

# TRACKING PROGRESS TOWARDS A LOW CARBON ECONOMY

## 6. SPECIAL REPORT on factors influencing large industrial energy efficiency

Summary Report  
July 2013

Full report available at [www.climateworksaustralia.org/tracking-progress](http://www.climateworksaustralia.org/tracking-progress)



# Executive summary

## Overview

This report focuses on the factors influencing large industrial companies to improve their energy efficiency. ClimateWorks conducted in-depth interviews with energy or environment managers (or similar role)<sup>1</sup> in large industrial companies that comprise 70 per cent of energy use in the Industry sector.

These 47 companies in the manufacturing, mining, water, waste and construction sectors are participants in the Australian Government's Energy Efficiency Opportunities (EEO) program.

The interviews were undertaken from January to April 2013 and used a standard questionnaire with both open questions and questions which invited companies to respond against set categories.

This information, combined with analysis of other publically available data, examined the reasons why companies have implemented some energy savings opportunities, and the factors that have prevented companies from fully implementing all available opportunities.

## What factors have driven the past and recent activity?

**Rising fuel prices, the carbon price, the Australian Government's Energy Efficiency Opportunities program and organisational changes have been the main reported drivers leading respondents to increase their energy efficiency activity in recent years.**

Since 2007-08, industrial companies have been implementing about three times more energy efficiency improvements each year than they had previously.

Several factors influenced this increase in energy efficiency activity:

- > 87 per cent of respondents reported that steep energy price rises over the last five years was a driver of activity in their company.

- > 82 per cent of respondents reported that the introduction of the carbon price had a highly or moderately significant impact.
- > 80 per cent of respondents stated that the EEO program also had a highly or moderately significant impact on their activities.

In addition, a suite of internal energy management practices were reported to be highly or moderately significant drivers of activity, including having systems in place to collect and manage energy data and staff to manage energy use.

**Many respondents reported that the carbon price has influenced their strategic approach to energy management, such as increased consideration of fuel-switching opportunities.**

The presence of the carbon price appears to have had a greater impact than its financial value, as most respondents reported that becoming liable under the carbon price scheme has focused their attention on energy and carbon management. Many eligible companies reported using Clean Technology Investment Program (CTIP) assistance to drive these strategic changes.

Most respondents mentioned that the financial impact of the carbon price on the majority of energy efficiency opportunities has been relatively small. This is in many cases due to the higher impact of energy price rises, and the uncertainty that currently exists around the future of the legislation.

The carbon price appears to have a different impact for different sectors, with respondents that reported a significant impact from the carbon price on energy efficiency activity generally coming from the manufacturing, mining, water, waste or construction sectors.

These respondents were also often in companies that had higher levels of process emissions or that were in sectors experiencing low growth.

<sup>1</sup> Interviewees often had multiple roles and responsibilities. An analysis of the job titles showed that the primary roles were 32% energy, 21% environment, 15% carbon and climate change, 9% engineering, 9% sustainability and 6% general management roles. All future references in this document to interviewees and respondents relates to this grouping.

## What factors have inhibited further activity?

**Factors inhibiting further energy efficiency activity that were reported by respondents could be grouped into three overarching categories: company capacity, project attractiveness and company motivation.**

ClimateWorks' preliminary findings from the Industrial Energy Efficiency Data Analysis Project<sup>2</sup> (IEEDAP) found that about 60 per cent of potential savings identified and reported through government programs such as EEO will remain unimplemented under current policy and economic conditions.

Respondents regarded *access to internal capital*, the *payback period of energy efficiency projects*, *opportunity cost* and *operational risk* as key reasons those savings are not being implemented.

In addition, the analysis suggests that *lack of information* and *access to low cost energy* are also inhibiting energy efficiency activity.

## How could more energy efficiency activity be unlocked?

There is a high level of variation in the volume of energy savings identified and implemented by different EEO companies. EEO data shows that the companies that identified and implemented the most savings saved 14 per cent of their energy use, six times more than median companies.

Of the companies interviewed for this report, internal practices appear to have a strong influence on energy efficiency activity. Our analysis of actual company savings shows that respondents with better internal practices in certain key areas also demonstrate higher implementation of energy efficiency activity.

**Respondents who simultaneously implement the three highest impact practices well achieve three times more savings than respondents who don't.**

These practices are *regular analysis of energy data*, *inclusion of energy efficiency in corporate policies or operational guides*, and *Board and senior management oversight of energy efficiency*.

In addition, companies reported that financial incentives, including a price on carbon and grants funding are most likely to have the strongest impact on future energy efficiency activity.

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<sup>2</sup> ClimateWorks Australia 2012. *Industrial Energy Efficiency Data Analysis Project: Summary of key findings from the ESI data analysis project*, Melbourne, Australia.

