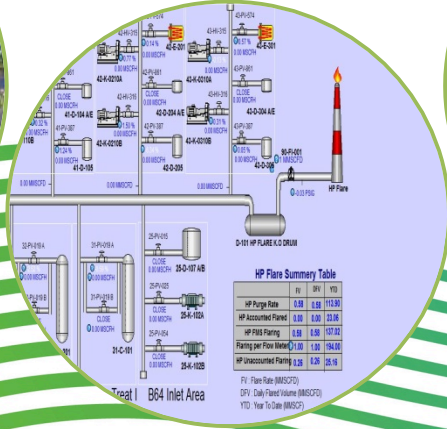




# Saudi Aramco Flaring Minimization Program



**Adel S. Al-Ghamdi**

where energy is opportunity™

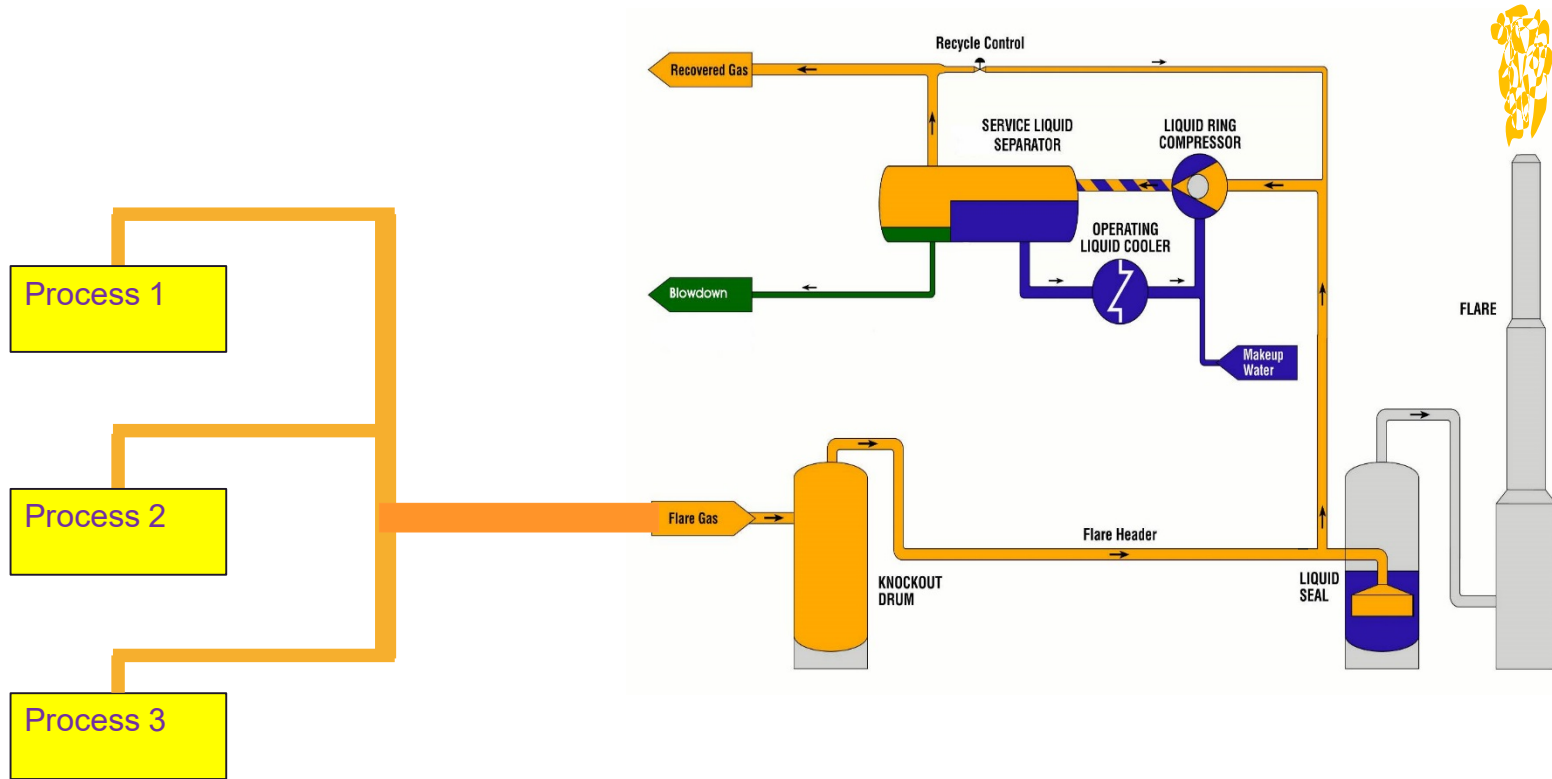
# What is a Flare System?

## Process Safety Disposal System

Relief Discharge Point  Flare Tip



# Typical Flare System



# Why Flaring?

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- ▶ Process operational requirement
- ▶ Partial/total depressurizing for plant
- ▶ Relief of overpressure due to plant upsets/emergency
- ▶ Safe disposal of hydrocarbons as required

# Continuous Flaring not Desired

- ▶ **Environmental Impacts:**
  - ❑ Gas Emission to Atmosphere
  - ❑ Noise & Odor
  - ❑ Thermal Radiation
- ▶ **Negative Image Impacts:**
  - ❑ Visible Flame
  - ❑ Sometimes, Smokey Flames
- ▶ **Economic Impacts:**
  - ❑ Loss of Valuable HC
  - ❑ Energy Loss (Steam/Power)



