Oil & Gas Authority

UKCS Production Efficiency in 2016

June 2017

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Executive summary

Production efficiency (PE) has risen for a fourth consecutive year, in 2016 it reached 73%, driving increased production in the United Kingdom Continental Shelf (UKCS).

Improvements in efficiency contributed an additional 12 million barrels of oil equivalent (boe) in 2016, which is more than the UKCS's 7th ranked field. There is still significant scope for further efficiency improvements, an additional 220,00 boe a day could be generated from underperforming hubs reaching 80% PE.

While there has been a continuing downward trend in the number of plant losses, an increase in well losses in 2016 could be a forewarning of future problems, given recent low levels of investment. Export losses carry on building year-on-year with terminal outages showing significant deterioration in 2016. This highlights a continued requirement for action.

Gas compression losses have improved in 2016 highlighting the significant effort and engagement made by industry through initiatives such as the Production Efficiency Taskforce's (PETF) compression sub-group. There is also a significant backlog of economically viable activities that could improve PE in the UKCS.

73% Production Efficiency

Continued improvement, up 2% on 2015

+270 Million Barrels

Additional production from efficiency improvements since 2012 efficiency low point (60%)

£2.8 Billion

Potential "prize" if underperforming hubs hit 80% target in 2016, an additional 220,000 boe day

(Oil @£50/bbl and Gas @ 40p/therm)

+3% Water Injection Efficiency

Increasing production by > 1mmboe

1. Introduction

The aim of this report is to analyse the production efficiency performance of the UKCS by comparing actual production in 2016 to the theoretical economic maximum potential of the fields and associated infrastructure, and to make comparisons with previous years.

The Oil and Gas Authority (OGA) and its predecessors have historically engaged with operators on the subject of PE with the objective of seeing improvement over time. In November 2016 the OGA published its first annual Production Efficiency Report.

This report, using data collected as part of the 2016 UKCS Stewardship Survey, provides an update to those findings highlighted in the 2015 report. It demonstrates further insights gained by the OGA through analysis of the new data and also through the work of the OGA, the Asset Stewardship Task Force and the PETF.

In its Corporate Plan 2016–2021 the OGA re-affirmed the target set by the PILOT taskforce" which aimed for 80% production efficiency by the end of 2016. In 2017 revised target date of 2018 was set for achieving this figure.

For the purposes of this report PE is defined as the total volume of hydrocarbons produced in 2016 as a percentage of economic maximum production potential (Economic Production Efficiency) and is based on guidelines drafted by the Society of Petroleum Engineers (Production Efficiency Reporting – Best Practice Guidelines).There is a slight change from last year's report with economic maximum potential now being used in place of structural maximum potential. This produces a more accurate representation of PE as hubs of differing ages and life-cycle stage become more comparable once uneconomic production potential is removed.

The OGA's Asset Stewardship Expectation on Production Optimisation states that "the operator should have a systematic approach in place to deliver production optimisation for each producing field. It should include appropriate processes, systems and personnel and also ensure that both production protection and production growth are addressed."

Analysis of PE and production losses allows industry to benchmark its performance over time in a clear, consistent, and quantifiable way. Tracking PE in this way allows the OGA to compare relative performance over time, aiding the Asset Stewardship tiered review process and ensuring that the Production Optimisation Asset Stewardship Expectation is met.

Operators may request an organisation PE benchmarking pack by making a request to the OGA at PPR.Team@ogauthority.co.uk.

2. UKCS production efficiency

2.1 UKCS overview

UKCS PE increased for the fourth consecutive year, reaching 73%. This is an improvement of 2% on 2015 which represents an additional production of 12 million barrels of oil equivalent due to efficiency.

PE in the UKCS fell from over 76% in 2008 to a low of 60% in 2012. Recent years have seen a reversal in the declining trend in both PE and overall production.

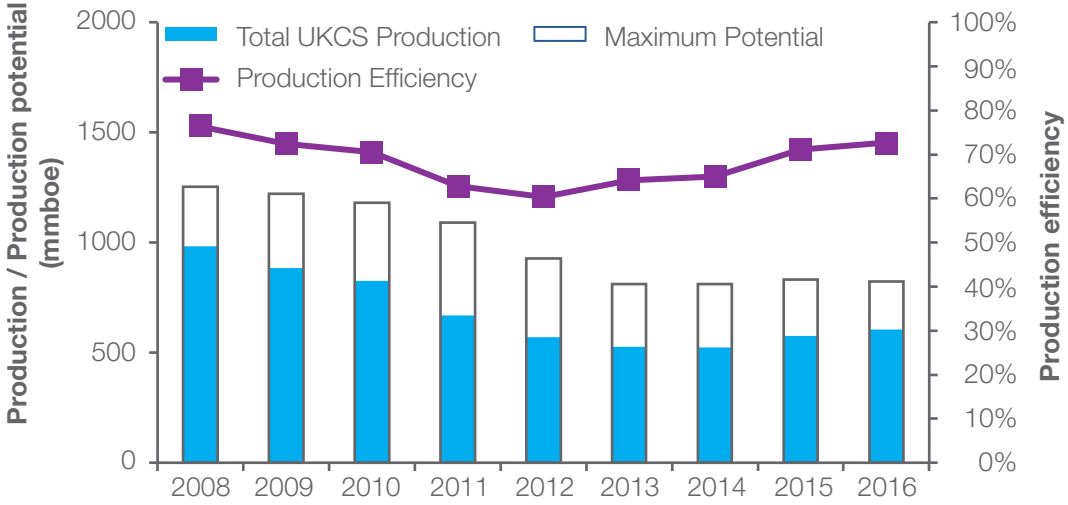
Production losses have been falling since 2012 and are continuing to fall, even as total production in the UKCS rises. From 2012 to 2016 losses have fallen by 157 million boe whilst production has risen by 34 million boe.

Total losses in 2016 were 210 million boe.

Plant losses continue to be the largest loss category in 2016 representing 60% of total losses (Figure 2).

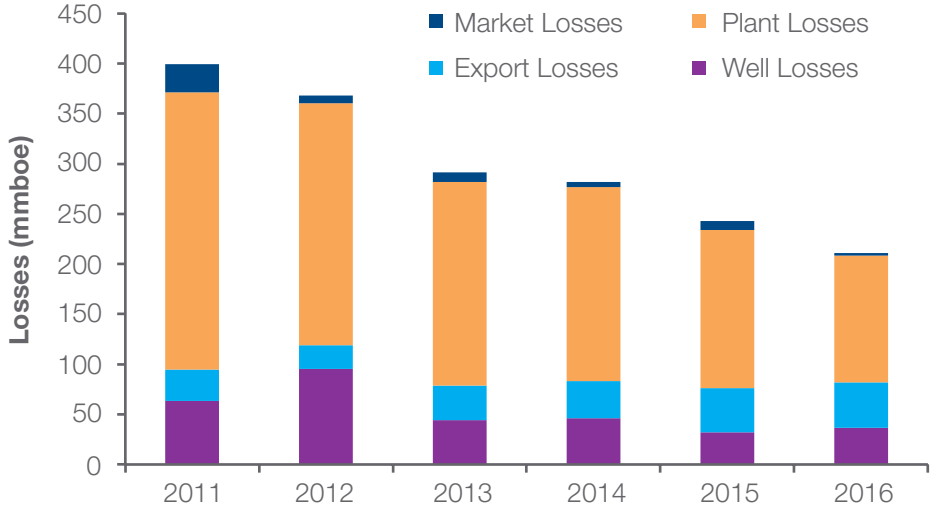
The maximum potential of the UKCS fell slightly in 2016, mainly due to a significant field coming off production plateau and continued decline in well potential in some ageing fields. Despite the fall in potential, production increased, driven by improved efficiency.

Figure 1 : UKCS production efficiency and production



*In 2015 methodology was updated in line with new SPE draft guidelines.

Figure 2 : UKCS production losses 2011–2016



2.2 2016 hub performance

In 2016, 38% of hubs met or exceeded the overall 80% target for the UKCS, compared to 30% last year.

The Northern North Sea (NNS) region saw on average a 5% increase in PE from 2015 driven by a continued improvement in plant efficiency.

The Southern North Sea (SNS) region saw a decline in PE, falling 4% from 68%. One of the reasons for the decline in this reason is a build-up in economic production potential. This topic is covered in more detail in section 5 of this report.

Figure 3: Production efficiency of UKCS hubs

UKCS (2015)
Average
73% (71%)
Hubs over target
35 (28)

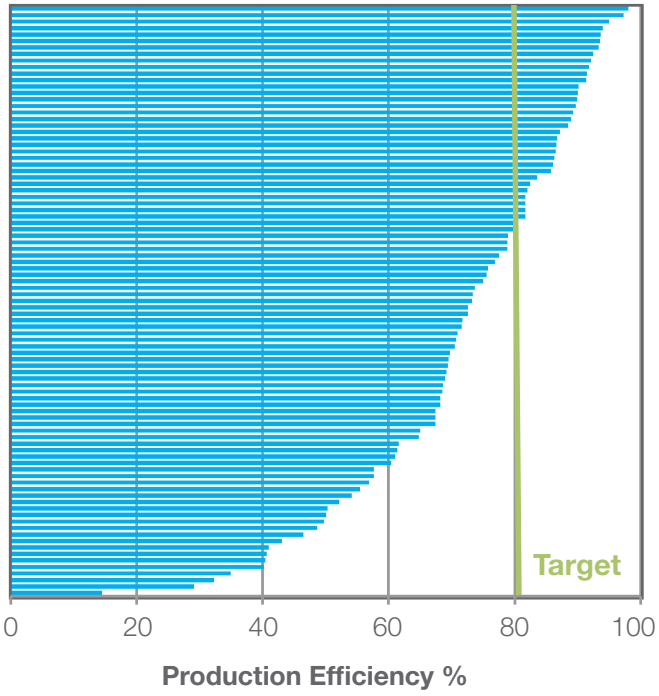
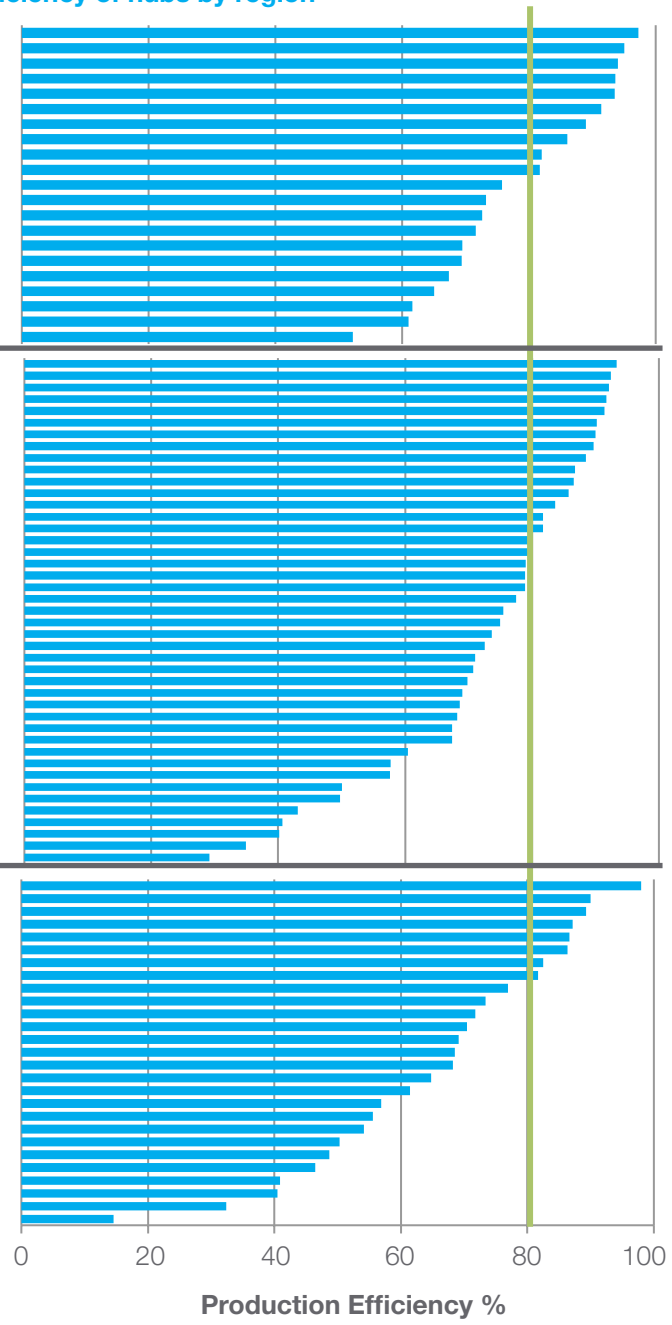


