

# What is going on with oil refineries around the world?

A trot through green initiatives and politics and the effect of the lockdowns

## AGENDA

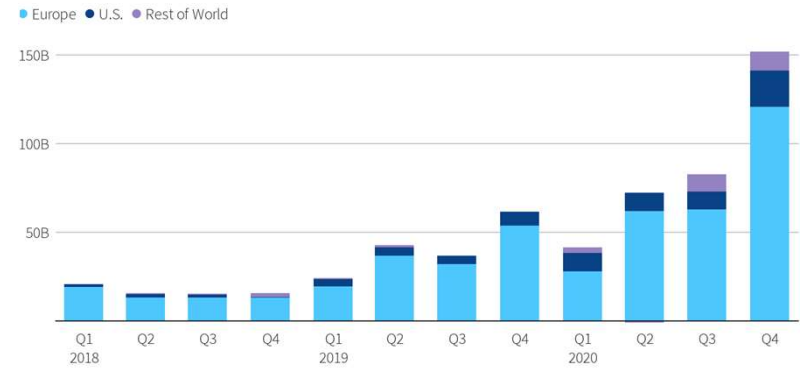
- Oil companies reaction to green initiatives and politics
- Where is the downstream sector headed?
- Decarbonisation
- Digitalisation
  
- Losses – pre covid typical causes and statistics
- Losses – the effects of covid restrictions thus far and into the immediate future
  
- ...and Finally !

## WHERE THE DOWNSTREAM SECTOR IS HEADED



### Sustainable fund flows surge past \$150 billion

Flows into sustainable fund flows over time, in billions of U.S. dollars

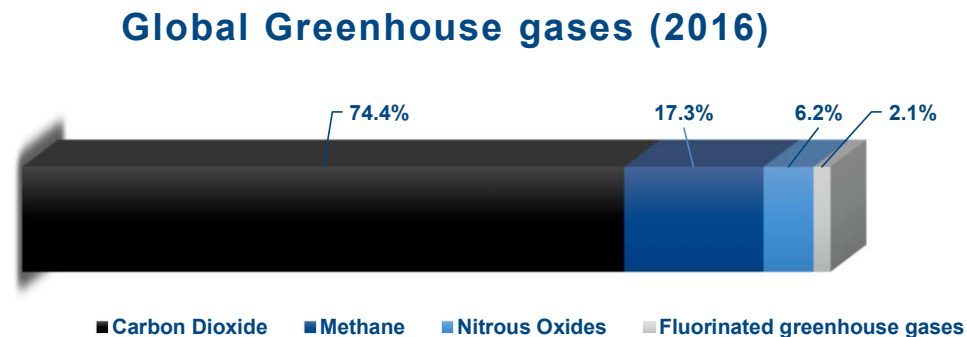


Source: Morningstar



## WHERE THE DOWNSTREAM SECTOR IS HEADED

- Climate change is the focus area of the Environmental factor
- Greenhouse gases are the main contributors to global warming
- CO<sub>2</sub> is the most abundant of the greenhouse gases ➡ **Decarbonisation**





## WHERE THE DOWNSTREAM SECTOR IS HEADED

Energy and chemical companies have invested less in digital technologies than other companies over the last 20 years

The trend has changed and refinery and petrochemical companies are seeking to use digital technologies to:

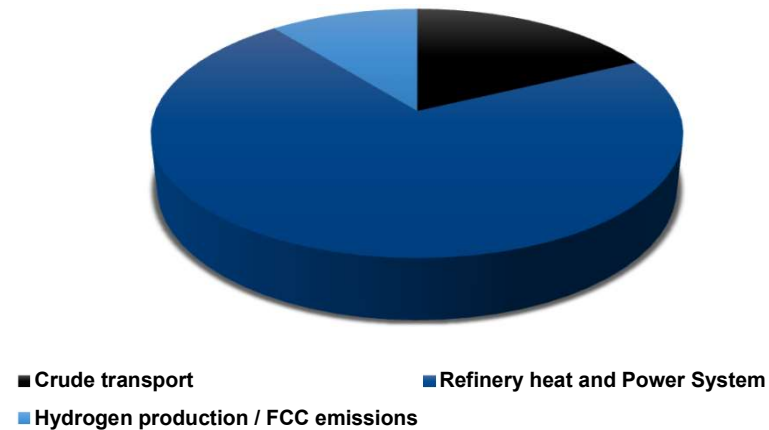
- Increase assets' reliability and safety
- Increase efficiency and reduce production costs
- Reduce carbon footprint



## DECARBONISATION

Removing or reducing the amount of carbon dioxide (CO<sub>2</sub>) emissions produced by an operating asset or company.