# Saudi Aramco Flaring Minimization Program

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SA Master Gas System

SA Corporate Flaring Roadmap

SA Near Zero Flaring



# Saudi Aramco's Flaring Minimization Program

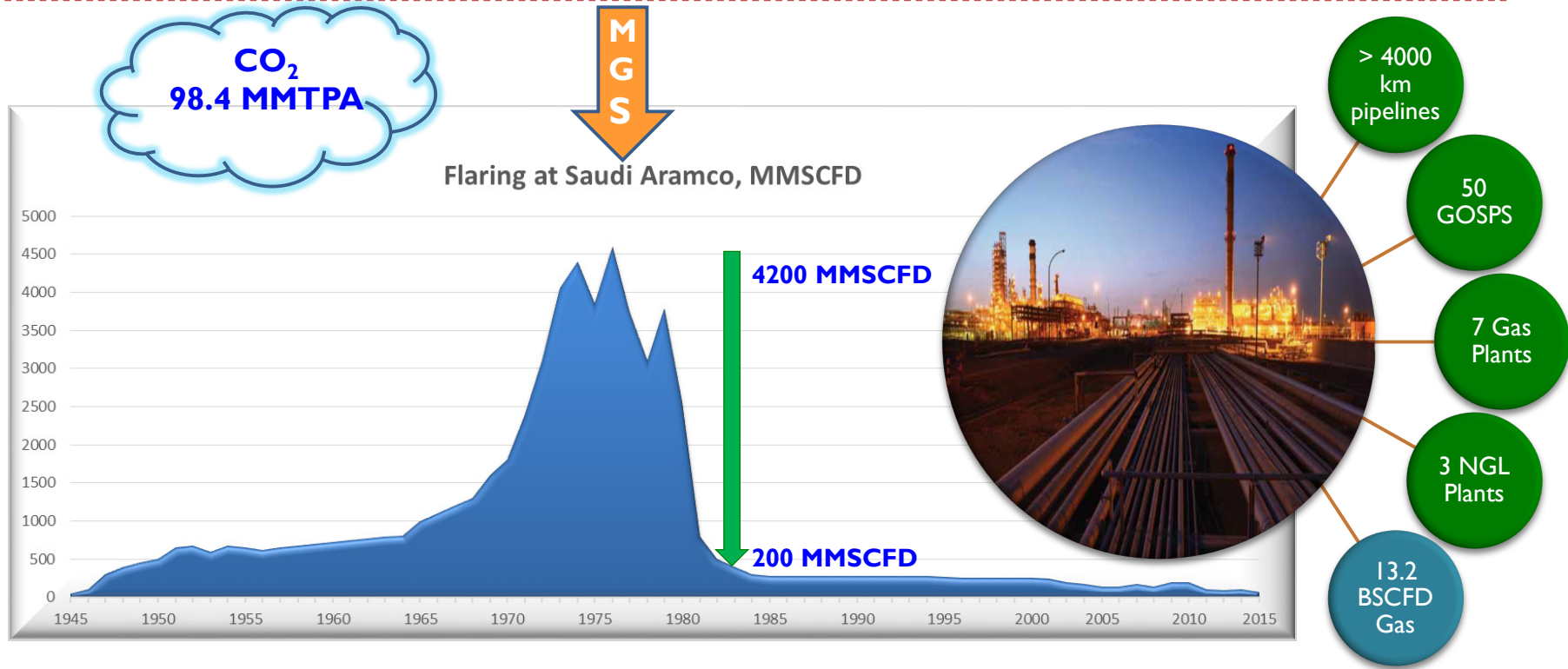
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SA Master  
Gas System





