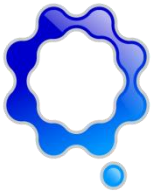
Qenos

FLARE ANNUAL REPORT

March 2022



Flare Annual Report 2022

- Qenos Flare Overview
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  - Methodology of Review
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- Five Year Trends
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Qenos Flare Description - Olefins

- Two staged elevated flares. Note: Plastics flares no longer in service

Source of flaring

- Flares continue to be in operation at Olefins

- There are many and varied reasons for needing to use the flare
  - Safe preparation of equipment prior to maintenance and returning to service (displacement of hydrocarbon or air with nitrogen)
  - Product quality problem
  - Plant operational upset and/or equipment trip
  - Loss of external utility supply (eg power)

- Steam is added to the flare to aspirate (draw in air) in order to avoid smoke
  - Excess addition of steam results in higher noise

Methodology

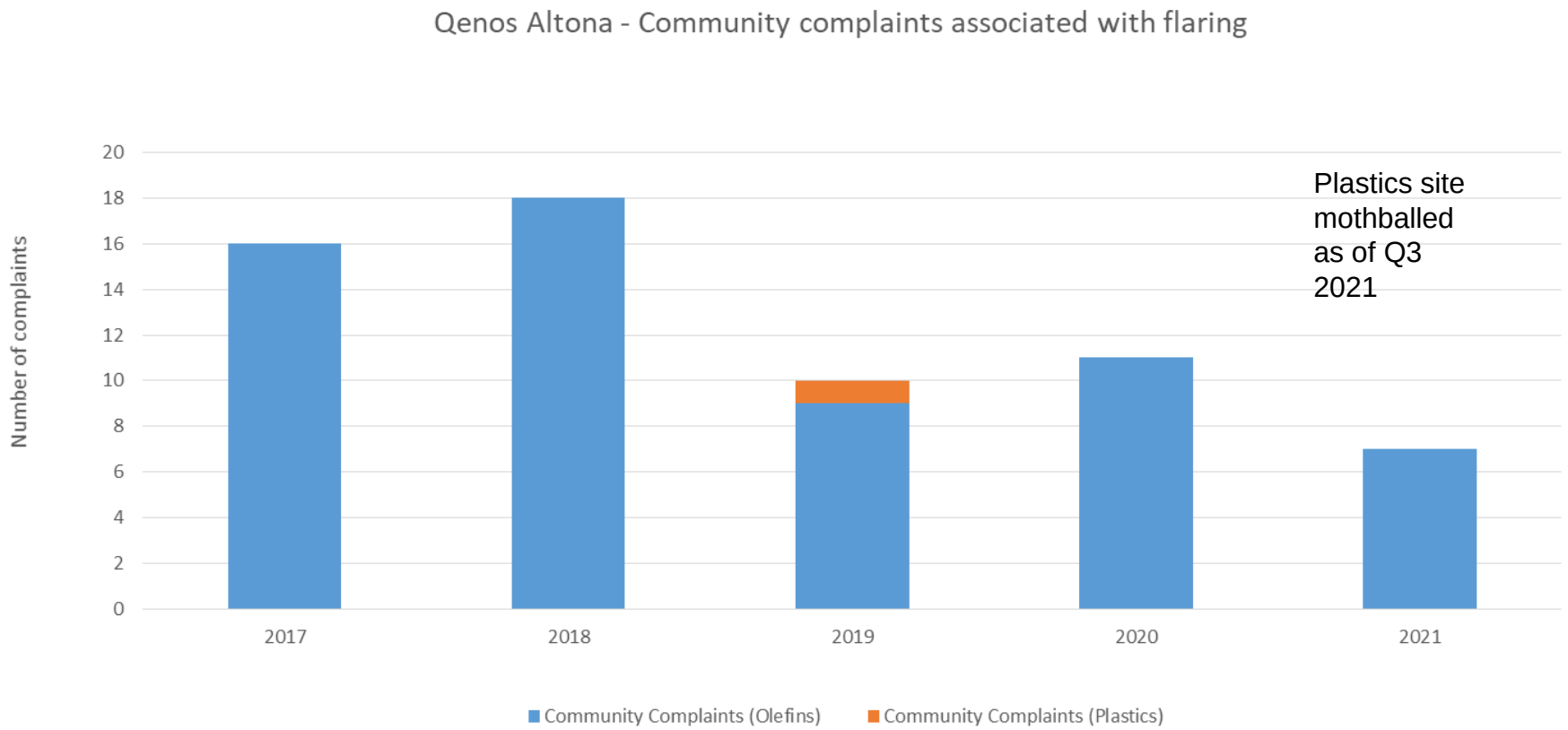
- A review of data between 2009 and 14 August 2020 that was used for the Flare EMP has been updated to include data from 15 August 2020 to 31st December 2021.
- Five year data trends from this review are in the body of the report
- Updated longer term trends/data are provided in the back-up material
- The review considered flaring that resulted in
  - Community Complaints
  - Flaring > 5t/h (Olefins) & Flaring > 1t/h (Olefins)
    - 5 t/h was selected as the threshold as flaring under that level is unlikely to result in unreasonable noise levels in the community
- Flaring events were categorised by
  - Planned (known) or Unplanned (including recovery of unplanned events)
  - Cause
  - Equipment

