

## FIRST PUBLIC REPORT

### Controlling Corporation

Caltex Australia Limited

### Period to which this report relates

(See sub-section 22(2) of the Act and Regulation 7.1 of the *Energy Efficiency Opportunities Regulations (the Regulations) 2006*)

Start

1 July 2006

End

31 December 2008

Note: This report refers to energy in PJ or petajoules and GJ or gigajoules. A petajoule is one thousand trillion joules and a gigajoule is one billion joules.

### Part 1 - Summary of assessments conducted thus far

Table 1.1 :

#### Description of the way in which Caltex has carried out its assessments and the period in which the assessments were undertaken.

Caltex Australia Limited has conducted energy efficiency assessments at each of its three refining facilities in their entirety, during this reporting period.

Caltex Refineries (NSW) Pty Ltd – Kurnell fuels refinery, and Caltex Lubricating Oil Refinery Pty Ltd - Lube oils refinery, were assessed between February and May 2008; and Caltex Refineries (Qld) Pty Ltd - Lytton fuels refinery, was assessed in the June to September 2008 period.

Consultants KBC Energy Services were engaged to assist Caltex staff with assessments. KBC Energy Services' methodology considered all aspects of energy improvement - operational enhancements, capital investment planning and implementation, and operational management for long-term sustainable benefits. KBC are recognised as a world leader for energy and emissions reduction in the hydrocarbon processing industries globally. During the assessments, sophisticated Pinch Analysis techniques were combined with process and utility integration to approach energy assessments and identify improvements.

The opportunities for energy savings which were identified in the assessments are currently under further investigation before implementation. Opportunities will be processed through Caltex's business and capital planning, and production management procedures, so that they are embedded within the business.

To the best of its knowledge Caltex has met the intent and key requirements of the *Energy Efficiency Opportunities Act 2006* and *Energy Efficiency Opportunities Regulations 2006*.

Table 1.2:

Table 1.2 - Group member/business unit/key activity/site that have been assessed	Energy use per annum in the year the assessment is completed *	Energy data accuracy (if not within $\pm 5\%$ ) **	Reasons for not achieving data accuracy to within $\pm 5\%$ **
(see paragraph 1(a) of Schedule 4 of the Regulations)	(see paragraph 2 of Schedule 4 of the Regulations)	(see paragraph 5(a) of Schedule 4 of the Regulations)	(see paragraph 5(b) of Schedule 4 of the Regulations)
Caltex Refineries (NSW) Pty Ltd – Kurnell fuels refinery	16.9 PJ	$\pm 5\%$	NA
Caltex Lubricating Oil Refinery Pty Ltd - Lube oils refinery	2.7 PJ	$\pm 5\%$	NA
Caltex Refineries (Qld) Pty Ltd - Lytton fuels refinery	12.6 PJ	$\pm 5\%$	NA
<b>Total</b>	32.2 PJ		
<b>Total as a percentage of total energy use of the group covered by this report</b>	>>95% (see paragraph 1(b) of Schedule 4 of the Regulations)		

## Part 2 - Outcomes of and business response to opportunities that have been identified and evaluated for each group member, business unit, key activity or site assessed

(See paragraphs 3-6 of Schedule 4 and Schedule 6 of the Regulations)

Group member/business unit/key activity/site >0.5 PJ name: **Caltex Refineries (NSW) Pty Ltd – Kurnell fuels refinery**

**Table 1.3 : Caltex Refineries (NSW) Pty Ltd**

Status of Opportunities		Number of Opportunities	Estimated energy savings per annum by payback period (GJ)		Total estimated energy savings per annum (GJ)	*Accuracy range (%)
			0 – <2 years	2 – ≤4 years		
Outcomes of assessment	Identified (accuracy ≤ ±30%)	9	76,804	620,179	696,983	+/-30%
	Identified (accuracy > ±30%)	-	-	-	-	-
	**Total Identified	9	76,804	620,179	696,983	+/-30%
***Business Response	Under Investigation	9	76,804	620,179	696,983	+/-30%
	To be Implemented	-	-	-	-	-
	Implementation Commenced	-	-	-	-	-
	Implemented	-	-	-	-	-
	Not to be Implemented	-	-	-	-	-

Group member/business unit/key activity/site >0.5 PJ name: **Caltex Lubricating Oil Refinery Pty Ltd - Lube oils refinery**

**NO** energy savings opportunities were identified for the Caltex Lubricating Oil Refinery which may be considered economic. Payback periods for the opportunities that were identified during the assessment greatly exceeded four years.

Group member/business unit/key activity/site >0.5 PJ name: **Caltex Refineries (Qld) Pty Ltd - Lytton fuels refinery**

**Table 1.3 : Caltex Refineries (Qld) Pty Ltd**

Status of Opportunities		Number of Opportunities	Estimated energy savings per annum by payback period (GJ)		Total estimated energy savings per annum (GJ)	*Accuracy range (%)
			0 – <2 years	2 – ≤4 years		
Outcomes of assessment	Identified (accuracy ≤ ±30%)	20	244,210	171,230	415,440	+/-30%
	Identified (accuracy > ±30%)	-	-	-	-	-
	**Total Identified	20	244,210	171,230	415,440	+/-30%
***Business Response	Under Investigation	20	244,210	171,230	415,440	+/-30%
	To be Implemented	-	-	-	-	-
	Implementation Commenced	-	-	-	-	-
	Implemented	-	-	-	-	-
	Not to be Implemented	-	-	-	-	-

**Note:** An opportunity is any potential change to a system, activity or piece of equipment that:

- is identified during an EEO assessment;
- is consistent with legal requirements such as OHS, and
- may result in energy savings projects with payback periods of 4 years or less.