# Background

## About the Tracking Progress project

Tracking Progress is the first national index of Australia's progress towards a low carbon economy. With increasing business and community focus on how best to transition to a low carbon future, it is critical to have a robust measurement and evaluation framework for low carbon activity. In order to understand how Australia is progressing towards our national emissions reduction targets, a good understanding of this activity – and the factors that are supporting or impeding it – is required. Building this evidence is critical for achieving an efficient, least-cost transition while maintaining our economic growth, competitiveness and prosperity.

The reports that make up this project provide an assessment of activity occurring across the Australian economy that reduces or avoids greenhouse gas emissions, pulling together all the available information and data across key sectors. We have tracked and reported progress through our national progress report series covering Power, Industry, Buildings and Land-Use & Waste<sup>3</sup>. In addition we have produced a Special Report of factors influencing large industrial energy efficiency.

No other research provides a national aggregation of data on the underlying investments and activity that lead to future abatement. National measurements currently focus on actual emissions and energy use each year. This only reveals 'the tip of the iceberg' of abatement activity.

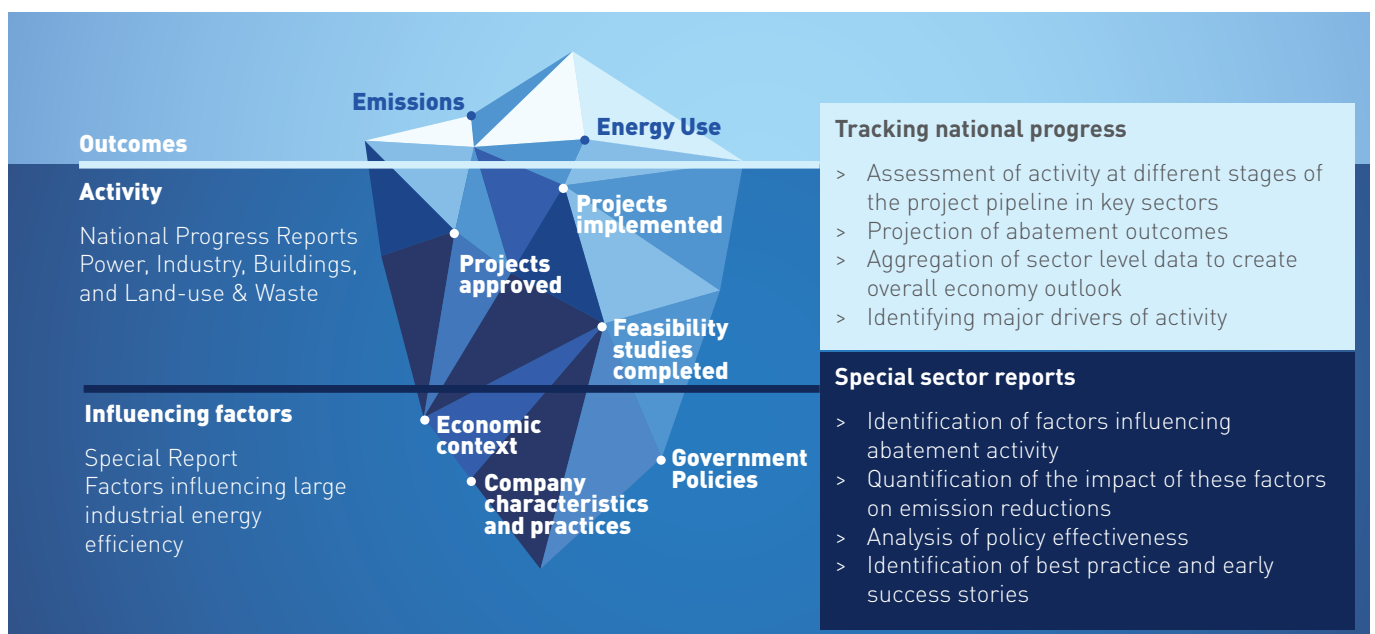
This series of reports reveals the hidden part of the story including:

**LEVEL OF CURRENT ACTIVITY** across key sectors of the economy. This includes activities that will deliver emissions savings in the future, some of which do not yet appear in national energy and emissions metrics but which are sufficiently advanced to make a known contribution to reducing future emissions.

**FUTURE ABATEMENT** that can be achieved if recent trends in abatement activity are sustained to 2019-20.

**FACTORS INFLUENCING EMISSIONS REDUCTION ACTIVITY** for large industrial energy efficiency – from broad economic influences to company specific factors – including an understanding of the common qualities of companies that achieve the most emissions reductions.

<sup>3</sup> The Transport sector has not been assessed in the 2013 *Tracking Progress* report series but will be addressed in a future report series.