Summary - Annual Flaring Review

- In Aug –Dec 2020 the key contribution to flaring was
  - SC-2 planned shutdown and delayed restart
- In 2021 the key contributions to flaring were:
  - Plant trip in January
  - SC-2 planned shutdown in September
  - SC-1 mothball shutdown in October

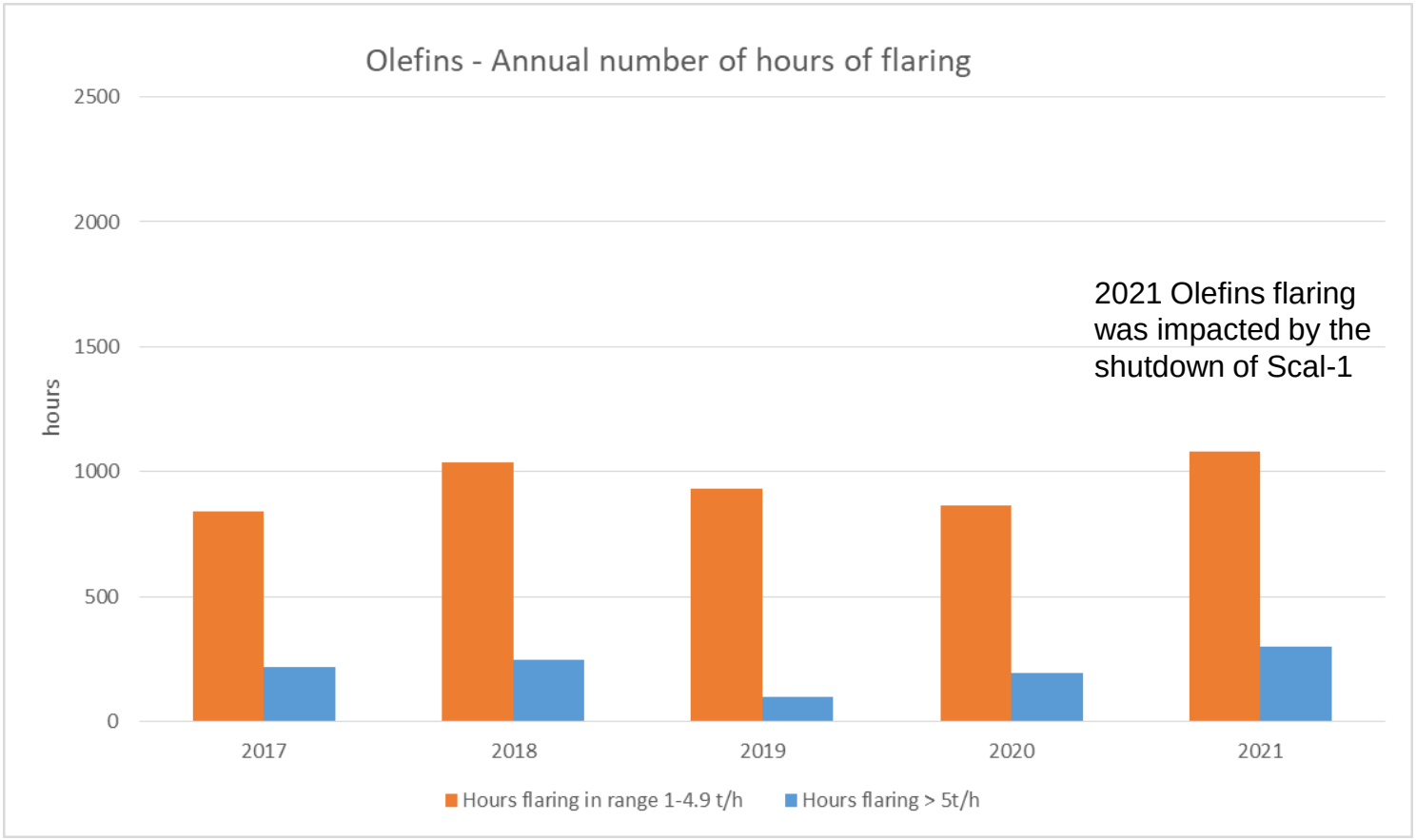
- The decision to mothball Scal-1 and Plastics had the following impacts:
  - Increase in flaring during 2021 with activities associated with shutdown and hydrocarbon freeing of both plants
  - Removal of a number of equipment items that have historically contributed to flaring events
- All required Flare EMP action items completed on schedule.

