




# Star Energy Partnership in Natural Gas STAR Program

Methane Expo 2013 - Vancouver

# Why Methane ?



Every greenhouse gas has a global warming potential (GWP)—the measure of its ability to trap heat in the atmosphere relative to CO<sub>2</sub>. Methane is referred to as a potent greenhouse gas because it has a GWP of 21. This means that methane is 21 times more powerful than CO<sub>2</sub> at trapping heat in the atmosphere over a 100-year period.

**President RI' s Executive Order To Reduce Greenhouse Gas Emission at 26% before 2020**

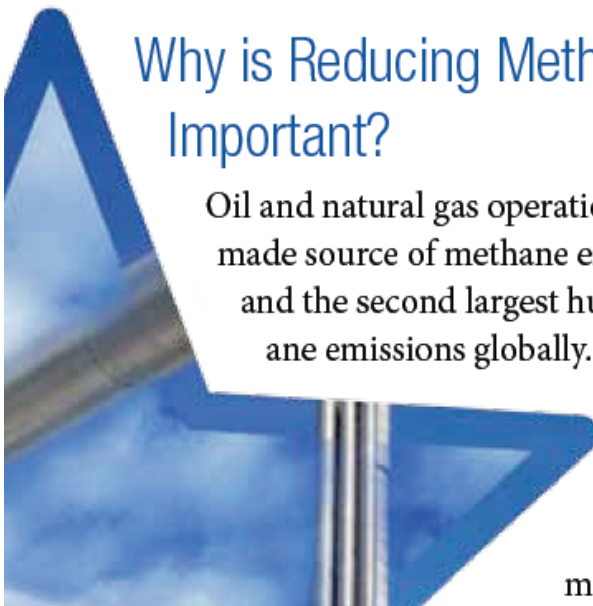
## Overall national commitment

Reduce GHG emissions by 26% through domestic effort and 41% with international support by 2020 (from BAU baseline)