## Scope of this analysis

This report focuses on the drivers of energy efficiency activity<sup>4</sup> in the large industrial sector, and those factors that may inhibit this activity. This report seeks to answer three key questions in relation to energy efficiency activity in the large industrial sector:

- 1. What factors have driven past and recent activity?** This analysis focuses on policy and regulation, company practice and third party drivers, ranging from the carbon price, internal energy management practices to the influence of Energy Service Companies (ESCOs). Broader macro-economic drivers such as rising energy prices were also analysed however in less detail.
- 2. What factors have inhibited further activity?** This analysis builds on previous work done by ClimateWorks in which 14 significant factors were identified that inhibit energy efficiency activity in the large industrial sector. The list was tested with interviewed companies to identify whether any factors were missing, and what the relative impact of each factor was on the company's energy efficiency activity.
- 3. How could more activity be unlocked?** This analysis looks at public data reported to the EEO program on energy use and savings, and compares

the characteristics (as reported through the interviews or from public company information) of the companies that identify and implement high volumes of energy savings, with companies that identify or implement fewer energy savings. This information could be used to help unlock more energy savings in the future. Interviewees were also asked what is most likely to support and motivate them to implement more energy savings in the future.

## Interviewed companies

The analysis in this report is based on publicly available data and interviews with energy and environment managers (or similar role) in 47 large industrial companies that comprise 70 per cent of energy use in the industry sector (see graphs below).

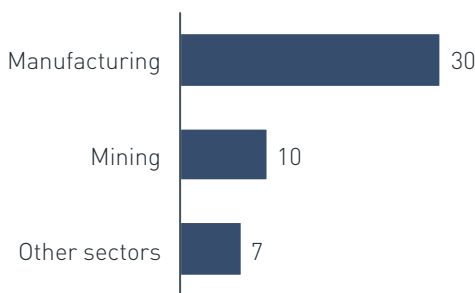
These companies are participants in the Australian Government's EEO program in the manufacturing, mining, water, waste and construction sectors.

The interviews focused on what these companies reported as the underlying factors that influence past, current and future energy efficiency activity.

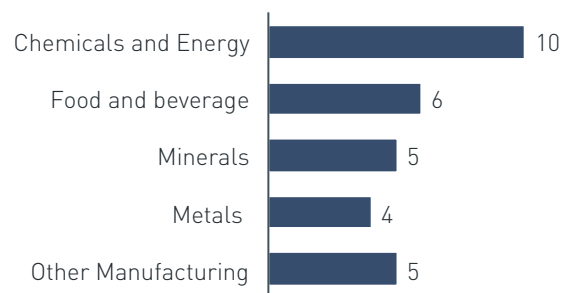
<sup>4</sup> For the purpose of this report, energy efficiency activity is regarded as any activity to identify, investigate or implement actions that reduce the amount of energy required to complete internal processes and operations.

Number of interview participants by sector (ClimateWorks team analysis)

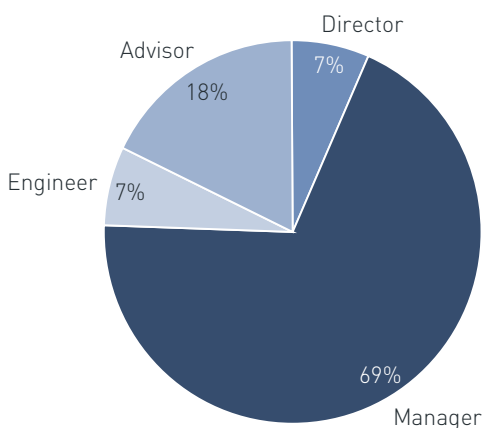
Number by sector



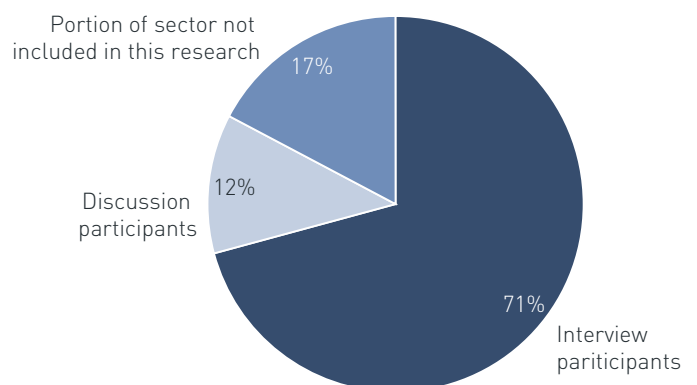
Number by manufacturing sub-sector



Role of people interviewed within company, % (ClimateWorks team analysis)



Share of Industry sector energy use represented by companies that participated in discussions and interviews, % (BREE 2011)



# What factors have driven the past and recent activity?

**In-depth interviews with large industrial companies indicate that a range of factors have led to increases in energy efficiency activity over recent years.**

## Energy price rises

The most common driver mentioned was rising energy prices over the past five or so years. 87 per cent of respondents reported steep energy price rises over the past five or more years have been a driver of their energy efficiency activity, with 36 per cent indicating it was the main driver.

