Executive Summary

Information on the energy efficiency opportunity available to the sector, its uptake to date, and some of the factors influencing implementation

May 2013

Summary of key findings:

- Extensive analysis has created a richly detailed picture of energy efficiency opportunities in industry.

- Across three major industrial sectors, companies responsible for half of Australia’s energy use have reported projects that could potentially save 11% of energy used, lowering their energy costs by over $3 billion per annum.

- Under business-as-usual, these companies are expected to capture 40% of this opportunity – worth $1.2 billion per year.

- However, the remaining $2.1 billion of energy savings is not expected to be implemented, due to a range of factors that influence business decision-making.
EXTENSIVE ANALYSIS BUILDS ON CLIMATENOWS’ PREVIOUS WORK TO HELP CREATE A MORE DETAILED PICTURE OF ENERGY EFFICIENCY OPPORTUNITIES IN THE INDUSTRIAL SECTOR

The Industrial Energy Efficiency Data Analysis (IEEDA) project was commissioned by the federal and state governments through the National Strategy on Energy Efficiency. It aims to provide detailed information to better understand and inform: (a) the size and value of energy savings that have been identified and reported through state and federal industrial energy efficiency programs, (b) the impact of current policies and economic drivers on unlocking those savings, and (c) the further factors and policies that might be preventing or incentivising optimal uptake of energy efficiency opportunities.

In 2012, ClimateWorks published the Inputs to the Energy Savings Initiative modelling from the Industrial Energy Efficiency Data Analysis Project and a summary report Industrial Energy Efficiency: summary of key findings from the ESI data analysis project (both available at www.climateworksaustralia.org/industrial-energy-efficiency-data-analysis). The report investigated the energy efficiency opportunities available to medium to large industrial energy users in the mining, manufacturing and transport sectors. These energy users include 587 companies, representing nearly 2,000 PJ of energy use, or around 50% of Australia’s total energy consumption in 2010-11.

This comprehensive research examined the energy savings opportunities, associated costs and benefits, and the factors that influence implementation across these sectors, creating a detailed and unique picture of the energy efficiency opportunities that exist in the industrial sector, and an understanding of why not all of these opportunities will be implemented. A key strength of the project is its focus on real world company data rather than theoretical assessments of energy efficiency opportunities.

Since then, the data has been refined to include additional and more up to date data sources. The information presented has not yet been extensively verified. As such, the factsheets aim to facilitate discussion on the areas which would benefit from further refinement (in particular in regards to the breakdown by technology and process type and the costs).

SIGNIFICANT POSSIBILITIES TO SAVE ENERGY EXIST IN INDUSTRY, MOST WITH A PAYBACK LESS THAN 2 YEARS

- Companies that account for half of Australia’s total energy consumption have reported projects that could save an average of 11% of their energy use (Figure 1), lowering their energy costs by $3 billion per annum and cutting greenhouse gas emissions by 15 million tonnes.

- A significant proportion of this can be achieved with a payback of less than 2 years.

- The possibility for energy savings varies substantially across sub-sectors, from 3% to 21%.

- Several factors can account for the wide variation, including the nature of the industry and plant used, how recently plant was built or updated, and what incentives exist to identify opportunities.

- In contrast to the other sectors analysed, the majority of opportunities identified in the transport sector have a payback period greater than 4 years. This is driven by upgrades to new, more efficient vehicles, providing co-benefits (e.g. better appearance, reduced maintenance requirements) and a long operational life.

![Figure 1 - Energy savings by sub-sector and payback period (% of energy use, 2010-11)](image-url)
ABOUT 40% OF ACTIVITY IS ALREADY HAPPENING

- Our analysis indicates that around 40% of the energy savings identified will be implemented under current policy settings, and that most of these opportunities will achieve a payback of less than 2 years (Figure 2). This is equivalent to 4.8% of total energy use across these sectors – worth $1.2 billion per year in energy savings.

- These energy savings are achieved primarily through operational improvements such as implementation of process controls and measurement, improved process design and optimisation or changes to staff behaviour and maintenance practices. Some of these require minimal capital expenditure for significant gains, and can often be achieved through simplified decision channels (e.g. via maintenance budgets).

- Some companies will still choose to implement opportunities with longer paybacks. This is typically due to other benefits than just energy cost reduction, for example improvements in productivity.