Figure 4: Production efficiency of hubs by region

NNS (2015)
Average
75% (70%)
Hubs over target
10 (11)

CNS (2015)
Average
75% (72%)
Hubs over target
17 (11)

SNS (2015)
Average
64% (68%)
Hubs over target
8 (6)



2.3 “Average” hub vs “best in class” hub

Figure 5 shows the difference between the average hub performance and the top performing hub (best in class) in terms of production losses.

The best in class hub achieves over 90% PE compared to 73% for an average hub.

Well losses in the average UKCS hub are roughly double that of a best in class field whilst plant losses are three times larger and export losses are over five times larger.

Figure 5: 2016 Hub performance

**The “best in class” hub defined is a hub that has performed near the top of the performance efficiency rankings consistently for a number of years.*

3. Operator performance

3.1 Changes to operators' PE

Over four years, increases of up to 57% (absolute) have been seen in operator PE. Generally those with the biggest improvements are now over the 80% target.

Figure 6 shows the change in operators' PE, compared to the recent record low levels seen in 2012. Since 2012 there has been cross industry improvement with 88% of operators increasing in efficiency.

Figure 7 shows individual operators' PE in 2016. It can be seen that 13 operators are now above or at the target, which is an improvement of four since last year and represents 277million boe of total production.

**It should be noted Figure 6 shows only operators that have been operating since 2012, including operators that have changed ownership / name without a significant variation to operated assets.*

Figure 6: Operator 2016 PE compared to 2012*

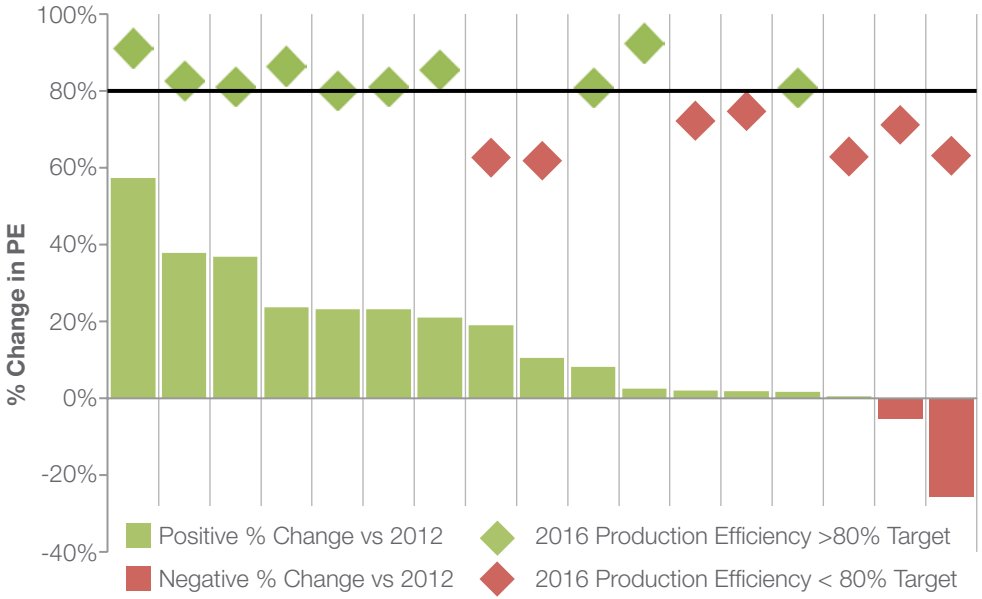
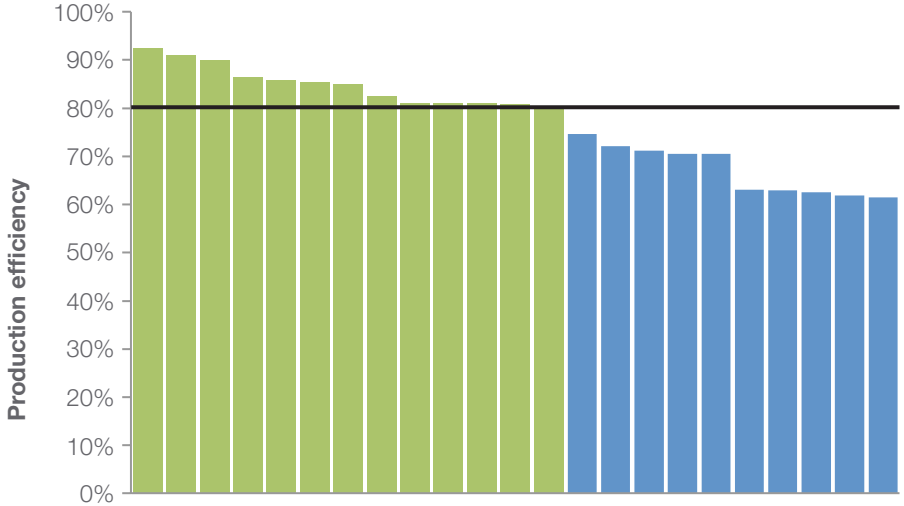


Figure 7: Operator PE

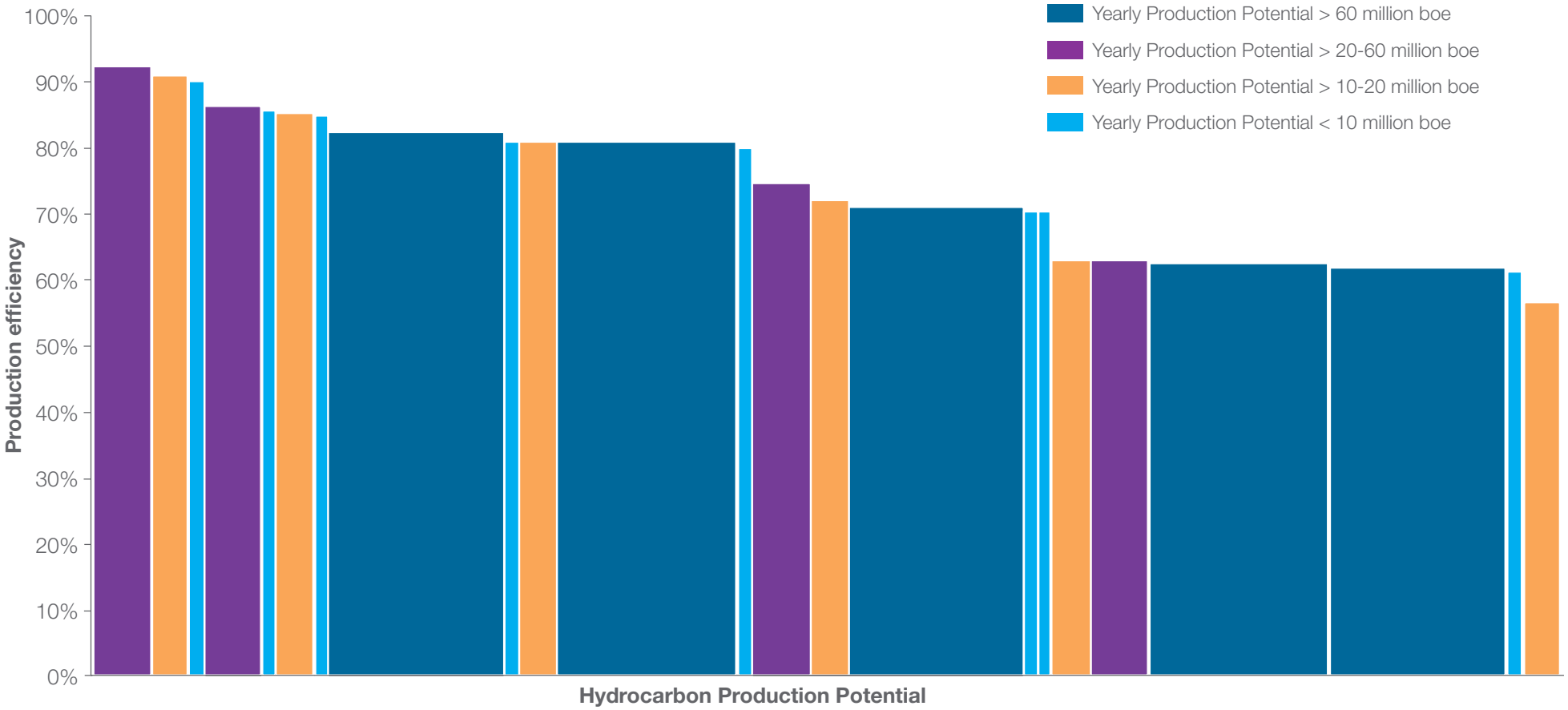


Whilst PE per operator is useful to assess individual performance, the bigger picture of efficiency at a UKCS level must factor in levels of production to obtain a meaningful picture of efficiency across the basin.

