8. The evolution of energy management practices

8.1 Introduction

As Chapter 7 revealed, the typical response by organisations in the first assessments that were conducted to meet obligations under the EEO legislation reflected a set of energy management practices based on assumptions about the resourcing, frequency and value of energy efficiency. That is, energy management was treated as an episodic process, external consultants were considered to be the credible and legitimate means of conducting assessments, and the value of energy efficiency improvement was primarily associated with energy cost savings. However, over the period 2006–2012 there were substantial changes in the organisational field associated with energy management practices. In particular, increasing government legislation and the growing concerns and interests of investors and customers influenced the evolution of energy management practices.

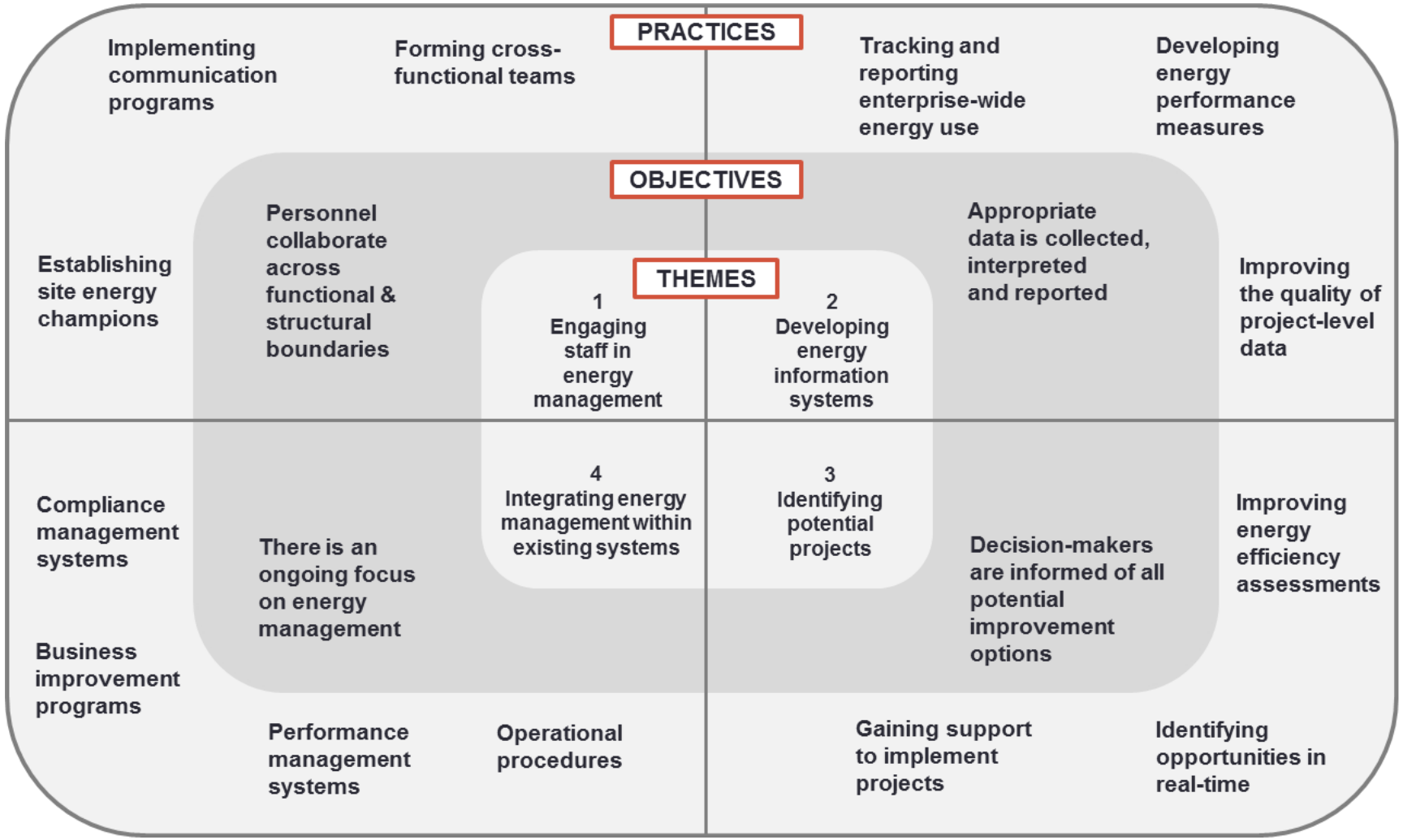
In the present chapter, the changes to energy management practices described by corporate energy practitioners in public conference presentations, interviews and case studies developed by the Department of RET are presented. Chapter 8 is structured in accordance with four key themes that have emerged from the research. These are:

1. engaging staff in energy management
2. developing energy information systems
3. identifying potential projects, and
4. integrating energy management into existing management systems.

While the themes, objectives and practices that emerged from the analysis are consistent with the energy management and organisational change literature, the practices contrast with those applied by organisations as they initially responded to the EEO legislation. Chapter 8 aims to expose the interactions between internal and external stakeholders and the social dynamics that support the successful implementation of such practices within an energy management context.

Figure 8.1 provides an overview of the research findings in respect of changing energy management practices. Key themes from the analysis are shown in the centre of the figure. In the dark shaded section, the objectives of each practice area are stated. In the outer section of Figure 8.1, the more specific energy management practices, for which significant change has occurred, are listed.

Figure 8.1: Themes, objectives and practices examined in this chapter



8.2 Theme 1 – Engaging staff in energy management

As organisations began to conduct energy efficiency assessments to meet the requirements of the EEO legislation, the limitations of a traditional 'energy audit' approach to energy management were being revealed to corporate energy practitioners. In particular, there was an expectation that external energy consultants would develop sufficient knowledge of their site in a short amount of time through which they would identify all available energy efficiency improvement projects. However, site specific knowledge – particularly associated with core production processes, was often held by local staff. Corporate energy practitioners explained that the limitations of this approach included the following:

- Fewer opportunities were typically identified than otherwise may have been with greater involvement of internal personnel.[74]
- The detailed information required to evaluate projects was lacking (particularly quantification of all business benefits, rather than just a focus on energy cost savings).[75]
- For those opportunities identified by consultants, there was a lack of motivation by internal personnel to be involved in progressing the evaluation and implementation of projects once the consultant left.[76]
- The poor quality of business case proposals and lack of organisational context suggested that fewer energy efficiency projects were ultimately implemented than otherwise might have been.[77]

This situation presented corporate energy practitioners with a challenge. On the one hand, there had been an expectation within their organisations that the use of energy consultants and a traditional energy audit approach was the most appropriate way to

[74] Interviewee CQ Principal Energy Advisor Mining 2013; Presenter BW Environmental Advisor Commercial 2012

[75] Interviewee CO Environmental Manager Transport 2013; Presenter CB Technical Manager Manufacturing 2012

[76] Presenter AA GM Carbon & Energy Mining 2011; Presenter AV Project Manager Energy Efficiency Manufacturing 2011

[77] Presenter AP Energy & Sustainability Manager Commercial 2011; Presenter AL Energy Project Engineer Manufacturing 2011

conduct energy efficiency assessments – both in relation to achieving an effective outcome and as a means of reducing the time and effort required to meet compliance requirements. On the other hand, corporate energy practitioners found that in order to meet compliance requirements and to optimise business outcomes within their organisations, they required substantially greater involvement from internal staff.

The tension between these two positions is an important observation. It highlights the difficulty that practitioners face when obtaining resources and convincing management that a more comprehensive approach to energy management is required.

Even in cases where it was acknowledged that more internal personnel should be involved in energy management, the motivation and resources available to corporate energy practitioners was not always forthcoming. This point is illustrated in the following comment from the Manager Greenhouse and Sustainability in the mining sector:

> "Everyone is just so busy. No matter how much of a legal requirement the EEO legislation is – and how good a business case you have got – it is always a challenge to get people to buy into the process and get involved."[78]

Corporate energy practitioners developed a range of strategies to broaden the involvement of personnel. This section of the case study describes three of the key energy management practices that had changed over the study period. These practices were used by corporate energy practitioners to engage personnel across their organisation and included:

- forming cross functional energy management teams
- developing and implementing communication programs to promote the benefits of energy efficiency and the action that staff could take in order to contribute to energy efficiency improvement, and
- assigning responsibility for energy efficiency improvement at the site level.

[78] Presenter AH Manager Greenhouse & Sustainability Mining 2011

8.2.1 Forming cross functional teams

Rationale

A key strategy that corporate energy practitioners used to broaden the involvement of personnel from different functional areas within their organisations was to establish cross functional energy teams.[79] Cross functional energy teams helped to overcome what corporate energy practitioners described as 'the challenge of working across organisational silos'. By this they meant that there tended to be a lack of communication and coordination across various professional and functional groups within their organisations.[80] This was a particular challenge for energy efficiency in that it was widely perceived to be the domain of managers with technical engineering expertise and/or external consultants who were viewed as 'energy efficiency experts'.[81] In some cases, projects were constrained by misaligned incentives in which the budget required to implement a project would need to be drawn from one division of the business (e.g. maintenance), while the benefits would accrue to another department in the form of energy savings (e.g. operations).[82] Establishing cross functional teams helped to improve communication and collaboration across multiple internal groups.

The involvement of a range of personnel also had an impact at the project level since the relative importance and influence of various internal stakeholders would vary from one project to another. For example, frontline operators could often yield significant influence over decisions associated with energy efficiency initiatives that required changes to daily operational practices.[83] In contrast, large projects often required significant financial resources – in the form of accounting, finance and

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[79] Case DN Centennial Coal Mining Sector 2012; Presenter AH Manager Greenhouse & Sustainability Mining 2011

[80] Presenter BD Energy Coordinator Mining 2011; Presenter CI Principal Consultant Mining Mining 2012

[81] Interviewee CS Carbon and Energy Manager Mining 2013; Presenter BH Energy & Carbon Manager Commercial 2012

[82] Interviewee CQ Principal Energy Advisor Mining 2013; Presenter AD Principal Greenhouse & Energy Manufacturing 2011

[83] Case DK Sydney Water Utility Sector 2012; Presenter AI Maintenance Superintendent Transport 2011

senior management personnel – to be involved in such decisions.[84] Other groups that were mentioned by corporate energy practitioners as influencing energy efficiency performance are discussed in the following paragraphs.

Personnel involved in teams

The diversity of personnel who were involved, and the role of corporate-level steering committees, are illustrated by a Group Environment Manager in a mining company below:

> "To assist in the implementation of the policy, we've established a steering committee that consists of our Chief Operating Officer, General Manager of Sustainable Development, our Chief Financial Officer, our General Manager of Health Safety Environment and Community, and our General Manager of Business Support. And their role is to monitor policy development, develop standards … and to review internal and external funding applications. They are also expected to identify company-wide opportunities to assist us in preparing for a carbon constrained future."[85]

Table 8.1 lists a number of different roles within organisations and the contribution they can make to energy management. Table 8.1 has been drawn from conference presentations by corporate energy practitioners and the Energy Efficiency Opportunities Assessment Handbook (RET 2009, p. 19). The handbook was developed by the Department of Industry as a practical guide to support organisations with conducting energy efficiency assessments.

[84] Presenter AT Sustainability Analyst Manufacturing 2011

[85] Presenter AF Group Environment Manager Mining 2011

Table 8.1: Personnel involved in teams

Role	Contribution
Line managers	Focus energy management on improvements that are aligned with business priorities.
Engineering personnel	Identify project options and specify technical risks and requirements.
Business improvement personnel	Apply analytical skills and help to identify and capture the full business benefits of energy-saving projects (e.g. reducing bottlenecks which can lead to improved productivity).
Frontline operators	Identify and implement improvements in daily operational practices.
Production planners	Influence planning on production runs and other operational planning decisions which can effect energy use.
Accounting and finance personnel	Establish project financial costs and benefits and inform the rest of the team of the availability of, appropriate timing and access to internal funds.
Maintenance personnel	Identify opportunities and provide specific input to the maintenance implications of energy efficiency measures.
Procurement personnel	Establish the suitability of specifications, preferred supplier arrangements (if applicable) and standardised specifications.
Environmental managers	Highlight the environmental risks and opportunities associated with energy efficiency measures.
Work, health and safety personnel	Highlight the safety-related risks and opportunities associated with energy efficiency measures.
Human resources (HR) personnel	Support recruitment for energy-related roles. Incorporate energy responsibilities into existing roles. Provide input and advice regarding other initiatives (e.g. incorporating energy efficiency performance into performance management systems and training measures).

(Sources: RET 2009, p.19; Presenter BK Strategic Projects Manager in the mining sector 2012; Presenter BT Sustainability Manager in the commercial sector 2012; Presenter BH Energy and Carbon Manager in the commercial sector 2012; Presenter BC Superintendent Energy in the mining sector 2011)

While Table 8.1 highlights the most common roles, some organisations had other specialist staff involved. For example, the Project Manager Energy Efficiency in a manufacturing business involved a marketing manager who helped to promote the program across the business and with clients. The respondent's organisation also involved a supply chain development manager who was responsible for procurement, and whose role developed into one of helping to incorporate energy efficiency into the organisation's procurement processes. The organisation also involved an energy consultant in the energy team. One of the important benefits of having their long standing energy consultant involved was that it provided the consultant with a network of people within the organisation that the consultant could follow up with directly, rather than having to work through and involve the Project Manager Energy Efficiency himself.[86]

Teams as a symbol of legitimacy

Teams were used to achieve a range of different aims within organisations. Box 8.1 illustrates how an energy management team was used to regain momentum for energy efficiency in a mining organisation.