Downstream CO<sub>2</sub> Emissions (2018)



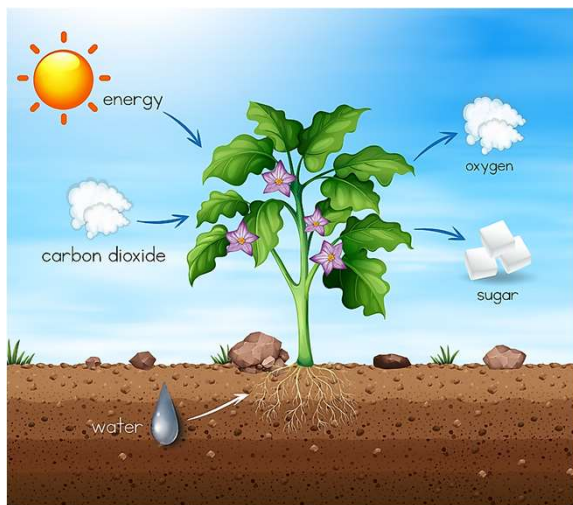
What are the energy companies doing to achieve decarbonisation



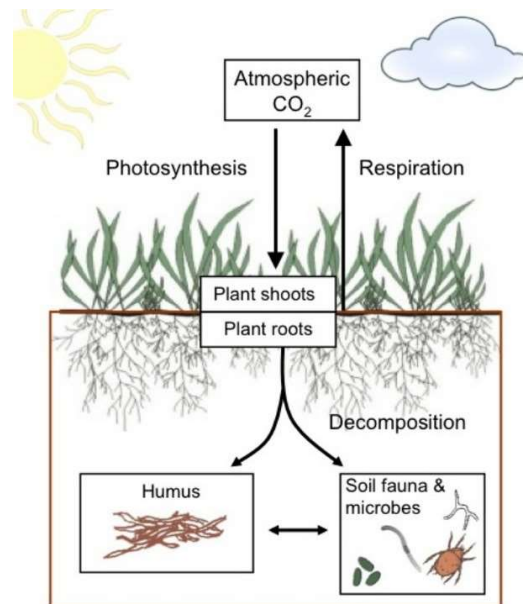
## DECARBONISATION

Investing in offsets - offsetting carbon emissions with **carbon sinks**, such as:

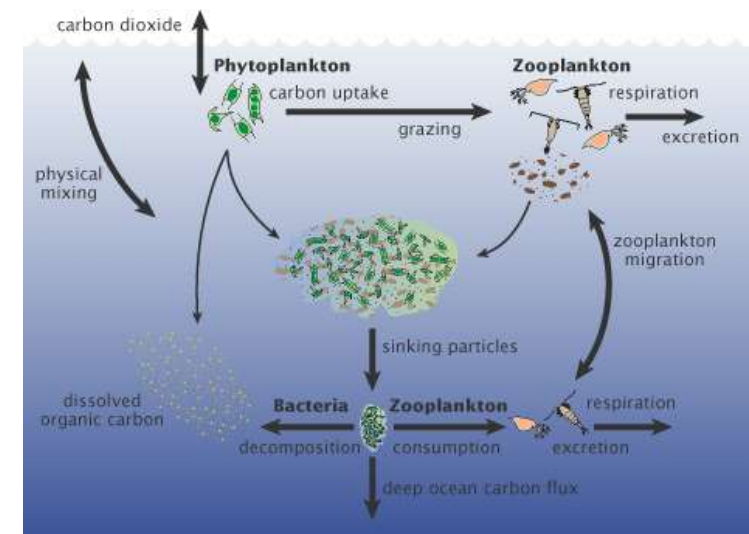
➤ Plants



➤ Soil

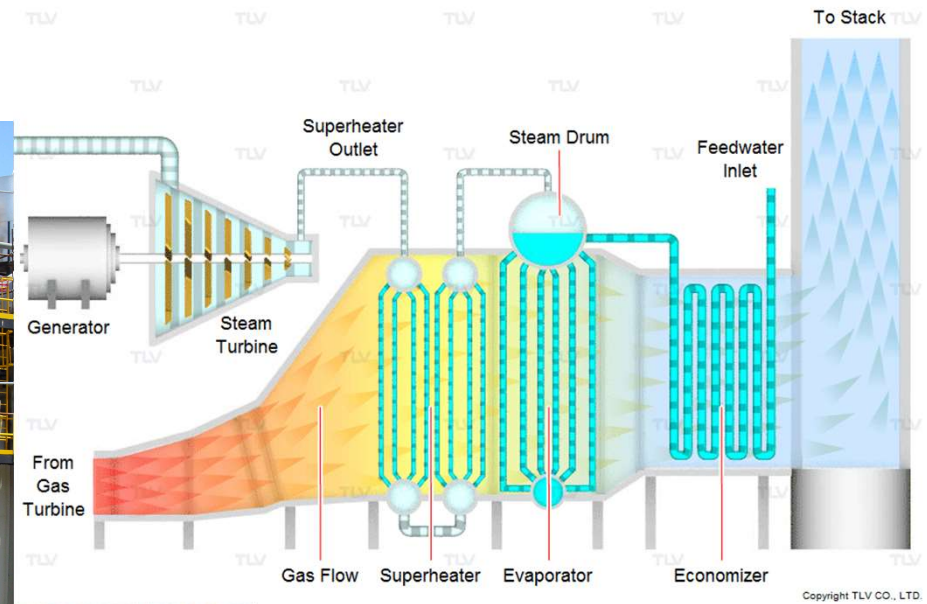


➤ Ocean



## DECARBONISATION

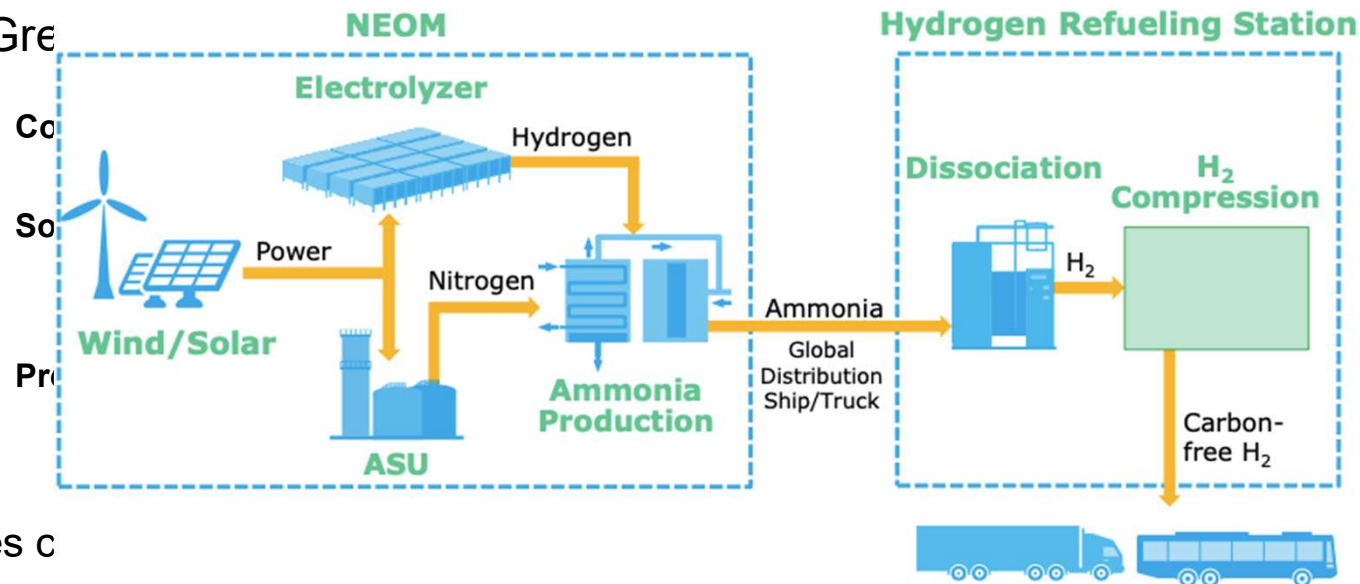
Improve energy efficiency



## DECARBONISATION

Replacing conventional fuels with renewable sources for energy and heat generation

