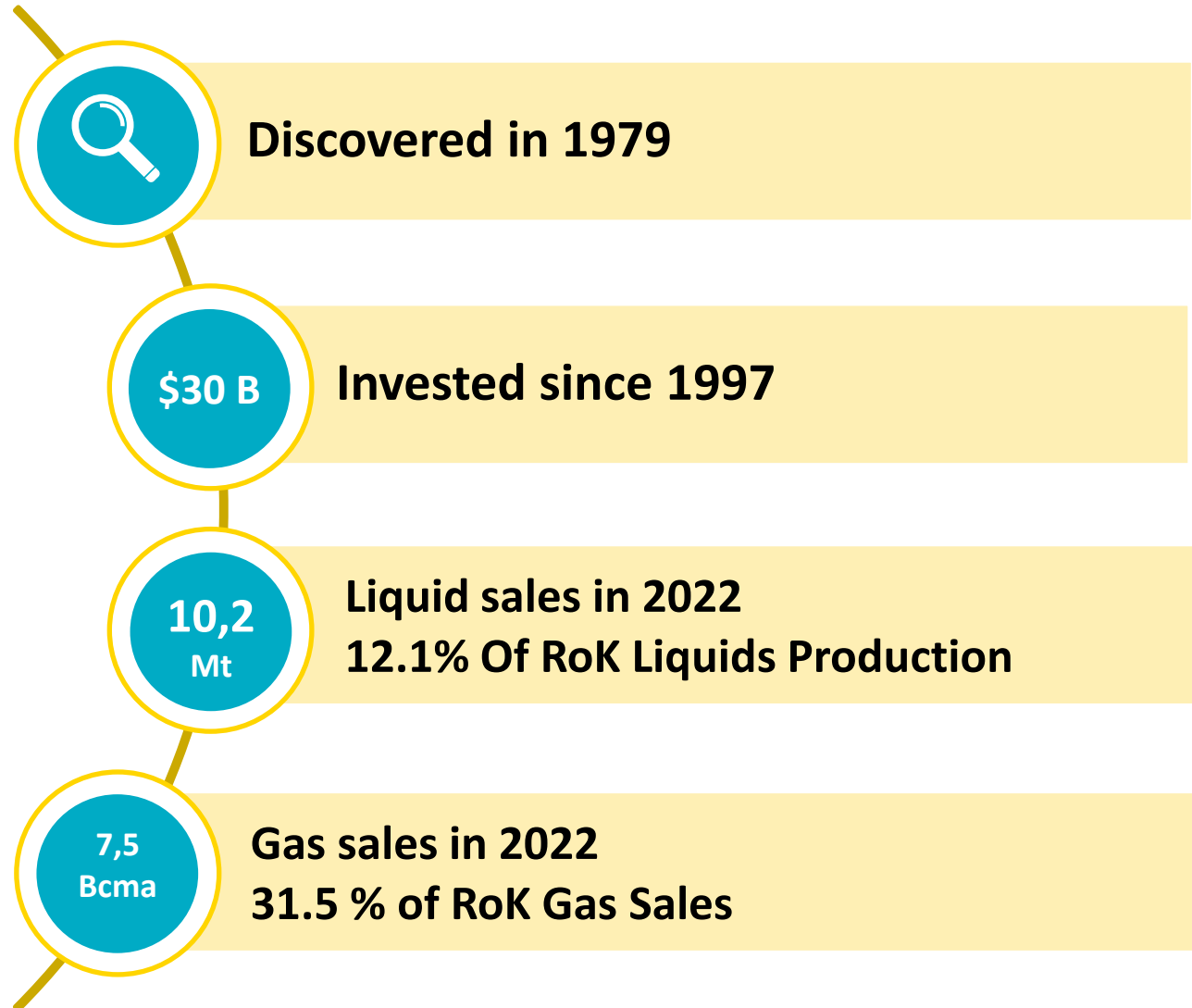




Karachaganak's Experience in Methane Measurement & Monitoring

Final Production Sharing Agreement (FPSA) 18 November 1997



Fugitive emissions monitoring campaign at KPO

ENI

KPO

Fugitive emissions monitoring at Unit 2 and Unit 3

Fugitive emissions monitoring at KPC in test mode

Development and approval of own standard

2016

2018

2020



2015

Fugitive emissions monitoring at KPC with use of gas analysers



2017

- Purchase of equipment
- Training of personnel
- Development of regulating Procedures