[86] Presenter AV Project Manager Energy Efficiency Manufacturing 2011

Box 8.1: Establishing a corporate team to regain momentum for energy management

An organisation which owned and operated mines around Australia found that when the organisation first responded to the EEO legislation it had not established a strong corporate role for energy management. Rather, responsibility for fulfilling the obligations of the EEO legislation had been delegated directly to each site. As the organisation was preparing the first public report required under the EEO legislation within 18 months of program commencement, a number of potential issues of non-compliance were revealed. This occurred soon after the introduction of the NGER legislation and at a time when the federal government was undertaking consultations on the design of a carbon pricing scheme.

Faced with the risk of non-compliance and potential reputational issues, a decision was made by the corporate management team to establish a new role to manage energy and carbon issues. One of the first actions that the new energy management practitioner took was to establish a corporate-level carbon and energy team. The team included representatives from a diverse range of departments including:

- external affairs
- engineering
- research and development
- production, and
- environmental management.

The team also included mine managers from each site. One of the first actions of the team itself was to agree on accountabilities and reporting arrangements. The team also determined that site energy practitioners would be established at each mine.[87]

This example illustrates a number of the benefits associated with using a cross functional team. First, since this was a newly-established team, it provided a powerful symbol of the importance of energy management to the organisation. As the team was established following a period of poor performance, it also

[87] Presenter BK Strategic Projects Manager Mining 2012

demonstrated that such performance was considered by management to be unacceptable while acknowledging that additional resources were required to reduce the risk of poor performance in the future.

Second, by involving mine managers in the corporate team, these managers became directly accountable for the outcomes that were achieved on each of the sites. This enhanced the credibility of the corporate energy practitioner and facilitated collaboration between the corporate energy practitioner and the sites.
Third, the corporate energy team provided a central point of review. This was important, both in managing the expectation from the team that compliance obligations would be met, as well as ensuring that other business benefits were encouraged through the process. By involving the different functional areas, if there were any functional barriers limiting the uptake of projects, then the team provided a forum within which these barriers could be discussed and directly actioned through the team – potentially reducing significant delays in the program.[88] Ultimately, the team established a strong sense of legitimacy for energy efficiency within the organisation.
The example also highlights the influence of both the EEO legislation and pending introduction of a carbon price in motivating management to address underperformance and the reputational and business risks associated with non-compliance.

The use of different types of teams

Corporate energy teams were typically responsible for overall energy performance across an organisation. However, an alternative approach was to establish cross functional teams that were responsible for energy performance in a particular functional area or technology. This is illustrated in Box 8.2.

[88] Presenter BK Strategic Projects Manager Mining 2012

Box 8.2: Technology-based teams

An organisation in the transport and logistics sector established a number of high-level cross functional corporate teams. Each team had responsibility for improving energy efficiency in a particular technological area. Areas included:

- mobile equipment (e.g. trucks, trains etc.)
- logistics
- procurement, and
- other key operational areas in which energy efficiency improvement could be achieved.

Each team included a technology specialist as well as senior-level representatives from accounting and finance, operations and other functional areas. One advantage of this approach for the organisation was that it placed clear accountability for obtaining outcomes in each technology area. It also allowed technical specialists in particular areas to be involved in an efficient manner (since they could focus their efforts) and, over time, helped develop the technical knowledge and understanding of other personnel in a particular technology area (e.g. finance staff).[89]

Cross functional teams were also formed at the site level.[90] While the corporate-level teams put greater focus on management issues, at the site level, the cross functional teams were typically more focused on progressing the implementation of specific energy efficiency projects. Respondents suggested that the effectiveness of teams often varied from one site to the next. A Principal for Climate Change and Energy Efficiency in the mining sector described the importance of having the right people involved in the site-level team:

[89] Interviewee CO Environmental Manager Transport 2013; Presenter CA Environmental Manager Transport 2012

[90] Presenter AD Principal Greenhouse & Energy Manufacturing 2011; Presenter AV Project Manager Energy Efficiency Manufacturing 2011; Presenter BD Energy Coordinator Mining 2011; Presenter CH Manager Environment & Sustainability Mining 2012

> "One of the big lessons learnt in our first five years was that it is essential to have the right people on the site driving the site energy teams. Having somebody that is the holder of the purse strings and understands the business driving the site energy team gets a lot more traction and buy in compared to those where the graduate engineer has the role of managing the team. We have seen the difference in the outcomes from the assessments."[91]

One of the advantages of having an established team at the site is that, by having personnel from different functional areas focused on energy management, the energy efficiency projects that are identified can be examined from a variety of perspectives.[92] Many energy efficiency projects have implications for operations, maintenance, HR (and potential people-related issues), environment and safety. Establishing a cross functional team at the site can reduce the likelihood of good projects being rejected and/or poor projects undergoing significant investigation by individuals only to be find that there is an operational or other reason that doesn't allow a seemingly promising project to be implemented.[93]

Responsibility and ownership was considered to be held by the team, rather than with a single corporate energy practitioner (another important advantage of establishing cross functional corporate teams).[94] Respondents viewed this as an important way of achieving a more enduring energy management program, and one where staff felt motivated to maintain new energy management practices on an ongoing basis. Site-based teams also helped to spread responsibility for progress on energy management beyond site-based energy champions or external energy

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[91] Interviewee CL Principal Climate Change and Energy Efficiency Mining 2013

[92] Case DR Australia Post Transport Sector 2012; Case DS Linfox Transport Sector 2012; Presenter BT Sustainability Manager Commercial 2012

[93] Interviewee CN Business Development Manager Transport 2013; Interviewee CQ Principal Energy Advisor Mining 2013

[94] Interviewee CP Project Manager Energy Efficiency Manufacturing 2013; Presenter AU Infrastructure Capability Manager Manufacturing 2011

management consultants.[95] In reviewing performance against energy targets or scheduled energy management activities, for example, the responsibility for progressing such items was more likely to be considered a shared responsibility, rather than being the sole responsibility of the site or corporate energy practitioner.[96]

For the corporate energy practitioners, site-based teams could also provide a communication channel for sharing information about how the organisation as a whole had been performing and to share information about projects as well as other energy management initiatives that had occurred on other sites.

In some organisations transient teams would be formed to conduct formal energy efficiency assessments.[97] This would provide an opportunity to further involve personnel at the site in energy management. These teams would typically report back through to the site-level energy management team, which would, in turn, be responsible for reviewing the opportunities identified and providing support in progressing or evaluating such projects as required. Although less common, in some cases teams would be established specifically to undertake evaluation and/or implementation of a particular energy efficiency measure. This was typically required for large complex projects that presented a significant financial or operational risk or in cases where a high level of 'buy-in' was required (e.g. from operators and maintenance staff).[98]

8.2.2 Implementing communication programs

The majority of corporate energy practitioners explained that it was challenging to make energy visible and relevant to staff. Establishing site-level energy champions and cross functional teams played an important role in addressing this challenge. However, corporate energy practitioners had identified many other internal personnel who can influence energy use – often through their day-to-day activities. Examples

[95] Interviewee CP Project Manager Energy Efficiency Manufacturing 2013

[96] Interviewee CQ Principal Energy Advisor Mining 2013; Presenter BK Strategic Projects Manager Mining 2012

[97] Presenter AT Sustainability Analyst Manufacturing 2011

[98] Presenter CA Environmental Manager Transport 2012

included:

- finance and accounting personnel involved in decisions on financing energy management projects[99]
- production planners, who made decisions on production scheduling,[100] and
- facility managers involved in the daily operation of buildings.[101]

A Project Manager for Energy Efficiency in the manufacturing sector explained his approach in the following way:

> "I get 40 minutes to go in and talk about energy efficiency in our induction training program for all new employees. I start off by asking: If you walked past a tap that was running as you were heading into this meeting, who would stop and turn it off? Everyone puts up their hand. But, when I ask them whether they would turn off a light in an office if it was on and there was no one in the office, they mostly say no. So I let them know that energy pouring out of the light globe costs us more than the water pouring out of the tap." [102]

One of the reasons that external consultants and engineering personnel found it difficult to obtain input from personnel in organisations is that energy had not been perceived as a legitimate activity for many personnel to spend time on.[103] An Environmental Manager in the transport sector explained that a contributing factor in his organisation was that energy was effectively treated as a fixed cost which meant that it was assumed that it was not worth making any effort to save energy.[104]

Corporate energy practitioners developed a range of strategies to broaden awareness of the importance of energy efficiency in their organisations (see Table 8.2). One method was to develop an organisation-wide communication program.

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[99] Presenter AF Group Environment Manager Mining 2011

[100] Presenter AL Energy Project Engineer Manufacturing 2011

[101] Case DH GPT Group Commercial Sector 2012; Case DI Spotless Commercial Sector 2012

[102] Interviewee CP Project Manager Energy Efficiency Manufacturing 2013

[103] Presenter BA Sustainability Manager Multi Sector 2011; Presenter BB Energy Champion Manufacturing 2011; Presenter BO Energy Analyst Manufacturing 2012

[104] Interviewee CO Environmental Manager Transport 2013

Communication programs were typically developed with the HR or internal communications teams within organisations[105]. Communication media included the use of videos,[106]posters[107]and information sessions.[108] Communication strategies included providing information about the actions people could take on energy efficiency, as well as broader messaging explaining how energy management, together with other environmental initiatives, were a priority for the organisation as a whole. A Project Manager for Energy Efficiency in a manufacturing organisation explained the aim of the organisations energy efficiency communication strategy as making energy efficiency a consistent part of day-to-day decision-making:

> "Am I doing something safely? Am I doing it at the quality that the consumer wants? These are the two key things that people take for granted. Our people don't have to stop and think about it. The third one should be to ask: 'Am I doing it in an efficient way?' My aim is for energy efficiency to be the third natural instinct in our organisation."[109]

[105] Presenter CA Environmental Manager Transport 2012; Presenter CG Manager Sustainability & Energy Manufacturing 2012

[106] Presenter AM Head of Sustainability Commercial 2011

[107] Presenter AJ Principal Energy Efficiency Engineer Manufacturing 2011

[108] Presenter AK Manager Climate Change & Environment Commercial 2011

[109] Interviewee CP Project Manager Energy Efficiency Manufacturing 2013

Table 8.2: Mechanisms to communicate energy performance

Mechanism	Description
Organisation-wide communication programs	Use of videos, posters and other channels to communicate the importance of energy management to the business[110]
Clubs	Creation of a social network to provide formal acknowledgement and a peer-to-peer network to support staff who did not have a formal energy management role[111]
Rewards and recognition	Senior management acknowledgement of outstanding performance[112]
Education and training	Specific information about the actions that could be taken in core business operations[113]
Reporting	Use of regular communication media within the firm to communicate performance[114]

The use of a 'green club' is illustrated in Box 8.3 as an example of one way in which attempts were made to engage staff in reducing energy and greenhouse gas emissions.

[110] Presenter AM Head of Sustainability Commercial 2011

[111] Presenter AJ Principal Energy Efficiency Engineer Manufacturing 2011; Presenter CA Environmental Manager Transport 2012

[112] Interviewee CP Project Manager Energy Efficiency Manufacturing 2013

[113] Presenter BA Sustainability Manager Multi Sector 2011

[114] Presenter BI Greenhouse & Energy Advisor Mining 2012; Presenter BM Greenhouse & Energy Advisor Manufacturing 2012

Box 8.3: Communication strategies in a transport organisation

An organisation in the transport industry had developed a cartoon character that acted as a mascot for their energy efficiency and sustainability program. The 'personality' that was developed for the character was intended to create the idea that implementing green initiatives, including reducing greenhouse gas emissions through energy efficiency, was a smart and socially responsible thing to do.