## Impact of key regulations, policies and programs relating to energy efficiency

Of the regulations, policies and programs analysed, respondents reported that the carbon price (including the Jobs and Competitiveness Program) and the EEO program have had the greatest influence on their energy efficiency activity.

As seen in the graph opposite, 82 per cent of respondents reported the carbon price had a highly or moderately significant impact, and 80 per cent of respondents reported that EEO had a highly or moderately significant impact.

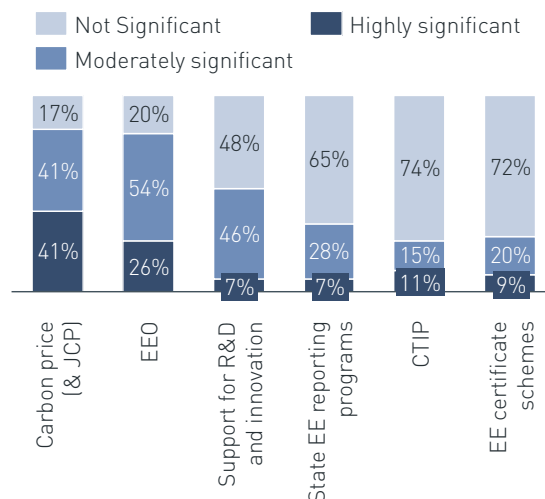
## Impact of company practices

Most respondents reported that having systems in place to collect and manage energy data and having staff to manage energy use were significant in achieving any major energy efficiency gains (see graph opposite).

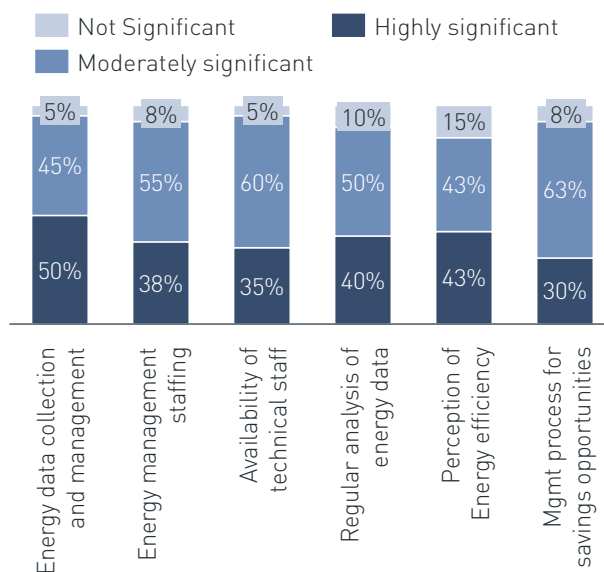
## Combined impact of multiple factors

A number of respondents noted that it was a combination of energy price rises coupled with other drivers that had encouraged activity over recent years including the compliance requirements and capacity-building of the EEO program, the carbon price (including preparation for previous carbon price-related policies), senior management focus, and reputational or supply chain drivers.

Respondents' perception of key regulations, policies and programs that have influenced their past energy efficiency activity, % of respondents, top 6 answers (ClimateWorks team analysis)



Respondents' perception of the internal practices that have the strongest influence on their past energy efficiency activity (ranked by average impact score), % of respondents, top 6 answers (ClimateWorks team analysis)



## Carbon price

**82 per cent of respondents reported that the introduction of the carbon price has had a highly or moderately significant impact on their energy efficiency activity.**

Of these respondents, half stated the carbon price had a highly significant impact on past energy efficiency activity, and half stated it had a moderately significant impact (see graph opposite).

The most significant impact that the carbon price has had, according to respondents, was to increase senior management focus on managing current and future carbon risks and liabilities.

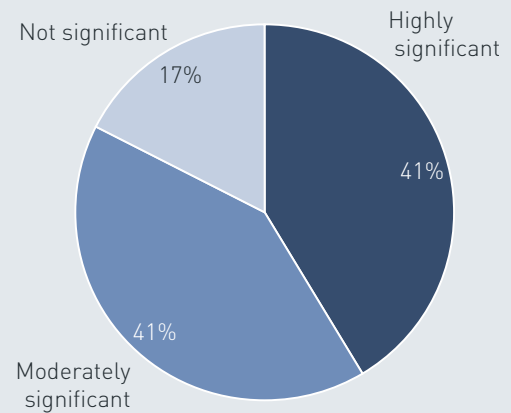
The graph below right shows that companies that are more affected by the carbon price are typically those that:

- > Undertake highly energy-intensive activities (such as metals manufacturing)
- > Have a high level of fugitive or process emissions (such as some chemicals activities)
- > Operate in the manufacturing or water and waste sectors (which generally fit into one or both of the above categories).