- Energy: Green

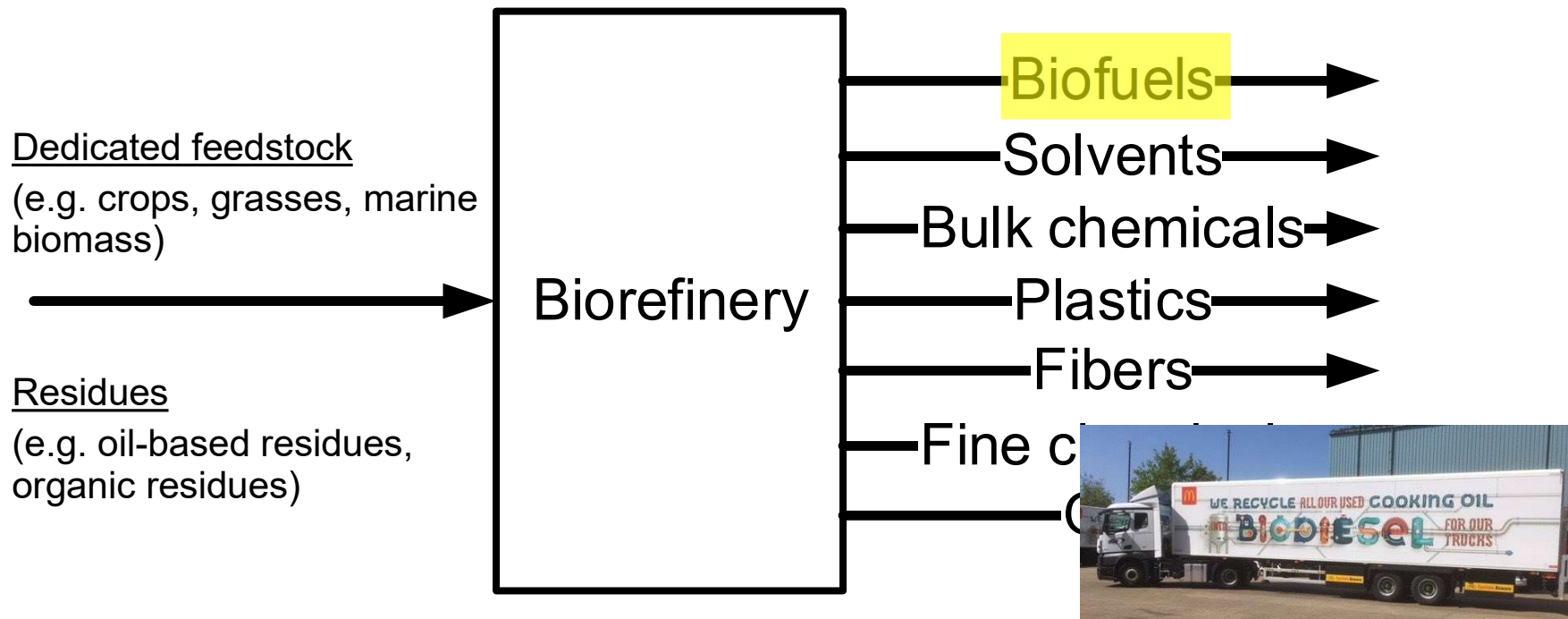


- Reduces carbon footprint
- Helps storing surplus energy production from renewables



## DECARBONISATION

Using greener feedstock, such as biomasses



## DIGITALISATION

- **Digitisation**
  - Conversion of non-digital information (e.g. a paper document) into a digital representation (e.g. an electronic file)
  - Refers to **Information**
- **Digitalisation**
  - Conversion of business processes and business models by the adoption of digital technologies, which replace analogue or offline systems (e.g. paper, whiteboards)
  - Refers to **Processes**
- How is digitalisation being deployed in the energy industry



## DIGITALISATION

The end goal is building **Autonomous Plants**, plants that:

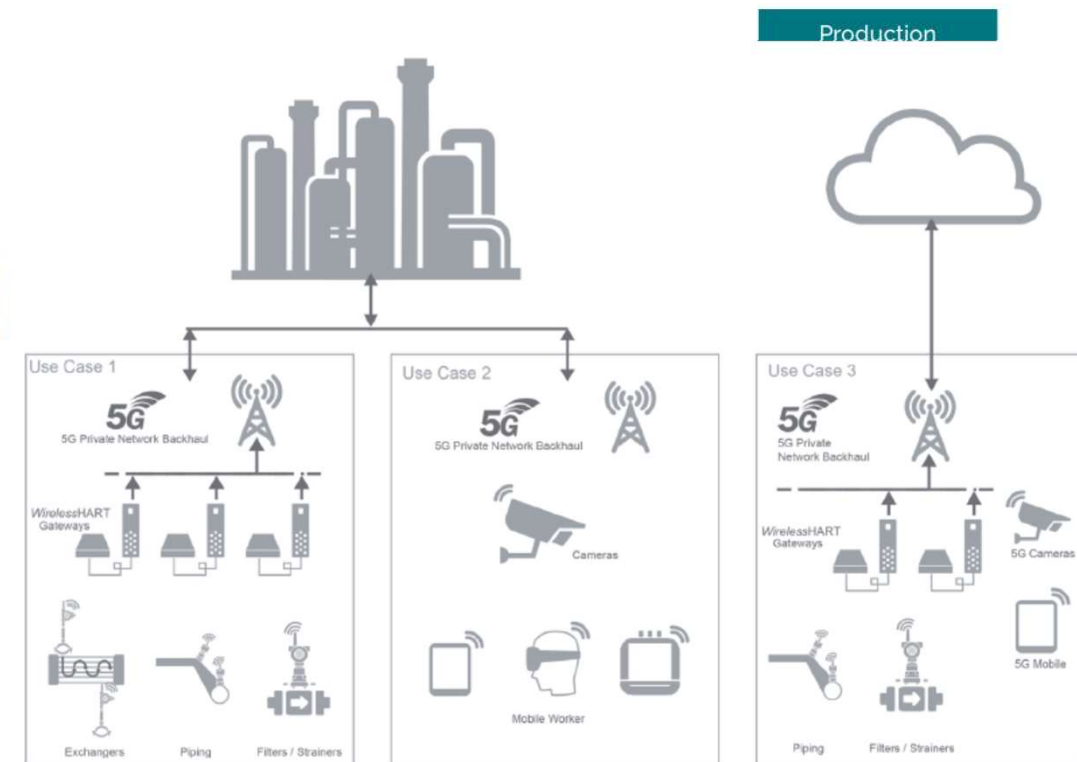
- Integrate technology, data, and advanced visualisations with operations
- Learn from each action taken by the operators and from historical data
- React to changing parameters, including
  - Economic conditions
  - Asset's health
- Continuously optimise operations without significant human intervention
- Achieve lower carbon footprint, increased safety and profitability