Community complaints for flaring were all at Olefins in 2020 and 2021and lower than 2017/18 peak complaint levels



Qenos | Ingenious Transformations

The higher flaring in 2021 did not result in 2017/2018 levels of complaints. Control circuit improvements to minimize noise is a key contributor to this outcome



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In the period 14th August 2020 to 31st December 2021, there were 13 community complaints associated with flaring.

Date	# complaints	Event	Cause	Follow-up
12/11/20	1	Tower start-up	Planned Shutdown	Tower now mothballed
7/12/20	3	Plant Startup	Extended start-up due to moisture ingress	Procedures updated to prevent ingress
9/12/20	1	Plant Startup	As above	As above
22/12/20	1	Plant start-up	Restart due to dry out following moisture ingress	As above
29/1/21	1	Feed supply interruption	Telemetry Issue	Supplier procedures updated
23/9/21	2	Compressor Trip	Loss of vacuum and water seal	Compressor now mothballed, Flare steaming rate controller enhanced – “boost feature”
28/9/21	1	Restart following trip on 23/9	As above	As above
3/10/21	1	Shutdown of Scal-1	Plant shutdown prep	Nil – mothballing complete
15/10/21	2	Scal-2 offspec	Methanol injection procedure	Procedure updated

Flare improvement activities

- For many years, Qenos has had a strong program of reporting, investigation and implementing improvements for events that have resulted in flaring
- In April 2020, Qenos submitted a list of improvements implemented since 2009 which has resulted in improved flaring performance
- A technology and potential improvements review was completed utilising Qenos historical data and worldwide technology best practices
- The proposed flaring improvements aimed to:
  - Reduce the incidences of events that lead to flaring
  - Reduce the impact of flaring on the community, by minimizing steam addition or reducing flaring rate
- A number of these improvements have now been implemented and a number are no longer required with Scal-1 and Plastics mothballed