2019

Fugitive emissions monitoring campaign at Unit 2 and Unit-3 at test mode



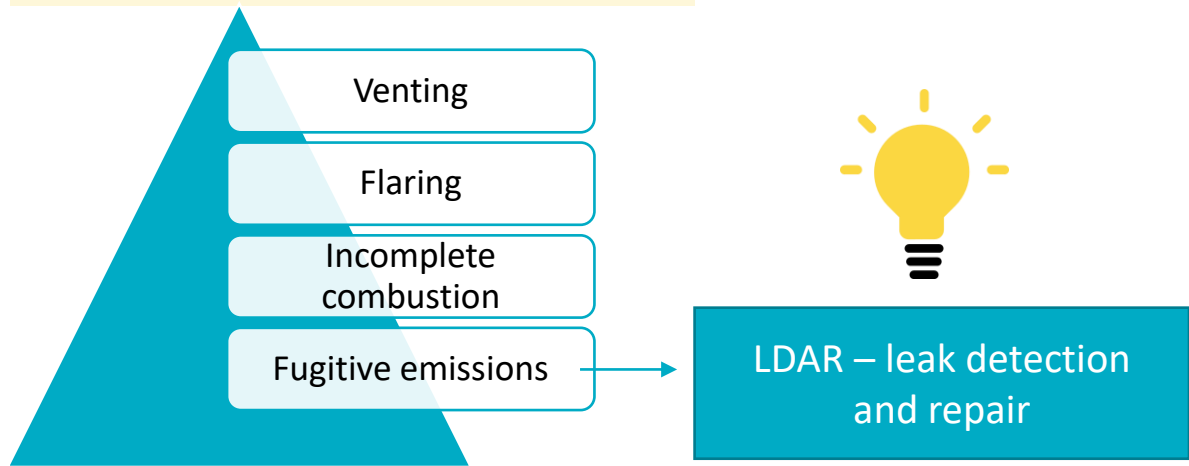
2021+

Regular fugitive emissions monitoring at KPC, Unit 2 and Unit-3

Leak Detection and Repair (LDAR)

Oil & gas upstream facilities might emit quantities of methane and other volatile organic compounds (“VOC”) from leaking components such as valves, connectors, pumps, sampling connections, compressors, pressure-relief devices and open-ended lines.

Sources of CH₄ emissions from the oil and gas industry



Main goals of LDAR Programme:

- Elimination of safety risk by timely maintenance of equipment
- Elimination of production losses



LDAR is a work practice designed to identify leaking equipment



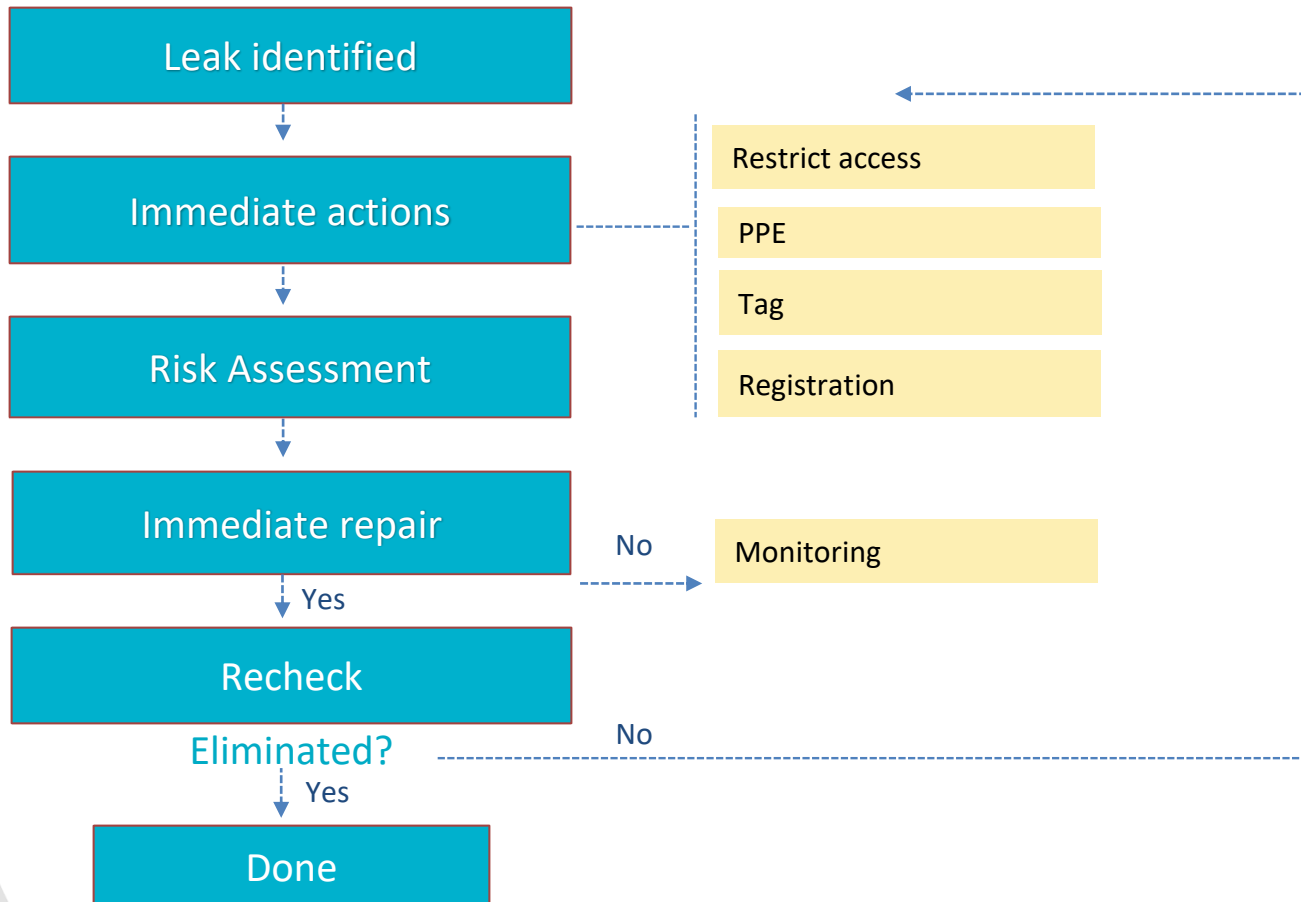
Repairing or replacement within a specified time frame