# Saudi Aramco Master Gas System





# Saudi Aramco Flaring Minimization Program

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SA Master  
Gas System

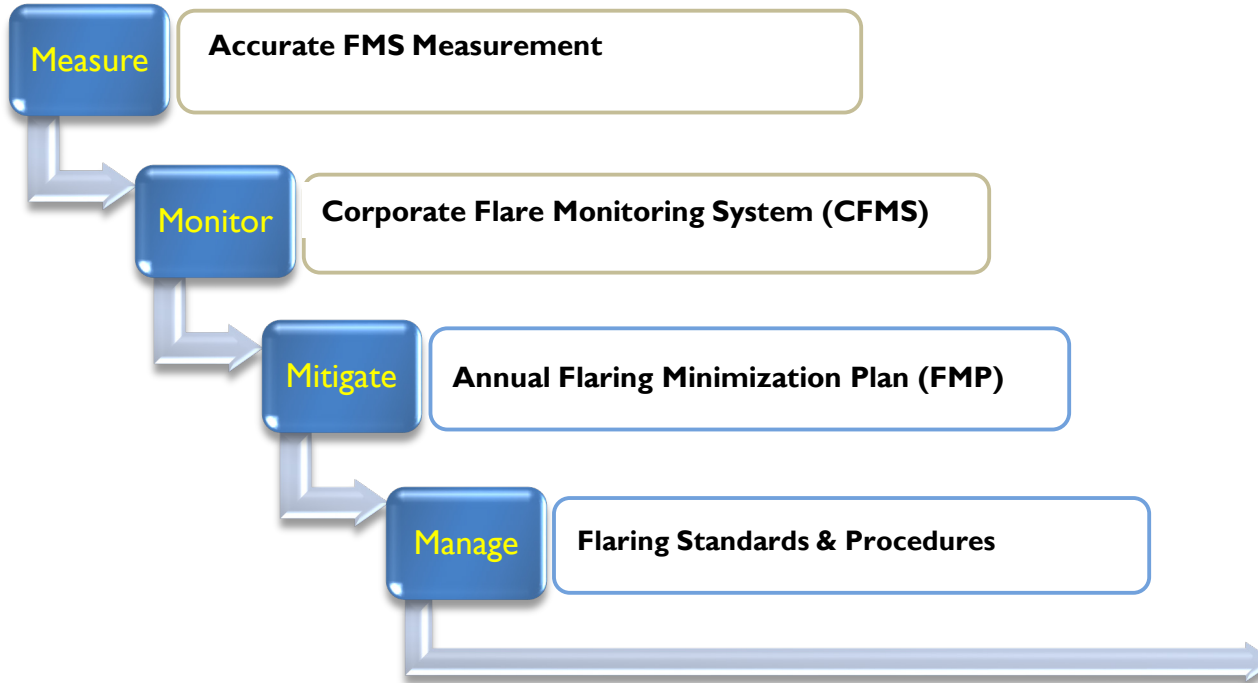
SA Corporate  
Flaring Roadmap



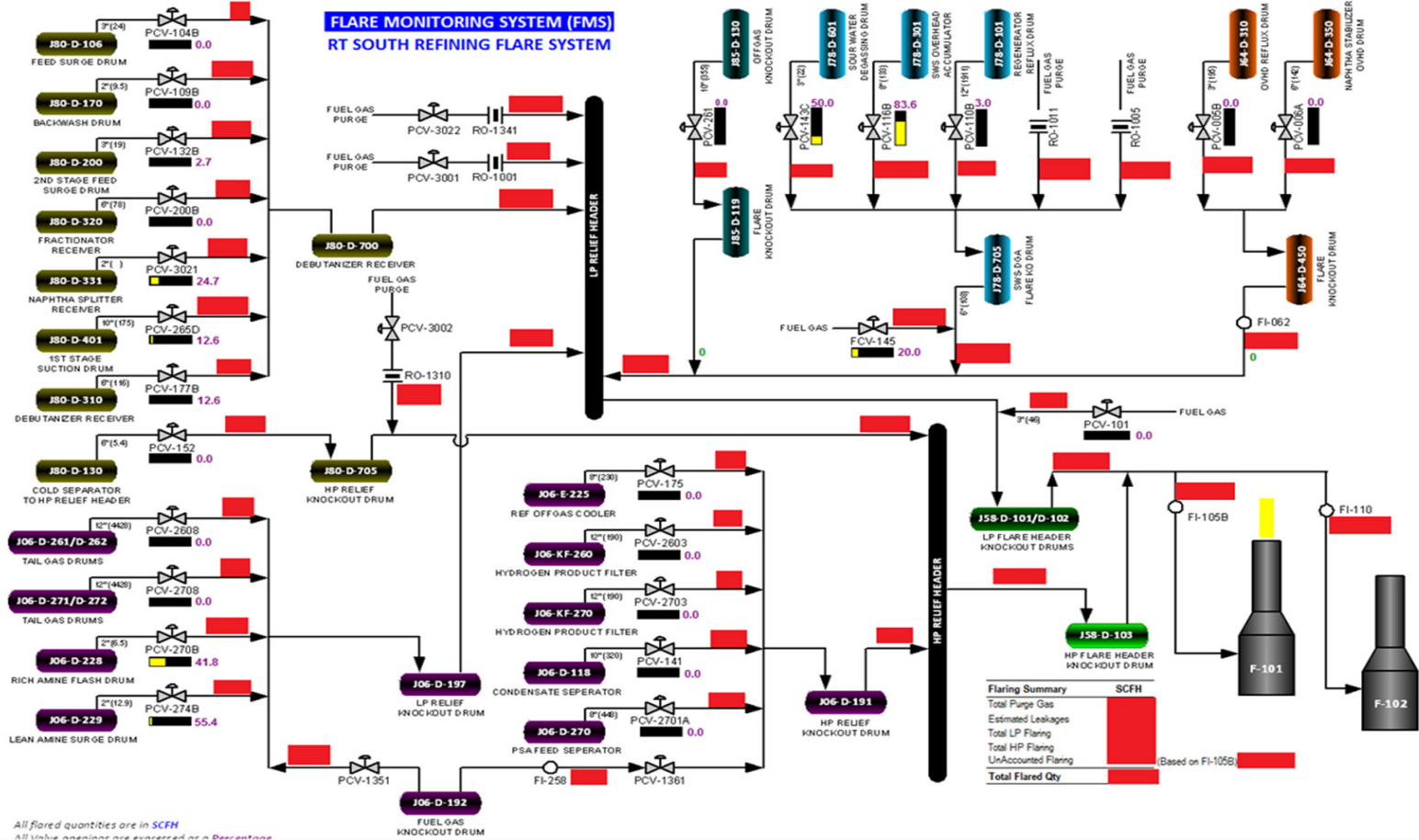
4000 MMSCFD

95%

# SA Corporate Flaring Minimization Program Components



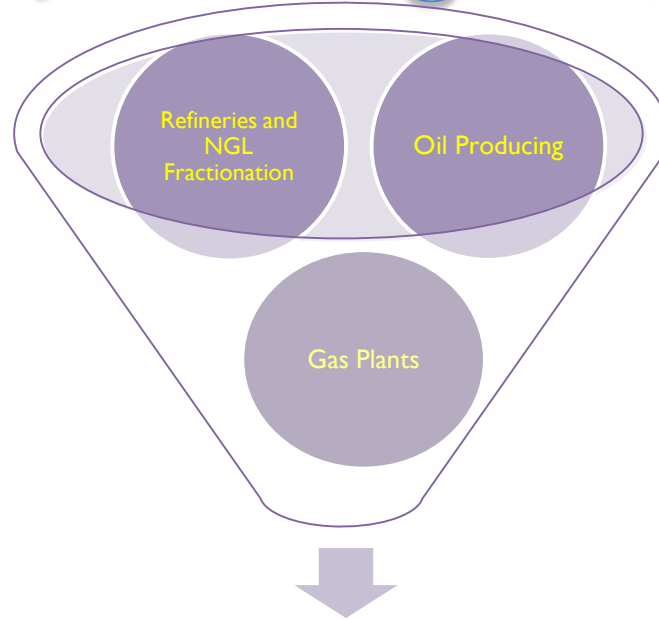
# SA Corporate Flaring Minimization-Measure