The communication program was supported by staff information sessions, awards for successful ideas that were put forward by staff and a 'green club' was established. The idea of the green club was to create a positive social network of people who could share their ideas and challenges associated with progressing energy efficiency in their organisation. According to the Environmental Manager who founded the program, the social network became something that people wanted to belong to.[115]

The design of energy efficiency communication strategies varied from one organisation to the next. Although many organisations used community awareness and concern about climate change as a means of engaging staff, this approach was not universal. In part, the 'main messages' that formed the focus of communication programs were influenced by each company's culture, business objectives and the extent to which they considered energy efficiency to be viewed by their stakeholders as an issue associated with the reputation of the organisation overall.[116] The importance of aligning communication with the corporate culture and expectations of various internal stakeholders is reflected in the following quote from an Energy Coordinator in the mining industry:

[115] Interviewee CO Environmental Manager Transport 2013

[116] Presenter AA GM Carbon & Energy Mining 2011; Presenter AM Head of Sustainability Commercial 2011; Presenter CA Environmental Manager Transport 2012; Presenter CG Manager Sustainability & Energy Manufacturing 2012

> "There is nothing more frightening than going into a meeting room with a bunch of miners at six in the morning and talking about energy efficiency … I'd rather face the Board! But this is where it all happens – you have to engage with these core people on site. For example, we always talk to surveyors about energy efficiency in terms of bench movements, ore movements and how projects are going; whether the project involves a diesel additive or a new set of tyres or realigning a haul road. These guys are integral to making sure your projects are implemented and accurately reported."[117]

Broad-based communication programs reinforced the work of teams and energy practitioners and provided a broad level of interest in energy management. However, corporate energy practitioners often found it challenging to define the specific actions that could be taken by staff involved in core production or maintenance activities.[118] This has required detailed work to identify specific actions and procedures that should be taken within the day-to-day activities of these staff.
For example, one manufacturing organisation had been developing an education and training program for production planners. The Project Manager for Energy Efficiency identified that planners had many different criteria to consider when they did their scheduling. However, energy had not been one of them. The organisation is now developing a detailed training program demonstrating how production planning decisions impact on energy efficiency. This has required detailed energy data and analysis to determine the potential impacts. Until this data was available the organisation was unable to finalise the training program and had limited success influencing the activities of program planners.[119] This example highlights the time and resources required to make energy efficiency relevant to, in this case, production planners. It also highlights that communication programs often evolve over time – a point made by many corporate energy practitioners.[120]

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[117] Presenter BD Energy Coordinator Mining 2011

[118] Presenter BC Superintendent Energy Mining 2011; Presenter BH Energy & Carbon Manager Commercial 2012

[119] Interviewee CP Project Manager Energy Efficiency Manufacturing 2013

[120] For example: Case DG Woolworths Commercial Sector 2012; Presenter AP Energy & Sustainability Manager Commercial 2011; Presenter BL Manager Sustainability Commercial 2012

The need for an appropriate level of data was also demonstrated by companies in the transport sector. One organisation found that it had multiple operators driving the same trucks each week. Without the appropriate level of detailed energy data it was difficult to link individual behaviour to fuel consumption. As a result, the first iteration of the organisation's training program was quite broad. However, once more comprehensive fuel monitoring systems became available, the training was revised to incorporate the data and the new procedures associated with reviewing the data on a shift-by-shift basis.[121]

Rather than simply telling site managers and their teams what they had to do to meet the compliance requirements, corporate energy practitioners found that they could be more successful in building support for energy efficiency at the site level by reframing the risks and opportunities associated with energy management in ways that were carefully targeted at the current issues and priorities on each of the sites.[122] For example, the performance of one site was being impacted by the reliability of the site's operating equipment. This meant that frequent breakdowns were impacting on site production targets. By framing the energy efficiency assessment as a means of examining and identifying opportunities to improve reliability of equipment *as well as* identifying energy cost savings, the site management team was motivated to be involved in the assessment since they saw it as an opportunity, rather than simply a compliance obligation.[123]

Often the most effective ways of reframing the benefits for a particular site were not immediately obvious to corporate energy practitioners when they first commenced assessments under the EEO legislation. However, as they worked more closely with operational staff and managers, they came to understand how best to communicate the benefits of the energy efficiency assessment process in ways that were considered to be more relevant to site managers and key site-based staff. A Manager

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[121] Interviewee CN Business Development Manager Transport 2013

[122] Presenter AH Manager Greenhouse & Sustainability Mining 2011; Presenter BA Sustainability Manager Multi Sector 2011; Presenter CD Environmental Sustainability Manager Commercial 2012

[123] Presenter BP Group Sustainability Manager Manufacturing 2012

for Sustainable Building Operations in a commercial organisation explains:

> "We had a team (based in a capital city working closely with the on-site guys to monitor progress) that put together the business case for energy efficient building upgrades and 'what have you'. We found that it worked very well for us. The consistency of having a professional working with the building manager on site and staying with that building for a number of years and setting the targets each year was one of the big advantages that we had – this ongoing consistency. It also meant that we had consistent communication with the asset managers who make decisions about investment in properties. They started to understand our efficiency language and we would also get to understand their language of return on investment, lease profiles and lease expires. I have learnt all of that by spending time talking to asset managers, and it meant that were talking about wider value to the business, rather than just cost savings from efficiency."[124]

This example highlights how energy management professionals, whether they are based within an organisation or externally (as consultants), may limit their influence and effectiveness by focusing solely on energy savings benefits. However, the quote suggests that it can take time and experience with a particular building or site to fully understand the potential benefits. It also requires collaboration between other personnel with specific site or business experience to establish the complete range of benefits. This example suggests that the solution to this requires collaboration across professional boundaries over time in order to create new understanding and meaning associated with the value of energy management.

In summary, a range of communication strategies were used to promote energy efficiency more widely across organisations. Energy management was typically communicated as an activity that aligned with the organisations' wider business goals and values. This helped to broaden interest and action on energy management beyond those individuals who had a formal role. Creating social networks, peer-to-

[124] Interviewee CK Sustainability Manager Commercial 2013

peer support and learning was considered an important way of maintaining interest and enthusiasm. Ultimately, these programs reinforced other activities, such as the use of formal energy management teams. Communication programs developed over time as more detailed data, information and understanding of the relevance of energy management to individuals and groups across the organisation evolved.

8.2.3 Establishing site energy champions

Corporate energy practitioners explained that corporate-level energy and environmental staff are often perceived by site-level managers as presenting unhelpful constraints on site-level efforts to meet mainstream and core business objectives.[125] As a relatively new initiative, energy efficiency was competing with a range of other corporate programs and priorities for attention and resources. A Principal for Climate Change Energy Efficiency in the mining sector described the challenge in the following way:

> "… the sites often see the regional office driving multiple initiatives. For them, introducing a new initiative is just about more noise and distraction. Trying to get buy-in is a real challenge and that stems back to trying to sell the business case to the sites."[126]

Other factors contributing to these difficulties were time and geographical constraints, since respondents typically had oversight of a number of sites and were located in a capital city head office.[127] To address this challenge, corporate energy practitioners typically allocated responsibility to locally-based site energy practitioners – often referred to as 'site-based energy champions'.[128] In many cases, however, allocation of responsibility did not happen automatically, and required careful negotiation with site management as they were the ones who would have to provide the funding and allocate the time for the site-based energy champion to

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[125] Presenter AL Energy Project Engineer Manufacturing 2011; Presenter BB Energy Champion Manufacturing 2011; Presenter CG Manager Sustainability & Energy Manufacturing 2012

[126] Interviewee CL Principal Climate Change and Energy Efficiency Mining 2013

[127] Interviewee CR Principal Energy Efficiency Engineer Manufacturing 2013; Presenter BN Carbon Policy Manager Manufacturing 2012; Presenter BO Energy Analyst Manufacturing 2012

[128] Presenter AD Principal Greenhouse & Energy Manufacturing 2011; Presenter BB Energy Champion Manufacturing 2011; Presenter AL Energy Project Engineer Manufacturing 2011

focus on energy efficiency. Reframing the benefits – to highlight the operational, maintenance and productivity benefits, *as well as* energy cost savings, played an important part in this process.[129] Selecting the appropriate person at a site was important. A Project Manager for Energy Efficiency in a manufacturing organisation describes the characteristics that they were seeking in a site-based energy champion:

> "There are three important criteria for successful energy champions at our sites. First, they have got to be passionate about energy efficiency. Then, they have got to have good respect from their peers – otherwise they can't sell it. And third, they have got to make time to do it. The site leadership team also has to make time available for them to do it. And so these are the requirements – not their technical background necessarily. Sometimes plant accountants are the best ones to be energy champions because it is all about the money. We have an energy engineer at two sites. At another site we have one of our electrical managers and at our agricultural business we have the engineering manager. So their background varies, but they all have to be passionate, have respect and they have to be able to make time to do it."[130]

These characteristics highlight the important role that the site-based energy champion plays in promoting energy management across the site. Since they are located on site, the site-based energy champions are able to more frequently and easily use existing formal communication channels to promote energy management.[131] Informal networks at the site level were also considered to be important since site-based energy champions played an important role in motivating their peers to contribute time and effort to energy efficiency improvement.[132] Of significance is the comment in the quote above that site-based energy champions may not necessarily have a technical engineering background. The corporate energy practitioner implies in this quote that the appropriate background of a site-based energy champion depends on the needs and culture of the site. According to this

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[129] Presenter BC Superintendent Energy Mining 2011

[130] Interviewee CP Project Manager Energy Efficiency Manufacturing 2013

[131] Presenter AI Maintenance Superintendent Transport 2011

[132] Presenter AL Energy Project Engineer Manufacturing 2011

respondent a site-based energy champion needs to be an effective communicator that is able to motivate others. This was emphasised by a majority of other respondents as well.[133]

Many organisations were also able to create a powerful community of practice through which the experience and lessons learnt about energy efficiency could be shared across an organisation. For example, corporate energy practitioners would convene formal meetings of site-based energy champions.[134] These meetings would provide the energy champions with an opportunity to share their experiences of what had worked and what had not on each site and to learn from each other's experience. Formal and information communications between site-based energy champions were also encouraged. The liaison across site-based energy champions also helped to develop new energy management practices and encourage those practices to be applied across all of the organisations sites. Such practices included those associated with the way in which performance was reported, technical analysis was conducted and energy efficiency measures were developed and rolled out more widely.[135] The learning between site-based energy champions was not just about technical initiatives, it also included learning about how to most effectively influence internal stakeholders.[136] Collaboration also provided an important support network for champions that helped to reinforce the importance of their role and to acknowledge any difficulties. This was important, because they were often involved in promoting activities at their sites (and activities that were not necessarily established as a legitimate and ongoing business practice). Support from personnel facing similar challenges helped to increase morale amongst site-based energy champions.[137]

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[133] Interviewee CP Project Manager Energy Efficiency Manufacturing 2013

[134] Interviewee CQ Principal Energy Advisor Mining 2013; Presenter CE Energy Manager Mining 2012

[135] Interviewee CQ Principal Energy Advisor Mining 2013; Presenter AD Principal Greenhouse & Energy Manufacturing 2011; Presenter BR Energy Manager Utilities 2012

[136] Interviewee CQ Principal Energy Advisor Mining 2013

[137] Interviewee CQ Principal Energy Advisor Mining 2013; Presenter BI Greenhouse & Energy Advisor Mining 2012; Presenter BM Greenhouse & Energy Advisor Manufacturing 2012; Presenter BR Energy Manager Utilities 2012

8.2.4 Section summary

This section of the case research has described the energy management practices that organisations involved in the research have applied to improve the level of involvement and engagement of internal personnel. The key practices were:

- forming and managing cross functional energy management teams
- developing communication programs to promote the benefits of energy efficiency and actions that staff could take in order to contribute to energy efficiency improvement, and
- establishing energy champions at the site level.

Corporate energy practitioners faced a number of challenges in broadening the involvement of personnel. For example, they needed to convince management that the investment and time required to involve others would be beneficial. Even with the support of management, however, they had to encourage personnel to become involved. Corporate energy practitioners modified the way in which they communicated the benefits of energy efficiency to build support and engagement by reframing the benefits in a manner that was most appealing to the particular stakeholder group they were attempting to influence.

8.3 Theme 2 – Developing energy information systems

8.3.1 Introduction and background

The uses and consumption of energy within organisations are complex and can be influenced by multiple factors,[138] some of which are controllable (e.g. decisions about equipment purchased and the way in which the equipment is used). Other factors are outside the organisation's control (e.g. more energy is required to air condition an office environment on a hot day, when compared with a cool day). Due to the complexity of energy use, corporate energy practitioners explained that access to accurate and reliable energy data is an essential aspect of effective energy

[138] The information presented in this paragraph is drawn from a range of presentations. It reflects the general understanding expressed by both government and industry personnel at the annual conferences.

management. Energy data needs to be accessible, accurate and reliable. Also, different levels of data are required (e.g. across the organisation as a whole, at the level of individual sites and at the level of single items of equipment and particular operating processes). The usefulness of energy data also depends on the frequency with which it is collected and the form in which it is made available to energy users. Energy data can be obtained in different ways, including through fixed energy meters or obtained manually by using specialist tools. Software systems are typically used to convert raw data into meaningful information. The sophistication of the software used can vary from a simple spreadsheet to customised energy management software that may also be linked to financial and operational data.

The term 'energy information system' is used here to describe the development of a system that supports the collection, interpretation and reporting of energy data in order to "measure and maintain performance and to locate opportunities for reducing energy consumption and cost" (Swords, Colyle & Norton 2008, p. 61) and to deliver other business benefits.