Figure 8 highlights operator PE against total production. To ensure anonymity of data, operators have been grouped by volume of production using the average production for each group.

The figure also highlights the differing scales of production that operators manage within the UKCS, and the range of efficiency achieved. There is no correlation between total size of production and efficiency with examples of highly efficient large producers, less efficient small producers and vice versa.

Figure 8: 2016 total hydrocarbon production and production efficiency by operator



4. Loss analysis

4.1 Major causes of production losses

Total UKCS losses in 2016 were 210 million boe.

The Central North Sea (CNS) has the largest total production losses by volume, although this is to be expected as it also has the largest total production. Plant losses make up the most significant category of loss representing 70% of the total.

Plant losses are the largest category in the CNS, NNS and West of Shetland (WOS) regions with the majority of losses caused by full plant outages.

In the SNS, wells is the largest loss category. This is due (at least in part) to the later life stage of the region and the resultant degradation of well productivity over time. As the SNS is mainly gas infrastructure, wells also take on more significance in later life as the plant facilities become less utilised. This highlights the need for rigorous well management in the SNS as this will have the greatest effect on PE.

Overall plant losses make up 61% of the top 10 losses with full plant losses and gas systems making up 40% of total losses alone.

Industry initiatives including the PETF sub-groups focus on specific losses, such as the TAR (turnaround) guidance (aiming to reduce full system losses) and the compression losses report (looking at gas system losses). These are covered in more detail in section 7 of this report.

Figure 9: Production losses by region

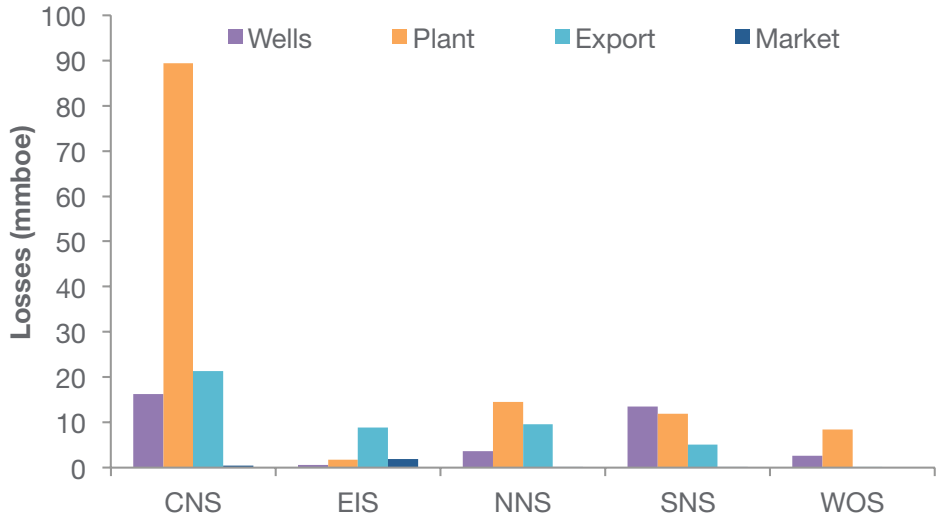
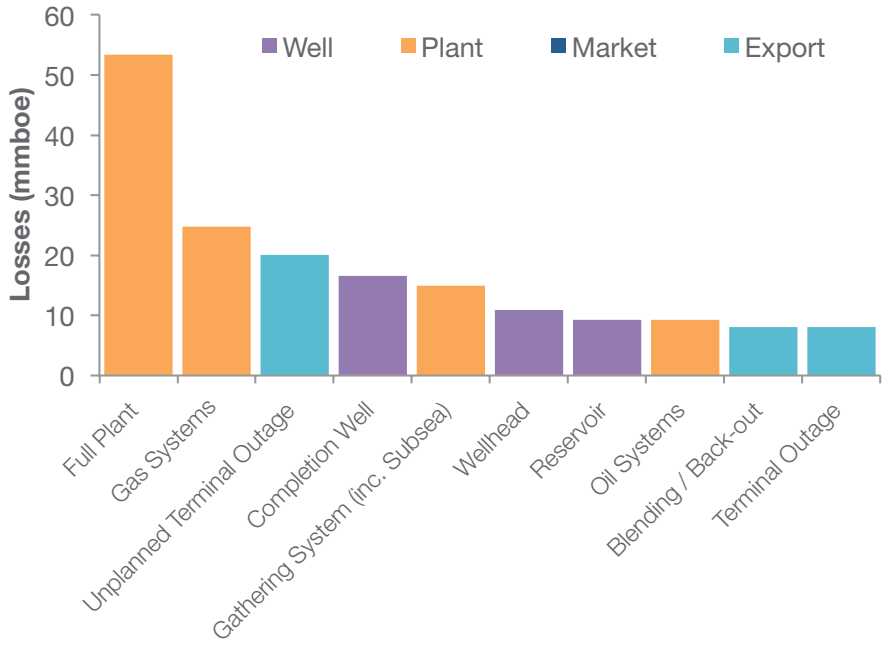


Figure 10: Top 10 loss categories



4.2 Progress since 2012

In 2012 PE was 60%. This is the lowest efficiency level ever recorded by the OGA or its predecessors. If efficiency levels had remained at this level there would have been an estimated 270 million boe reduction in production from the UKCS across the four following years up until the end of 2016.

Figure 11 highlights the changes to production losses since 2012, showing the changes that have resulted in improved efficiency.

Plant losses have been steadily decreasing for the past four years, with an additional 30 million boe of reductions in 2016 alone.

Market losses have also seen reduction in the last year and have fallen drastically since 2012 down from 28 million boe to 2 million boe.

In contrast to plant, export losses have grown for the last four years, although at a gradually reducing rate of growth.

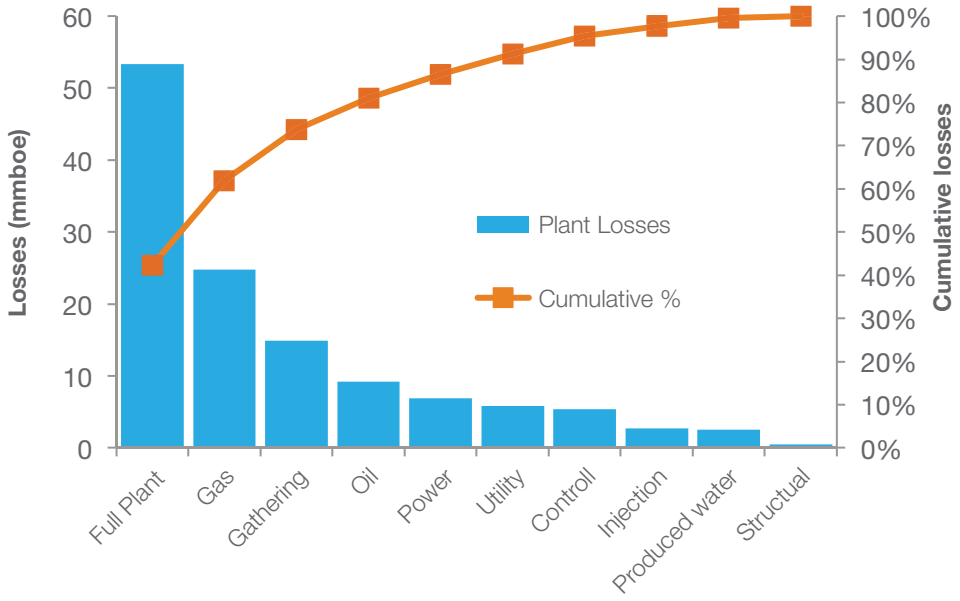
In 2016 well losses grew by the largest amount since 2012, totaling 5 million boe. This was the largest increase in losses of any category.
For PE to continue to improve in the UKCS the progress seen in plant must be replicated in export losses, and recent deterioration in well losses must be turned around.

Figure 11: Yearly losses and year on year % change by category

4.3 Plant losses

Plant losses make up 60% of the total losses in the UKCS, representing a volume of 126 million boe. Figure 12 splits plant losses into sub categories. It can be seen that three categories - full plant, gas and gathering systems (inc subsea) - make up over 70% of plant losses.

Figure 12 : Plant losses



4.4 Well losses

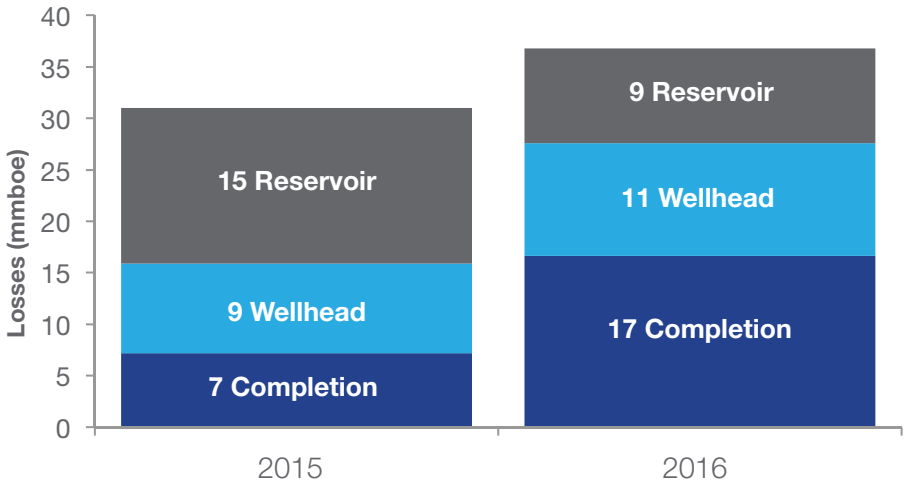
Completion losses represent the largest category of well losses, followed by wellhead and reservoir.

Completion and wellhead both rose in 2016, whilst reservoir losses fell. In 2016 completion losses were the largest loss group showing an increase of 130%.

A rise in well losses threatens efficiency in the future, and requires investment in order to reverse the trend. As the UKCS well stock continues to age, well losses will become increasingly critical to the UKCS efficiency on a whole.

Interventions have the potential to decrease losses in wells. The OGA is now tracking intervention activity through the Asset Stewardship Survey to ensure that Asset Stewardship Expectations are met.