# SA Corporate Flaring Minimization- Monitor

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PI Flaring Data



**Corporate Flaring Monitoring System (CFMS) Database**

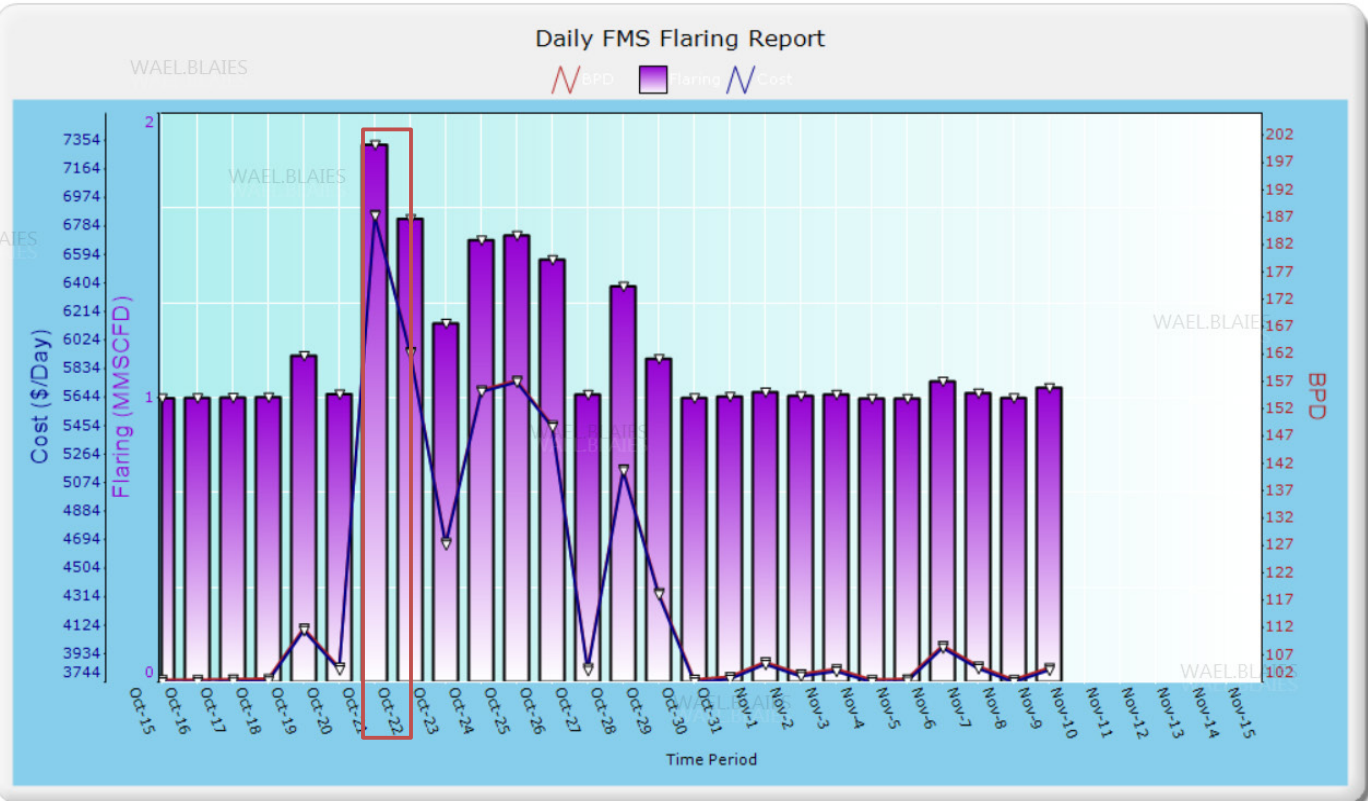
# CFMS: Daily Report

Daily FMS Flaring Report

Print

Date From: 10/15/2015 Date To: 11/15/2015

Day	MMSCFD	BTU/SCF	BPD	\$/Day
Oct-15	0.998	595	102.464	3744
Oct-16	0.999	595	102.477	3745
Oct-17	1	595	102.583	3748
Oct-18	1.002	594	102.658	3751
Oct-19	1.148	565	111.88	4088
Oct-20	1.013	599	104.73	3827
Oct-21	1.889	576	187.46	6850
Oct-22	1.629	578	162.43	5935
Oct-23	1.261	586	127.519	4660
Oct-24	1.554	580	155.406	5679
Oct-25	1.57	580	157.17	5743
Oct-26	1.485	582	148.984	5444
Oct-27	1.011	600	104.61	3822
Oct-28	1.391	588	140.982	5151
Oct-29	1.137	604	118.386	4326
Oct-30	0.999	595	102.494	3745
Oct-31	1.004	595	103.015	3764
Nov-1	1.02	601	105.707	3863
Nov-2	1.006	597	103.52	3783
Nov-3	1.011	599	104.429	3816
Nov-4	0.997	596	102.482	3745
Nov-5	0.997	597	102.613	3749
Nov-6	1.057	597	108.715	3972
Nov-7	1.016	599	104.946	3835
Nov-8	0.999	595	102.488	3745
Nov-9	0.999	595	102.488	3745
Nov-10	0.999	595	102.488	3745
Nov-11	0.999	595	102.488	3745
Nov-12	0.999	595	102.488	3745
Nov-13	0.999	595	102.488	3745
Nov-14	0.999	595	102.488	3745
Nov-15	0.999	595	102.488	3745



# SA Corporate Flare Minimization-Mitigate

Site specific annual Flaring Minimization Plan (FMP) approved by facility manager

- ▶ Detailed description of the flare system
- ▶ Details of source wise flaring amount and reasons
- ▶ Policies and procedures of the site
- ▶ Long-and short-term mitigation measures