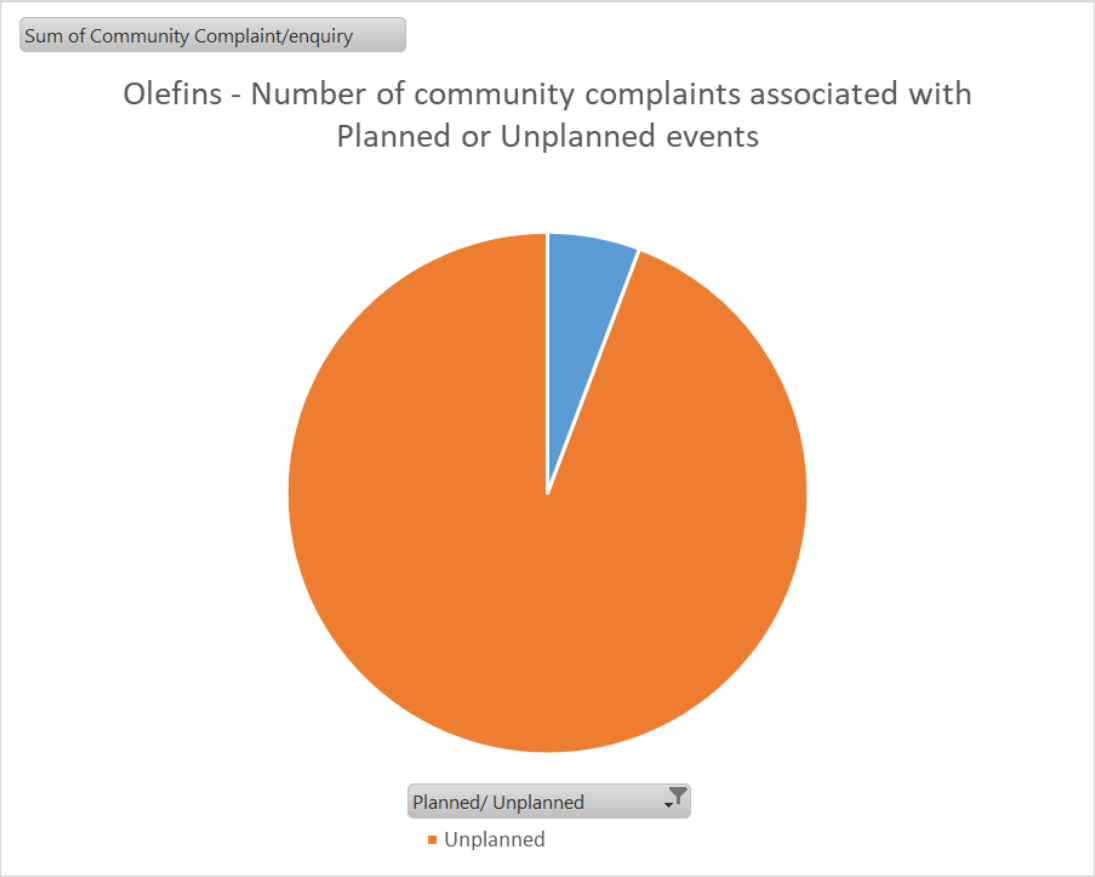
The following flaring improvement activities have been completed, in progress or are no longer required (strikethrough)

- Implement flare steam control improvements in order to optimise steam addition (reduce noise) at both Olefins ~~and Plastics~~. Continue to tune as required
- ~~Ground flare controls modified to soften initial light up~~
- Investigate installation of an infrared camera for the Olefins Overcapacity Flare
- Discuss this report with Olefins/Plastics personnel to highlight opportunities for improvement (to further educate plant personnel on flare impacts and causes)
- ~~Review DMDS pump operation (reduce number of offspec events)~~
- ~~Review SCAL1 furnace feed in/out (reduce number of offspec events)~~
- Review SCAL2 furnace feed in/out (reduce number of offspec events) – 2022 planned activity
- ~~Implement and optimise 2 x acetylene converter controllers (reduce number of offspec events)~~
- ~~Cold eyes review of C353 trips and implement actions (reduce number of trips)~~
- Continue to investigate incidents and implement action items for individual flaring events
- Review flare performance annually and adjust recommendations/confirm actions for following 12 months – This report!

Questions?