Figure 13: Well losses



4.5 Oil pipeline export losses

Oil pipeline systems transport production from a number of hubs to a sales point. Figure 14 shows export production losses for pipeline systems in the UKCS in 2015 and 2016.

The total oil pipeline export losses in 2016 were 15 million boe in 2016 up from 12 million boe in 2015.

Both terminal and pipeline sub categories of loss grew between 2015 and 2016.

The largest increases in export losses were seen in the pipeline system indicated as “pipeline 1” on Figure 14. This system saw an increase of 5 million boe of losses in 2016 across both terminal and pipeline loss categories.

Figure 15 looks at the hubs connected to “pipeline system 1” in further detail. It can be seen that for hubs on this system export losses grew by 74% in 2016. However, despite this increase in losses, the production efficiency of the hubs in the system actually improved by 1%.

This improvement was achieved by an 18% improvement in plant losses. This could have been a result of continued improvements to plant efficiency but may also indicate that operators utilising “pipeline 1” used outage time efficiently to conduct activities such as maintenance which led to improved efficiency when the pipeline system was operating.

Figure 14: Oil export losses by export pipeline

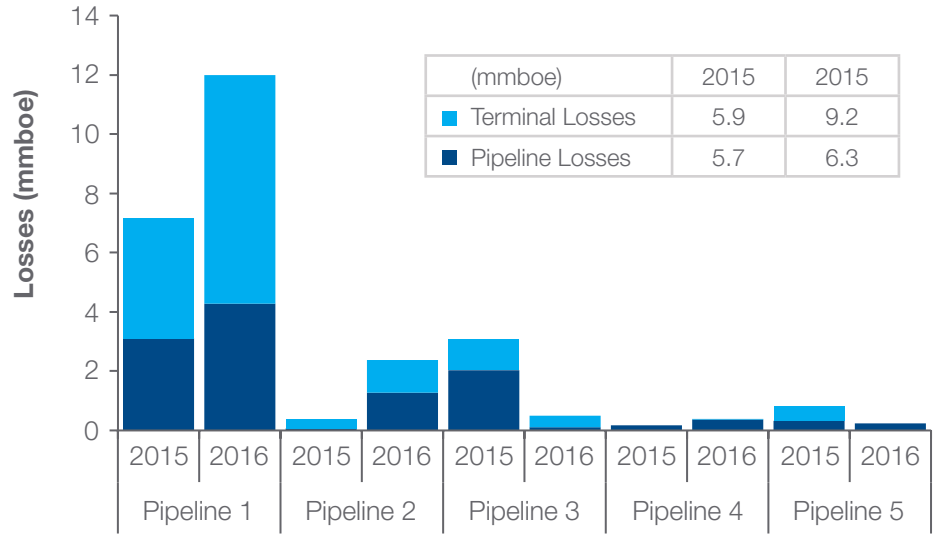
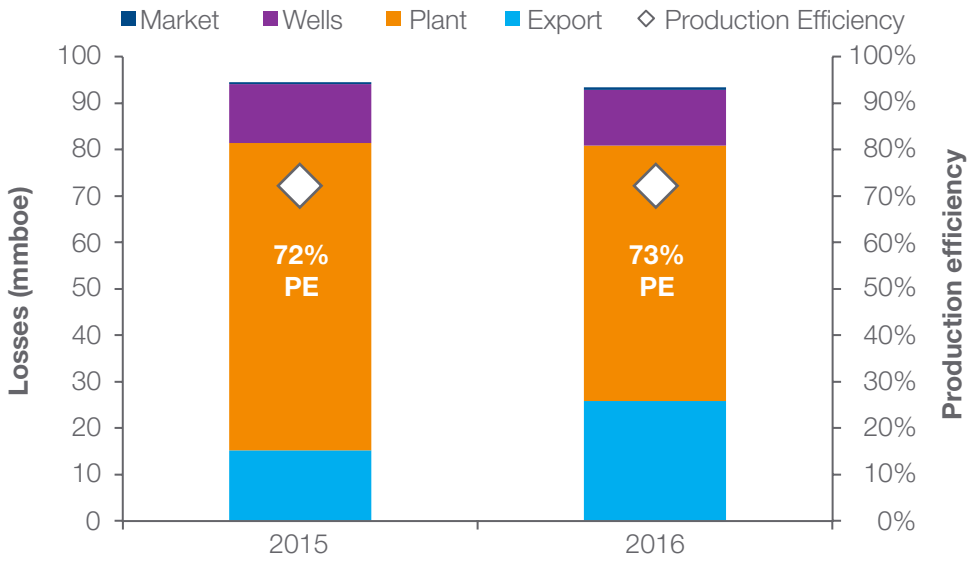


Figure 15: “Pipeline system 1” total hub losses



4.6 Gas pipeline export losses

Figure 16 highlights export losses by gas pipeline in 2015 and 2016 for the top ten largest pipeline systems by total loss. It should be noted that the table summarises total losses across the whole UKCS.

Overall total gas losses associated with export were up by 2.3 million boe, rising from 28.5 million boe in 2015 to 30.8 million boe in 2016.

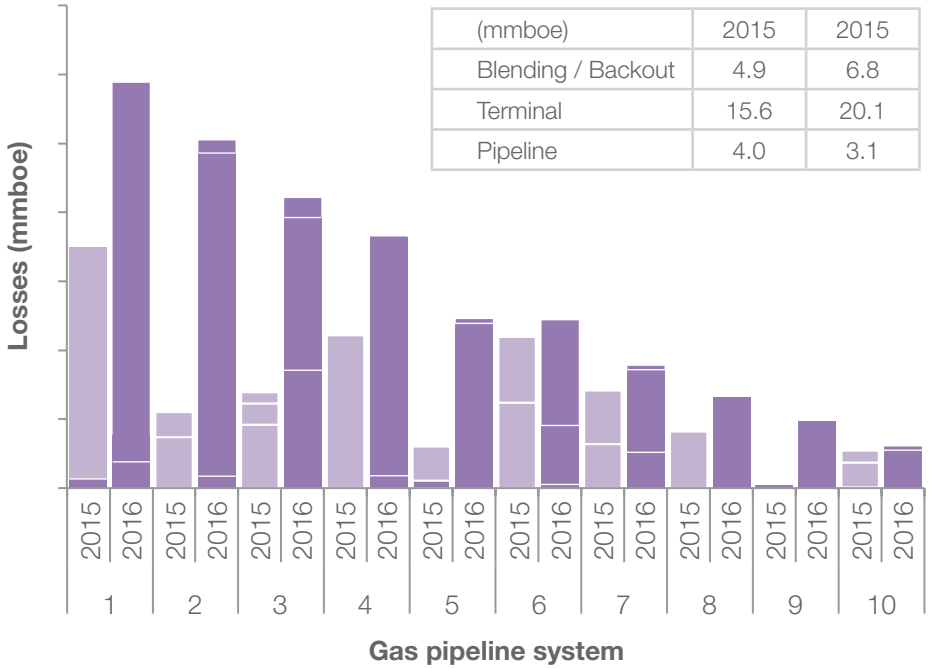
Currently, gas pipeline export losses are roughly double than that of oil pipelines, however, all gas is exported via pipeline, whilst oil can also be exported via tanker.

The largest increase was seen in terminal losses, rising by almost 5 million boe in a year. There has also been an increase in losses due to either blending or back-out losses. Losses associated with the pipeline for gas systems fell in the same period.

Losses due to back-out could be tackled with investment in additional compression, which, given their steady rise, could provide a boost to UKCS PE.

Terminal losses are more complex to solve and require continued industry focus. Section 7 of this report covers the rising trend in terminal losses in further detail.

Fig 16: Export losses by gas export pipeline



4.7 Market losses

Market losses totalled 2.6 millionboe in 2016. This represents 1% of the total, which is a reduction on 2015. Market losses in the UKCS are low because of the nature of the market for oil and gas in the UK.

Although market losses are relatively small compared to the other three loss categories, it is important to continue to monitor the scale of market losses, to ensure that market losses do not become a problem in the future.

5. 2016 PE insights

5.1 Water injection efficiency

Water injection plays an important role improving the production from the majority of fields in the UKCS. Ensuring that the optimum amount of water is injected helps maximise hydrocarbon production.

In 2016 the optimum injection rate for the UKCS was 3.4 million barrels of water per day of which 80% of this target was achieved. This represents a 3% increase on 2015 performance, as shown in Figure 17.

Failure to inject the optimum amount of water leads to lost production of hydrocarbons, Figure 18 shows the total amount of lost production attributed to injection systems. It can be seen that the direct effect of increased water injection efficiency was at least an additional 1 million boe of hydrocarbons produced in 2016. There will also be additional production due to injection efficiency that will be captured by full plant losses which cannot be separated to this level of granularity.

Figure 17: Water injection efficiency

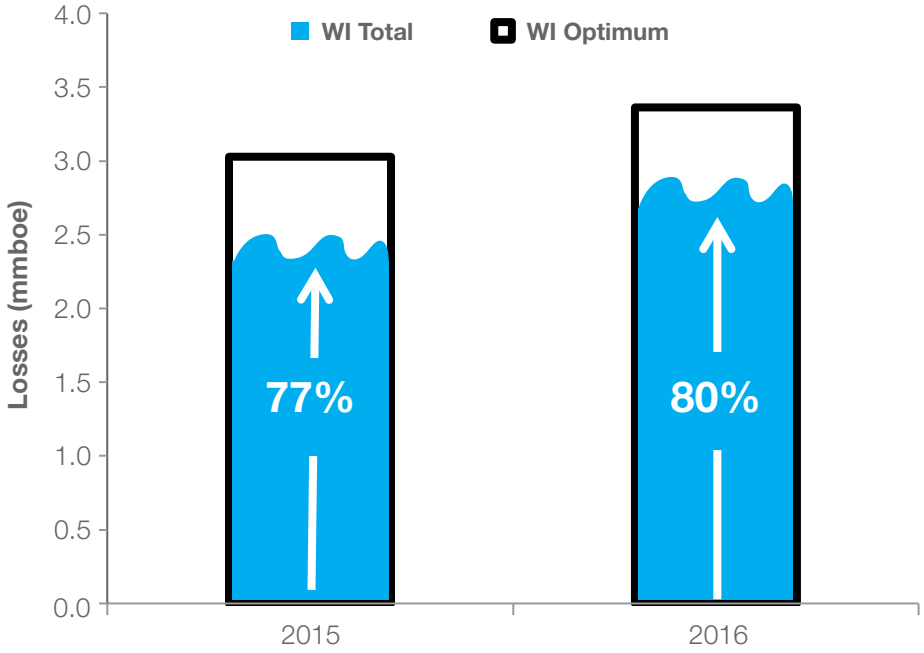
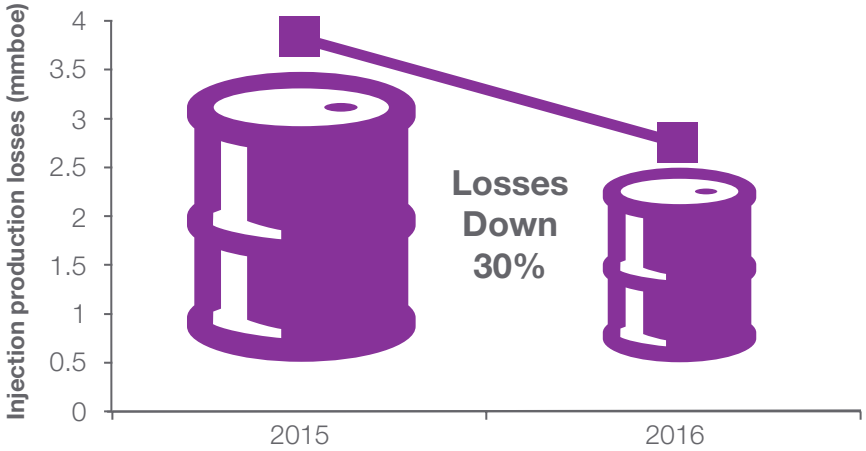


Figure 18: Injection systems plant losses



Additional production potential

Economic Production Potential (EPP) is additional hydrocarbon production that could be realised if an economically viable project / activity was completed. Examples of such activities could include well work overs, plant upgrades etc.