Among respondents, the carbon price impact appeared to differ by sector. The graph opposite shows that respondents that reported the carbon price had a lower influence were typically involved in less emissions-intensive activities. This includes companies in the construction sector, contract miners and other companies for which a high proportion of their energy cost relates to transport (not covered by the current carbon price legislation).

The graph below shows that respondents from companies with low profitability or growth reported stronger impacts from the carbon price, with 93 per cent reporting a highly or moderately significant impact, compared to 72 per cent for companies in sectors with a high profitability profile. This could be explained by the relative significance of their carbon liability against their profit margin.

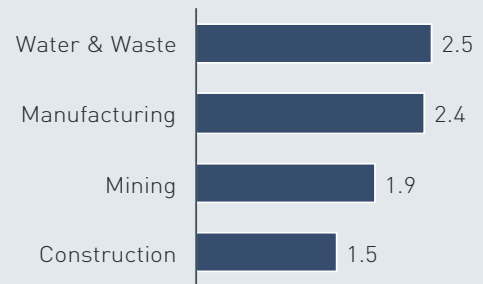
Respondents' perception of the impact of the carbon price on past energy efficiency, % of respondents (ClimateWorks team analysis)



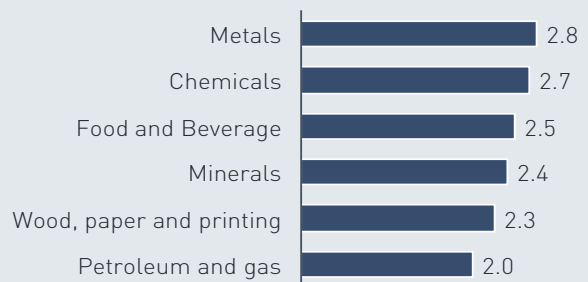
Average reported impact of carbon price on improving energy efficiency by industry sector and manufacturing subsector (ClimateWorks team analysis)

(3= highly significant, 1=not significant)

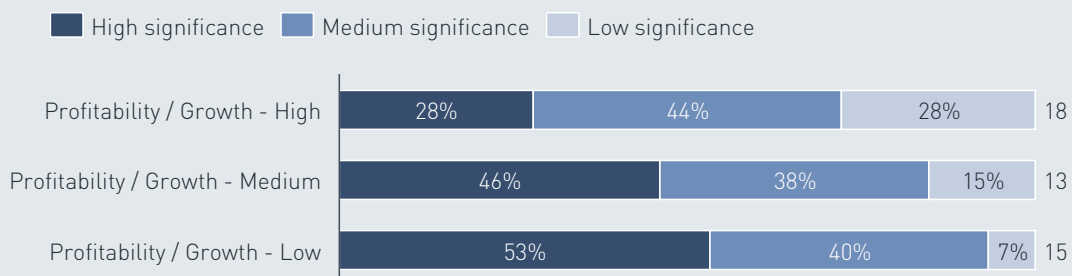
### Average by sector



### Detail by manufacturing sub-sector



Respondents' perceptions of the impact of the carbon price on energy efficiency by profitability / growth sector, % of respondents (ClimateWorks team analysis)



# What factors have inhibited further activity?

ClimateWorks' preliminary findings for the Industrial Energy Efficiency Data Analysis Project (IEEDAP) found that nearly 60 per cent of identified savings (as reported through a range of government programs and other sources) are not expected to be implemented in the large industrial sector. Even among opportunities with short payback periods (less than 2 years), nearly 40 per cent of opportunities are not expected to be implemented, suggesting there are a range of factors that inhibit energy efficiency activity.

**The factors that respondents regard as strongest in inhibiting further energy efficiency activity include access to internal capital, the payback period of energy efficiency projects, opportunity costs and operational risk.**

As seen in the graph below, 91 per cent of respondents reported the payback period of energy efficiency projects as a highly or moderately significant factor that inhibits energy efficiency activity, with 64 per cent reporting this as highly significant.

The majority of respondents interviewed did not mention a specific payback threshold for energy efficiency projects, but for those that did, thresholds ranged from less than one year to more than five years.

91 per cent of respondents also reported availability of internal capital as a highly or moderately significant factor that inhibits energy efficiency activity, with 55 per cent reporting this as highly significant.

**Some factors were reported to be influential, but do not appear to correlate to differential levels of energy savings between companies.**

In order to understand the correlation between respondents' perceptions and actual energy savings,

these factors were compared with the energy efficiency savings that companies have reported through the Energy Efficiency Opportunities program. This comparison was done in order to estimate the impact that inhibiting factors have on the amount of savings identified and implemented by companies.