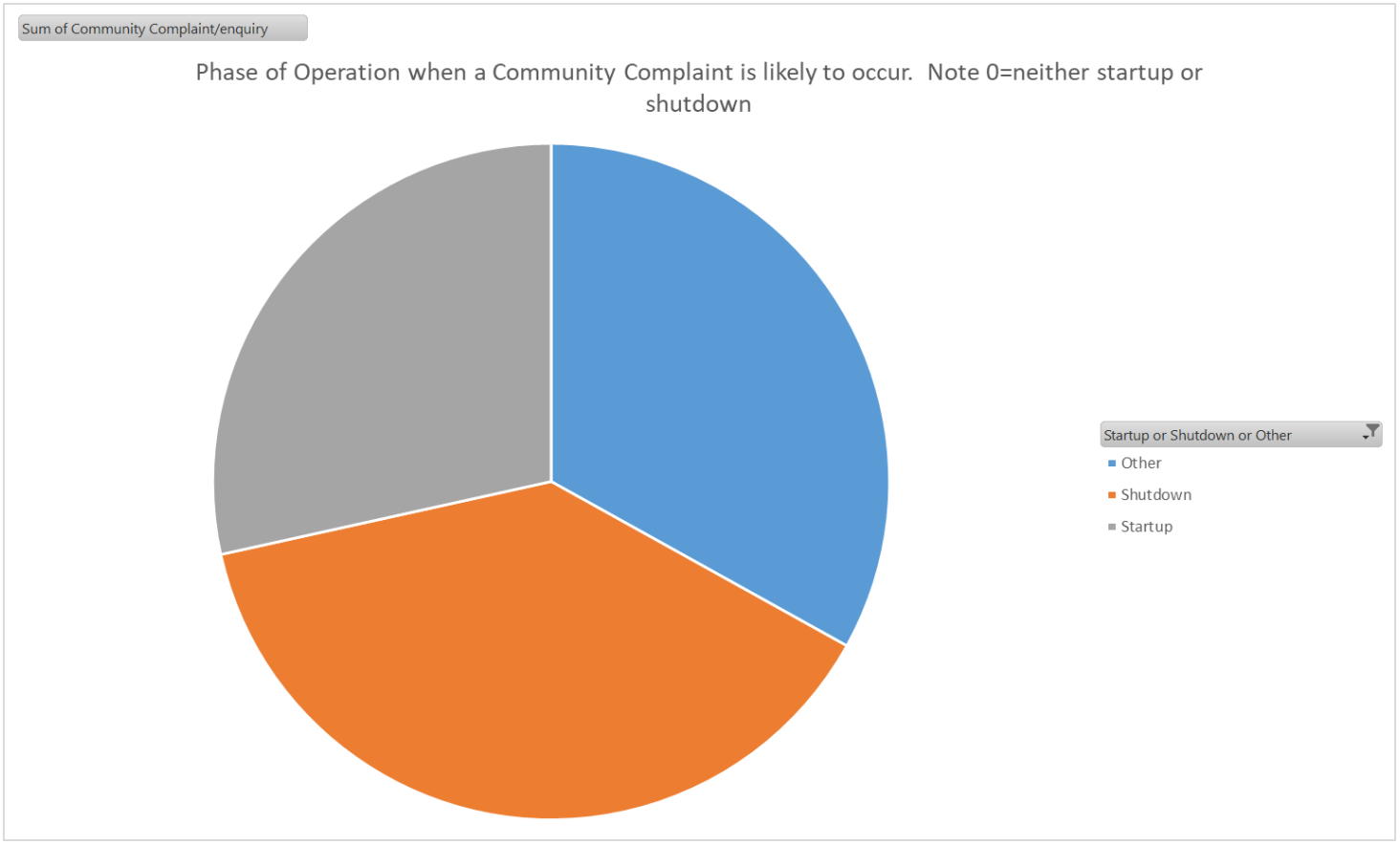
BACK-UP

Historically community complaints are linked to unplanned events – in 2021/2022 the planned shutdown of Scal-2 and Scal-1 mothballing also contributed