## Gas flaring objective

To achieve zero flared gas in 2025

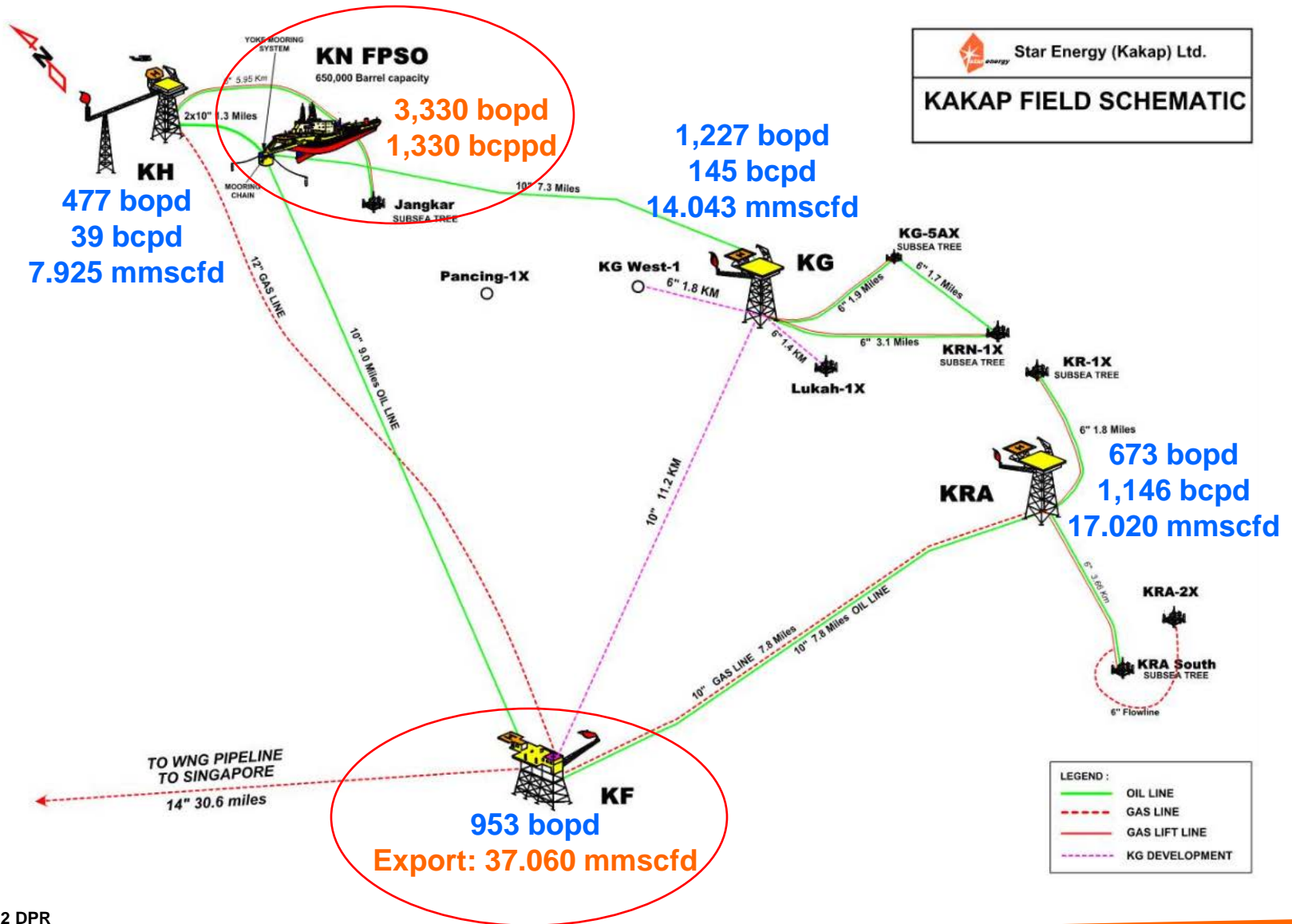
## Why is Reducing Methane Emissions Important?



Oil and natural gas operations are the largest human-made source of methane emissions in the United States and the second largest human-made source of methane emissions globally. Given methane's role as both a potent greenhouse gas and clean energy source, reducing these emissions can have significant environmental and economic benefits.

**Decrees of Minister of ESDM / Director General of Oil & Gas to secure Flaring Reduction by 30% per annum to achieve ZERO in 2025**

# Process Philosophy – Methane Source



# Partnership



OMB Control No. 2060-0328  
Expires 07/31/2011

*Term of Reference for the*

## Global Methane Initiative


Signature: \_\_\_\_\_

Bambang Dwiyanto

Head of Agency of Research and Development for Energy and Mineral Resources  
Ministry of Energy and Mineral Resources of Republic Indonesia


Date: \_\_\_\_\_

29 April 2011



*Under the Methane to Markets Initiative, The Natural Gas STAR Program is a flexible, non-regulatory, and voluntary partnership between the EPA and the international oil and natural gas industry aimed at facilitating and accounting for cost-effective methane emission reductions worldwide.*

*The Natural Gas STAR Program has identified technologies and operating & maintenance practices in use by industry as cost-effective options for reducing methane emissions. A complete listing of these measures can be found at [epa.gov/gasstar](http://epa.gov/gasstar).*



### NATURAL GAS STAR PROGRAM: MEMORANDUM OF UNDERSTANDING FOR INTERNATIONAL OPERATIONS

This is a voluntary agreement between Star Energy (Kakap) Ltd (company name) and the U.S. Environmental Protection Agency (EPA) for the purpose of reducing methane releases to the atmosphere by implementing cost-effective emission reduction technologies and practices.