Prior to the introduction of the EEO legislation in 2006, energy management had typically received relatively limited management attention in the majority of the respondent organisations. Corporate energy practitioners explained that they inherited energy information systems with significant limitations. Typically issues included the following:

- There was limited energy data available.[139]
- The accuracy of the available data was highly variable.[140]
- Where data was available, it was often in a form that was difficult to access and interpret.[141]

[139] Case CV Downer EDI Mining Sector 2012; Presenter AS Chief Financial Officer Commercial 2011; Presenter BH Energy & Carbon Manager Commercial 2012

[140] Presenter AY Senior Consultant Manufacturing 2011; Presenter BC Superintendent Energy Mining 2011; Presenter BG Senior Consultant Mining 2011

[141] Presenter AN Director Consultancy Commercial 2011; Presenter AO Director Consultancy Commercial 2011; Presenter AP Energy & Sustainability Manager Commercial 2011

Figure 8.2 illustrates the various factors that respondents described which made it difficult for them to obtain the investment required to improve their existing energy information systems. At the project level, corporate energy practitioners explained that limited access to appropriate data led them to believe that a number of potential improvement opportunities were being overlooked. This meant that limited energy projects were identified[142] (see Box 1 in Figure 8.2). With regard to the projects proposed as potential improvement opportunities, a number of these were not progressed where there was insufficient data available to accurately establish the financial costs and benefits associated with the implementation of these projects[143] (see Box 2 in Figure 8.2). This, in turn, limited the overall business benefits that were achieved through the energy efficiency assessments (see Box 3 in Figure 8.2).

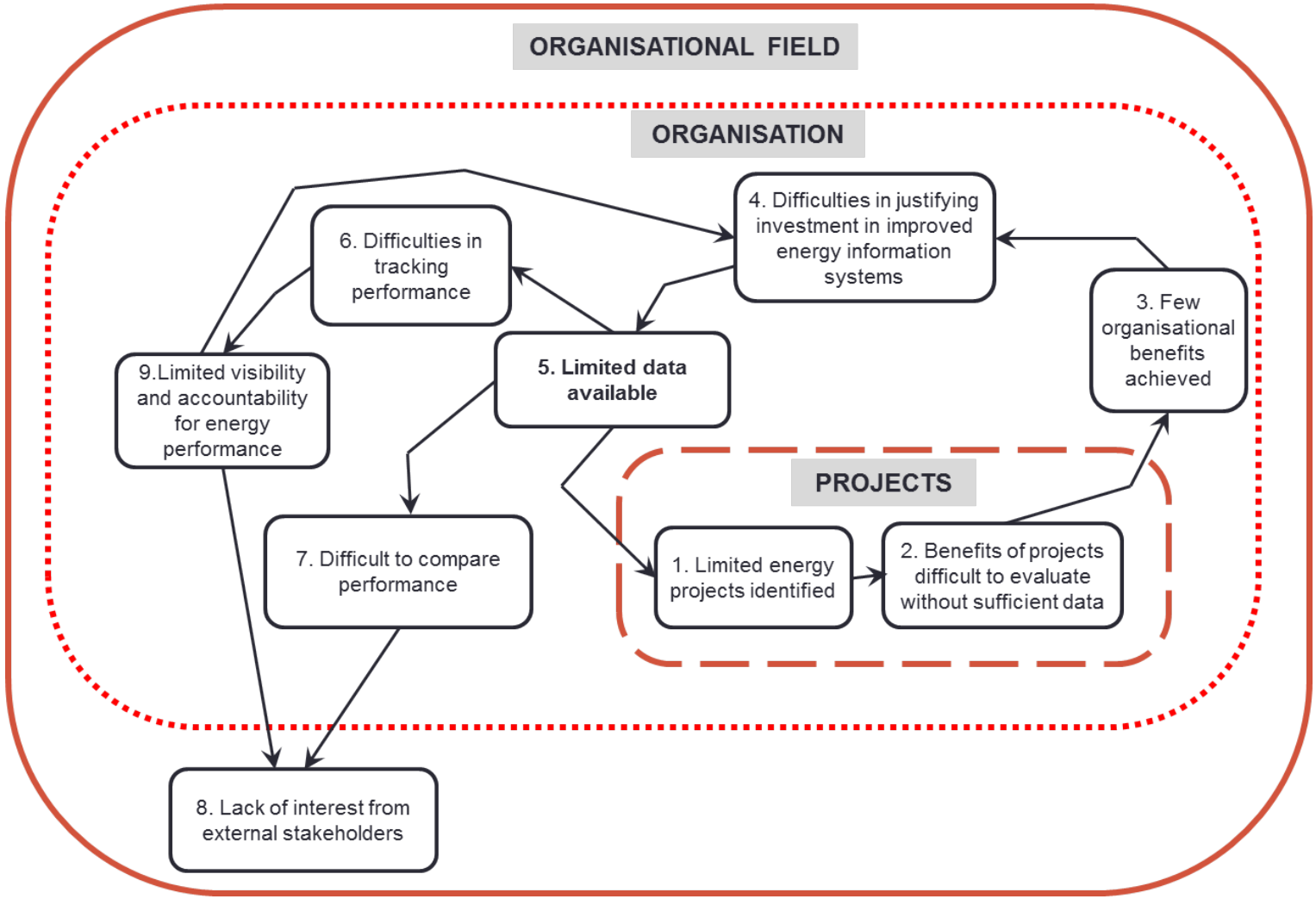
The lack of benefits then made it difficult to justify the investment required to improve energy information systems[144] (see Box 4 in Figure 8.2). This created a negative feedback cycle that maintained a situation in which it was very difficult to justify investment to improve the energy information system (see Box 5 in Figure 8.2).

[142] Presenter AF Group Environment Manager Mining 2011; Presenter AS Chief Financial Officer Commercial 2011

[143] Presenter AA GM Carbon & Energy Mining 2011; Presenter AY Senior Consultant Manufacturing 2011

[144] Presenter AX Senior Consultant Transport 2011; Presenter BC Superintendent Energy Mining 2011

Figure 8.2: Challenges associated with improving energy information systems



At the organisational level, the lack of available energy data made it difficult to track energy performance of the organisation over time (see Box 6 in Figure 8.2) and to compare performance of the organisation with others in the same industry sector[145] (see Box 7 in Figure 8.2). This meant that there was limited visibility and accountability for energy performance within the organisation (see Box 9 in Figure 8.2). Without this information, it was difficult for external stakeholders to compare and influence organisations when it came to energy efficiency performance improvement (see Box 8 in Figure 8.2). This situation reinforced the difficulty in justifying the investment required to further improve an organisation's energy information systems[146] (see Box 5 in Figure 8.2).

The EEO legislation requires organisations to identify and evaluate projects to a degree that provides decision-makers with 'investment quality' information (RET 2011). However, corporate energy practitioners explained that the specific compliance requirements outlined in the EEO legislation were not well understood at the time when the first energy efficiency assessments were being undertaken.[147] The limitations of existing energy information systems became more apparent as subsequent energy efficiency assessments were undertaken and as companies began to realise that they may not meet the compliance requirements of the EEO legislation. Such requirements included identified projects needing to be evaluated to a level of accuracy of ±30% (RET 2011).

Respondents explained that it was easier to justify improvements to the way in which energy data was gathered at a higher level, such as overall site energy use, relative to obtaining detailed energy use data at the sub-system or equipment level within a site.[148] Corporate energy practitioners explained that growing interest on the part of stakeholders external to their organisation provided an important motivation to

[145] Presenter BD Energy Coordinator Mining 2011; Presenter BE Product Manager Mining 2011

[146] Presenter AI Maintenance Superintendent Transport 2011; Presenter AO Director Consultancy Commercial 2011

[147] Interviewee CS Carbon and Energy Manager Mining 2013; Presenter AY Senior Consultant Manufacturing 2011

[148] Presenter AW Group & Risk Sustainability Manager Multi Sector 2011; Presenter BB Energy Champion Manufacturing 2011; Presenter BC Superintendent Energy Mining 2011

improve the quality and availability of energy data at the highest level, being total energy use for the organisation and the facilities within it.[149] However, these same external drivers for change did not directly support the development of energy information systems at a more detailed level (e.g. the level of an item of equipment or a specific production line). These differences are discussed separately in the following two sections – beginning with an examination of the strategies applied to improve data at the organisation and site levels.

8.3.2 Tracking and reporting enterprise-wide energy use

As discussed previously in this case study, the EEO legislation was an important trigger for organisations to review and (eventually) modify their energy management practices. However, subsequent to the introduction of the EEO legislation, the importance of energy management was reinforced through the influence of other organisational stakeholders, including investors and customers. The interest and needs of these other stakeholders provided an important driver for organisations to improve the quality and accessibility of organisational and site-level energy data. These drivers included the introduction of the NGER Act, which was introduced 12 months after the commencement of the EEO legislation (See Table 7.3 in Chapter 7). Practitioners also explained that they faced a number of other reporting requirements. These requirements included investors requesting information through reporting projects (e.g. the carbon disclosure project) and investor surveys about organisational sustainability performance.[150] Reducing the costs of managing the data to meet these external requirements and managing the potential risks of reporting data that was incorrect provided an important motivation for organisations to establish more effective energy information systems.

[149] Presenter AD Principal Greenhouse & Energy Manufacturing 2011; Presenter AT Sustainability Analyst Manufacturing 2011

[150] Interviewee CQ Principal Energy Advisor Mining 2013; Presenter AD Principal Greenhouse & Energy Manufacturing 2011; Presenter AM Head of Sustainability Commercial 2011; Presenter BM Greenhouse & Energy Advisor Manufacturing 2012

As a General Manager of Carbon and Energy in a mining company explained:

> "We had people out there collecting data three times – for National Pollutant Inventory reporting, National Greenhouse and Energy Reporting and EEO. Eight people were pulling the same sort of stuff together. So we had to do something about it and it's all coming together now. Anyone who needs it can come to the one place and pull it all out, and it's comprehensive and it's easy to use."[151]

Large energy consumers also began to use contract negotiations with energy retailers to obtain more detailed energy data.[152] Rather than monthly or quarterly billing data, organisations began to obtain more frequent interval data. For example, energy use for a facility could, in many cases, be provided on a 15-minute basis and in an electronic format. As well as reducing the administrative costs associated with collecting and aggregating data,[153] the availability of this data supported analysis of energy use at different times of the day, and from one day to the next.[154] This type of analysis helped to highlight potential areas in which energy was being used unnecessarily. An unintended, yet useful consequence of more frequent reviews of energy data was that many organisations identified mistakes in the billing data which they were able to rectify and have excess payments reimbursed. Opportunities to modify their tariff structure also delivered cost savings on subsequent energy bills.[155] These cost savings provided corporate energy practitioners with early 'wins' since they could clearly demonstrate that money was being saved by implementing more sophisticated energy information systems.

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[151] Presenter AA GM Carbon & Energy Mining 2011

[152] Interviewee CO Environmental Manager Transport 2013

[153] Presenter AW Group & Risk Sustainability Manager Multi Sector 2011

[154] Presenter AU Infrastructure Capability Manager Manufacturing 2011

[155] Examples include: Presenter AF Group Environment Manager Mining 2011; Presenter AW Group & Risk Sustainability Manager Multi Sector 2011; Presenter BR Energy Manager Utilities 2012

8.3.3 Developing energy performance measures

The commercial office sector

Respondents explained that one of the major challenges for energy management is that it is difficult to compare the energy efficiency performance from one site or building to another. This is because there are multiple factors that can impact on energy performance, including the age of particular sites,[156] the type of equipment used,[157] and the goods and services produced.[158] The challenge has been to develop performance measures that account for these differences to enable meaningful comparison. Developments in the commercial office sector provide an illustration of the way in which collaboration by multiple stakeholders over time is essential in order to develop meaningful measures of comparison that can be used to compare energy efficiency performance across commercial office buildings. This example is included in the analysis because it was mentioned frequently in presentations by corporate energy practitioners in the commercial sector as an important driver for change within their organisations.

The NABERS Energy rating tool was first developed in 1999 by the NSW Government. The involvement of building owners, tenants, technical consultants and government has helped to develop the credibility of the rating system to build confidence in the ratings system over time.[159]

Since 2010, it has become mandatory to use the rating system when commercial office space of 2000 square metres or more is offered for sale or lease (under the *Building Energy Efficiency Disclosure Act 2010* (Cth)). It is a performance-based tool, meaning that the rating is calculated on the basis of actual energy performance every 12 months. The tool allows for the normalisation of energy performance through consideration of building area, climate, hours of occupancy and equipment density. Ratings can be undertaken on a whole building, base building or tenancy. The outcomes are reported on a scale of one to six stars where 2.5–3 stars is

[156] Presenter AU Infrastructure Capability Manager Manufacturing 2011

[157] Presenter CE Energy Manager Mining 2012

[158] Presenter AD Principal Greenhouse & Energy Manufacturing 2011

[159] Presenter AN Director Consultancy Commercial 2011

considered to be the average energy performance.[160]

The star rating systems of the NABERS Energy rating tool has provided building owners and tenants with an opportunity to compare the energy performance of buildings in a way that is easily communicated and easily understood by non-technical audiences. In 2006, the 'Energy Efficiency in Government Operations' policy (AGO 2007)established a requirement that all government leases undertaken for longer than two years needed to be located in buildings demonstrating a NABERS Energy rating of at least 4.5 stars. The standard was also applied to new office buildings and major refurbishments. This requirement, together with a growing number of businesses that were also using the rating systems as a way of comparing building performance, has created an important commercial driver of improved energy performance.[161]

The development of the NABERS Energy rating system has also helped building owners to establish portfolio-wide energy performance targets. The advantage of adopting a portfolio-wide target is that it provides greater flexibility in considering the most appropriate buildings in which energy efficiency investments should be made. For example, energy efficiency investments can be matched to the business and equipment life-cycle of buildings.[162] Practitioners have also found that it is much easier to justify equipment replacement when such equipment is due to be replaced. They have been able to argue that any marginal increase in capital cost associated with energy efficiency can not only deliver operational cost savings but also 'future-proof' the building against rising energy costs and increasing tenant demands for more efficient office space. Similarly, business cases/proposals for energy efficiency investments may be more successful when presented at the time in which an existing lease is being negotiated with energy efficiency improvement presented as a value add. Another opportunity for energy efficiency investment is when a large tenant vacates a building. Practitioners can argue that an energy efficiency upgrade to the

[160] Mitchell 2009

[161] www.cbd.org, accessed July 2013

[162] Interviewee CK Sustainability Manager Commercial 2013; Presenter CD Environmental Sustainability Manager Commercial 2012

building can enhance the ability to attract future tenants. In some cases, energy efficiency upgrades can play a key role in repositioning a building in terms of both quality and reduced outgoings for tenants.[163] These examples highlight that it is important to have an ongoing focus on energy management since investment opportunities may be greater at these different times.