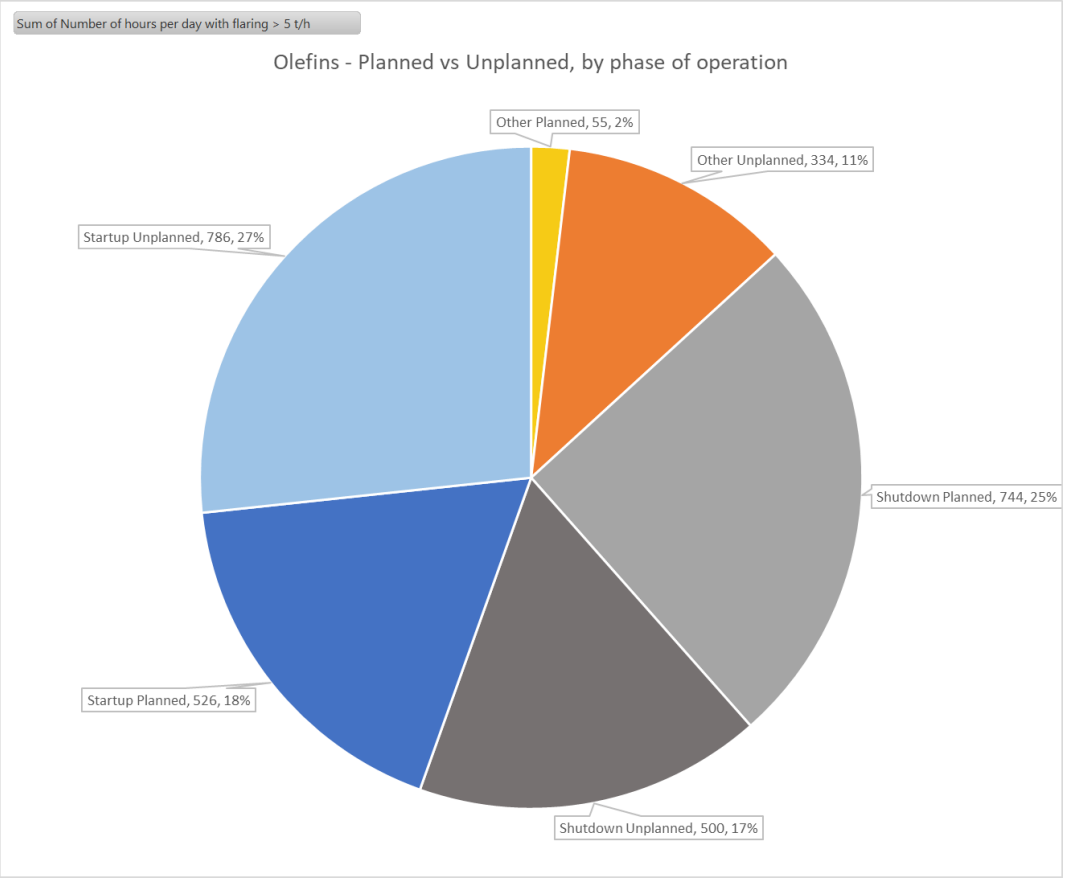
Of the 13 complaints from Aug 15th 2020 - Dec 31st 2021:
5 were associated with planned events.
The remaining 8 were associated with unplanned events

The phase of operation where community complaints occur are equally spread between shutdowns/startups and other (i.e offspec events)



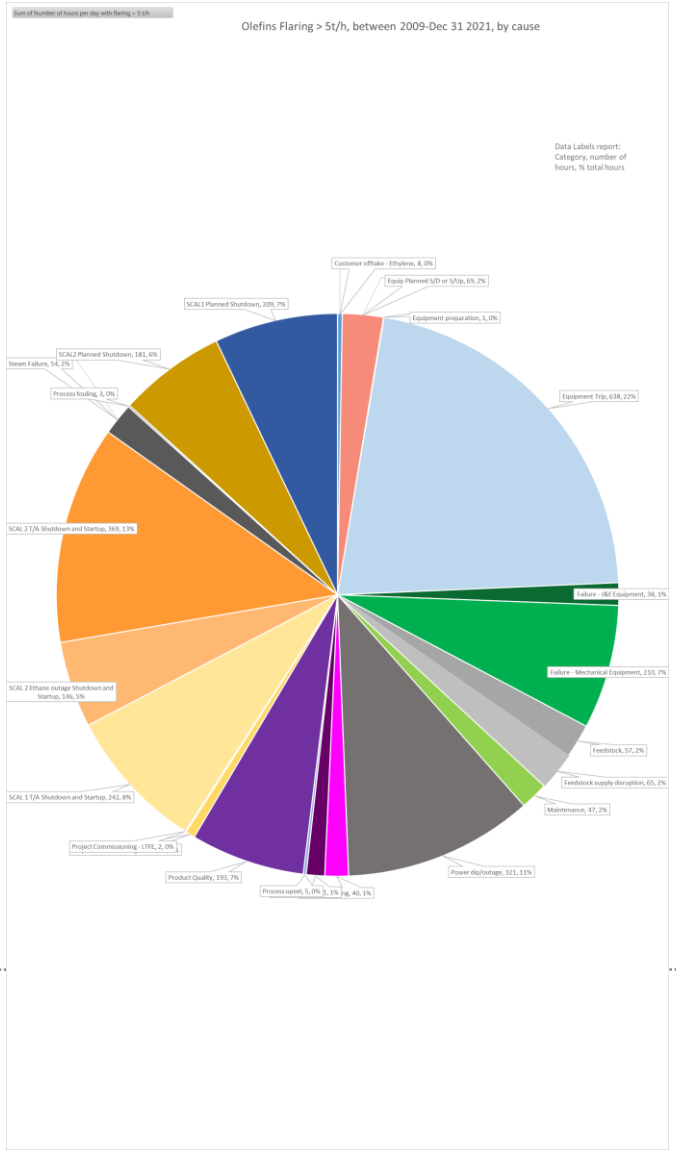
12 of the 13 complaints in the period were associated with plant shutdown or startup