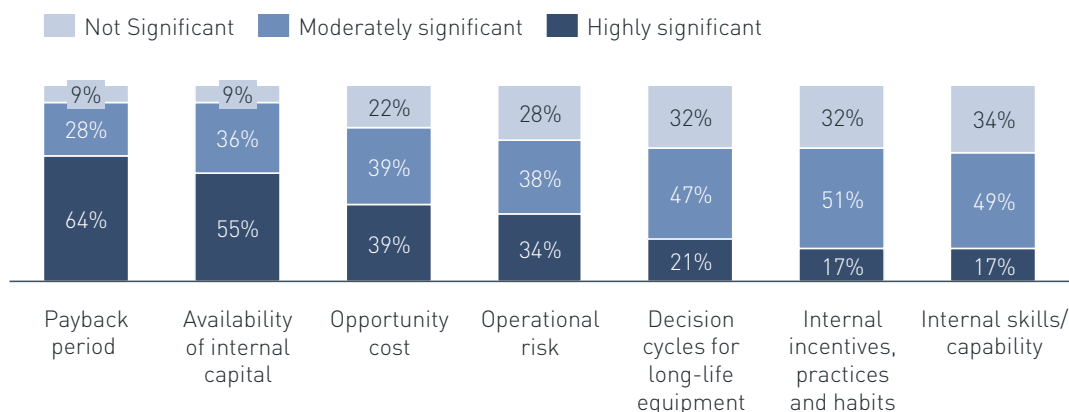
Over 90 per cent of respondents reported access to capital as a significant factor inhibiting activity. However there appears to be little difference in the amount of energy savings implemented between those who consider this an inhibiting factor and those who do not.

The weak correlation between this factor and levels of energy savings identified and implemented could be due to the fact that financial factors are experienced to a similar extent across most companies, with projects that are implemented either having short payback periods and requiring low capital investments, or representing strategic improvements that have a high priority in terms of capital attribution within the company.

The other major inhibiting factors identified by respondents do not appear to correlate to differential levels of energy saving between companies, with one exception. Companies that regard internal incentives, practices and habits as a strong impediment implement three times less savings than other respondents.

In addition, the analysis suggests that factors relating to access to information and non-market pricing have an influence on overall savings implemented, despite respondents not reporting that they have experienced a significant impact from them.

**Respondents' perception of factors that inhibit energy efficiency activity, % of respondents, top 7 answers (ClimateWorks team analysis)**





# How could more activity be unlocked?

## How much more energy could be saved?

**EEO data shows that those companies that achieved the most energy savings saved around six times more energy than other companies.**

Using public data from the EEO program, companies that report to EEO were grouped into quintiles based on energy efficiency activity.

The top quintile is the 20 per cent of companies that undertake the largest amounts of energy efficiency, as measured by a combination of the percentage of their energy use that they identify could be saved, the percentage of their energy use to be saved from projects that are reported to be implemented, and the ratio of these two (their rate of conversion of identified savings into implemented savings).

The companies in the top quintile identify savings equivalent to 21 per cent of their energy use on average, and they implement 14 per cent. This indicates they convert more than 60 per cent of identified savings into actual energy savings.

By comparison, the lowest 20 per cent of companies identify savings equivalent to 2 per cent of their

energy use on average, but implement close to zero per cent.

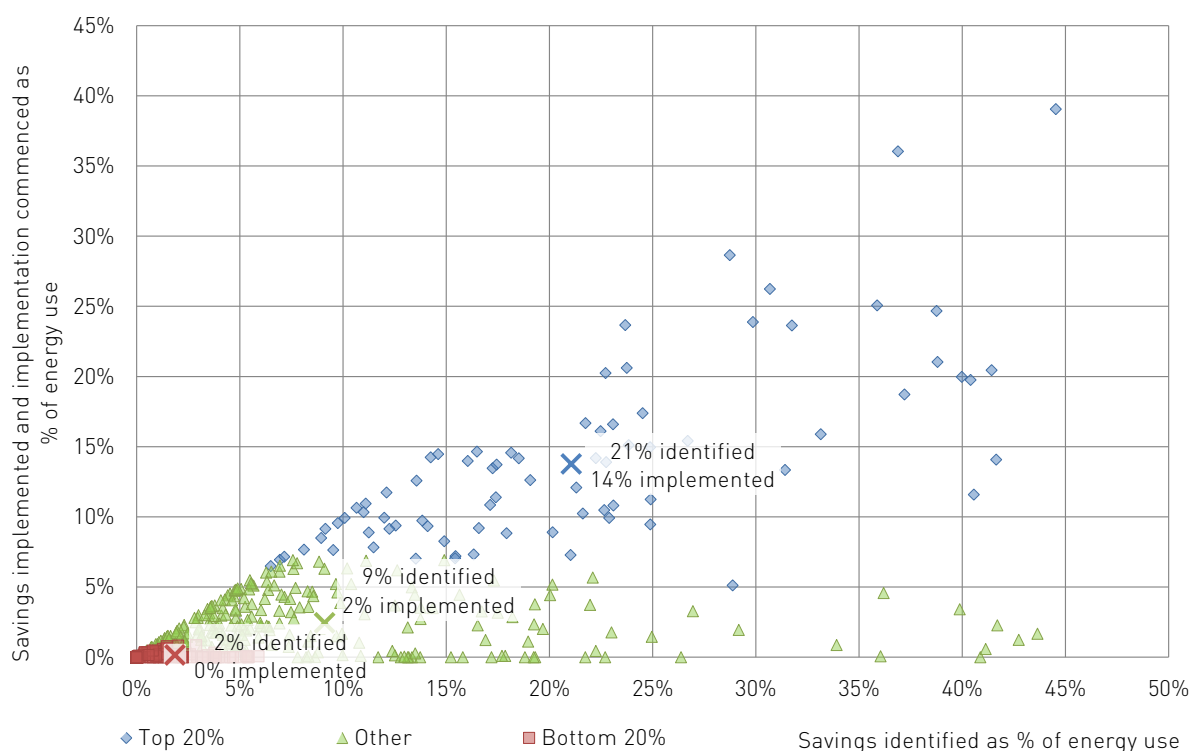
The remaining companies in the middle three quintiles identify savings equivalent to 9 per cent of their energy use on average, and they implement 2.4 per cent, converting 26 per cent of identified savings into actual energy savings.