## DIGITALISATION

Autonomous plants will bring together different technologies, such as:

- Digital twins
- Robotics
- Artificial intelligence (AI)
- Interconnected sites



## THE PRESENT



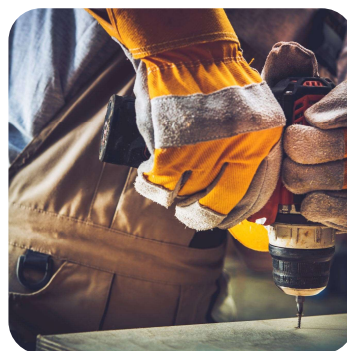
## TYPICAL PRE COVID CAUSE'S ?

Human factor will remain a cardinal element across the Downstream sector



### Construction & Commissioning

- Incorrectly Installed Equipment
- Commissioning procedures not followed correctly



### Maintenance & Operability

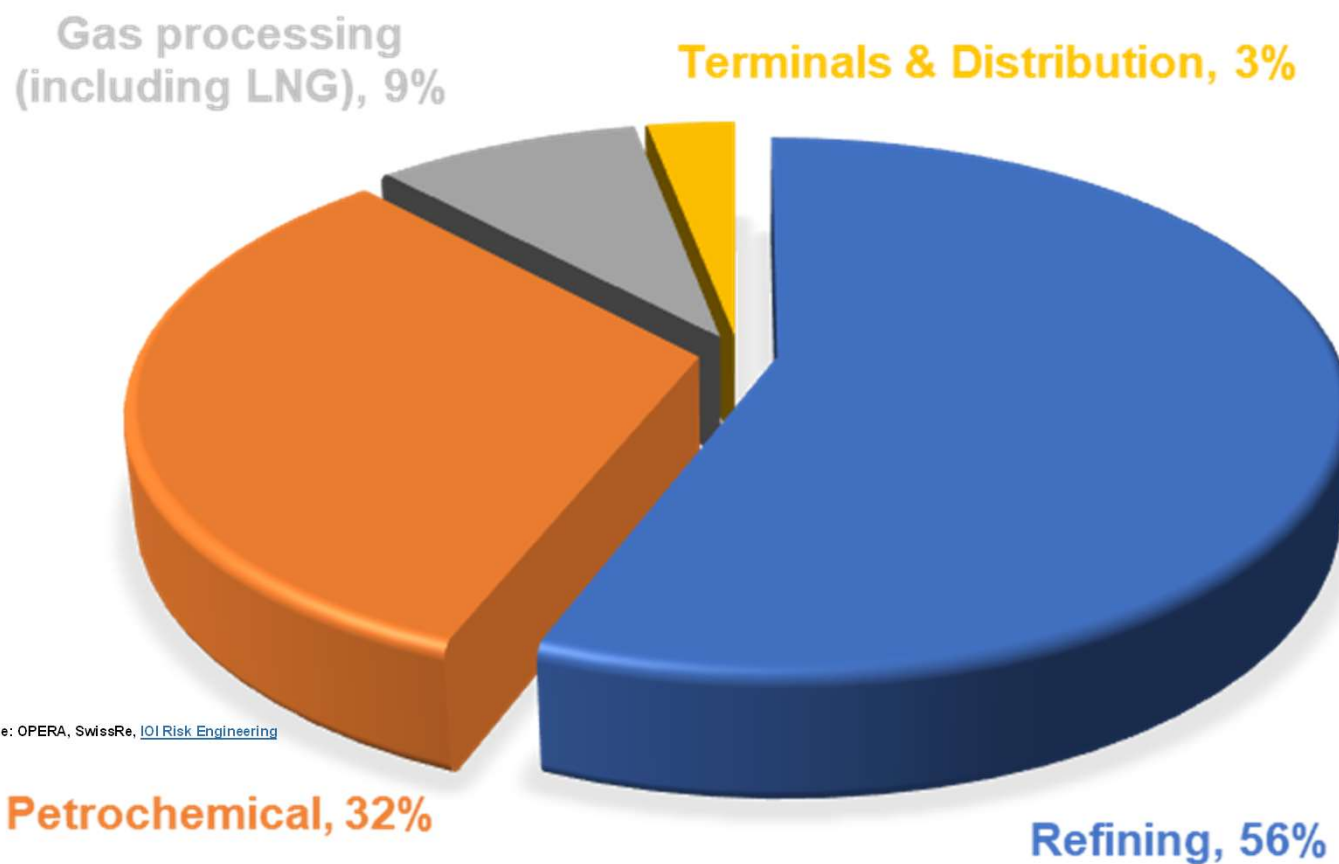
- Equipment not maintained in line with OEM recommendation.
- Procedures not followed.