Authorized Company Representative: Asrin Haznam, Vice President Oil & Gas Operations (name)

Signature: \_\_\_\_\_ Date: May 23, 2011

Dina Kruger: Director, Climate Change Division, U.S. Environmental Protection Agency

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

#### Partner's Designated Natural Gas STAR Implementation Manager:

Name: Wahyu Wicaksana

Title: Sr. Manager Operations

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E-mail: wahyu.wicaksana@starenergy.co.id

# Star Energy's Involvement



- Measurement Study Objectives Formulation (end of 2011)
  - Identified and evaluated opportunities to reduce methane emissions
    - Venting
    - Fugitive
    - Flare efficiency
- Measurement Study was Conducted
  - KRA & KF (February 2012)
  - KN FSO (September 2012)
- Attended GMI workshop & study tour at Denver, Colorado (April 2012)
- Co-Hosted 2nd Asia Pacific GMI workshop with Pertamina EP, SPE, and GGFR (September 2012)



2<sup>nd</sup> Asia Pacific Global Methane Initiative  
Oil & Gas Sector Workshop

September 18, 2012

Presented by U.S. Environmental Protection Agency, Pertamina EP, Star Energy,  
Society of Petroleum Engineers Java Indonesia, Global Gas Flaring Reduction Partnership and  
BPMIGAS

Pertamina EP Offices Jakarta  
Standard Chartered Tower – 3<sup>rd</sup> Floor  
Jl. Prof.Dr.Satrio 164 – Casablanca District  
Jakarta, 12950 - Indonesia

# Measurement Study Result



## KF Platform Emission Source

General Fugitives	5 %
Reciprocating Comp. Packing	< 1 %
Centrifugal Comp. Seal	2 %
Flare	93 %