The widespread use and publication of portfolio-wide energy targets using energy ratings has also helped practitioners to more easily explain the energy performance of a portfolio to internal and external stakeholders. In recent years, the Chief Executive Officers of some large commercial building owners have received questions from investors about progress towards energy efficiency targets.[164] One of the reasons for this is that investors have become increasingly aware of and concerned about the capability for building owners to attract and retain tenants.[165] Benchmarking across a portfolio has also made it easier for energy practitioners to engage with financial staff, such as Asset Managers, because when they use the NABERS Energy rating system, they can more easily compare the performance of one building with another and present energy efficiency improvement options in terms of the increased rating that a building is likely to achieve once such investments are undertaken. In essence, the NABERS Energy rating has helped to create a common language for building energy performance that is accessible to owners, tenants and investors.[166]

While the NABERS Energy rating system supports comparison across buildings, it does not provide the detailed energy data that is required to identify potential energy efficiency improvement projects. Accurate, reliable and accessible data was found to become increasingly important as organisations found that they had to improve day

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[163] Case DH GPT Group Commercial Sector 2012; Case DJ National Australia Bank Commercial Sector 2012

[164] Interviewee CK Sustainability Manager Commercial 2013; Presenter AK Manager Climate Change & Environment Commercial 2011; Presenter AQ Sustainability Manager Commercial 2011

[165] Case DH GPT Group Commercial Sector 2012; Presenter AR Head of Finance Products Commercial 2011

[166] Interviewee CK Sustainability Manager Commercial 2013; Presenter AN Director Consultancy Commercial 2011; Presenter BU GM Sustainability Commercial 2012

to day operational performance as well as major capital upgrades to continue to obtain continuous improvement.[167]

The NABERS Energy example highlights the interaction between internal and external stakeholders in relation to establishing legitimate and widely-used measures of energy performance. These allow for credible (legitimate) comparisons to be made within organisations and by external stakeholders, including investors and customers.[168]

The NABERS Energy rating system supported a change in understanding of the value of energy efficiency. As the Sustainability Manager of a large commercial sector organisation explained:

> "For companies like ours with premium commercial buildings, energy efficiency had become synonymous with quality and value. It is as if the bar had been raised and it has become the norm that any "A grade" property has got to be highly efficient. And I think that maybe it is not so much that an efficient building means additional value, but that an inefficient building raises alarm bells in terms of the investment required to get it up to scratch."[169]

Mining sector example

In other industry sectors, comparison can be more challenging due to the multiple factors that influence energy use. For example, on mine sites large trucks transport material from the mine face to the processing plant. Energy use can be influenced by factors including the quality of the road, the way the truck is driven, the size of the load and the type of material being transported. Despite these challenges, one organisation developed and promoted a tool for comparing energy performance over time and from one site to another (see Box 8.4). Unlike the NABERS Energy tool

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[167] Presenter AP Energy & Sustainability Manager Commercial 2011; Presenter BT Sustainability Manager Commercial 2012

[168] Interviewee CK Sustainability Manager Commercial 2013; Presenter AN Director Consultancy Commercial 2011

[169] Interviewee CK Sustainability Manager Commercial 2013

which was an industry-wide development, this company, which was a mining contractor, developed a benchmarking tool in their corporate energy and greenhouse group. An important rationale supported the development of the benchmarking tool; the creators believed that it improved their competitiveness, as it provided a tangible example of their approach to innovation. It also highlighted their ability to reduce operating costs and support mine owners in meeting compliance requirements (e.g. NGER Scheme reporting) and to build their reputation.[170]

[170] Presenter AH Manager Greenhouse & Sustainability Mining 2011

Box 8.4: Developing a performance measure in the mining sector

One organisation (contract mining) with a strong in-house corporate technical team sought to better understand the variables that impacted on fuel consumption in order to develop a measure that could be used to compare and track performance. The technical team worked with a site which had a particularly strong culture of innovation. The first assessment under the EEO legislation was conducted on this site.

The technical team engaged with site-based operators, managers and technical staff with specific knowledge and developed a measure which enabled them to track performance at a refined level. The measure was sufficiently rigorous that it ultimately enabled them to incorporate performance bonuses into managerial remuneration programs.

Their motivation for doing this went well beyond compliance requirements. As a contract miner, they viewed their energy and greenhouse gas management as a key differentiator when bidding for mine operation projects. Therefore, the investment in time and effort was justified on a number of factors, including compliance, cost savings and future business growth. They also had a strong team and used a strategy of developing new initiatives on a site with a team that was particularly open to innovation.

Once techniques and practices were evaluated (those that were positive), they then implemented the successful initiatives across the organisation. In the case of the performance measure, this become part of an operating performance 'dashboard' of indicators that is communicated clearly on site alongside production performance and safety. [171]

[171] Case DO Downer EDI Mining Sector 2012

8.3.4 Improving the quality of project-level data

While the motivation to improve energy information at the organisation and site levels was driven by external compliance requirements and the interests of stakeholders, it was more challenging for corporate energy practitioners to justify investment in energy information systems at a more detailed or 'sub-level' of energy data[172].

The case in Box 8.5 illustrates how opportunities to upgrade technology to monitor fuel performance were able to be incorporated into a technology upgrade that was being undertaken for another purpose.

Box 8.5: Leveraging customer interest to enhance energy monitoring

A transport organisation had implemented a wide range of energy efficiency improvement initiatives. However, the cost of improved vehicle tracking technology and software that would provide data on the energy efficiency performance of their drivers could not be justified solely on the basis of any fuel savings that might be achieved.

When a long-term client's contract came up for renewal, the client required more sophisticated GPS tracking of their orders. This provided the transport organisation with the justification to make the significant investment that was required to upgrade existing technology. In their selection of technology they were also able to consider the requirements that would support appropriate feedback to the drivers.

This example also shows the important links between the company looking for improvement opportunities, but needing greater justification than could be achieved by a compliance requirement in its own right. They were also able to successfully 'piggy back' the energy efficiency improvement on another organisational priority.

[172] Presenter AW Group & Risk Sustainability Manager Multi Sector 2011; Presenter BE Product Manager Mining 2011; Presenter BG Senior Consultant Mining 2011; Presenter BK Strategic Projects Manager Mining 2012

Another opportunistic example is demonstrated by the strategy employed to justify metering on a mining site. In this case, the justification for the metering came through linking the improvement to other business benefits.

Box 8.6: Justifying metering on a mine site

A site had power quality issues that were impacting on operations through unplanned plant downtime. A comprehensive business case proposal was developed over a six-month period, which was able to demonstrate production improvements as well as meet legislation requirements and support improved identification of energy efficiency projects.[173]

Improvement of detailed energy data was typically achieved on a progressive basis. This is illustrated in Box 8.7.

[173] Case DQ Rio Tinto Iron Ore Mining Sector 2012

Box 8.7: Adopting a progressive approach to data analysis

In response to the difficulties of clearly defining the required level of data and analysis that is undertaken as part of an assessment, many organisations have found that adopting an iterative approach to improving energy information systems has been a successful strategy. In one example where this approach was taken, a consultant presented a case study of an office building that was commissioned in 2004. It had been designed to meet a 4.5 star energy rating under the NABERS Energy rating scheme. However, after the first year of occupation, it was found to have achieved only 2.5 stars. The consultant was asked by the building owner to improve the energy performance of the building.

Using the available data, the consultant was able to achieve a 4 star performance. When the building owner made it clear that they required the consultant to achieve a 4.5 star rating, it was agreed that advanced energy monitoring equipment would be required. The client was able to justify this investment because of the savings achieved from the earlier energy efficiency work and also due to the pressures of management and external stakeholders to achieve a 4.5 star rating.

A 4.5 star rating was finally achieved 12 months after the installation of advanced energy monitoring equipment and analysis. The overall improvement from 2.5–4.5 stars took three years to achieve.[174]

The description of this process highlights a number of important points about energy efficiency improvement and energy information systems. First, there have been few clear guidelines or agreements on the level of data that is required in operations to identify, evaluate and implement opportunities. This is challenging because of the diversity of operations and the way in which energy is used within and across

[174] Presenter AN Director Consultancy Commercial 2011

industries.[175] Second, obtaining resources for improved metering is typically very difficult for energy efficiency practitioners.

One successful strategy has been to implement smaller projects and to use the positive results from these projects to justify investment in more sophisticated data and monitoring systems. Once achieved, the savings from the early work assist in justifying investment in improved monitoring equipment. As additional benefits are obtained from the improved monitoring equipment, the corporate energy practitioner is then in a position to justify further investment in energy information systems.[176] These findings underscore the need for government policies and practitioner strategies that encourage continuous improvement over time, rather than expecting that a 'one off' energy efficiency assessment will lead to sufficiently improved energy information systems and the identification of all of the cost-effective energy efficiency measures that are available to an organisation.

8.3.5 Section summary

This section of the case research has described the energy management practices organisations have used to improve the way in which data is collected and interpreted. Such practices are used to measure, maintain and report on energy performance. The practices described have been associated with:

- tracking and reporting organisation-wide energy use
- establishing energy performance measures, and
- improving the quality of detailed energy data.

Corporate energy practitioners faced a number of challenges associated with improving energy information systems within their organisations. In particular, they found that it was difficult to justify the investment required to improve such systems due to the challenge of quantifying the resultant benefits. Improvements were typically made on a progressive basis over time. These were supported by legislative requirements and requests for information from other stakeholders, linking

[175] Presenter BH Energy & Carbon Manager Commercial 2012; Presenter BL Manager Sustainability Commercial 2012

[176] Presenter AN Director Consultancy Commercial 2011; Presenter BC Superintendent Energy Mining 2011; Presenter BG Senior Consultant Mining 2011

improvements in energy monitoring to operational or customer benefits. In addition, successful results were communicated as a means of demonstrating the benefits of improved energy data and justifying further investment in energy information systems.

8.4 Theme 3 – Identifying potential projects

8.4.1 Introduction

As described earlier in this case study, organisations have traditionally sought to identify energy efficiency improvement options through energy efficiency assessments. Assessments were typically:

- conducted once every three to five years
- heavily reliant on the expertise and resources of an external energy consultant, and
- concluded with a report that listed the costs and benefits associated with potential energy efficiency projects.

This section of the case describes the key changes that organisations made in the way energy efficiency projects were identified. The three practices examined in this section include:

1. improving energy efficiency assessments
2. identifying opportunities in real time, and
3. gaining support to implement projects.

8.4.2 Improving energy efficiency assessments

Adapting from one site assessment to the next

The EEO legislation allows organisations to schedule their site-based energy efficiency assessments across a five-year 'assessment cycle'.[177] This feature of the program provides organisations with an opportunity to improve their approach to conducting energy assessments from one assessment to the next. It also allows organisations to spread the resource requirements over a number of years, rather than requiring them to complete all site assessments in a short period of time.

[177] Interviewee CM Climate Change & Resource Efficiency Manager Multi Sector 2013; Interviewee CQ Principal Energy Advisor Mining 2013

Organisations have taken advantage of this design feature to adapt their approach to conducting assessments over time. Boxes 8.8 and 8.9 present two examples.

Box 8.8: Sequencing assessments to improve results (example)

An organisation in the mining sector chose to conduct their first energy efficiency assessment under the EEO legislation on a site that had a reputation for approaching new business initiatives in a proactive and innovative way. Working with a site that was receptive to innovation and change was an effective way to obtain good outcomes from the first assessment. Since the site had a proactive organisational culture, site personnel were motivated to reflect on the assessment process and to identify any actions that they could take to improve it.

Once the site achieved tangible outcomes, the Manager for Greenhouse and Sustainability used the positive outcomes to suggest changes to the assessment process to influence the way in which other sites conducted assessments.[178]

The site involved in the example presented in Box 8.8 became a 'test-bed' for innovation. Personnel would carefully monitor the results from new projects. If a project demonstrated sufficient benefits, then the Manager for Greenhouse and Sustainability would share the information with other sites.

This highlights the important role that corporate energy practitioners can play in sharing lessons learnt from one site to another.