In reviewing flaring occurrences of >5t/h, planned flaring is approximately 40%, and the majority of flaring (planned or unplanned) is linked to part or whole plant shutdowns or startups



A breakdown of causes of flaring >5t/h indicates the top 4 causes are planned maintenance (eg T/A), equipment trips, mechanical equipment failure and power outages between 2009 and 2021

No significant movement in this data since Aug 2019



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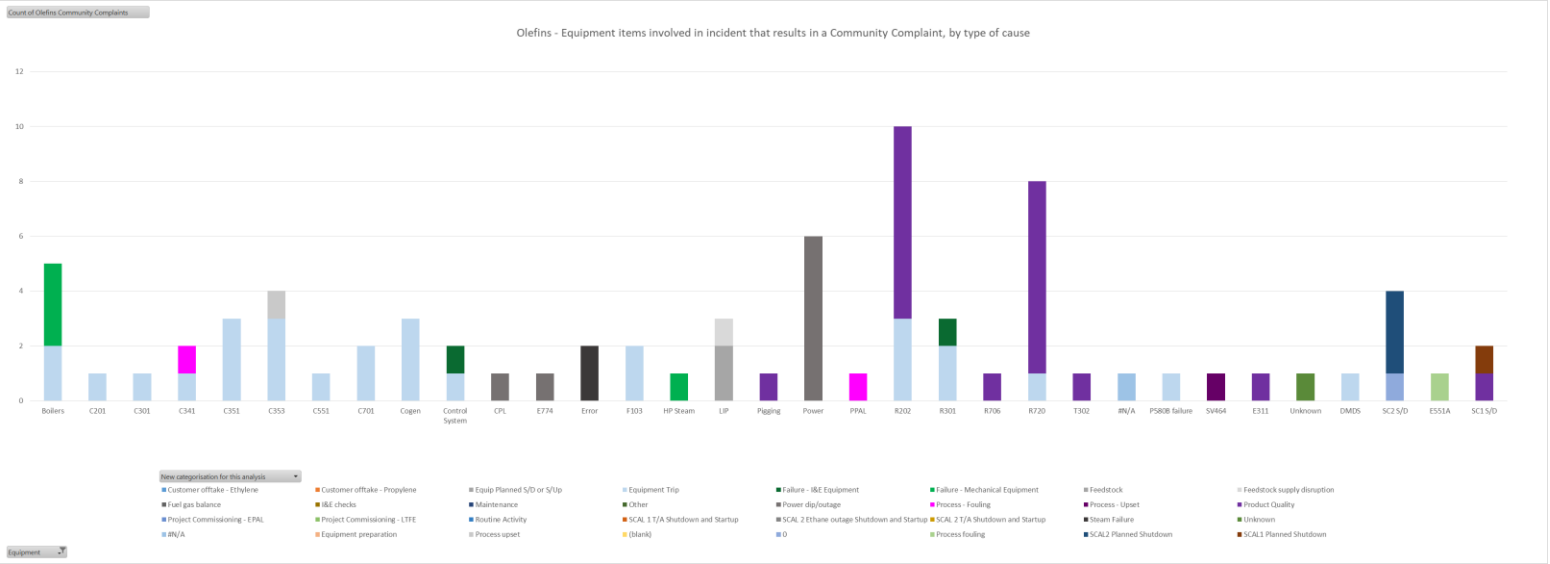
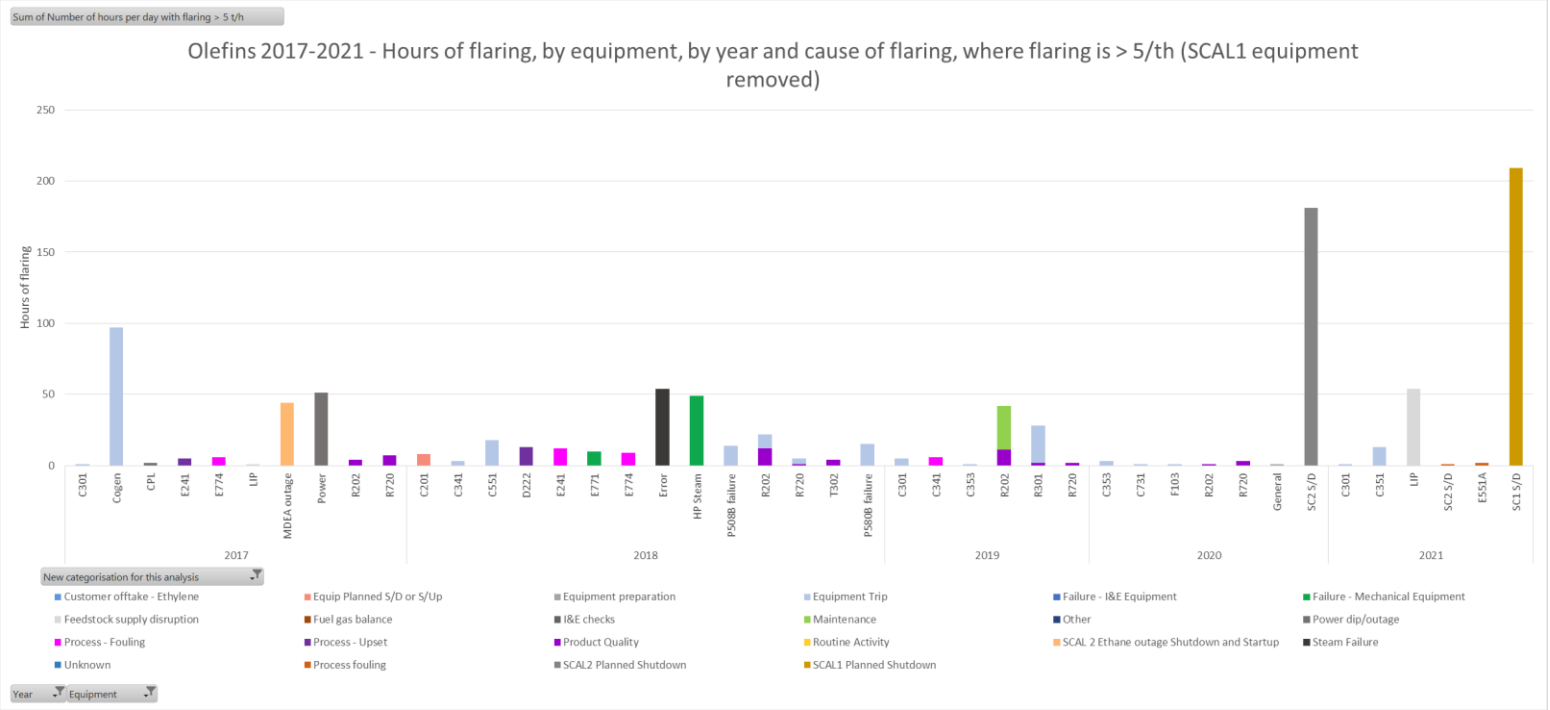
There are many causes and types of equipment that have resulted in flaring that has lead to a community complaint in the period 2009-2021 – A number of these have now been mothballed



Qenos | Ingenious Transformations

In the past 4 years, there have been a variety of causes of flaring > 5 t/h. Investigation of each incident and implementation of action items has resulted in a changed profile over time – reducing or eliminating many causes of flaring.



There is ongoing flare performance monitoring as part of how we operate

- Real time
  - Monitored in real time on DCS and Video Camera @ operating console
  - Operators can take over control if required
  - Communicate performance issues by shift log or if required QIDs/QNC
- Short/medium term
  - Daily process meetings
  - Process notifications
  - Monthly SHE performance reports
- Longer term
  - Annual flare performance review