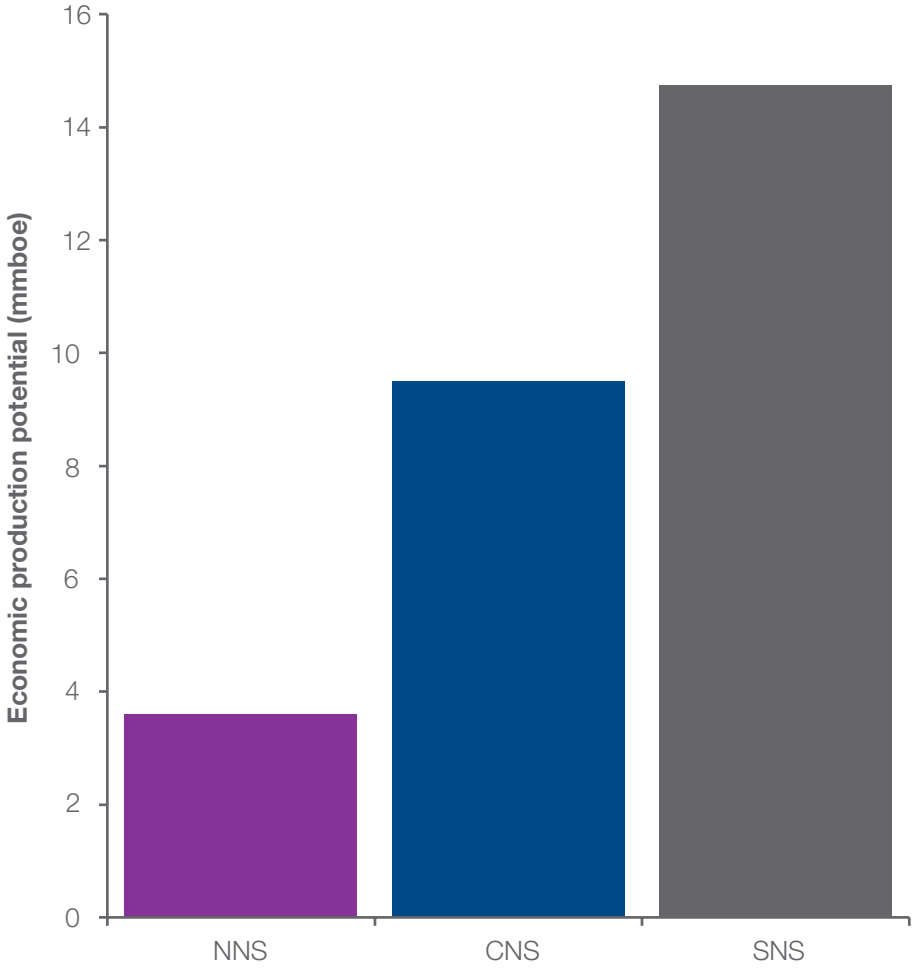
Figure 19 shows the current amount of EPP in the UKCS. In total there was the potential to increase the UKCS production by 29 million boe in 2016. If these projects were to have been completed it would have increased the UKCS PE by 3%.

Based on the data submitted, the majority of the EPP is within the SNS. The SNS is currently the least efficient region with a PE of 64%. If all of the economically viable projects / activities were to be completed this would increase the PE to 74%.

Data on EPP has been taken directly from operator submissions, however there is potential for EPP to be larger as completion is not yet consistent across all operators due to the fact that EPP has only recently been collected as part of the survey. Therefore, figure 19 could be considered the minimum EPP currently found in the UKCS.

The recent stabilisation in oil price creates a future opportunity for some operators to decrease the backlog of EPP, improving efficiency.

Figure 19: Economic production potential



6. Changes in 2015/2016

Figure 20 highlights changes from 2015 into 2016 for hubs, regions and operators, in terms of PE. Changes can be split into the following types:

1. Consistently over target

In this region the 80% target has been attained in both 2015 and 2016. This is the aspiration for all hubs, however given varying operating issues such as export routes, facility age, etc this would not be attainable by all

2. 2016 Target new entrants

This region represents an improvement from under 80% in 2015 to over 80% in 2016

3. 2016 Target "drop outs"

This region represents a fall in efficiency from over 80% in 2015 to under 80% in 2016

4. Under target improvement

Showing improvement in 2016, however still under target

5. Under target deterioration

Deterioration in efficiency in 2016 from a starting point under the target

Table 1 summarises the change, showing both numbers and the total production potential. The total hub production potential that either improved or remained above target was 603 million boe, representing 75% of the total.

Figure 20: summary of changes to operators, hubs and regions from 2015-2016

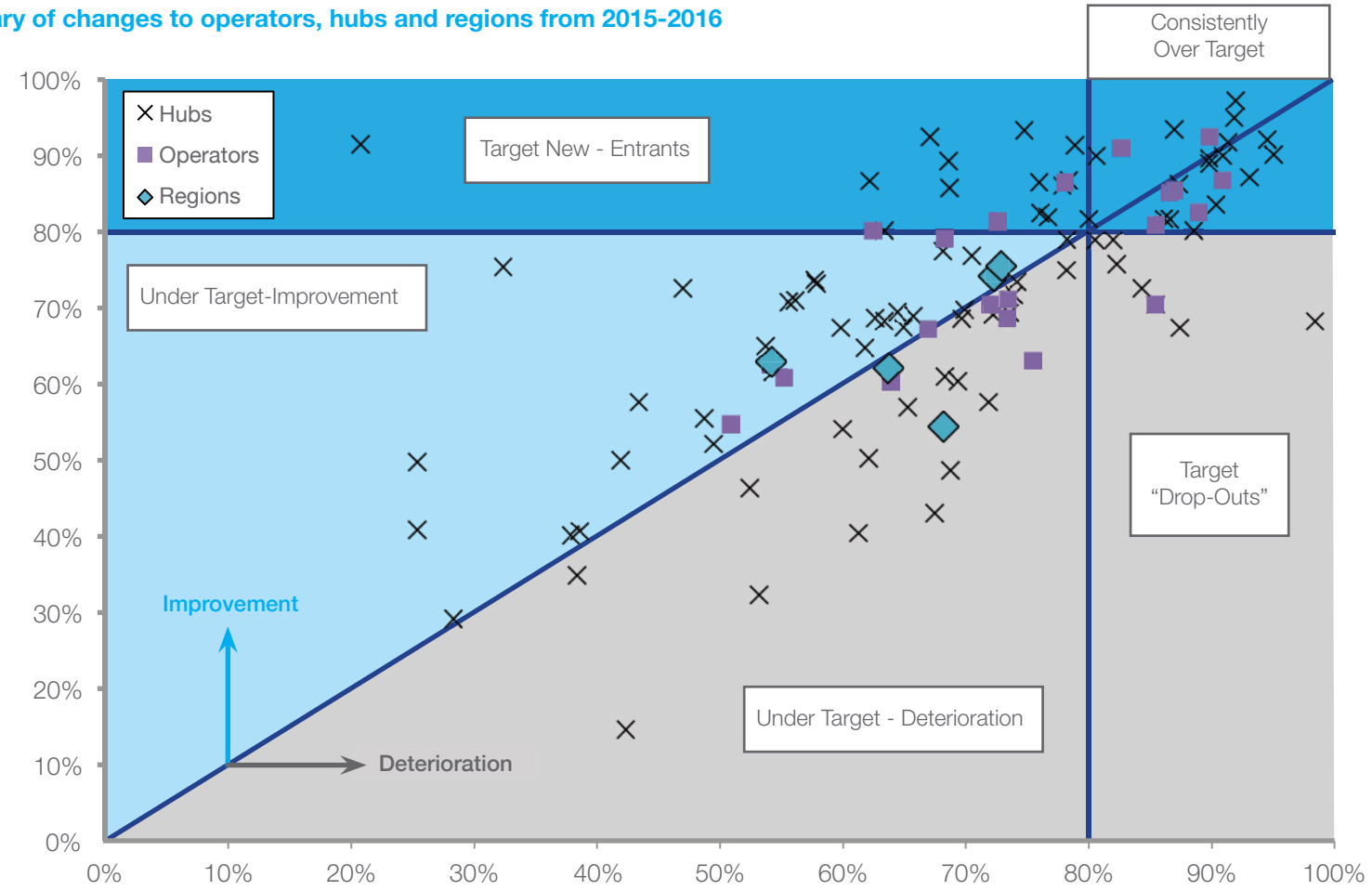


Table 1

Change "Type"	Hubs		Operator		Regions	
	Number	Production potential	Number	Production potential	Regions	Production potential
Consistently over target	17	247 mmboe	7	247 mmboe		
2016 target new entrants	14	96 mmboe	4	45 mmboe		
2016 target "drop outs"	7	62 mmboe	1	7 mmboe		
Under target improvement	27	260 mmboe	5	303 mmboe	CNS, NNS, WoS	650 mmboe
Under target deterioration	20	139 mmboe	6	183 mmboe	EIS,SNS	156 mmboe