**184 ton / year**

## KRA Platform Emission Source

General Fugitives	5 %
Centrifugal Comp. Seal	2 %
Flare	93 %

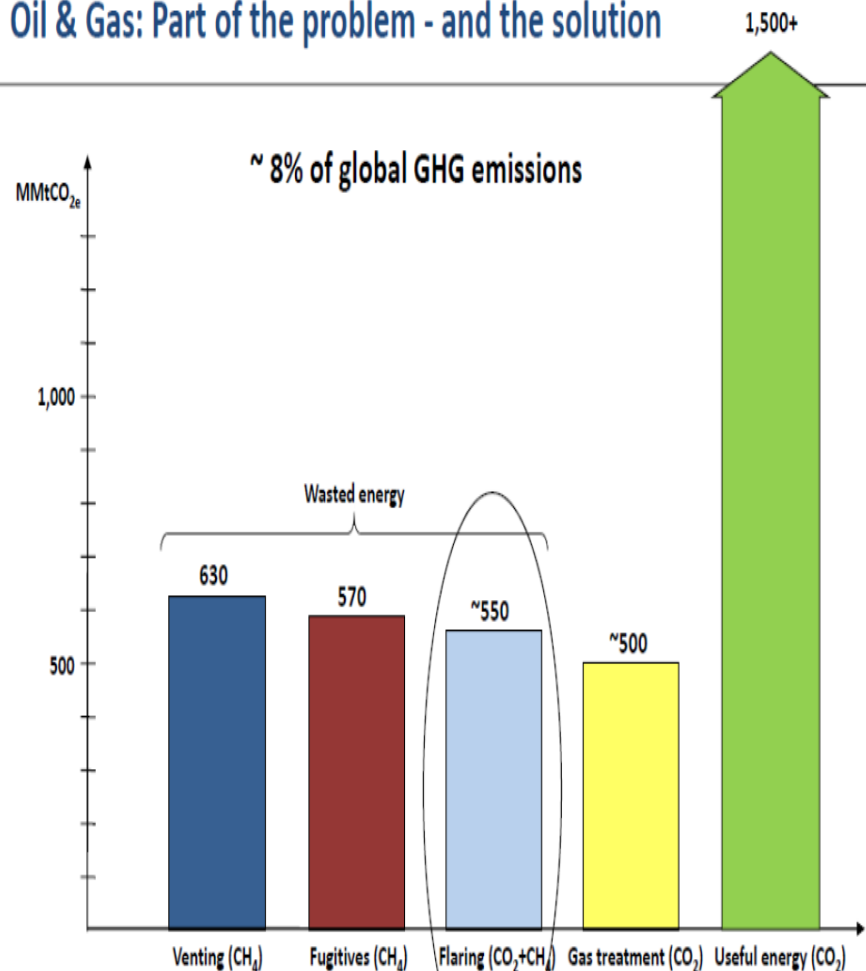
**143 ton / year**

# Indonesia's Oil & Gas Contribution to Global Warming



Oil & Gas: Part of the problem - and the solution

## Flaring and Venting in Indonesia



- 2009 estimates: 270-350 mmcf (2.8-3.6 bcm) is flared, i.e. ~ 10% of annual Indonesian consumption (36 bcm in 2009)
- Indonesia rank # 7-10
- Equivalent to ~10 mln tonnes of CO<sub>2</sub> eq.
- Equal or greater amount of CO<sub>2</sub> directly vented during gas processing
- Combined CO<sub>2</sub> emissions would place Indonesia #5
- CH<sub>4</sub> vented volumes are unknown
- Black Carbon emitted during flaring increases the warming effect of flaring
- \$500 mln in lost revenues including lost government share



Indonesia venting and flaring adds 17 million tonnes CO<sub>2</sub> to atmosphere every year and wastes million dollars of energy resources

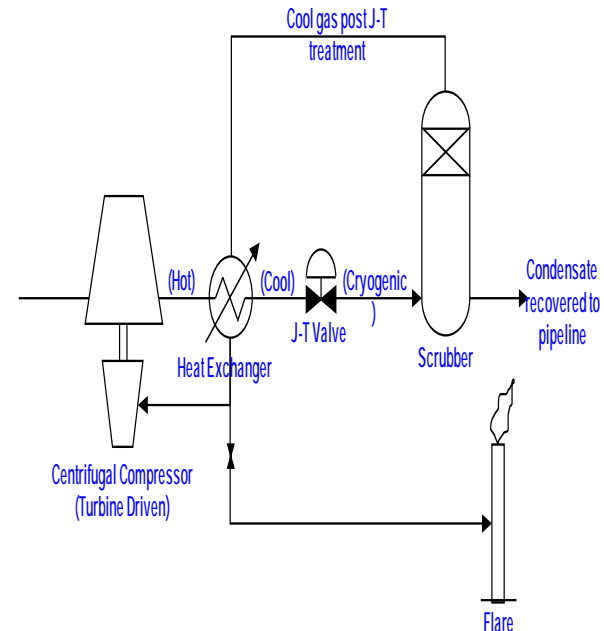
\* Estimates calculated by Carbon Limits, based on data from DMSP/GGFR (2006), EPA (1992/1994/2004), M2M (2008) and IEA (2008). Very low level of accuracy due to absence of aggregated, monitored operational data.

# Proposed Improvement (1)



Net First Year Cost	NPV	IRR (%)	Payback Period (Years)
ID Rp 33.5 billion (US \$3.7 million)	ID Rp 90.8 billion (US \$10.0 million)	100%	1.0

## Proposed Improvement: Joule-Thomson Skid



### Resources Required:

1. Accurate gas to flare measurement
2. Detail engineering complete with economic analysis
3. Compressor with high compression ratio

