Saudi Aramco
Flaring Minimization Program

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Saudi Aramco Flaring Minimization Program

Master Gas System

Corporate Flaring Roadmap

Near Zero Flaring

1970s

2000s

2010s
Saudi Aramco Flaring Minimization Program
Saudi Aramco Master Gas System

- Reduction of 4 Bscfd
- 80 MM tons CO₂ annually
- (2.8 Giga-tons since 1980)
Saudi Aramco Flaring Minimization Program

Master Gas

Corporate Flaring Roadmap

1970s

2000s

4000 MMSCFD

95%
Saudi Aramco Corporate Flaring Minimization

**Program Components**

- **Measure**
  - Real-Time FMS Measurement

- **Monitor**
  - Corporate Flare Monitoring System (CFMS)

- **Mitigate**
  - Annual Flaring Minimization Plan (FMP)

- **Manage**
  - Flaring Standards & Procedures
Saudi Aramco Corporate FMS - Monitor
Corporate FMS Hierarchy & Display
Saudi Aramco Corporate FMS - 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
For accountability, consistency and continuous improvement

FMP 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

• Corporate Flaring KPI is established to manage flaring loss
Corporate Flaring Minimization Roadmap

Target Met:
50% Flaring Reduction
Corporate-wide Implementation
Flaring Monitoring System Corporate Dashboard

Corporate Summary: Oct 1 - 26, 2018

- This Year: 26,756.23
- This Quarter: 2,143.62
- This Month: 2,143.62
- Yesterday: 166.16

Graphs and charts display data on flaring (MMSCF) and flaring trend (MMSCF) for different weeks and days.
Flaring Monitoring System Dashboard (By Department)
Saudi Aramco Flaring Minimization Program

Master Gas System

1970s
4000 MMSCFD 95%

Corporate Flaring Roadmap

2000s
100 MMSCFD 98%

Near Zero Flaring

2010s
Saudi Aramco Near Zero Flaring Technologies

- **Zero Discharge Technologies (Offshore)**
- **High Integrity Protection Systems (HIPS)**
- **Flare Gas Recovery Systems (FGRS)**

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**Saudi Aramco Near Zero Flaring Technologies**

**Zero Discharge Technologies (Offshore)**

**High Integrity Protection Systems (HIPS)**

**Flare Gas Recovery Systems (FGRS)**
SA Corporate Flaring & Near Zero Flaring

**Target Met:**
50% Flaring Reduction

**Target Met:**
50% Flaring Reduction

<table>
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<tr>
<th>Year</th>
<th>Flaring % of Raw Gas Production</th>
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<tr>
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<td>2016</td>
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<td>2017</td>
<td>0,50</td>
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Saudi Aramco Flaring Minimization Program

Master Gas System

Corporate Flaring Roadmap

Near Zero Flaring

1970s

2000s

2010s

4000 MMSCFD
95%

100 MMSCFD
98%

50 MMSCFD
99.5%
Saudi Aramco Flaring Minimization Performance

Total Saudi Aramco Flaring as % of Raw Gas Production

- Raw Gas Production (MMSCFD)
- Flaring % of Raw Gas Production

Years: 2009 to 2017

Data:
- 2009: 2.26
- 2010: 2.12
- 2011: 1.02
- 2012: 0.89
- 2013: 0.98
- 2014: 0.63
- 2015: 0.67
- 2016: 0.63
- 2017: 0.50

Flaring % of Raw Gas Production
Saudi Aramco Flaring Minimization Program

- Master Gas System
- CFMS
- Near ZRF
Saudi Aramco Achievements

- 4000 MMSCFD
  Associated Gas Utilized by the Master Gas System
- 100 MMSCFD
  Flaring Reduction: Corporate Flaring Roadmap
- 50 MMSCFD
  Flaring Reduction: Near Zero Flaring
- 98.5 MM T/Y
  Reduction in CO₂ Emissions
- Patented FMS
  FMS Patented for Saudi Aramco
- Global FMS
  FMS Globally Available for Implementation
WB Global Recognition For Saudi Aramco