line haul	2	61.4	172,000
Interstate line haul			
Total fleet	34		

➤ The business case for investment in data

Many managers are reluctant to invest in data systems (especially those tracking energy or resource data) because there is no direct or immediate return on investment.

Capturing data costs money, but the process of getting the data doesn't create immediate savings. The reality for most SMEs is that such additional costs are hard to justify.

However, this shouldn't be used as a reason for doing nothing. After all, a business incurs real costs if it maintains current levels of energy use while electricity prices continue to increase. Similarly, if competitors reduce their energy use and pass this saving on to customers, revenue can be lost as your customers switch to cheaper operators.

For these reasons, the costs associated with capturing data should be seen as an investment. Without the data, improvements cannot be easily identified, quantified or demonstrated to others.

A good analogy is to look at operational data such as orders, sales and deliveries; financial data such as company accounts; and HR records related to staff.

These also incur administrative costs but they are an essential part of running the business, so too should good energy management.

➤ What next?

- Understand how your company currently collects and stores energy-related data. Could it be improved? Are current systems suitable?
- Do staff need training to understand the issues?
- What metrics are currently used to measure or monitor energy efficiency? Are they sufficient? Are they relevant to business success? Do you need to set new metrics or amend the ones already used?
- Assess whether you are collecting enough energy and 'production' data to report the metrics and achieve your company's energy objectives. If not, how will you collect the extra data? Consider sub-metering or data loggers to collect data on major equipment items or sections of the site.
- Draw up a simple data management plan to understand what data is collected, when, how, by whom – and where it's stored (see example in Table 3).
- Set up a process to regularly review and report energy data.

Table 3: Example data management plan

Area	Energy	Source	Resp	Freq.	Report
W/ house	Elec.	Bill	Admin	Quarter	M'ment report
Water heater	Elec.	Sub-meter	Maint.	Month	n/a
Trucks	Diesel	Supplier bill	Admin	Month	M'ment report
Vans	Diesel	Fuel card	Admin	Month	M'ment report
Forklift	LPG	Supplier bill	Ops Mgr	Week	M'ment report
a/c	Elec.	Sub-meter	Maint.	Month	n/a

➤ Further information

Case Study No.1 - Keysborough Spec 1

New warehouse purchase case study

http://energy-efficiency.sclaa.com.au

Case Study No.2 - McGills Transport

Transport company case study

http://energy-efficiency.sclaa.com.au

Energy Efficiency Training Program

NSW government training in energy efficiency

http://www.environment.nsw.gov.au/sustainbus/greenskills/eneftraining.htm

Energy Efficiency Assist

A series of videos covering energy efficiency opportunities for the manufacturing sector: Motors & Drives, Lighting, Process Cooling & Refrigeration, Boiler, Compressed air, Heating Ventilation Air Conditioning (HVAC), Easy wins, Demand Management, Energy Data Management, Undererstanding your bill

http://energyefficiencyassist.com.au/onlineinteractivetools

Measuring, metering and capturing energy data

Detailed information about capturing energy data from a range of non-transport equipment (support material for EEO program)

http://eeo.govspace.gov.au/files/2013/03/ESMG-Chapter-2.pdf

Measurement and Opportunity evaluation in the Transport Sector

Federal government guide to measuring energy use in transport under the Energy Efficiency Opportunities (EEO) program

http://eeo.govspace.gov.au/files/2012/10/Measurement-and-Opportunity-evaluation-in-the-Transport-Sector.pdf

Save Energy, Cut Costs: energy efficient warehouse operation

A UK based guide to enable organisations to identify prioritised opportunities, develop a business case and implement an energy reduction programme

http://www.ukwa.org.uk/_files/23-carbon-trust-23.pdf

Training course on energy efficiency in SMEs

Very detailed (European) guidance on collecting energy data, setting metrics, identifying opportunities, calculating costs and savings, and other relevant activities

http://www.engine-sme.eu/uploads/media/Training_material_en.pdf

Telematics for efficient road freight transport

This comprehensive guide shows the transport professional how to choose the right telematics system for their operation in a step-by-step manner. It offers detailed information on different types of systems and system suppliers, as well as practical advice on how to implement a system using 11 real world case studies

http://www.freightbestpractice.org.uk/telematics-for-efficient-road-freight-operations

Learn more on how to make your business more energy efficient at **sclaa.com.au**

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