[178] Presenter AH Manager Greenhouse & Sustainability Mining 2011

Box 8.9: Developing an assessment tool to improve the effectiveness of assessments (example)

An Energy Efficiency Engineer in a manufacturing organisation explained that the organisation had initially contracted a consultant to conduct assessments on each of the organisation's sites. Several limitations of this approach (with regard to identifying opportunities) became apparent after the first few assessments. For example:

- Since sites varied significantly in size and complexity, some required more resources than others to conduct a comprehensive assessment. However, the same assessment resources and time were allocated to each site.
- Site personnel found that the assessments were too broad and there was little opportunity to investigate particular areas of opportunity in detail.
- Management did not allocate sufficient resources to establish the costs and benefits for specific projects. This process could take from several months to a year for each project depending on the complexity of a project.
- Sites did not share information about their assessments with other sites. This meant that similar problems were repeated.

The Energy Efficiency Engineer worked with a consultant and site personnel to develop an 'energy efficiency assessment tool' to help address these limitations. To use the tool, site assessments teams first segmented the site's operations according to key technologies and process areas. These were the key focus areas. Specific manufacturing lines or compressed air systems (for example) were separate focus areas. The assessment team allocated the time and resources required to investigate each focus area and scheduled the time for the assessment of each focus area into a compliance calendar. The complete assessment schedule for a complex site could be a number of years if the site had a large number of focus areas.

The tool featured a set of common questions relevant to each focus area. Assessment teams at each site would update the questions and information in the tool throughout an assessment. In this way, the tool played an important role in sharing information and knowledge from one site to another. Other benefits of this approach included that relevant internal personnel would only need to be involved in the focus areas for

which they had appropriate expertise. Also, detailed investigations of particular project ideas would be staggered over time, rather than having to be completed in one go.[179]

Improving the way in which personnel, consultants and suppliers were involved in assessments

The majority of respondents explained that they had modified their approach to selecting and involving people in assessments. In particular, the majority of organisations modified the role and scope of work undertaken by external consultants. The Principal Advisor in a mining organisation explained his experience:

> "We got people from the site involved in the room for a workshop, but the consultants were very much controlling it. A lot of the ideas came directly from the consultants. They would say 'we are here to do an assessment and identify all these opportunities, and what do you think of this opportunity or that opportunity'. We tried to allocate projects for people to follow up, but it just went nowhere. The ideas that were being generated were getting absolutely no traction. Most of the ideas that were discussed at the workshop would just get abandoned. So, early on it was very heavily weighted towards a consultant doing the work and us being receivers of the work. That continued for probably the first four assessments. It was very much 90% consultant input and 10% from us. But then slowly, we started to realise that this wasn't a particularly good way to do it."[180]

As the quote above highlights, the Principal Advisor believed that involving a range of personnel in a 'brainstorming' workshop was not sufficient to obtain good results from the assessment. It required a different approach. In the example presented below, the organisation modified their approach to assessments. They still used consultants; however, their role was to provide input on the generic energy-related

[179] Interviewee CR Principal Energy Efficiency Engineer Manufacturing 2013

[180] Interviewee CQ Principal Energy Advisor Mining 2013

technologies with which they were most familiar. The role of the consultant was to facilitate the process, rather than to identify and evaluate the full suite of projects that might be available to the site.

The Principal Energy Advisor described why it is essential to involve personnel with specific site experience as well as technical expertise:

> "It might seem logical that if you have two secondary crushers then you could turn one off. In the past, that idea would have been rejected because it would create other production problems. But, because that idea started getting discussed broadly amongst the engineers, we had people coming back to us and saying: 'look, there are issues about vibrations, if you turn one off and keep the other one going then the vibrations cause problems. Perhaps what we can do instead is run the other one at a really low speed. It will still be turning over, but it won't be using as much electricity'. That sort of dialogue … that sort of 'care factor' … we just didn't have in the earlier assessments."[181]

This quote illustrates the importance of involving experienced site personnel who are closely involved in the process of identifying and evaluating energy efficiency projects. They can:

- highlight the operational issues that need to be considered when evaluating the suitability of a particular project or operational change
- contribute in-depth knowledge and experience about specific equipment and operating processes (This knowledge is not necessarily available from external experts, and is typically not available from energy consultants with broad energy rather than operational experience.)
- contribute to the development of business case proposals by ensuring that the operational risks are accounted for in preparing a project proposal.[182]

[181] Interviewee CQ Principal Energy Advisor Mining 2013

[182] Case CV Downer EDI Mining Sector 2012; Case DD Xstrata Copper Manufacturing Sector 2007; Case DM Foster's Group Manufacturing Sector 2012

This example also suggests that just having key personnel involved in a workshop may not be sufficient to obtain their input – particularly if participants do not have the 'care factor' required to make the effort necessary to change existing operational practices.

Another limitation of the use of consultants was that they often did not have the specific business knowledge that was required to engage personnel – particularly site managers. One practitioner explained that this had happened at one site when the consultants had presented to the site management team. Since that time, the consultants have always presented to important business stakeholders in conjunction with the corporate energy manager to improve the credibility of the energy efficiency work by linking the requirements and outcomes more clearly into the business case and drivers.[183]

Understanding how to best to use external consultants has evolved for organisations through the process of conducting assessments. This was in part driven by the requirements of the EEO legislation to engage and involve a range of expertise in assessments. As energy efficiency practitioners also developed a better understanding of the requirements, they also became less reliant on external energy consultants.[184] This was further supported through networking with other companies at annual conference events organised by the Department of RET.[185]

Another important stakeholder group not traditionally involved in energy efficiency assessments was that of equipment suppliers. Box 8.10 illustrates a novel approach by one organisation to involve suppliers in their energy efficiency assessment. The quote reflects an attempt to engage personnel more widely in the process of identifying and evaluating opportunities; however, it shows that having the appropriate people in the room is not sufficient in its own right to engage with and

[183] Interviewee CL Principal Climate Change and Energy Efficiency Mining 2013

[184] Presenter AD Principal Greenhouse & Energy Manufacturing 2011; Presenter AE Energy Engineer Manufacturing 2011; Presenter AT Sustainability Analyst Manufacturing 2011; Presenter BA Sustainability Manager Multi Sector 2011

[185] Presenter AA GM Carbon & Energy Mining 2011; Presenter AW Group & Risk Sustainability Manager Multi Sector 2011; Presenter CD Environmental Sustainability Manager Commercial 2012

build ownership for energy efficiency improvement.

Box 8.10: Involving suppliers in assessments (example)

One group of stakeholders that have not been widely involved in energy efficiency assessments are suppliers. This was recognised as an issue by a corporate energy practitioner in a mining organisation as they reflected on how to improve the effectiveness of their assessment processes in the second cycle of assessments. It came about through the experience of the initial assessments, which had led to a better understanding of the sources of information on projects.

Specifically, there was a disconnect between the information available to suppliers and their willingness to provide it to the consultant involved in conducting an energy efficiency assessment, as set out below:

> "The external consultant says: 'what do you think about using this technology?' The site says: 'Yes, it is worth exploring further'.
>
> The external consultant tries to get costs from the supplier, but the supplier is reluctant to give them detailed costs. So the external consultant has to guess costs.
>
> This means we don't get a realistic evaluation of the project and so it doesn't provide the basis for investment decisions."

Prior to conducting energy efficiency assessments at the site level, the corporate energy practitioner arranged a two-day workshop in which suppliers presented the latest information on energy efficient products that they could supply. Site-level energy champions and operational staff, together with corporate technical and procurement personnel were also involved in the workshops. Following a presentation by a particular supplier, the workshop participants could ask them questions about their technology. They would then explore the potential ideas for improvement in smaller groups that included suppliers and other sites.

The suppliers found that they now had an important connection into the sites, they understood that energy efficiency was a priority for the organisation and they had

clearer lines of communication through which to promote these projects.

For the site-level energy champions, the workshop provided important input into their site-based assessments. This background work highlighted areas of potential opportunity as well as areas that were not worth examining further. They had also made better contacts and connections back to the corporate groups involved in procurement, operations and asset management. This saved time and effort that had been lost in the previous assessment when site personnel or consultants were allocated responsibility to evaluate a project, but they didn't understand the business well enough or know who the right people were to talk to in order to do that effectively. [186]

This example further illustrates the limitations of traditional energy auditing approaches that focus on improvements on a site by site basis and in which both the range of opportunities identified and the quality of the financial data required to evaluate a project would be constrained through a lack of involvement from equipment and service providers.

In this case, the change came about by reflecting on prior experience with assessments and the development of a network of site-based energy champions. The outcome was that the boundary between equipment and service providers external to sites, as well as corporate groups within a site, had previously limited the scope of potential opportunities identified. It had also increased the time, effort and accuracy required to evaluate the cost/benefit associated with ideas once they were identified.

8.4.3 Identifying opportunities in real-time

A challenge for organisations that have been systematically focused on energy efficiency improvement is to continually improve. This is explained by the GM Sustainability in a commercial property organisation:

[186] Interviewee CQ Principal Energy Advisor Mining 2013

> " … in the first year or two, the rate of improvement is quite rapid and then it gets a little bit harder … we could see the rate of improvement beginning to slow around 2008 … I was wondering if we had maxed out … so we sort of put our heads to thinking ... is there a different approach because this approach seems to be running out of steam?"[187]

As the GM Sustainability explained, much of this initial improvement had been achieved through capital investment upgrades to the building, including replacement of chillers, upgrading building management systems and control systems, and installing new technology (e.g. more efficient lights). In order to better understand the factors that influence energy performance, he then decided to analyse two very similar buildings and compare their energy efficiency performance.

The buildings both had the same company as a tenant, were of similar age, with similar technology installed, and located within one block of each another. Despite these similarities, the extent to which the energy use per square metre had improved was around 50% in one building and around 20% in the other over the period October 2005 to October 2008. The organisation determined that the difference in performance was due to the skills and motivation of the person responsible for the day-to-day operation of the building. Based on this evidence, the respondent was able to justify investment in more sophisticated energy information tools. Training was provided to the facilities manager and other key members of each building's operational team. The improved information systems led to the establishment of daily benchmarks. That is, an email was sent to each of the building management team members every day showing their energy performance on the previous day and how this compared to optimal performance. The same email provided a target energy use for the day. Performance data was compared within a building and across the portfolio of buildings on a monthly and annual basis to compare the energy management performance of the building operations teams.[188]

[187] Presenter BU GM Sustainability Commercial 2012

[188] Presenter BU GM Sustainability Commercial 2012

This example demonstrates how new potential opportunities to improve energy efficiency can result from continuous improvement and the development of new practices. This type of opportunity was unlikely to have been identified in the situation where an external consultant conducts an assessment and provides a report of potential opportunity areas, and it was developed following an energy efficiency improvement program that had been in place for a number of years. Even if an external consultant did identify the potential for such an improvement option, without detailed data it would be difficult for them to establish the potential savings and there would be many challenges to introducing accountability for energy use since this would involve changing the work practices of the building operations. For example, building operations teams could claim that they were too busy focusing on day-to-day operations and keeping tenants comfortable and safe in the building. Successful implementation required support from management as well as the operators in order to successfully implement the new regime. Thus, these multiple factors all contributed towards improving the identification and action taken on new opportunities in real-time.

Other property companies also reported that they were developing similar approaches.[189] The Energy and Sustainability Manager in one commercial organisation explained that they had linked continuous improvement to incentives:

> "Most people look out the window, they see a really hot day, they go: 'Fantastic, it's a lovely day'. Our people look out the window and start to think about what they need to do to reduce energy use in the building on that day so that they can work towards getting their bonus!"[190]

[189] Presenter AN Director Consultancy Commercial 2011; Presenter AP Energy & Sustainability Manager Commercial 2011; Presenter BH Energy & Carbon Manager Commercial 2012; Presenter BL Manager Sustainability Commercial 2012; Presenter BT Sustainability Manager Commercial 2012

[190] Presenter AP Energy & Sustainability Manager Commercial 2011

8.4.4 Gaining support to implement projects

Ultimately, the success of improved energy management practices is demonstrated through the implementation of projects that deliver business benefits. Examining the process by which specific projects have been identified and implemented can provide insights into the influence that changes at the organisational and field level and how this impacts on energy performance. To better understand changing energy management practices associated with identifying and evaluating projects and the interactions between internal and external stakeholders, a project example is presented in Box 8.11, then discussed in more detail.

Box 8.11: Reducing the idle time on bulldozers

The EEO legislation requires diesel, electricity and other energy sources to be investigated. This example relates to an energy efficiency project implemented on bulldozers at a port operation. Bulldozers are an important part of port operations. Diesel is used primarily by bulldozers. Typical operating tasks include transporting and mixing coal around the site to support loading operations.