### Start-up & Shut-down

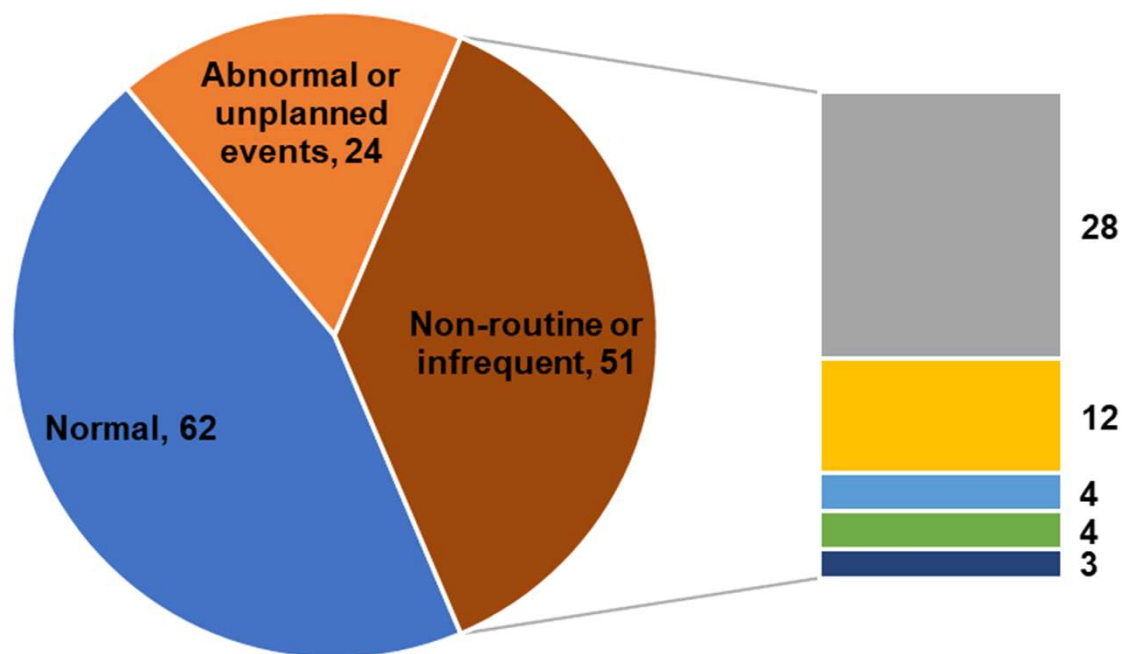
- Sequence of events not adhered to.
- Availability of man-power

## ONSHORE OG&P LOSSES BY OCCUPANCY



Source: OPERA, SwissRe, [IOI Risk Engineering](#)