### Resources Available:

1. Support from US EPA for engineering study



# Proposed Improvement (2)



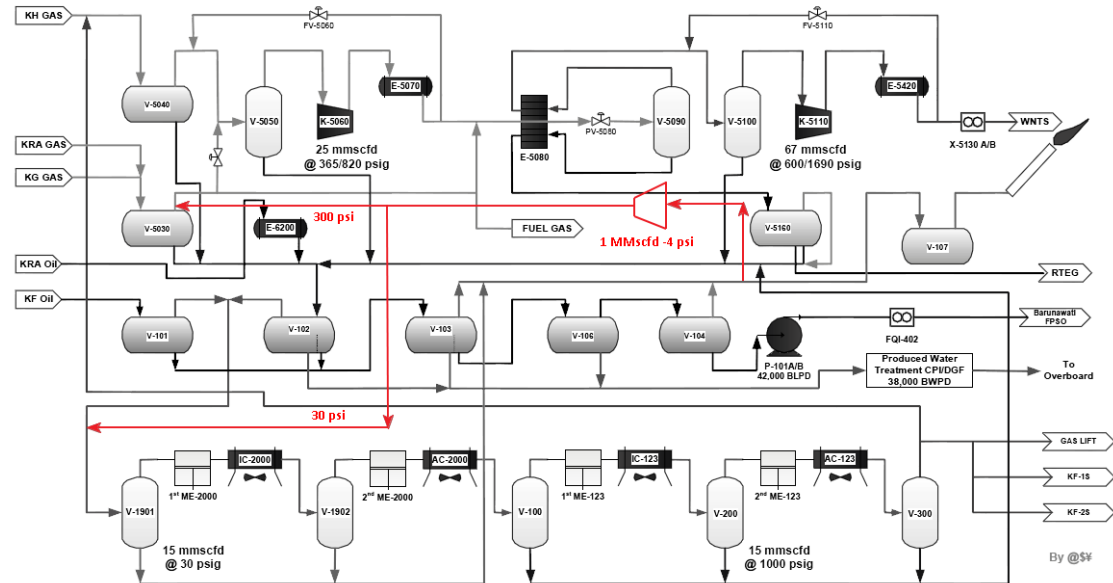
- Average gas to flare KF (2011):  
23 MMSCF / month
- Potential Revenue Loss:  
USD 530K / month
- Gas to Flare Composition:  
Average Methane 58 %

## Proposed Improvement: Flare Gas Recovery

### Resources Required:

1. Accurate gas to flare measurement
2. Detail engineering complete with economic analysis
3. Compressor with high compression ratio

**KF PLATFORM - Hydrocarbon Processing Diagram**



### Resources Available:

1. Support from US EPA for engineering study

# Emission Reduction Practices



## Engine Starting System Retrofit

- Retrofit from natural gas starting system to air starting system – Successful Trial
- 3-5 cranking before engine running
- Benefits:
  - Reduce emission
  - Reduce interruption on gas export
  - Reduce water coning risk



# Publication



**APOGCE**  
**Asia Pacific Oil & Gas Conference and Exhibition**  
22–24 October 2013 | Jakarta, Indonesia  
"MAXIMISING THE MATURE. ELEVATING THE YOUNG"

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First Steps in Global Methane Initiative Offshore Natuna Sea, Indonesia

Author Block: S. Ramadhana, M. Amar, Star Energy (kakap) Ltd

## *Abstract*

Methane ( $\text{CH}_4$ ) is the major component of natural gas. However, it's also the second most important manmade greenhouse gas (GHG) after carbon dioxide ( $\text{CO}_2$ ). While methane is in the atmosphere for a shorter period of time and is emitted in smaller quantities than  $\text{CO}_2$ , its ability to trap heat in the atmosphere, which is called its "global warming potential," is 21 times greater than that of  $\text{CO}_2$ .

Star Energy is the first oil & gas company in Indonesia which supports the MIGAS Directorate General & Ministry of Environment's Global Methane Initiative (GMI) program under the auspices of US Environmental Protection Agency (US EPA). Star Energy and US EPA team had already conducted a series of emission measurements on Kakap offshore field production facilities (KF & KRA platforms) in February-March 2012 and on KN FSO in September 2012.

The measurement shows that KF platform's emission reaches approximately 257,000  $\text{m}^3$  / year whilst KRA Platform emits approximately 200,000  $\text{m}^3$  / year and most of them are coming from flaring activities. The measurement results for KN FSO are still being assessed out with recent project changes.