# SA Corporate Flaring Minimization-**Manage**

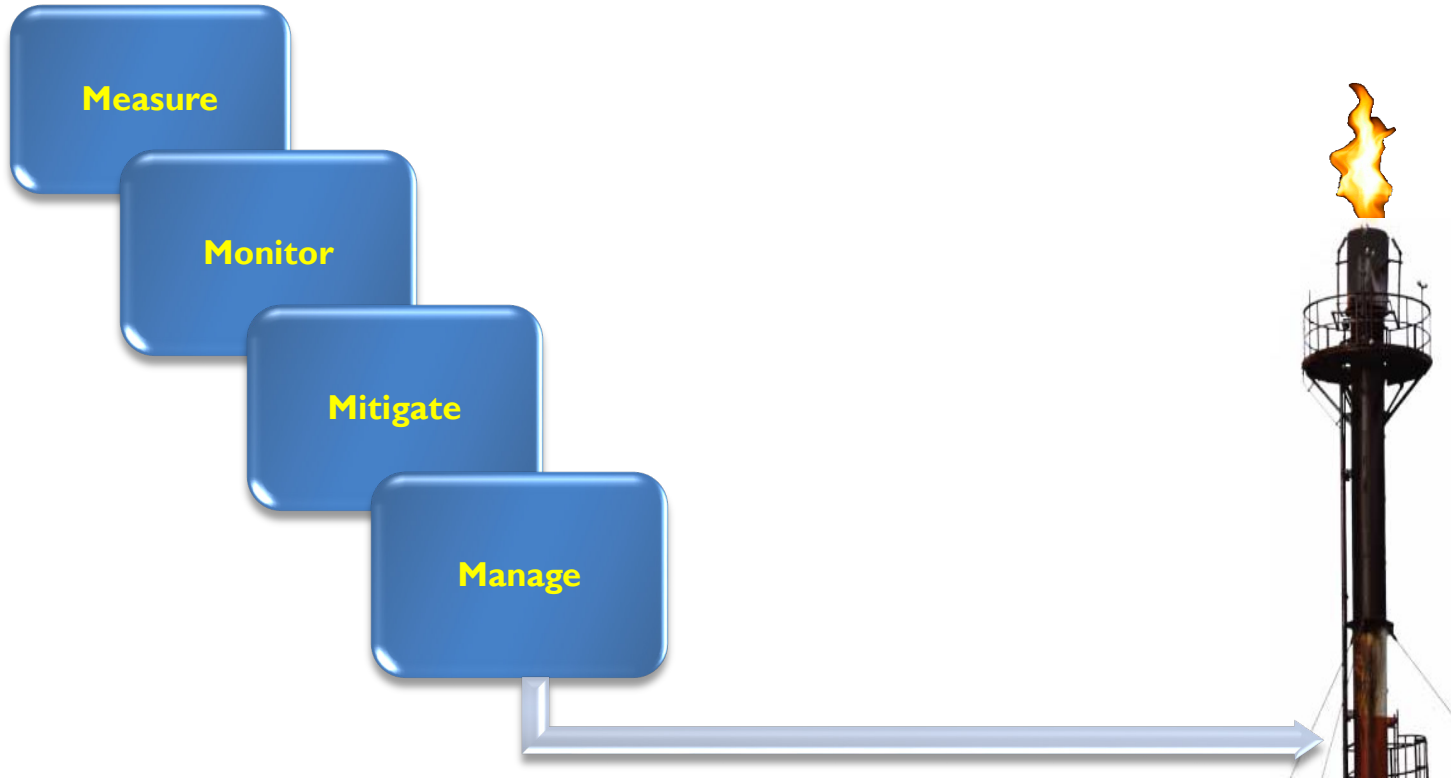
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- ▶ For accountability, consistency and continuous improvement, the **Flaring Minimization Program** is governed by procedures and standards:
  - ▶ SAEP-400: Guidelines for Facility Flaring Minimization Plan
  - ▶ SAEP-400A: Guidelines for Real-Time Flare Monitoring System Development
  - ▶ SAES-A-102: Ambient Air Quality and Source Emissions Standards
- ▶ KPI Established to Manage Flaring Loss



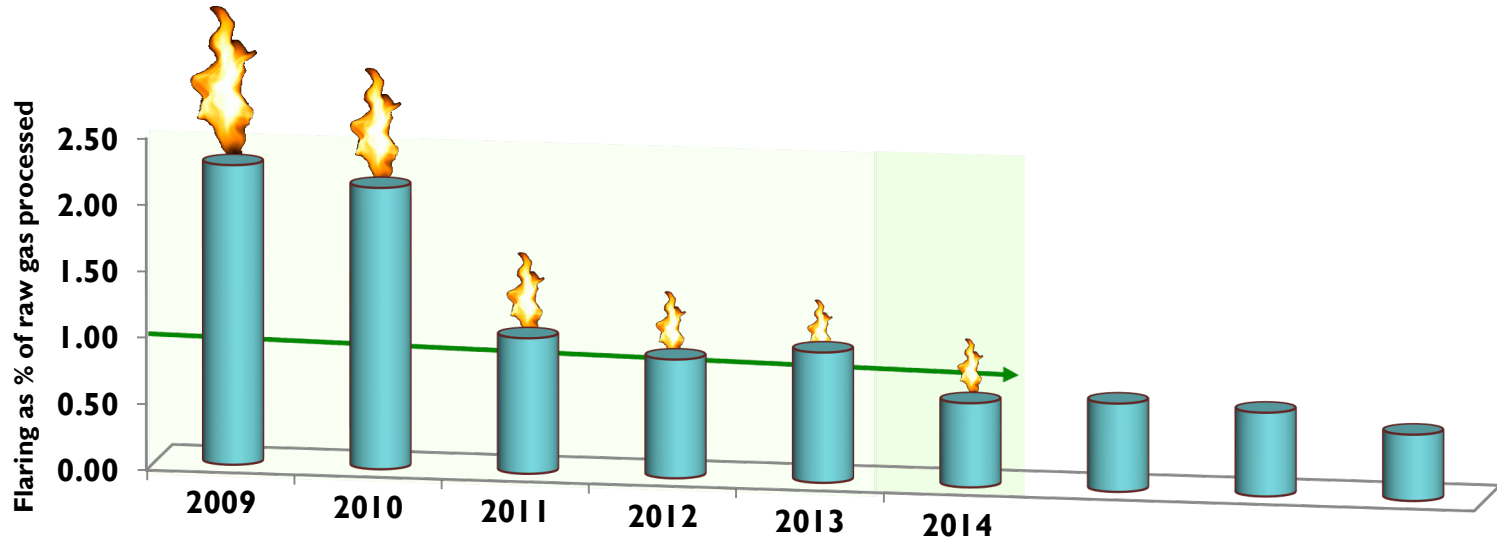
# Saudi Aramco Corporate Flaring Minimization Program Components