**This suggests that the companies in the top quintile implement over six times more energy savings as a proportion of their total energy use, compared to other companies** (e.g. around 14 per cent implemented compared to 2.4 per cent implemented).

The same trend can be observed across different sectors and different levels of energy intensity – in other words, regardless of the industry sub-sector or energy intensity of the company, the top quintile appears to implement significantly more savings than the average and the lowest quintile.

The companies interviewed for this report display a similar trend to the full EEO dataset used for this correlation analysis, namely the top quintile implement savings corresponding to nearly 10 per cent of their energy use, which is around three times more than the median respondent.

**Distribution of companies according to energy savings identified and energy savings implemented, % of energy use – all EEO companies (DRET 2011, ClimateWorks team analysis)**



## Key factors that could drive additional savings

**Respondents who simultaneously implement the three highest impact practices well achieve three times more savings than respondents who don't.**

This section is focused on looking at the key factors and characteristics that could drive additional energy and greenhouse gas savings in the industrial sector.

The analysis involves:

- > Identifying the internal company practices that correlate best with the energy savings implemented by companies.
- > Identifying what the common characteristics are of the companies that implement the most energy savings as a share of total energy use.

While respondents reported a range of historic influences on their energy efficiency activity, the analysis indicates that in a few specific areas, implementing best practices was associated with higher energy savings achieved.

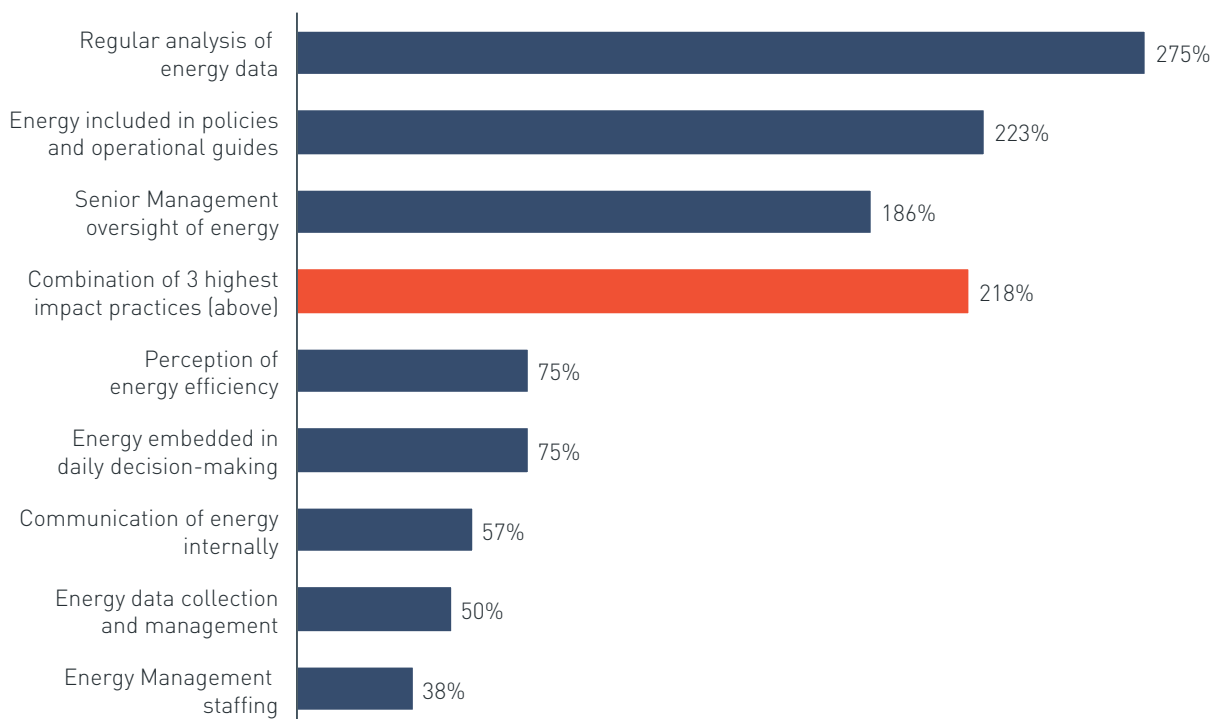
As shown in the graph below, three company practices have been identified as the most influential on energy savings. These were:

- > *Regular analysis of energy data* - best practice is defined as “regular or thorough analysis of energy data scheduled and undertaken”.
- > *Inclusion of energy efficiency in corporate policies or operational guides* - best practice is defined as “energy efficiency considerations are explicitly included in corporate policies and operational guides”.
- > *Board and/or senior management oversight of energy efficiency* – best practice is defined as “Board / Senior management provides active oversight and accountability for energy management and performance (e.g. a committee of the Board/Senior management is actively involved in regular reviews of energy management)”.

Respondents that had high scores for these three characteristics displayed much higher levels of energy savings than respondents that had low scores for them.

The graph below summarises the observed impact on energy savings of the main practices involved. These results are discussed in detail in the full Special Report.

**Percentage of additional savings achieved for companies with a high score for the practice compared to companies with a low score (DRET 2011, ClimateWorks team analysis)**



# Case studies



## Embedding energy efficient behaviour through smarter technology

Qenos is Australia's only manufacturer of polyethylene, a raw material used by a wide range of industries.

Throughout the manufacturing process, engineering support staff are responsible for monitoring the condition of energy-intensive equipment including furnaces, boilers, compressors and processing plant. Small improvements in the efficiency of these pieces of equipment can save significant amounts of energy.

Qenos has implemented a system which allows engineering support personnel to access real-time data on the company's industrial processes from their office via the Qenos intranet. The system allows staff to identify and correct non-optimal operations at an early stage, as well as helping to identify faulty equipment that requires maintenance.



## Murray Goulburn's Energy Blitz uncovers new savings

Murray Goulburn Co-operative (MG) is a co-operative of Australian dairy farmers and Australia's largest dairy company.

In contrast to traditional energy audits, the Energy Blitz approach developed by MG involves interaction with all employees on-site, from production staff through to management.

The Energy Blitz team spends a week with staff at each site, observing plant operations, identifying new opportunities and understanding barriers to change. Daily production meetings are presented with the previous day's energy data for discussion and analysis. The approach allows staff to discuss and develop their ideas with support from the Energy Blitz team, including through use of hard data.

During an Energy Blitz at the Rochester milk processing site, staff discovered that electric heaters were running to compensate for a steam supply problem that no longer existed. At the 'flick of a switch' a saving of approximately \$150,000 per year was achieved.



## Driving efficiency through best practice data management

Toyota Australia is a wholly-owned subsidiary of Toyota Motor Corporation in Japan. It is a leading manufacturer, distributor and exporter of vehicles, and employs over 4200 people in Australia.

Toyota undertakes detailed analysis of their energy data to better pinpoint energy savings opportunities, including weekly and monthly analysis of energy data. It has also fully integrated energy management processes including data collection and analysis into standard production practices.

This approach has helped Toyota Australia reduce the intensity of CO<sub>2</sub> emissions per vehicle produced by over 20 per cent between 2005-06 and 2010-11.



Full case studies are available in Report 6: Special Report on factors influencing large industrial energy efficiency in the *Tracking Progress* report series

# CONTACT US

For further information about this project,  
and to view all reports in the Tracking Progress series, visit

[www.climateworksaustralia.org/tracking-progress](http://www.climateworksaustralia.org/tracking-progress)

Or contact

Amandine Denis  
HEAD OF RESEARCH  
EMAIL [amandine.denis@climateworksaustralia.org](mailto:amandine.denis@climateworksaustralia.org)

Anna Skarbek  
EXECUTIVE DIRECTOR  
EMAIL [anna.skarbek@climateworksaustralia.org](mailto:anna.skarbek@climateworksaustralia.org)

Climateworks Australia  
Level 1, 31 Flinders Lane  
Melbourne Victoria 3000  
PHONE +61 3 9902 0741

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This report was authored by Amandine Denis (Head of Research) and  
Paris Nichols (Senior Business Analyst)

With support from Eli Court (Project Manager), Shane Gladigau  
(Project Officer), Meg Argyriou (Head of Engagement) and  
Anna Skarbek (Executive Director)



A detailed bibliography is available in the full Special Report at  
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