In this example, some new bulldozers had recently been purchased and, for the first time, they included fuel and activity monitoring. The data from the new bulldozers was reviewed and it showed that 30% of a bulldozer's operating time was spent idling.[191] Discussions with bulldozer operators highlighted that idling was caused by bottlenecks and plant breakdowns that occurred as coal was being loaded. These events often meant that bulldozers could not do useful work. As a consequence, the bulldozers would remain stationary with the engine idling for up to 60 minutes at a time. The reasons the bulldozers were left idling, rather than being turned off, included that the motor ran the air conditioner and the temperature in the cab would frequently be extremely hot. Some personnel involved in the workshop suggested other reasons. For example, some assumed that: "it is better for an engine to idle than to turn it on and off". A number of maintenance staff expressed the attitude of: "if it

[191] Meaning that the engine would be left running, but the machine would not be moving or doing any useful work.

isn't broken then don't change anything". This suggested that change was perceived as 'risky' because it can often lead to more significant and often unforeseen problems, so it is perceived to be better to maintain the status quo.

Following the workshop, further analysis was conducted. It was estimated that, on average, a bulldozer would idle for around 1,400 hours per year using 14,400 litres of fuel. As well as increasing fuel costs, the idle time was 'counted' as operating hours. Since maintenance schedules are based on operating hours, this significantly increased the maintenance requirement for the bulldozers over their lifetime.

The solution that was identified was to install an air conditioning systems for the cab that did not require the engine to be running in order for cooling to occur. Establishing the costs and benefits of the project was difficult initially because discussions with external suppliers had highlighted that there were no 'turn-key' solutions available. An open tender was used to identify suppliers who would be willing to jointly develop a solution.

A suitable supplier was identified and a trial was implemented. Following some major changes to the new design, the project established that a potential saving of more than AUD1m/year with a six month payback period was possible. After the successful trial the new technology was then applied to the other bulldozers.[192]

This provides an indicative example of how a new and innovative project can progress from idea to implementation. Key factors that contributed towards the success of the project at the field, organisational and project levels are set out in Table 8.3.

[192] Presenter AI Maintenance Superintendent Transport 2011

Table 8.3: Interactions between organisational and field contextual factors

Level	Success factors
Organisational field	• The site was seeking energy efficiency ideas, primarily as a result of the EEO legislation. • The original equipment manufacturer had recently incorporated improved fuel monitoring systems into their vehicles. • The supplier of the solution was willing to work collaboratively with the site to develop and trial the solution.
Organisation	• The assessment process involved representatives from across all functional areas in the organisation, which provided multiple perspectives on the risks and opportunities associated with the project. • Site management were willing to partner with an external provider to develop a new solution.
Project	• The availability of data enabled assumptions about operating practices to be challenged. • The trial provided further evidence of the cost-effectiveness and suitability of the solution. • Reduced maintenance costs as well as fuel savings were included in the cost benefit analysis.

The three different stages of the project (i.e. identification of the idea, evaluation of the idea and the decision) are set out in the paragraphs below.

At the first stage (i.e. identification of the idea), the availability of energy and operational data was crucial. The data exposed inefficient operating practices. By involving operational and maintenance staff at this point, their concerns and established assumptions could also be considered. This aimed to avoid potential barriers to evaluation and acceptance of the idea at later stages in the project's development. The level of internal negotiation and discussion with personnel was significant. The practitioners had existing positive relationships with a number of staff across the site. Such negotiation and engagement would have been difficult to achieve had the project been progressed by an external consultant.

In the second stage (i.e. evaluation of the idea), the support of the organisation and staff to trial a new idea were influential in its success. Also, since there was no turn-key solution available, collaboration between the organisation and its supplier was essential. The supplier was willing to adopt a level of risk in the project because they could see the benefits beyond this particular organisation; that is, they had highlighted innovation in energy efficiency as an issue for which other customers would require solutions. Incorporating maintenance benefits into the business case proposal made a significant contribution to the financial return associated with the business case proposal. Had the project simply focused on energy savings alone, the financial return would not have been as positive. Thus, the practice of incorporating wider business benefits into the evaluation was an important contributing factor.

In the third stage (i.e. the decision), the trial helped to establish the business case *and* build support for the project with operational and maintenance personnel. This led to wider application of the project within the organisation. The project has since been promoted more widely by the corporate energy practitioner at conferences and in the organisation's public reports. The supplier has also marketed their solution to other organisations – increasing the likelihood that energy savings will occur more widely.

This example further reinforces that identifying and evaluating energy efficiency projects requires the appropriate data and an effective process. An important part of the process is the development of business case proposals.

In 2010, the Department of RET commissioned research that aimed to better understand what successful energy efficiency practitioners do to improve the likelihood that business case proposals for energy efficiency projects will be successful. The project included the development of 18 project-level case studies from across the mining, transport, manufacturing, commercial buildings and services sectors. Each of the brief case studies described the process that was followed to identify and evaluate energy efficiency projects. The case studies and guidance material are available at: www.eex.gov.au.

Six key success strategies were identified across the different case studies. An important finding from the research was that rigorous financial evaluation of energy efficiency projects is essential, but not necessarily sufficient to support investment in energy efficiency projects. Successful business projects typically involved the final decision-makers in the process well before a final proposal was presented. Other important strategies included linking a project with current business priorities, involving a range of people throughout the process, identifying and showing how project risks would be managed and presenting a range of funding options. The rationale behind each of these strategies is summarised in Table 8.4.

Table 8.4: Six key strategies to improve the success rate of business case proposals

Strategy	Rationale
1. Link your project to current business priorities	Place the project within the wider business context by linking it to existing business priorities. This is likely to be more appealing to decision-makers.
2. Involve the right people in developing the business case proposal	Increase the credibility of the business case proposal by demonstrating that people with the appropriate expertise and influence have provided input.
3. Communicate with decision-makers early and regularly	Build awareness and obtain input from decision-makers to ensure the business case proposal is appropriately targeted.
4. Identify project risks and develop strategies to manage them	Demonstrate that risks have been carefully considered and will be managed if the project is implemented.
5. Describe and quantify all business costs and benefits	Demonstrate that the business case proposal is comprehensive.
6. Consider a range of funding options	Investigate the full range of funding options, both internally and externally, and leverage these where possible.

(Source: Crittenden & Lewis 2012, p. 5)

The Business Case and Beyond Project (see www.eex.gov.au/energy-management/the-business-case-and-beyond/) also highlighted how important it is to create a broader workplace culture of energy efficiency improvement. Some of the strategies proposed by practitioners to do this included ensuring that successful projects were monitored, verified and communicated widely. This helped to remind managers and staff across the firm of the business benefits associated with energy efficiency improvement. Regular senior management briefings were also considered essential. The regular briefings not only provide an opportunity to update management on successes, but these also provide a mechanism to communicate key challenges, additional resource requirements and any relevant changes external to the firm, including new legislation or government funding programs. Finally, those involved in the research encouraged other energy efficiency practitioners to review and challenge existing project approval processes. They suggested that it is easy to assume that current ways of doing things are fixed and cannot be influenced. However, many had found ways of modifying internal approval processes to support progress on energy efficiency by establishing energy efficiency funds or by bundling projects together in ways that presented projects as more attractive to decision-makers in the business.

8.4.5 Section summary

This section of the case research has described the energy management practices that organisations involved in the research applied to improve the identification and evaluation of energy efficiency projects. Key practices included:

- improving the way in which energy efficiency assessments were conducted – by adapting the approach from one assessment to the next and involving the appropriate people in the audit, including suppliers
- reviewing energy data on a day-to-day basis to identify and act on energy efficiency improvement projects in real-time, and
- improving the process by which business case proposals were developed.

Improvements were supported by the design of the EEO legislation. Organisations were encouraged to schedule site audits over a five-year period, rather than doing them all at the same time. This encouraged organisations to review and further develop their approach to identifying opportunities.

The case study material also demonstrates how organisations, through the involvement of government, can share their experiences about how to improve energy efficiency (in this case, through improving the way in which business case proposals were developed and presented to management).

8.5 Theme 4 – Integrating energy management within existing systems

8.5.1 Introduction

As corporate energy practitioners were working to broaden organisational involvement in energy management, improve energy information systems and improve the way in which new opportunities were identified, they were also establishing systems and processes that aimed to integrate energy management as a standard and ongoing business practice. The objective was to address the limitations of the piecemeal/episodic approach to energy management (a characteristic of traditional energy management approaches) to more effectively identify, evaluate and attract resources to implement energy efficiency projects.[193]

This section of the case research describes the key established management systems that respondents sought to integrate energy management into and how they went about it. The existing business systems and procedures examined in this section are:

- compliance management systems
- business improvement programs
- performance management systems, and
- operational procedures.

[193] Interviewee CM Climate Change & Resource Efficiency Manager Multi Sector 2013; Interviewee CR Principal Energy Efficiency Engineer Manufacturing 2013; Presenter AU Infrastructure Capability Manager Manufacturing 2011; Presenter BC Superintendent Energy Mining 2011; Presenter CA Environmental Manager Transport 2012

8.5.2 Compliance management systems

The EEO legislation required companies to undergo an externally-managed compliance audit at least once every five years.[194] Other legislation, such as the NGER Act, also required organisations to put in place a structured system to ensure that they could track and document their energy data and energy management activities.[195]

Respondents explained that the requirement to undergo external verification encouraged them to be more systematic in their approach and to document their activities more carefully.[196] Initially, however, the effort required to establish separate compliance management systems for energy-related legislation was found to be significant. This encouraged corporate energy practitioners to identify ways to better use existing compliance management systems. This situation is explained by the Principal Energy Efficiency in a large manufacturing organisation:

> "As we put systems in place to meet our compliance obligations, we began to find ways of modifying them to match our internal needs. Compliance was the basis for putting them together, but since then, we have modified them even further to better support our business."[197]

Large organisations typically have formal systems and procedures that they use to review and check that the organisations compliance obligations are being met. Many of these systems are based on the Plan-Do-Check-Act cycle that has been popularised through the application of formal quality, environment and safety management systems.[198] The approach taken to integrating compliance management systems with energy management at a

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[194] RET 2010, 'Verification Handbook'.

[195] Presenter BK Strategic Projects Manager Mining 2012; Presenter BO Energy Analyst Manufacturing 2012; Presenter BZ Environmental Systems Manager Manufacturing 2012

[196] Presenter AY Senior Consultant Manufacturing 2011; Presenter CG Manager Sustainability & Energy Manufacturing 2012; Presenter CH Manager Environment & Sustainability Mining 2012

[197] Interviewee CR Principal Energy Efficiency Engineer Manufacturing 2013

[198] Interviewee CR Principal Energy Efficiency Engineer Manufacturing 2013; Presenter BH Energy & Carbon Manager Commercial 2012; Presenter BV Manager Resource Efficiency & Climate Change Manufacturing 2012

large manufacturing organisation is described in Box 8.12.

Box 8.12: Integrating energy management with compliance systems

A manufacturing organisation found that managing the compliance components of the EEO legislation was time-consuming and difficult to enforce within the organisation. To address this challenge, the organisation developed an energy assessment tool. The tool listed a series of focus areas to be assessed. This included central operational plant and equipment as well as ancillary services (e.g. compressed air).

The assessment tool includes checklists of all items that should be considered. For complex sites, the assessment of focus areas is spread out over a number of years. For less complex sites the assessment is spread out over a single year. These and other activities, such as monthly reporting, are scheduled into existing 'compliance calendars,' which list tasks, deadlines and the people responsible for ensuring that the tasks are fulfilled.

Environmental managers are required to report progress each month against tasks listed in the compliance calendars. Each year, a site is selected to be involved in an internal compliance audit. The compliance audit is undertaken by the Principal for Energy Efficiency in conjunction with the environmental management team. Personnel from other sites are also selected to be involved in the annual process. The compliance audit helps to identify the need for corrective actions, as well as sharing experience across the sites regarding the best way to implement the energy management components of the overall compliance management system.

The system is supported by monthly reporting to top line managers against established key performance indicators. This means that senior management

> are aware of progress against compliance and they also receive regular updates on the positive business outcomes associated with the energy management program. Non-compliances are also identified clearly and systematically, which means that the need for corrective actions can be identified early.[199]

This example highlights a number of advantages for corporate energy practitioners in using existing management systems. First, it allowed for existing infrastructure to be used. Compliance management systems have been developed over a number of years in many organisations and may be quite sophisticated in their design. Additional tools were required to incorporate energy management effectively, but a large part of the system was already well established.

Second, within organisations the use of these compliance management systems was already considered to be an established management practice. This helped to change the view of energy management as a separate activity that was not relevant to ongoing business operations.

Third, as an established system, senior management could have greater confidence that their compliance risk was being managed, and it provided a systematic feedback process that allowed for the early identification of potential non-compliance, rather than waiting for an external audit to highlight deficiencies. [200]

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[199] Interviewee CR Principal Energy Efficiency Engineer Manufacturing 2013

[200] Presenter BA Sustainability Manager Multi Sector 2011; Presenter BI Greenhouse & Energy Advisor Mining 2012; Presenter BR Energy Manager Utilities 2012

Respondents also explained that external compliance audits undertaken by the Department of RET provided a useful mechanism for obtaining feedback on and improving their approach to energy management.[201] The style and focus of the verification approach was reported by respondents to have helped create a constructive, rather than threatening, environment.