## ONSHORE OG&P LOSSES BY OPERATING MODE

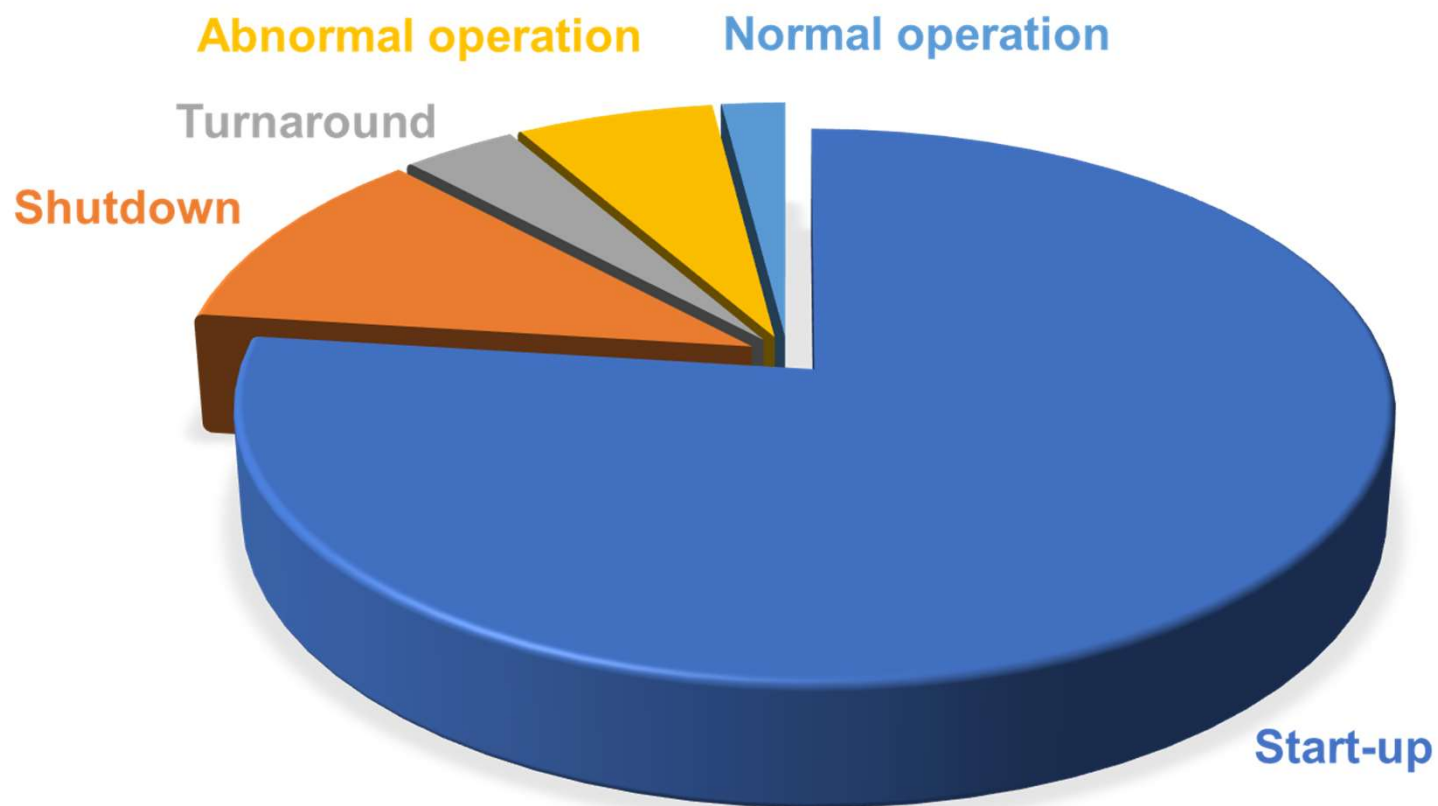


■ Start-up ■ Equipment switching ■ Shutdown ■ Idle/Turnaround ■ Other

- 137 recorded incidents
- 28 incidents occurred during start-up

Source: OPERA, SwissRe, [IOI Risk Engineering](#)

## ONSHORE OG&P LOSSES BY OPERATING MODE (NORMALISED ON TIME)



Author's estimates based on referenced data

## WHAT HAS BEEN HAPPENING DURING LOCKDOWN AND WHAT LIES AHEAD?

Refineries turned down due to reduced offtake now being brought rapidly back into operation

Increased storage of feedstock and products

Turnarounds (TAR) and TIL's delayed

TAR staffing minimised due to Covid restrictions: sickness/distancing in congested areas/ sudden lockdowns/ quarantining

Supply chain affected

Borders closed preventing specialist engineers travelling

Experienced Engineers disinclination to travel/overloaded/retiring

Fixed costs remain but revenue decreased – could lead to economies in procedures

Risk Surveys delayed or held virtually – does this really work?

Pre Covid Risk Survey recommendations not introduced and resurveys delayed or badly attended/prioritised