Leak management at KPO

Management of weeps/seeps and leaks KPO-AL-HSE-PRO-00116-E

Regular inspections at each Unit

Fugitive emissions monitoring process

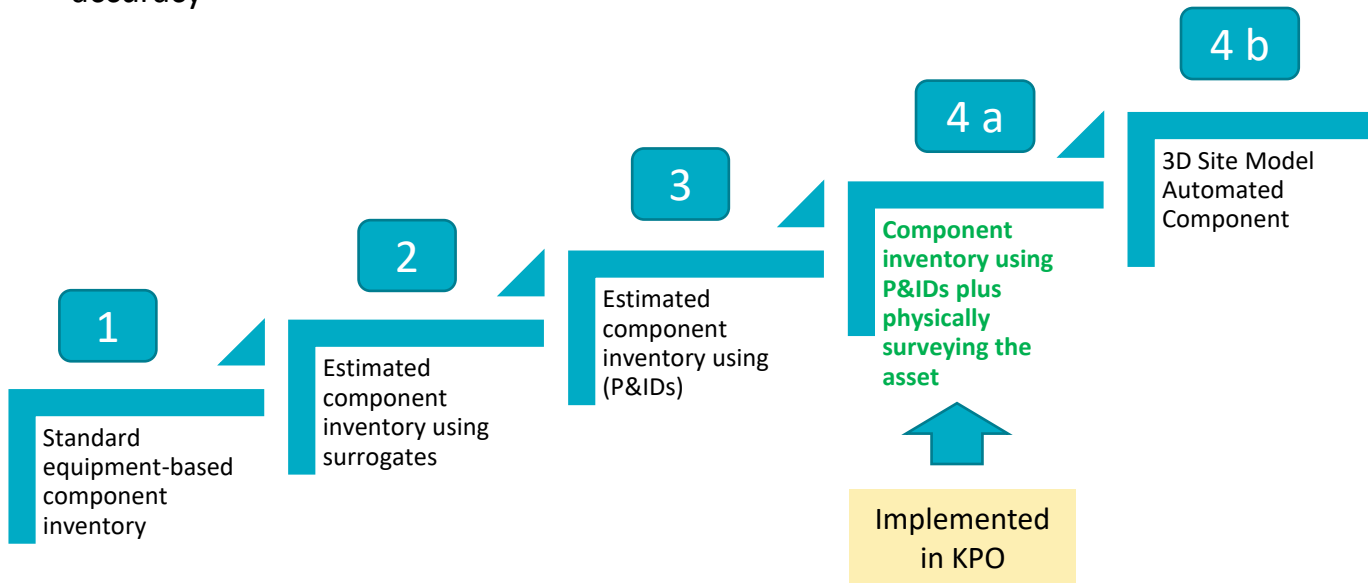


Fugitive Emissions Monitoring – part of LDAR process in KPO

LDAR best practice examples used in KPO

Building of data base

- ✓ Worldwide component inventory building approaches from lowest to highest accuracy



Measurements

- ✓ The use of OGI cameras for leak detection is fast and effective method
- ✓ Can be used to detect difficult and unsafe to monitor equipment
- ✓ Does not require direct contact with the component

Continuous improvement

- ✓ From 2023 - EyeCGas 2.0 Optical Gas Imaging hand-held Camera and EyeCSite® Software for gas leak detection and quantification
- ✓ Expansion of fugitive emissions monitoring scope in number of sources to be measured
- ✓ Potential digital solutions for LDAR process.