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# Saudi Aramco Corporate Flaring Roadmap

Target Met:  
50% Flaring Reduction



# Saudi Aramco Flaring Minimization Program

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SA Master  
Gas System

SA Corporate  
Flaring Roadmap

SA Near  
Zero Flaring



4000 MMSCFD

100 MMSCFD

95%

98%

# Near Zero Flaring Technologies

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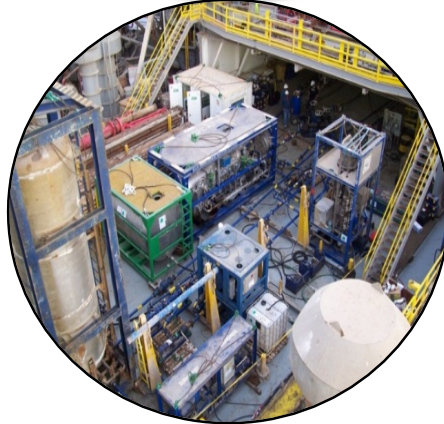
## Upstream

ZDT  
Onshore



Intermittent

ZDT  
Offshore



## Downstream

HIPPS



Emergency

FGRS



Purge

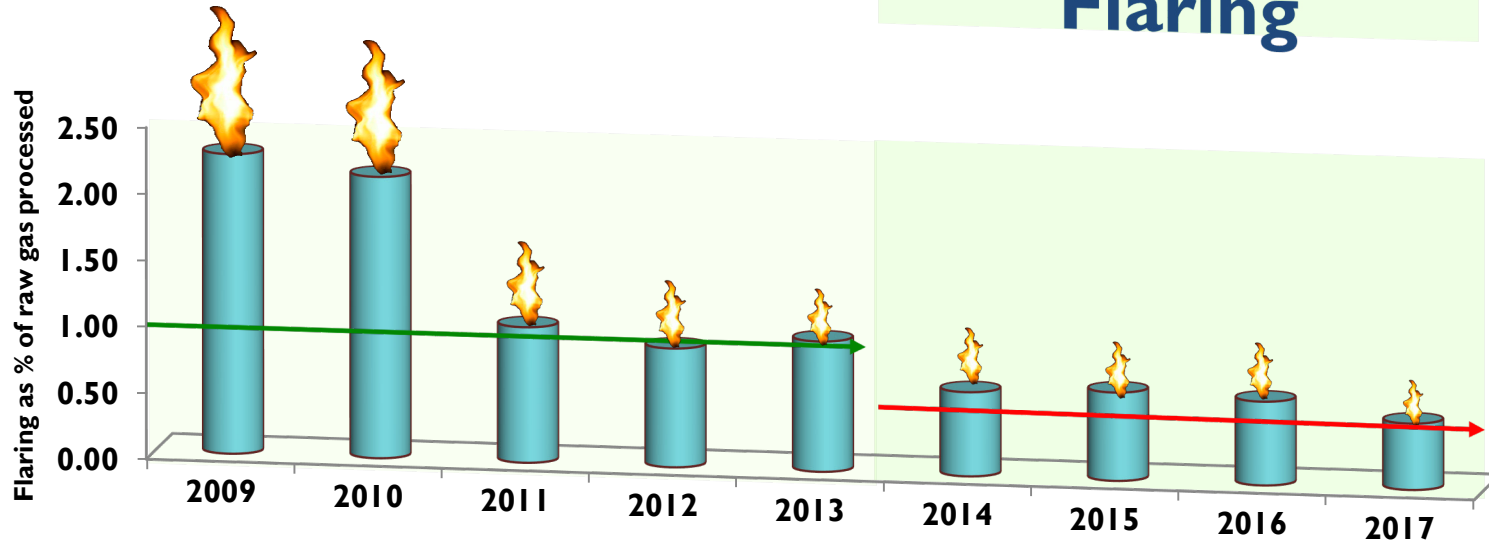
# Saudi Aramco Near Zero Flaring

Target Met:  
50% Flaring Reduction

Corporate Flaring  
Roadmap

Target Met:  
50% Flaring Reduction

Near Zero  
Flaring



# Saudi Aramco Flaring Minimization Program

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SA Master  
Gas System

SA Corporate  
Flaring Roadmap

SA Near  
Zero Flaring



4000 MMSCFD

100 MMSCFD

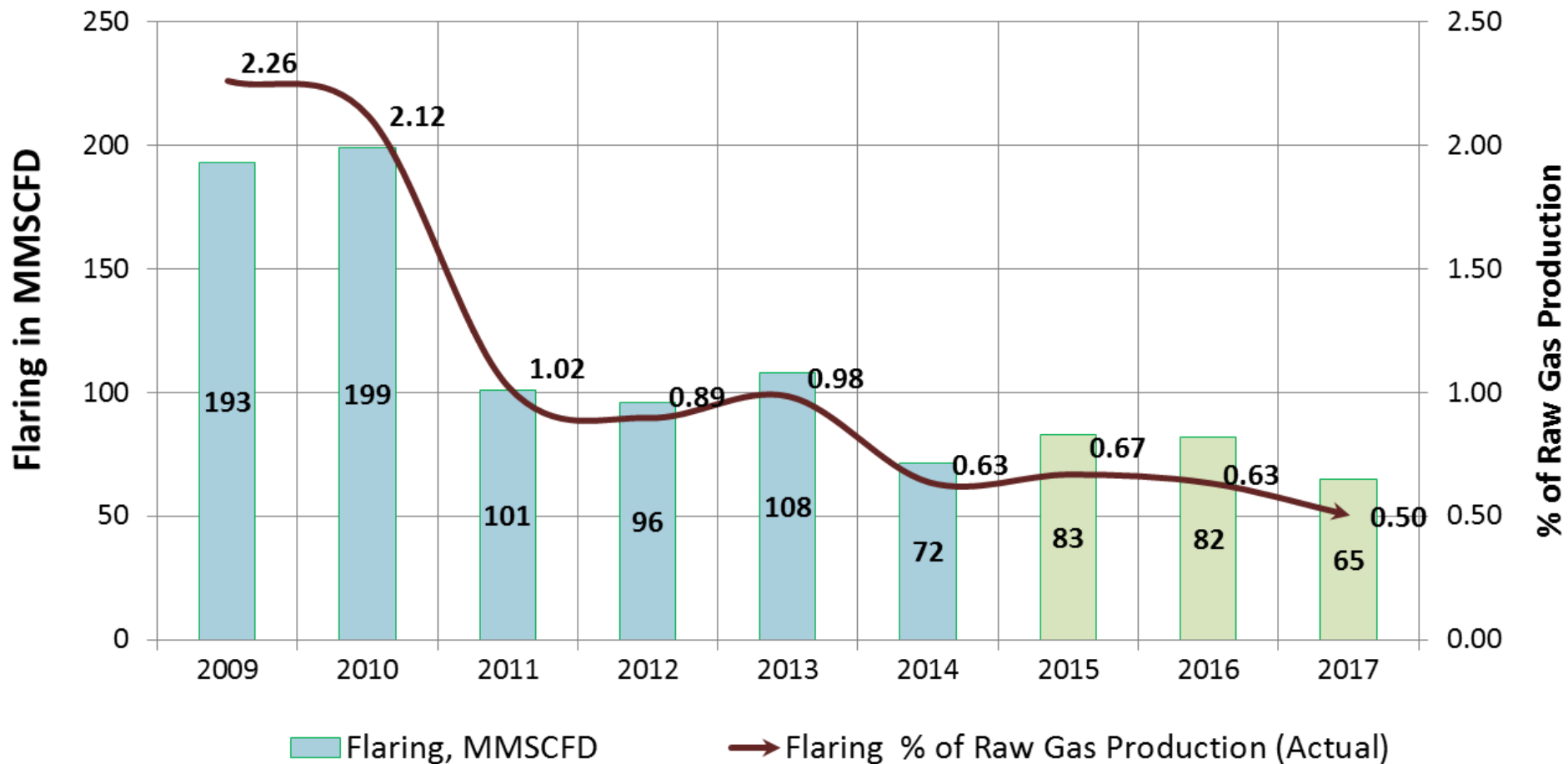
50 MMSCFD

95%

98%

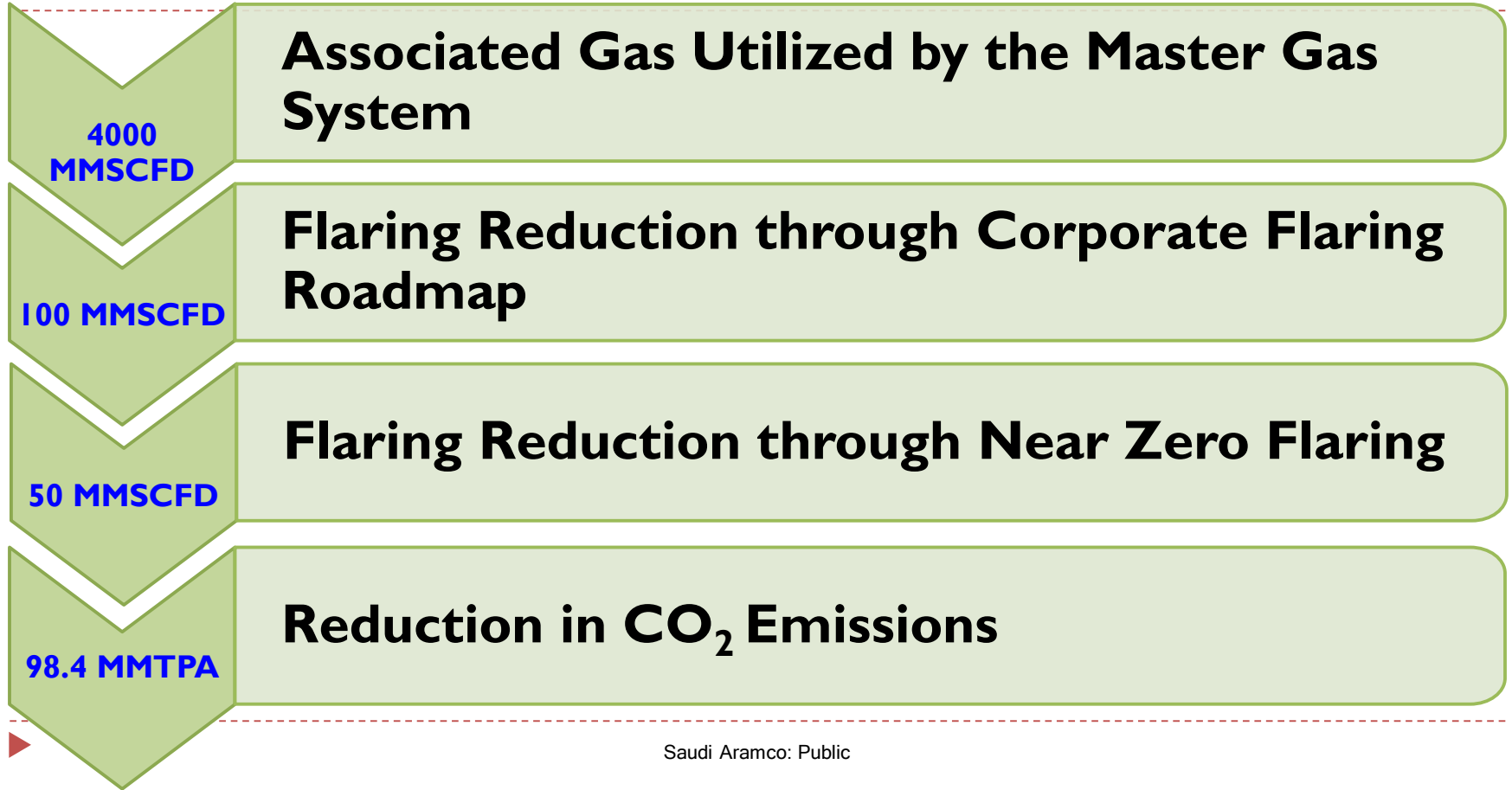
99.5%

# Total Saudi Aramco Flaring as % of Raw Gas Production



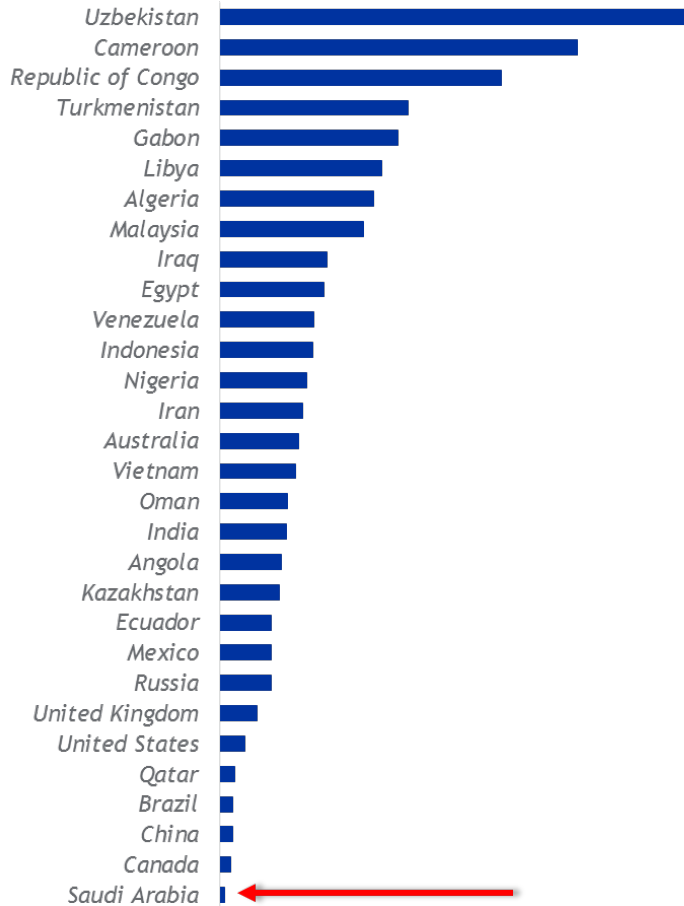