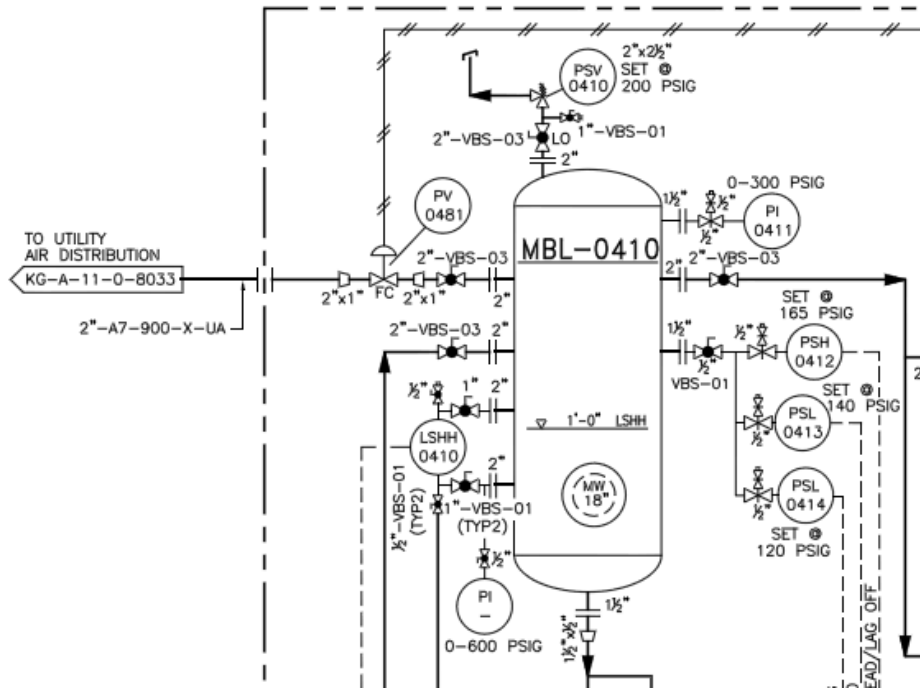
Efforts on emission control have been focused on flare reduction on KF platform. The joint government-company Team is proposing to install JT process in KF to reduce flare emission. JT process' objective is simply to recover the methane gas to flare, compress it, flow it through JT valves, re-export the methane gas and recover the condensate. However, several technical challenges exist for implementing this pilot project, such as finding the right compressor to compress methane gas from near atmospheric pressure to gas system pressure of around 300 psig. Another challenger is how to accurately measure the recoverable methane gas rates in order to secure a viable economic assessment.



# Existing Air Receiver

<b>MBL-0410</b>	<b>CZZ-0490B/0540A</b>	<b>MAJ-</b>
<u>UTILITY AIR RECEIVER</u>	<u>AIR COMPRESSORS</u>	↓
SIZE : 4'-0" O.D.x8'-6" S/S	CAPACITY : 150 SCFM (EACH)	
DESIGN : 200 PSIG @ 170 °F	DISCHARGE PRESS.: 165 PSIG (NOTE 2)	
OPERATING: 120-165 PSIG @ 110 °F	DRIVER : 100 H.P.	

- Existing Air Receiver
  - Volume 106 cuft
  - Operating at 165 psig



# Pertamina's GHG Account

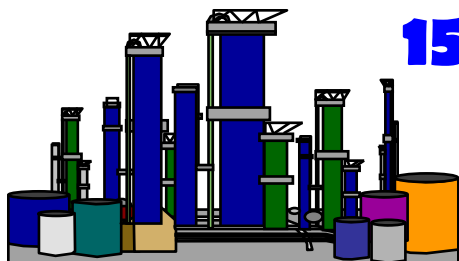


**Hulu**



**9,056 juta ton CO<sub>2</sub>e**

**Refining**



**15,421 juta ton CO<sub>2</sub>e**

**Marketing & Trading**



**0,44 juta ton CO<sub>2</sub>e**



**Total Emisi  
24,92 juta  
Ton CO<sub>2</sub>e**

**Emission Reduction (ton  
Co2e/yr)**