Figure 2 – Energy savings expected to be implemented, % of energy use 2010-11

<table>
<thead>
<tr>
<th>By payback period</th>
<th>By type of project</th>
<th>% of total energy savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2 years</td>
<td>Behaviour change and maintenance practices</td>
<td>48%</td>
</tr>
<tr>
<td>2-4 years</td>
<td>Process controls and measurements</td>
<td>41%</td>
</tr>
<tr>
<td>&gt;4 years</td>
<td>Process design and optimisation</td>
<td>39%</td>
</tr>
<tr>
<td></td>
<td>Various energy efficiency opportunities</td>
<td>42%</td>
</tr>
<tr>
<td></td>
<td>Equipment upgrade</td>
<td>42%</td>
</tr>
<tr>
<td>Mining</td>
<td>5.4%</td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>4.7%</td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>4.3%</td>
<td></td>
</tr>
<tr>
<td>Grand Total</td>
<td>4.8%</td>
<td></td>
</tr>
</tbody>
</table>

HOW CAN IT BE DONE?

ClimateWorks has created a suite of factsheets that provide a detailed picture of the available opportunities and the factors influencing their implementation across five industrial sectors – Mining, Metals, Chemicals, Transport and Other Manufacturing sectors (available on our website at www.climateworksaustralia.org/industrial-energy-efficiency-data-analysis). Key highlights include:

- In the mining sector, improving the efficiency with which excavators, shovels and trucks are operated could save 2.3% of total energy use. This is achieved through changing the gradient of the slope upon which vehicles travel, reducing the amount of time vehicles stop and start and improving load management, all of which improve fuel efficiency.

- Across the manufacturing sector, reducing thermal energy losses from heating processes such as furnaces, kilns and boiler systems can generate both energy and financial savings. Waste heat can be captured and used to pre-heat materials and reduce the fuel inputs required to perform other industrial processes, reducing production costs.

- On-site cogeneration in the petroleum refining sector offers possible long-term electricity and heat generation alternatives to traditional energy sources. These projects often have long payback periods, so not all opportunities will be taken up.

- In the road freight transport sector, about 18% of the total opportunity to reduce energy use is achieved through process improvements such as improved operator training and behavioural adjustments or scheduling optimisation.
However, not all savings identified will be implemented due to a range of factors that impact business decision-making.

There are multiple and competing factors which influence business decisions relating to energy efficiency, many of which are interlinked. This means that not all the identified energy savings opportunities will be implemented (Figure 3), leaving about $2.1 billion of energy savings not expected to be taken up in current business implementation plans.

- **Availability of internal capital** to fund projects remains difficult, a result of strong internal competition for capital within companies, the tightness of financial markets, and the challenging economic environment in Australia for some sectors.

- **Payback period** is a strong factor across multiple sectors. Many companies set criteria that require projects to pay for themselves within two years, or sometimes as low as one year. This reflects cautionary investment behaviour in a highly uncertain environment.

- **Operational risks** are a common factor inhibiting implementation. Many industrial sites operate 24 hours a day, seven days a week. Operations interruptions to implement energy efficiency opportunities – such as installing or modifying equipment – need to be carefully planned to match scheduled downtime periods.

- **Decision cycle** relates to equipment with a long lifespan, which companies can be reluctant to replace before the end of its useful operating life.

- **Access to information** can be a particular issue for smaller companies, who may not have the internal resources or skills to identify and implement energy efficiency opportunities. On the other hand, evidence suggests that organisations with multiple sites and participating in EEO or other State-based energy efficiency programs generally have the skills and resources to tackle energy efficiency.

The variation in factors across different sectors reflects the type of opportunities available. For example, in the mining sector, most opportunities involve process improvements and fall below 2 years payback and are primarily blocked by the risk of operational disruption and decision cycles. By contrast, in the transport sector, most opportunities involve upgrading capital intensive equipment (e.g. buying new trucks), and have longer payback periods, reducing their attractiveness compared to other projects.

The purpose of this document is to present the preliminary results of the Industrial Energy Efficiency Data Analysis (IEEDA) project, in order to facilitate discussions with industry on how best to improve public information on energy efficiency opportunities in the industrial sector going forward. We welcome feedback on the preliminary results included in the reports. If you wish to provide feedback, please contact us. The datasets will be updated following this consultation process.

ClimateWorks Australia is an independent non-profit organisation whose mission is to facilitate substantial emissions reductions in the next five years in Australia by working with government, business, industry groups and the community via a collaborative research and action-based approach.

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