7. Spotlight on

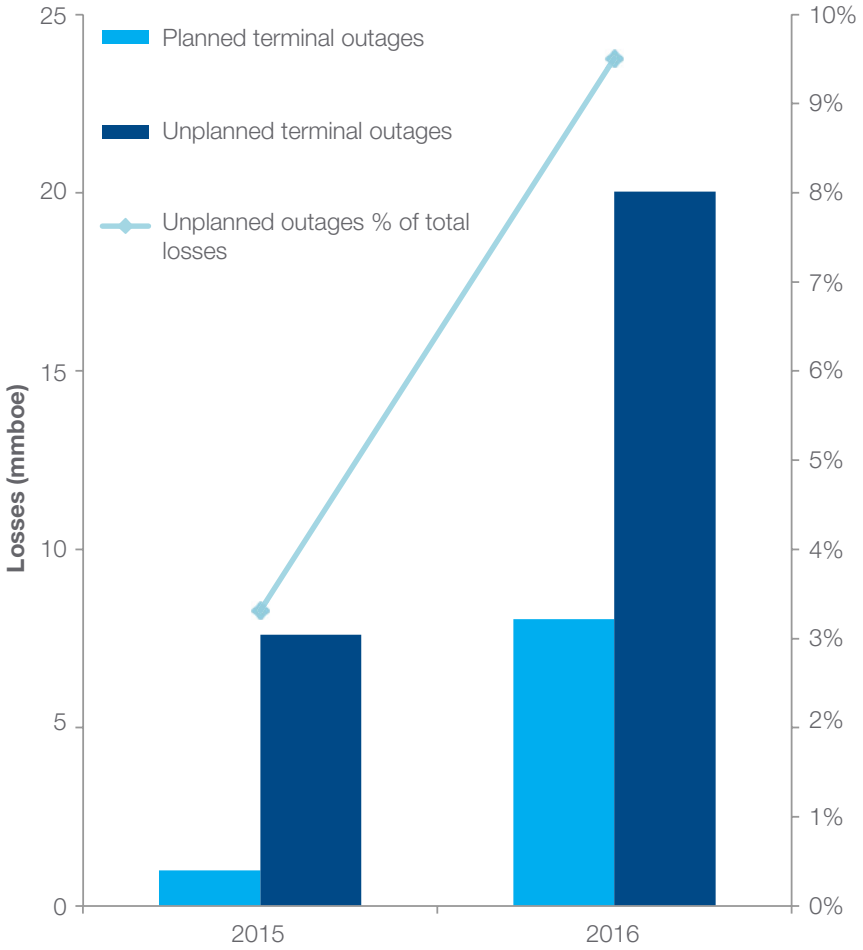
7.1 Terminals

Increasing efficiency in terminals has been a focus of activity of the PETF and its terminals sub-group. Due to its relatively large effect on PE as a whole over the last few years, reducing unplanned outages has, and will have, a material effect on efficiency upstream.

Figure 21 shows that unplanned terminal outages are growing, both in terms of total losses and as a percentage of losses as a whole. In 2015 unplanned terminal outages accounted for less than 4% of losses whilst in 2016 this jumped to over 9%.

The PETF terminals sub-group has been formed with the aim of engaging across industry to develop solutions to this growing problem, and is currently in the process of developing a terms of reference and deliverables.

Figure 21: Change to terminal losses 2015-2016



7.2 Gas compression

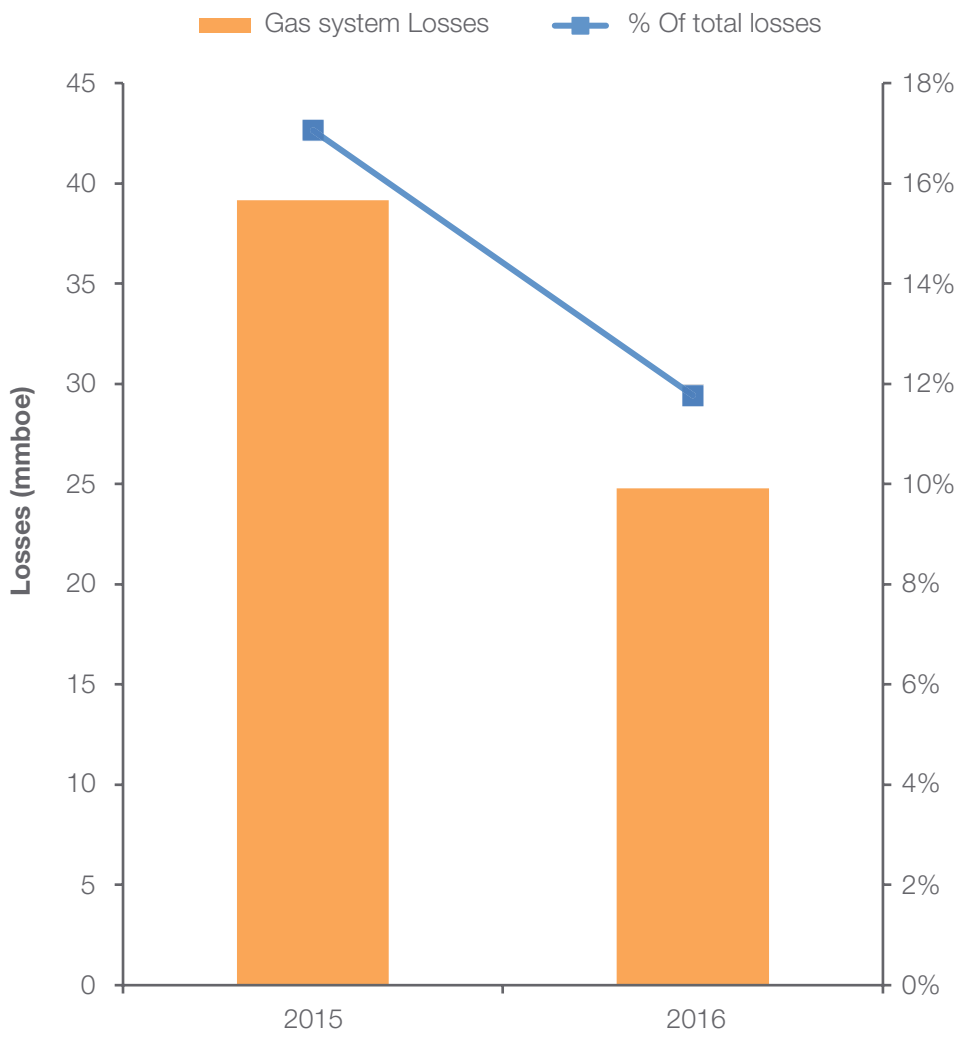
Gas compression losses have fallen by 14 million boe since 2015, and by 5% when considered against the total losses in the UKCS. This shows the progress that the industry has made in increasing efficiency and decreasing downtime, for gas compression systems.

The PETF has made gas compression systems a priority through the gas compression workgroup, and activities such as the compression club in the SNS.

In 2017 Oil and Gas UK will launch new guidelines developed by the PETF gas compression sub-group to maximise compressions system efficiency, creating additional potential for continued improvements to gas systems.

With many installations in a later stage of life, improvements to compression efficiency contribute directly to life extension, potentially helping retain infrastructure which could be used for further development opportunities.

Figure 22: Changes to gas system losses 2015-2016



7.3 Hub shutdowns

Planned shutdowns to processing facilities are essential to ensure the long term reliability and safety of hubs. Losses caused by planned shutdowns are a large contributor to total UKCS losses. Therefore, ensuring that planned shutdowns result in the minimal amount of loss possible, is key to improving PE. The PETF established a planned maintenance shutdown (PMSD) sub-group in 2014 to address this issue, and developed best practice guidelines published in 2015.

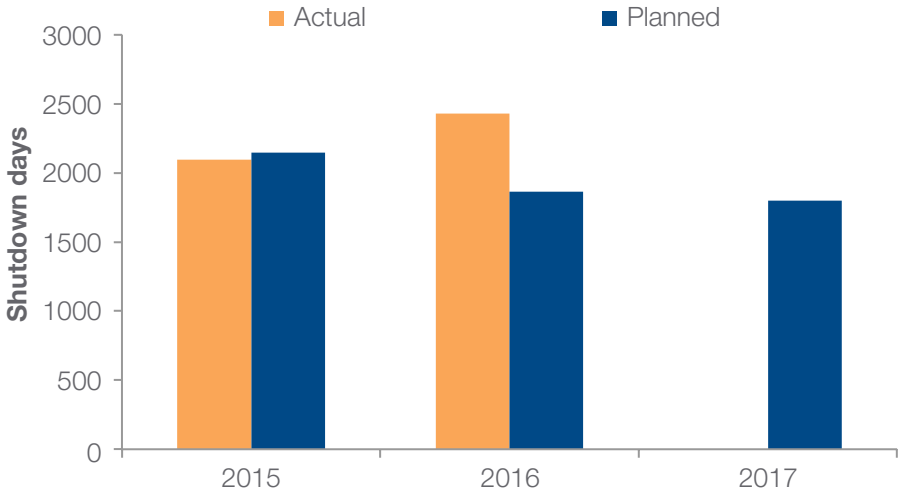
Figure 23 shows losses caused by full plant losses compared to the total losses in 2015/2016. It can be seen that losses caused by shutdown have increased slightly in 2016 both in volume and as a percentage of total losses. It should be noted that full plant losses is a subset of plant losses and includes both planned and unplanned shutdowns to processing facilities.

Whilst there has been a growth in full plant losses in 2016, it should be noted that there was an additional 335 days of actual planned shutdowns in 2016 across all UKCS hubs in total when compared to 2015 (figure 24). The increase in shutdown days was 15% whilst losses grew by 4% in the same period.

Figure 24 shows the planned number of shutdown days against the actual for 2016 in the UKCS. It can be seen that, in total, there was an overrun of 566 days which represents 30% of the total. This is higher than 2015 when the number of shutdown days was actually lower than planned. This could have been due to a large amount of deferred activity in 2015.

Figure 23: Changes to full plant losses 2015-2016

Figure 24: Planned and actual shutdown days in the UKCS



7.4 Overruns

Figure 25 highlights the causes of overruns of expected shutdown durations in 2016. Unplanned outages were the largest single source of overrun, Figure 27 overleaf shows the causes in more detail highlighted by the scale of overrun.

Outside of unexpected shutdowns, scope increase was the next largest source, followed by issues that developed during a shutdown causing an overrun. Export outages were the smallest cause of overrun.

7.5 Reductions

Whilst overruns impact negatively on shutdown losses, reductions in duration can impact positively. Figure 26 shows the causes of reductions in 2016. Figure 27 highlights the causes in more detail.