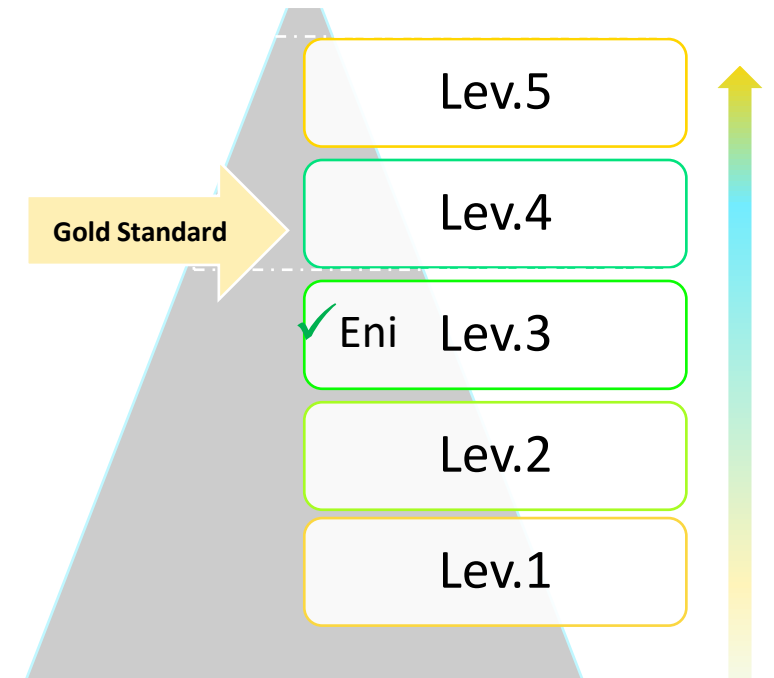
OGMP (Oil & Gas Methane Partnership) 2.0

- OGMP 2.0 is measurement-based **reporting framework** aimed at improving accuracy and transparency of methane emissions for O&G industry
- Both **Eni** and **Shell** have adhered to the OGMP 2.0, a multi-stakeholders initiative launched by UNEP and the Climate and Clean Air Coalition, aimed at improving the accuracy and transparency on methane emissions reporting for O&G industry.
- In particular, Eni has set the goal to achieve the "**Gold Standard**" (**Level 4**) in 2024 based on 2023 performance on methane emissions **for KPO**.
- To meet this target, KPO with support of Eni has conducted a Methane quantification campaigns in KPO (KPC, Unit 3 and Unit 2) during the **2-11 August 2023**.



OGMP 2.0 reporting levels

Progression: increase in accuracy and granularity



**TARGET GOLD STANDARD
2024 (data YE 23)
OPERATED ASSETS**

Methane Measurement Campaign

Flare Team measurement

Scope of work

- High-Pressure Flare at Unit 3
- Flare at KPC
- Medium Pressure Flare at Unit 3
- Reinjection gas Flare at Unit 2

Results

Preliminary results based on observation: **Combustion efficiency of Flares shows in average 96-97%.**

Final confirmed & calculated data will be provided in Official Report



Fugitive Team measurement

Goal

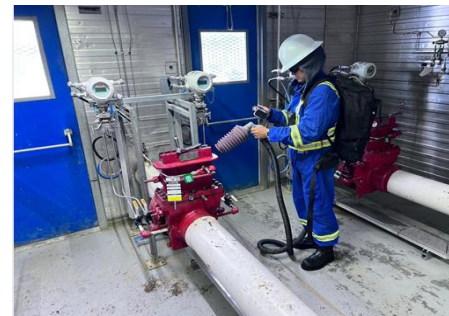
Capture representative fraction of fugitive sources throughout facilities, including different types of components (valves, fittings, connections, etc.) and service lines (gas/water/oil)

Scope of work

- Site Assessment Records
- Line Walk-Down
- Optical Gas Imaging (OGI) Leak Detection
- Measurement & Leak Records
- Measurement of **> 11 thous. sources**

Results

Scope of Work covered, no leaks detected.



Thank You!