## Details of two significant opportunities found through EEO assessments

(See paragraph 7 of Schedule 4 of the Regulations)

Table 1.4

### **Opportunity 1**

#### **Reduce air introduction to catalytic cracker –**

Caltex has identified a potential opportunity to save energy at the Lytton refinery catalytic cracking unit.

Operation of this processing unit involves a burn-off or catalyst regeneration phase where air is introduced to the unit by a very large blower driven by a steam turbine. The energy efficiency assessment of this unit identified a potential opportunity to reduce the volumes of vent air introduced. Less air will equate to less steam to drive the air blower – potentially saving around 18 tonnes of steam per day, or up to 3,600GJ of energy per annum.

This opportunity involves no capital expenditure, and Caltex will trial operation of the unit with reduced air introduction to better understand the energy savings possible and build operational confidence in running the unit with less scope for blower adjustment.

### **Opportunity 2**

#### **Improved crude oil preheating –**

Caltex is investigating an opportunity to save energy at the Caltex Kurnell fuels refinery by improving waste heat exchange arrangements for crude oil before it is fed into the two crude distillation towers. This is known as “pre-heating”.

During the energy efficiency assessment of the crude distillation units, a detailed study of heating requirements was undertaken using a sophisticated technique called “pinch analysis” and some further advanced modeling. The outcome was design of improved preheat exchange arrangements, which would enable significant reduction in furnace duty on these units. The crude would be better pre-heated by waste heat so less heating is required by the furnace. This would save fuel gas in these furnaces.

This potential opportunity requires capital investment in new equipment, and at this stage does not appear economically viable.

## Part 3 - Voluntary Contextual Information

### **Caltex Refining -**

Caltex Australia Limited is the largest refiner and marketer of petroleum products in Australia with operations in all states and territories. Caltex owns and operates two petroleum fuels refineries at Lytton and Kurnell, and a lubricating oil refinery, located adjacent to the Kurnell fuels refinery.

The Kurnell refineries are located on the southern shore of Botany Bay in Sydney's south-east. The fuels refinery was commissioned in 1956. It is the largest refinery in NSW and the second largest of the seven operating oil refineries in Australia, based on a crude oil throughput capacity of 20 million litres per day.

The Lytton refinery is located at the mouth of the Brisbane River to the south of the Brisbane CBD. The refinery was commissioned in 1965 and with a crude oil throughput of 17 million litres per day, is the largest oil refinery in Queensland and fifth largest oil refinery in Australia.

### **Energy Use at the Refineries -**

The Caltex refineries use over 30 petajoules of energy each year to produce petrol, diesel, jet fuel, fuel oil, LPG, butane and propane, bitumen, lubricating oil base stocks, waxes, process oils and sulfur.

Energy efficiency at the refineries varies significantly over time due to

- a) Variable operating rates - where reduced demand for products may limit throughput rates, or change the product mix,
- b) Variation in feed – where more than 20 different crude oil types are handled annually in our facilities, each requiring different energy intensity in processing, and yielding a different product mix,
- c) Shutdown of production units for inspection and maintenance – where individual unit are typically scheduled for a shutdown every 4-6 years and these take several months to complete in each case,
- d) Changing specifications of products – where changes to fuel quality specifications have increased the energy intensity of production over time, including higher octane fuels and clean fuels quality improvements to reduce benzene and sulfur in fuels.

### **Other Opportunities for Energy Efficiency at the Refineries -**

Caltex has focussed attention on efficient energy use from the design and early operation of the refineries, and continues to do so today. As the refineries burn their own fuels derived from crude oil feed, as well as importing natural gas and electricity, savings in fuel use can result in a double saving as this will often yield additional product. Both the Kurnell and Lytton sites have an Energy Engineer appointed to optimise energy efficiency.

In addition to the opportunities presented in this report, the Energy Efficiency Opportunities assessments identified a large number of opportunities that did not satisfy initial screening of an economic payback on capital costs within four years. Among these were large capital modification prospects that would substantially change the refineries energy footprint, but which are higher risk and involve substantial investment in new infrastructure, such as site cogeneration projects. Although these opportunities are economically unattractive at this time, they will be reviewed as business prospects because of their large potential energy savings and may be implemented in the future if they become more economically attractive.

**Part 4 - Declaration**

(See paragraph 8 of Schedule 4 of the Regulations and paragraph 22(4)(c) of the Act)

The information included in this report has been reviewed and noted by the board of directors and is to the best of my knowledge, correct and in accordance with the *Energy Efficiency Opportunities Act 2006* and *Energy Efficiency Opportunities Regulations 2006*.



Desmond King, Managing Director & CEO