The majority of reductions came from reducing the scope of a shutdown, or optimising it, which, when combined, amounted to 159 days. Positive performance at the original scope only accounted for 29 days in total

During 2016, 142 days of shutdown were deferred into 2017.

Figure 25: Days over plan, by cause type

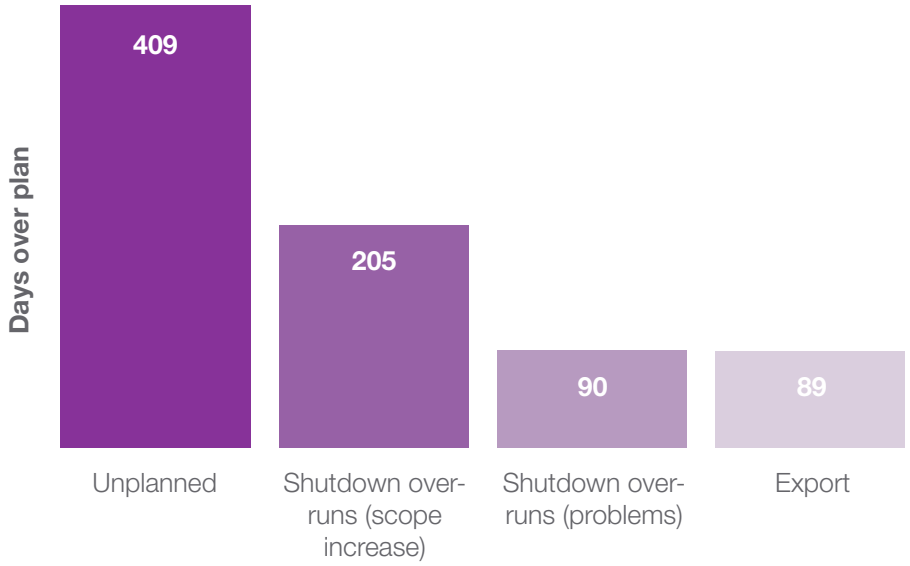


Figure 26: Days under plan, by cause type

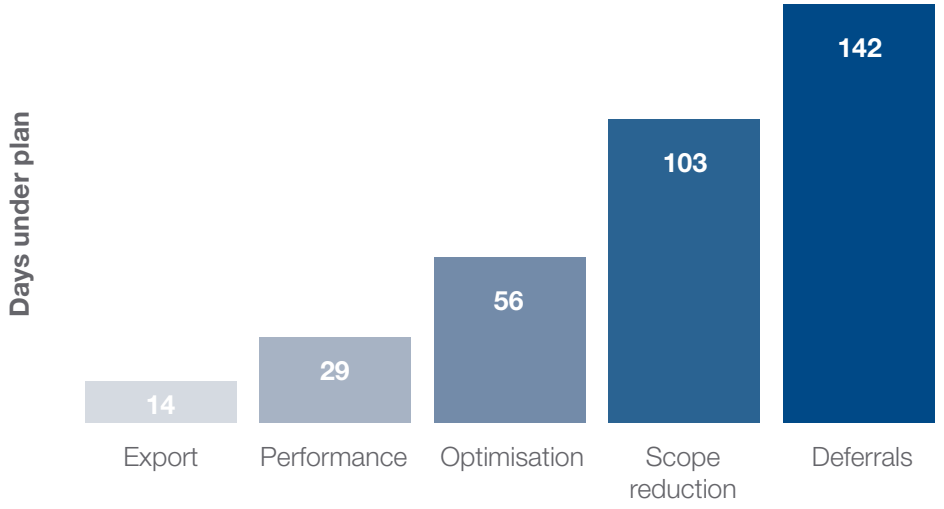
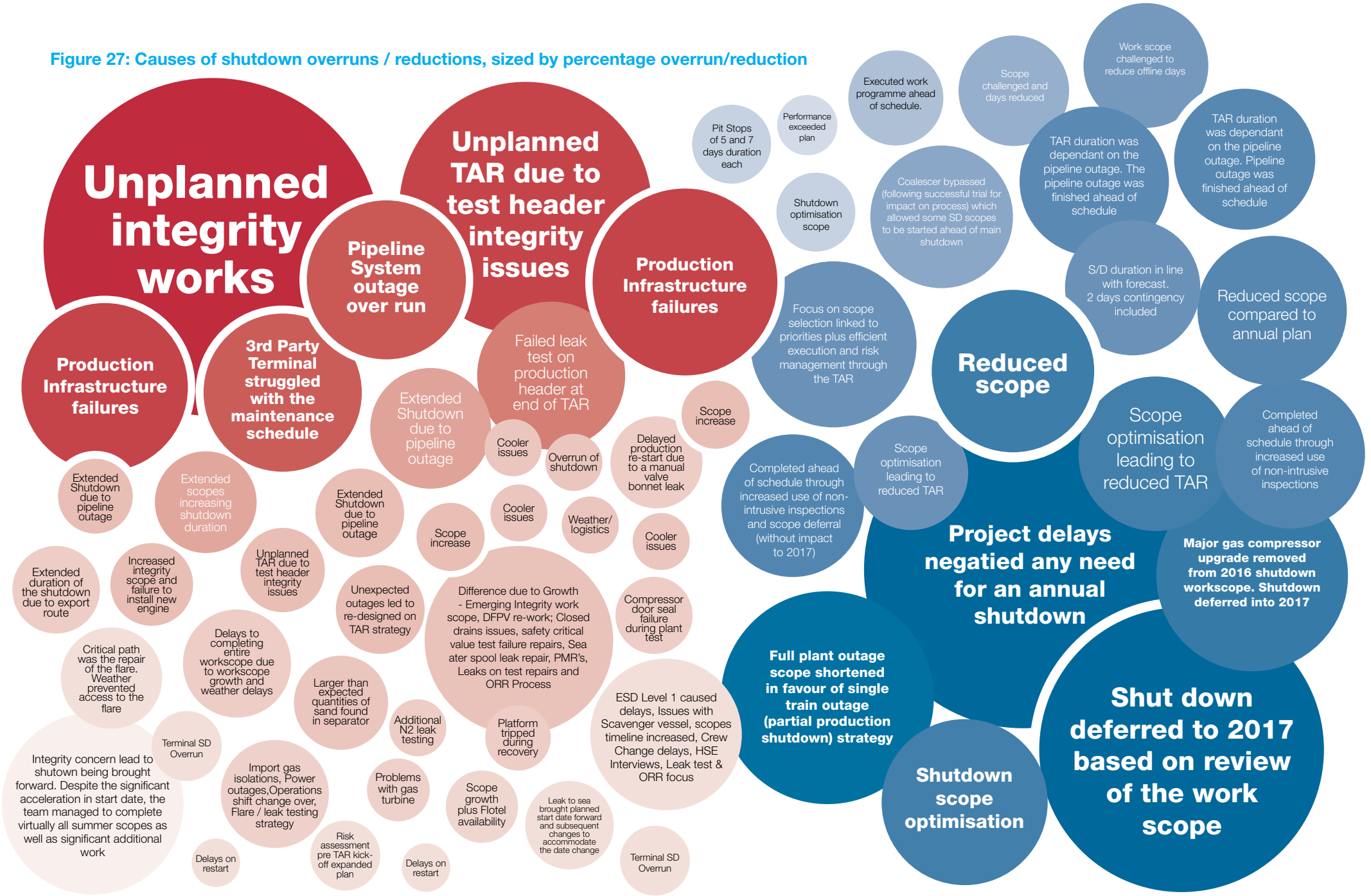


Figure 27: Causes of shutdown overruns / reductions, sized by percentage overrun/reduction



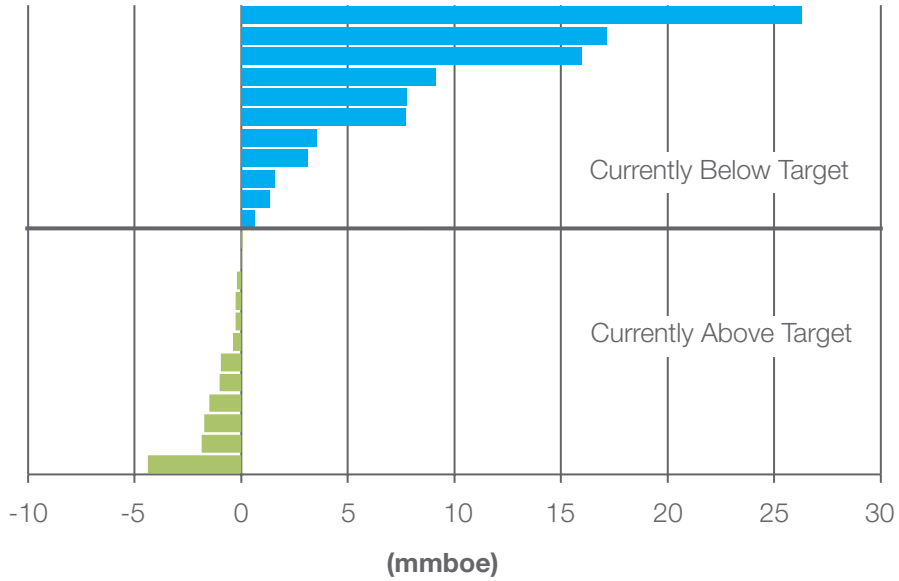
8. Looking Forward

8.1 Potential prize from hitting PE target

Figure 28 shows the change in production for each operator if they were to achieve the 80% PE target. Operators with a negative value are already achieving the target.

There are currently 11 operators under the target with 12 at, or over, the target.

Figure 28: Potential change in production per operator from hitting 80% PE Target



Hypothetically, in 2016 there was a potential prize of an additional 160,000boe a day equating to 59 million boe a year from all hubs hitting an average PE of 80% in the UKCS.

This prize grows to +80 million boe a year (+220,000 boe a day) if you assume that all hubs already over the 80% target remain at their current level whilst all hubs under raise to 80%. This is equivalent to a sizable field development in the UKCS.

To put this in perspective, a field producing 160,000 boe a day would have been the UKCS's largest producing field in 2016.

Table 2

		Additional production "prize"	
PE Average	Daily production (mmboe)	Daily mmboe	Yearly mmboe
90%	2.01	+0.39	+142
80%	1.78	+0.16	+59
73% (current)	1.62	0	0
60%	1.34	-0.28	-102

8.2 Production efficiency outlook

2016 has shown growth in PE which has been achieved through the continuation of improvements seen in recent years.