In the case of the EEO program, government representatives partner with external consultants with specific industry expertise to undertake the verification. The approach is explained by the Energy Project Engineer in a manufacturing organisation:

> "The people from the Department were flexible and very helpful. They were clear about what they're after and what they wanted the energy efficiency assessments to actually achieve. We did our own internal audit and saw that, for much of it, we had it covered. So I would encourage you to use the process to help you improve your approach to energy management."[202]

In summary, the requirement to undergo external audits provided an important motivation for organisations to document and track their energy management activities. Both internal and external verification audits provided important feedback on ways to improve. Initially, it was time-consuming and difficult for organisations to establish these systems – particularly where they were developed in parallel to existing compliance management systems. However, as organisations gained more experience with the compliance requirement they began to integrate their approach within existing compliance management systems, which enhanced the legitimacy of energy management within their organisations, provided useful feedback on performance and minimised the resources required to meet the legislative requirements.

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[201] Interviewee CR Principal Energy Efficiency Engineer Manufacturing 2013; Presenter BJ Chief Engineer Manufacturing 2012; Presenter CB Technical Manager Manufacturing 2012

[202] Presenter AL Energy Project Engineer Manufacturing 2011

8.5.3 Business improvement programs

Energy management practitioners also looked to create opportunities to link energy management with other corporate initiatives. For example, in organisations with established business improvement systems using business improvement frameworks (e.g. 6 Sigma[203] and Lean Manufacturing[204]) there was an opportunity to use the expertise of the skilled personnel within such teams. In particular, these types of programs encourage the development of skills in analysing data, evaluating and tracking projects.[205] In some organisations it might be expected that energy would have already been a natural focus of such business improvement systems. However, as corporate energy practitioners explained, the focus on energy had traditionally been ad hoc and business improvement programs were typically focused on other business issues, such as increasing quality and throughput.[206] The Environment Manager Resource Efficiency & Climate Change in an energy-intensive manufacturing organisation explains:

> "In the second [five-year assessment] cycle we want to engage our people more and use our own internal resources to meet the requirements of the Act and to deliver the savings we're after. We've got an existing business improvement system that we've been using for a number of years, but in the past we have treated energy efficiency improvement as a separate process. Aside from requiring less resources, integrating the requirements of EEO within the existing business improvement system will help us to further engage all our workforce in energy

[203] 6 Sigma is a set of tools and strategies aimed at improving business processes. It was first developed at Motorola in 1985 and then became more widespread as General Electric applied the approach from 1995.

[204] Lean manufacturing is a production practice characterised by a focus on the creation of 'value' for a customer. This approach discourages waste of any kind, including that created through energy use. It consists of formal review and corrective action practices.

[205] Presenter AD Principal Greenhouse & Energy Manufacturing 2011

[206] Presenter AB Chief Engineer Manufacturing 2011; Presenter BI Greenhouse & Energy Advisor Mining 2012; Presenter BV Manager Resource Efficiency & Climate Change Manufacturing 2012

management."[207]

In order to involve business improvement personnel in energy management there needed to be a negotiation within their groups and an agreement to identify and evaluate projects in ways that would align with the compliance requirements of the EEO legislation, as well as to focus on the business improvement outcomes that they aimed to achieve. One benefit from this approach was that even though there had been an explicit focus on energy management for a period of time, often the energy perspective provided new and unique insights into other issues, such as productivity, throughput and reliability.

One project that offers an example of productivity benefits is provided by the Barrick Gold Corporation (*Barrick*) and described in a paper by Buckingham et al. (2011). *Barrick* had conducted energy audits in three of their operations in 2011. Energy efficiency benefits included up to a 20% net grinding energy reduction. As well as energy cost savings of around AUD5m per year, however, throughput had increased in the three operations by approximately 60,000 ounces of gold annually. Although the value of this additional throughput is not quantified in the paper, it is likely to be substantial – particularly as it occurred at a time when the price of gold was at an all-time high.

Since business improvement personnel were skilled in establishing productivity and other improvements, in many organisations they played an important role in identifying and quantifying business benefits beyond simple energy savings. This perspective contrasted with energy management consultants who were more likely to focus on the energy savings, rather than wider business benefits. However, the value of energy efficiency was not just in highlighting energy projects – it provided a new 'lens' or way of looking at the business, helping to identify and implement improvements in a range of ways including by improving throughput, reliability and maintenance regimes.

[207] Presenter BV Manager Resource Efficiency & Climate Change Manufacturing 2012

8.5.4 Performance management systems

Integrating accountability for energy management into formal employee performance management systems was seen by a number of the presenters as an important mechanism for change. The influence of this strategy is highlighted in the following quote made by a Project Manager for Energy Efficiency in a manufacturing organisation:

> "How do you get the people that have got a great deal of responsibility for production, and not a lot of spare time involved interested in energy management? We found a tool just recently and that's to do our own voluntary verification with all of the key managers in the same room together. Suddenly, it's not only one of their Key Performance Indicator (KPI), but it's a KPI they have to stand up and tell the Chief Executive about. Boy, that's powerful."[208]

Some organisations have been progressively incorporating energy efficiency performance into management and operational responsibilities. As a Manager for Energy and Greenhouse Gas in a mining organisation explained:

> "There's been a paradigm change with people on site. A lot of the initial resistors have left. So what's happened now is we get new people on site that understand that environmental management and also energy management is actually part of their job. So I find it a lot easier working with site energy champions now because when somebody starts, they understand from day one that it's actually part of their job. So I find now that they're holding me accountable, rather than the other way around. So there's been a paradigm change with energy champions on site."[209]

One of the companies that was able to do this successfully established direct links between energy efficiency performance and the remuneration bonuses for site and senior management. The Manager Greenhouse and Sustainability from a mining organisation explained that integrating energy efficiency into their performance

[208] Presenter AV Project Manager Energy Efficiency Manufacturing 2011

[209] Presenter CE Energy Manager Mining 2012

management systems had taken a number of years and a high degree of consultation at both the site and corporate levels to achieve.

First, they had to review and develop new key performance indicators. The original performance indicator that was traditionally used to reflect energy efficiency improvement did not account for variations in energy performance that was beyond the control of management and staff. The new performance indicator was developed with experts, trialled on one of the sites that had the most positive culture for innovation and then rolled out across all of the sites.[210]

A number of other speakers explained that they were in the process of working through the same process.[211] A number saw significant challenges, but as their internal energy information systems were improving, and they were working in conjunction with their HR teams more often, they considered that they were likely to have some success in achieving such integration into their performance management systems.

[210] Presenter AH Manager Greenhouse & Sustainability Mining 2011

[211] Presenter AU Infrastructure Capability Manager Manufacturing 2011; Presenter AW Group & Risk Sustainability Manager Multi Sector 2011; Presenter BX Environmental Programs Manager Transport 2012

8.5.5 Operational procedures

The energy efficiency assessments highlighted a number of operational and procedural changes that supported improved energy management. In contrast to large capital projects for which there is a clear phase of approval, implementation and commissioning, operational and procedural changes are less distinct in terms of when the project begins and how well the change is being implemented. There is also the risk that if a key operator leaves, then the knowledge would also be lost. One solution to this has been for new operational and procedural changes to be written in to standard procedures and incorporated into training programs.

> "We've written 31 energy efficiency procedures so far and they're always being improved. We have really got to document the things we do because if a key person leaves we've got to have the maturity and the robustness for this energy program to continue."[212]

For example, opportunities for improved energy efficiency were found in cases where operators used 'rules of thumb' to determine how much time major plant and equipment needed to 'warm up' prior to use or 'warm down' after use.[213] Opportunities for operators to share their perspectives on what was appropriate frequently revealed that there were a range of different opinions about the amount of time required. Investigation to clarify the requirements of the original equipment manufacturer helped to establish an informed guide to operation of the plant or equipment. Once established and trialled, the new procedure would then be incorporated into standard operating procedures and training, which would support ongoing performance. However, like any new practice, training, monitoring and feedback all played an important role in ensuring that the new procedures were effectively implemented.[214]

Although operational changes are typically seen as 'low hanging fruit' (a term often used to describe energy efficiency projects that do not require significant capital

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[212] Presenter AV Project Manager Energy Efficiency Manufacturing 2011

[213] Presenter AT Sustainability Analyst Manufacturing 2011; Presenter AU Infrastructure Capability Manager Manufacturing 2011

[214] Presenter AB Chief Engineer Manufacturing 2011; Presenter BE Product Manager Mining 2011

expenditure), many such changes were described by corporate energy practitioners as complex due to the range of different stakeholders that needed to be involved in the process from idea, to successful implementation and through to ongoing application of the new operating practice. Change also needed to be managed carefully; for example, in cases where external consultants or corporate personnel were involved there could be resistance from 'outsiders' telling personnel how to do their job.[215] The process also relied on the availability of sufficient data in order to determine the appropriate procedure. Original equipment manufacturers and suppliers typically needed to be involved to ensure that warranties would be appropriate to maintain the conditions of plant and equipment warranties.[216] HR professionals might then be involved in developing the new procedures in the appropriate format and supporting them through effective implementation, particularly where training was required.[217]

8.5.6 Section summary

This section of the case research has described a range of strategies that respondents have used to integrate energy management into existing business management systems. These systems include:

- compliance management systems
- business improvement programs
- performance management systems, and
- operational procedures.

The reasons for integrating energy management into existing systems included that:

- existing infrastructure could be used
- personnel were typically more familiar with existing systems
- using existing systems helped to more effectively show energy management as 'business as usual', rather than being perceived as separate from legitimate day-to-day management practices

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[215] Interviewee CL Principal Climate Change and Energy Efficiency Mining 2013; Presenter BG Senior Consultant Mining 2011

[216] Interviewee CQ Principal Energy Advisor Mining 2013; Presenter BG Senior Consultant Mining 2011; Presenter BX Environmental Programs Manager Transport 2012

[217] Presenter AH Manager Greenhouse & Sustainability Mining 2011

- the approach reduced the reliance on individual corporate and site-level energy practitioners, both in the short and long term, and
- integrating within existing systems helped to maintain ongoing focus and attention on energy management.

To make the changes, corporate energy practitioners had to work with other specialist personnel within the organisation (e.g. HR, business improvement specialists) and justify the reasons for the integration. Such integration also takes time and support. For example, performance management systems require good data and a measurement tool that managers and other staff consider to be credible.

8.6 Summary

The aim of this chapter has been to present the findings from the empirical research from the perspective of the key energy management practices that changed over the study period. It is highlighted that the changes in energy management practices were relatively consistent across the organisations involved in the study. These changes have been described in four key thematic areas that emerged from the analysis:

- engaging staff in energy management
- developing energy information systems
- identifying potential projects, and
- integrating energy management into existing management systems.

Within each of the thematic areas, new practices were described together with a description of the reasons for and process of change. These outcomes are summarised in Table 8.5 following.

Table 8.5: Changes in energy management practices

From …	To …
1. Engaging staff in energy management	
The external consultants lead energy management with the aim of establishing a list of costed energy efficiency projects. There is limited involvement and engagement with internal personnel.	Energy efficiency is linked to a range of business benefits in order to engage with and involve a wide range of personnel across organisational and professional boundaries.
2. Developing energy information systems	
Limited data available Low accuracy Information is not in a form that is easy to interpret It is difficult to justify further investment	Energy information systems are progressively developed by communicating achievements to justify additional investment over time. Improvements 'piggyback' on the introduction of new equipment, technology and other systems.
3. Identifying potential projects	
Energy efficiency opportunities identified through energy audits conducted every 3-5 years.	Energy efficiency is integrated into daily operational procedures and ongoing processes that support the identification of energy efficiency projects. Key decision-makers and other relevant stakeholders are involved and informed throughout the process of developing business case proposals for energy efficiency projects.
4. Integrating energy management into existing management systems	
Energy management is approached as an isolated activity in which the outputs from energy audits and other activities are made available to technical/ engineering functions of an organisation.	Energy management is integrated with business systems to support an ongoing focus on energy management. Systems include: compliance management systems; business improvement programs; performance management systems, and, operational procedures.

9. The dynamics of institutional change

9.1 Introduction

How and *why* do energy management practices change? This chapter brings together the analysis and observations from the empirical research to answer this important question and consider the implications for institutional theory and energy efficiency policy. It does this by drawing on the case research developed in the previous two chapters.

Chapter 7 presented important context that helps to explain changes in large Australian energy consuming organisations between the years 2006–2012. The chapter examined the institutionalised practices (i.e. the established practices that were accepted as the appropriate 'way of doing energy management' at the time) that were applied by organisations once the EEO legislation commenced, before analysing changes in the organisational field associated with energy management practices over the study period.

Chapter 8 then analysed the changes in energy management practices in large energy consuming organisations. The analysis exposed the reasons behind why such changes were made, the challenges associated with implementing new practices and the social dynamics of institutional change, including the strategies applied by corporate energy practitioners and other stakeholders to influence the change process at the project, organisational and organisational field levels.

This chapter proceeds in the following way. First the dynamics of changing energy management practices are explored within and across the organisational field, organisational and project levels of analysis. The implications for institutional theory are then discussed before examining the implications of the research for policymakers and practitioners concerned with accelerating the adoption of effective energy management practices. The chapter then presents the limitations of the research and recommendations for future research that will contribute new knowledge about institutional change, the energy efficiency gap and the process by which organisations adopt more effective energy management practices.