# Saudi Aramco Achievements



## 2015 Flaring Intensity

(m3 per barrel oil produced)

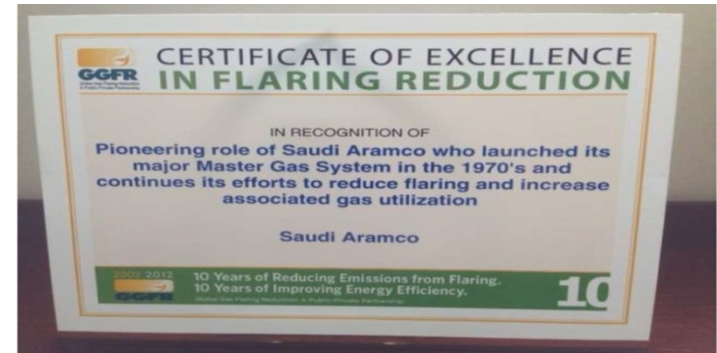


Source: World Bank

# Saudi Aramco Flaring Minimization Program

- *Master Gas System*
- *Corporate Flaring Monitoring System*
- *Near Zero Routine Flaring*

# Global Recognition For Saudi Aramco



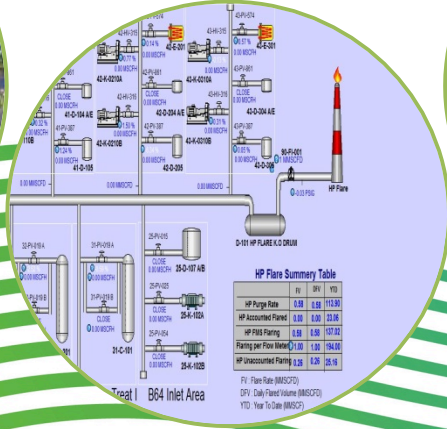
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**THANK YOU**

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# Saudi Aramco Flaring Minimization Program



# Questions?

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