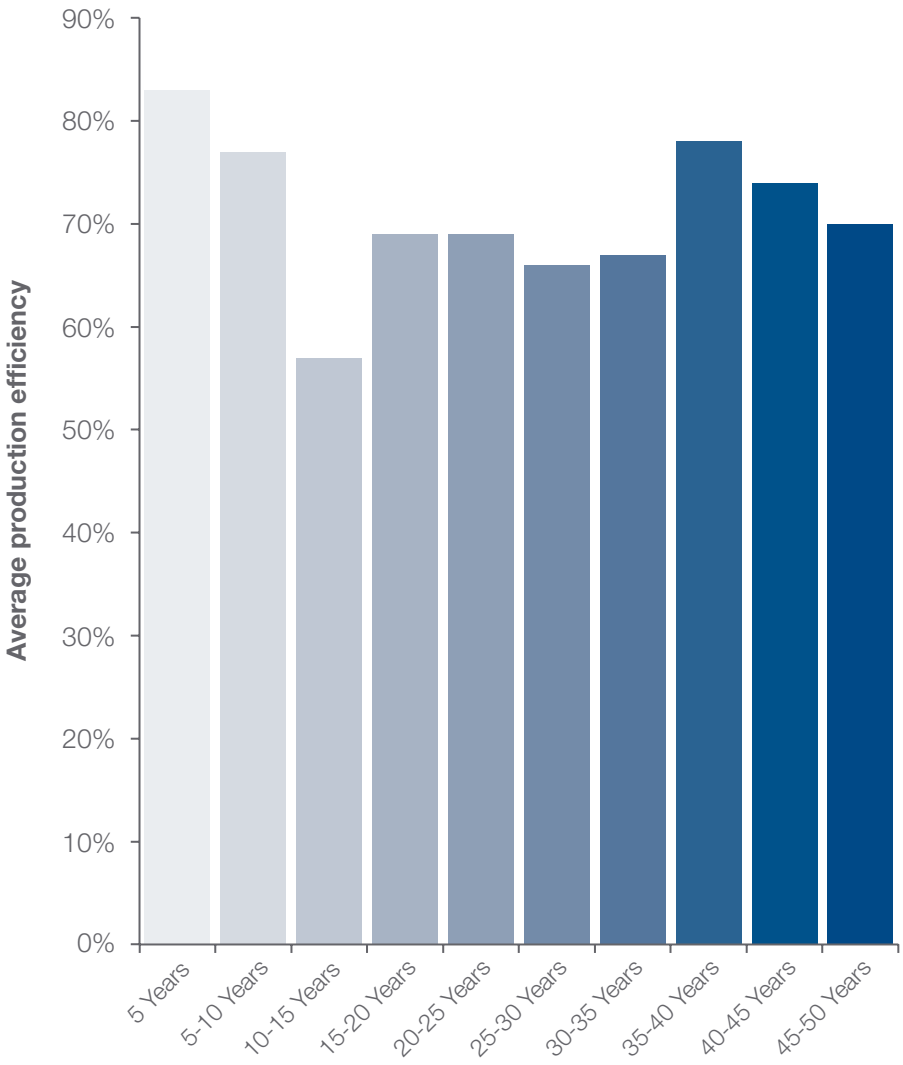
Whilst PE is moving in the right direction, the 80% target has yet to be reached.

Recently, newer hubs have been performing above average (figure 29), with hubs less than five years old averaging above the 80% target. 2017 will likely see significant new projects come on stream. As more new production comes online and moves past the early production stages it is expected that this will pull up PE as a whole in the UKCS as long as the momentum in existing fields is continued.

2016 also saw significant pipeline outages. Given the effort demonstrated by various parties across industry, it is hoped that a corner will be turned, and export losses will begin to fall, much like has been seen with plant losses.

It will be key that new projects can be brought online in a timely fashion, existing improvements to efficiency are maintained and built upon, and deterioration in export losses are successfully addressed.

Figure 29: Production efficiency vs hub age



9. Conclusions

2016 has been a positive year for PE in the UKCS. Overall, an additional 12 million boe was produced due to increased efficiency when compared to 2015.

Plant losses continued to fall, continuing a remarkable turnaround since 2012. Water injection efficiency has also increased by 3% in 2016 delivering reduced losses, and improving production.

Export losses continue to remain a concern, with significant losses caused by pipeline and terminal outages. Whilst an increase in well losses could be indicative of future problems, gas compression systems have seen strong improvements to efficiency, highlighting industry efforts such as the PETF compression work group. Improved efficiency in gas systems is key to extending mature infrastructure such as that found in the SNS. This allows MER UK to be put in practice and is an enabler for small pool development.

There is a significant backlog of economically viable projects in the UKCS that will lead to improved efficiency. With the recent stability in the oil price environment, conditions should be more favourable in 2017 for operators to reduce this backlog and boost efficiency.

10. Appendix

10.1 Summary table

	2015	2016
Production efficiency		
UKCS	71%	**73%**
NNS	70%	**75%**
CNS	72%	**75%**
SNS	68%	**64%**
Progress towards 80% target		
Hubs above target	28	**35**
Operators above target	9	**13**
Potential & losses		
Well losses	32	**37**
Plant losses	158	**126**
Export losses	44	**45**
Market losses	9	**3**
Total losses	243	**211**

10.2 Glossary

Backout
Occurs when pressure from a well/ wells causes production from other wells to stop.

CNS
Central North Sea.

Economic Production Potential
Economic Production Potential (EPP) should only be made up of production potential which is commercially achievable for the operator through actions such as intervention, workover, repair, maintenance activity, etc. The EPP category may only contain production potential that has been previously available.

EIS
East Irish Sea.

EMPP
Economic Maximum Production Potential (EMPP) is equal to SMPP, less any provision for Uneconomic Production Potential.

Export loss
Losses occurring from the export system of a hub. Defined as the process past the export point of the platform or FPSO, and the custody transfer point or aggregated system entry point.

Full plant
Losses involving the total shutdown of processing facilities, either planned or unplanned.

Market loss
Losses occurring due to the market. Defined as the process past the custody transfer point or aggregated system entry point.

NNS
Northern North Sea.

PETF
Production efficiency Task Force.

Plant loss
Losses occurring from the plant system of a hub. Defined as the process between the tree connection outboard of the production wing valve and the export point of the platform, or FPSO.

SMPP
Structural Maximum Production Potential. The theoretical maximum production from a hub. This is equal to the smallest choke in the system.

SNS
Southern North Sea, otherwise known as the southern gas basin.

UKCS
United Kingdom Continental Shelf.

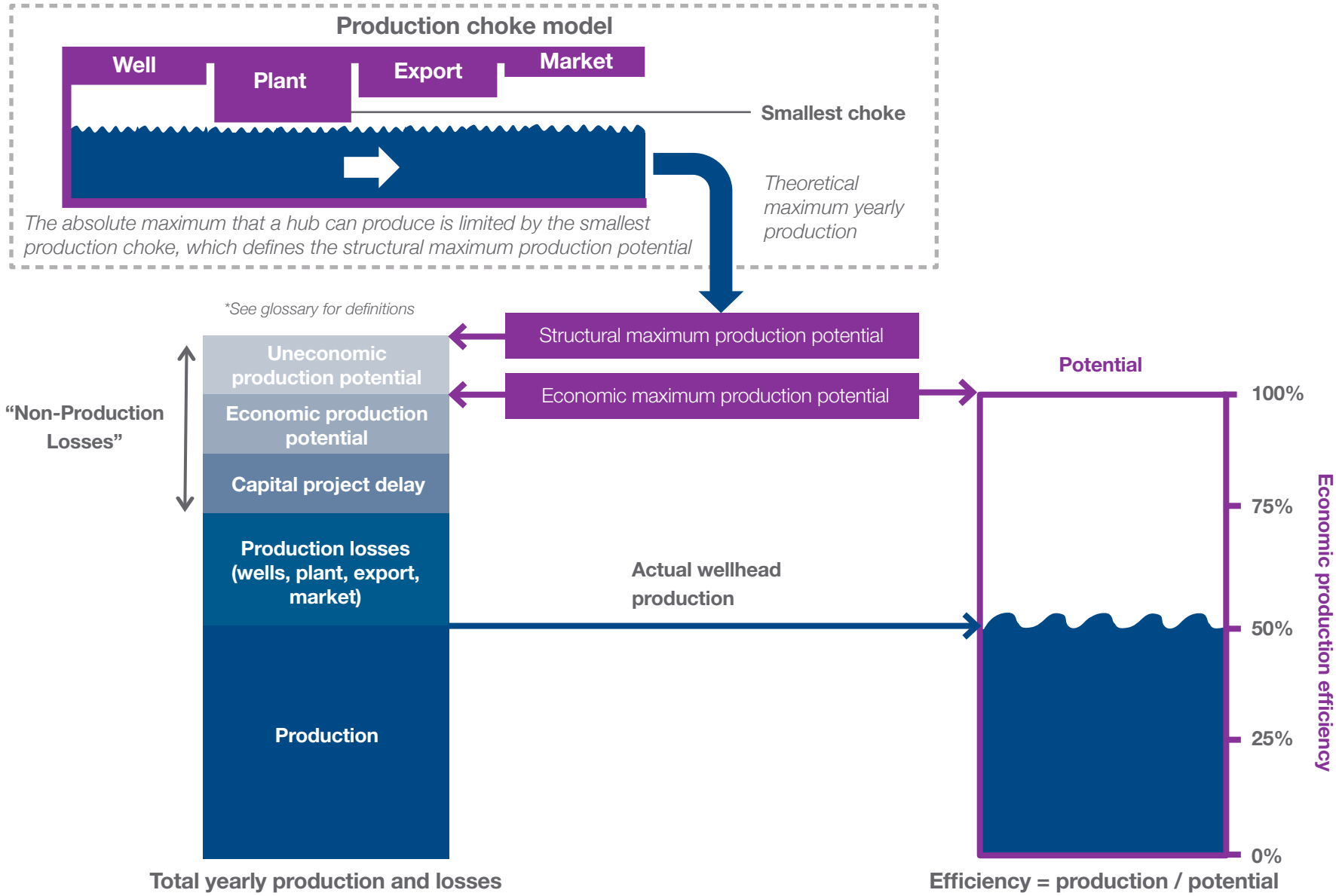
Uneconomic production potential
Uneconomic Production Potential (UPP) is production potential which is not commercially achievable for the operator. UPP may only contain Production Potential that has previously been available.

Water injection efficiency
The percentage of water injected into a reservoir compared to the optimal rate

Well loss
Losses occurring due to wells. Defined as the process from the reservoir to the tree connection outboard of the production wing valve

WoS
West of Shetland

Figure 22: production efficiency methodology



Oil & Gas Authority

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