## LOSS ONE – LOOSE BOLT ON NRV (1 / 2)





## LOSS ONE – LOOSE BOLT ON NRV (2 / 2)



## LOSS TWO – MALADJUSTED COLLAR CLAMP – SHORT STAFFED DUE TO COVID

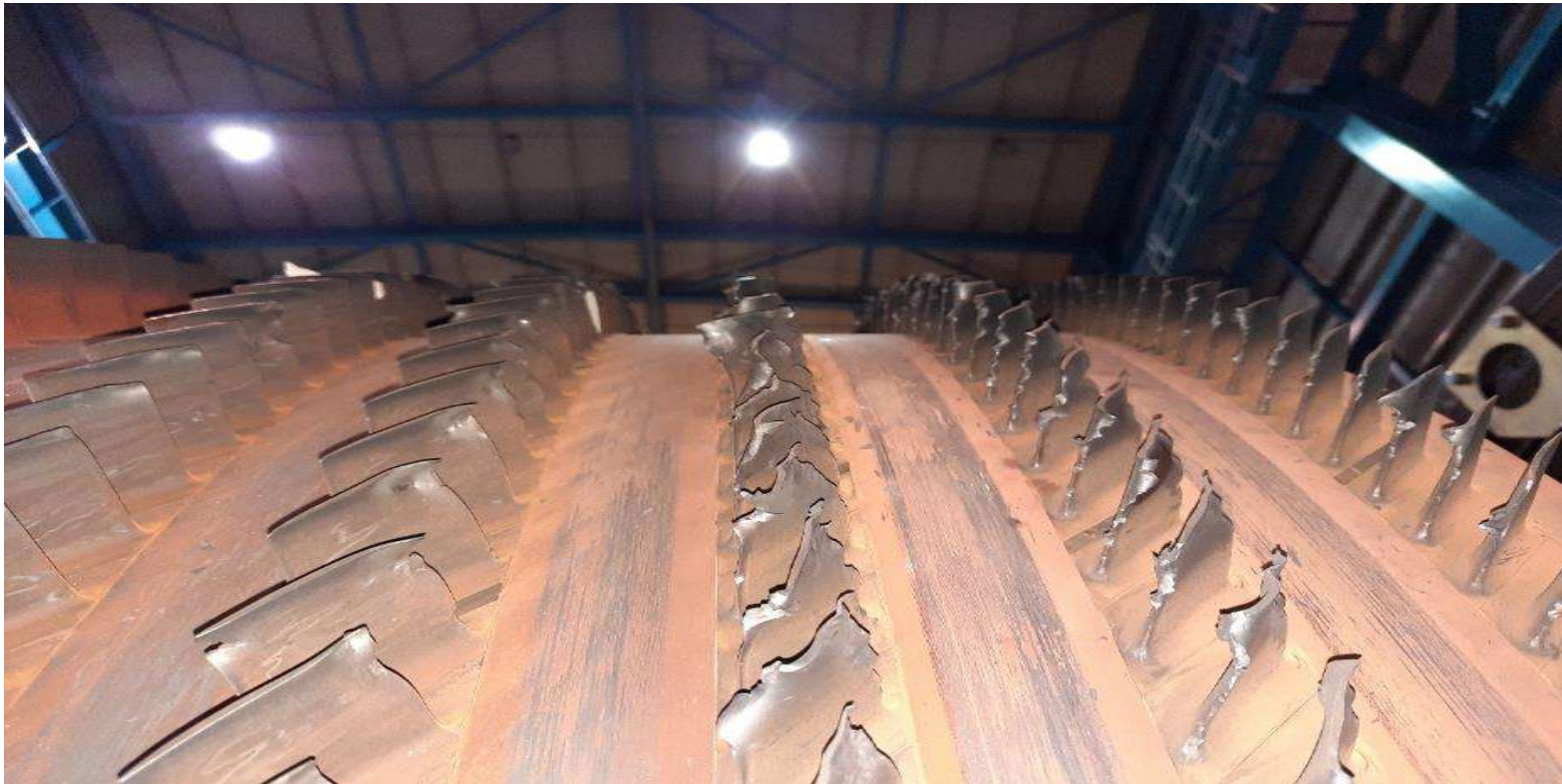




## LOSS THREE – DELAYED IMPLEMENTATION OF TECHNICAL INFORMATION LETTER (TIL) DUE TO COVID



## LOSS 3 - DELAY OF TIL IMPLEMENTATION



## SUMMARY

- Oil companies are investing in decarbonisation and digitalisation
- It will take time for the results of those investments to manifest
- Green politics likely to become even more imperative
- Covid has affected the ways that refineries and power plants operate – it has arguably indirectly caused losses
- Potentially the consequences of covid have not yet been fully understood
- Virtual meetings have their place but IRL meetings elicit more information and development of trust and relationships

## AND FINALLY – REPUBLIC X84H THUNDERSCREECH



**Tradition. Transition.**

## CREDITS FOR DATA AND IMAGES

### Slide 2

Sources: [Philip Halling \(cc-by-sa/2.0\)](#),  
Morningstar

My Uncle is a retired Geography teacher

### Slide 3

Sources: Climate Watch, the World Resources  
Institute (2020)

### Slide 4

Sources: [Process Engineering](#)

### Slide 5

Sources: OECD and IEA

### Slide 6

Sources: WorldAtlas, Creating Tomorrow's

Forests,

### Slide 7

Sources: [Sphudson](#), TVL CO. LTD

### Slide 8

Sources: Air Products investor presentation

### Slide 9

Sources: McDonald's

### Slide 10

Sources: Smart Water Magazine

### Slide 11

Sources:

### Slide 12

Sources: Aveva, Nexxis, Yokogawa, Emerson



## THE SCOTTISH CRAB CONUNDRUM – THE PRICE FOR CLEAN ENERGY?

At the heart of the offshore renewable energy discussion, there lies an often overlooked problem...

- Male brown crabs typically migrate up the east coast of Scotland.
- Scientists are now aware that the electromagnetic field generated by underwater cables from windfarms interrupts this migration.
- The change in activity changes them on a cellular level; they become less active and are less likely to find a mate.
- This may result in a build-up of male crabs in the south of Scotland.

