



Oil & Gas
Authority

UKCS Production Efficiency

2015 Results

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1. Executive summary

Production efficiency (PE) is an important indicator for the Oil and Gas Authority (OGA); it is a core element of production optimisation within the asset stewardship framework and a key focus area for the Maximising Economic Recovery (MER) UK Asset Stewardship Board.

In early 2016 the OGA carried out a survey of 2015 production efficiency data across the UKCS. The results of the survey indicate sustained production performance improvement on the UK Continental Shelf (UKCS) with an average production efficiency of 71% across the industry. This is an increase of 6% from the previous year (11% from the 2012 low) and equates to 8.43 million barrels of oil equivalent (boe) extra production (based on 2015 production volumes) for every 1% increase in PE.

Production losses continue to decrease with 243 million boe recorded for 2015, 39 million boe less than 2014. Structural Maximum Production Potential (SMPP) has increased 32 million boe to 841 million boe from 2014; however SMPP is significantly down from the 1,083 million boe recorded in 2011.

Figures show a welcome and sustained improvement in PE in comparison to figures from 2012, however further focus on efficiency, continuous improvement and collaboration across the industry is required if the UKCS is to come close to achieving the shared industry and OGA target of 80% PE by the end of 2016.

2. Introduction and background

The aim of this report is provide a deeper understanding of the UK's offshore hydrocarbon production performance, to enable closer working with industry to maximise economic recovery.

The OGA and its predecessors have historically engaged with operators on the subject of PE with the objective of seeing improvement over time.

PE will continue to form a core element of the OGA's future focus on production optimisation.

In the context of this report, PE is defined as actual production as a percentage of SMPP. The OGA, in its Corporate Plan 2016-2021, identified it as a Key Performance Indicator (KPI) for industry, with a target of 80% PE for the UKCS by the end of 2016.

The OGA has produced this report, performing analysis using data gathered from industry and using best practice guidelines drafted by the Society of Petroleum Engineers in collaboration with industry.

An exercise was carried out to engage with industry on the methodology and approach via a series of workshops, with the result being a complete dataset returned for 91 producing hubs. This dataset categorises production potentials, the chokes preventing hubs achieving their potential and a quantification of the associated production losses, which will be identified as targets for improvement going forward.

The OGA has collaborated extensively with industry on the production of this report and appreciates the value that is placed on PE analysis by colleagues across the sector.

An operator which has submitted production hub data can be provided with a PE benchmark pack relating to their hub by making a request to the OGA at **PPR.Team@ogauthority.co.uk**. PE Benchmark packs will only be provided to operators participating in the OGA survey.

3. Production efficiency analysis

3.1 UKCS overview

UKCS production efficiency in 2015 was 71%, a significant improvement from the 2012 low of 60% (see Figure 1). This has been driven by a year on year reduction in the volume of production losses (illustrated by Figure 2) but also partly aided by a reduction in production potential relative to 2012. UKCS SMPP in 2015 was 835 mmbobe with plant and export chokes mostly responsible for production potential restriction (Figure 3).

Evidence shows a reversal in the declining production potential trend coupled with a sustained decrease in production loss volumes in the UKCS. This has yielded an increase in realised production in 2015, the highest since 2011 and a clear indicator of improved performance.

Figure 1:
UKCS production efficiency and production

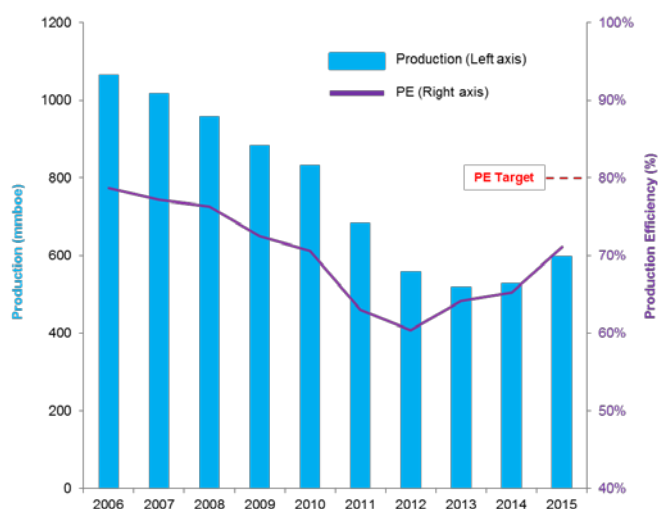
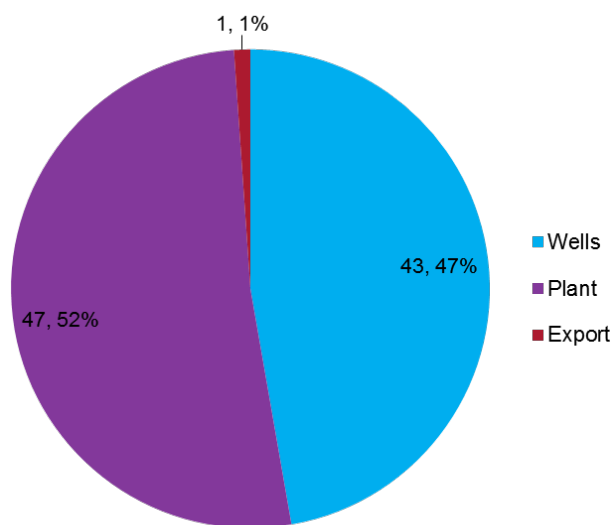


Figure 2: Production losses vs. time



Figure 3: SMPP restrictions on the UKCS – 2015



3.2 2015 Hub performance

In the context of measuring PE, a hub is defined as “an asset or installation that processes hydrocarbons for its associated fields.”

Of the 91 production hubs analysed, 28 have exceeded the target of 80% (Figure 4). This is further split out regionally in Figure 5, where it is clear that the central North Sea (CNS) achieves the highest average production efficiency, while the southern North Sea (SNS) is currently experiencing the lowest average production efficiency.

There is a particularly large range in PE performance between the best performing hubs and the poorest, however there is no correlation between PE performance and the age or type of hub infrastructure.

The UKCS average performance when compared to a 'best in class' hub (Figure 6) further highlights the opportunities for improvement and specifically demonstrates the requirement for plant loss and export loss improvements (Figure 6). Further details describing the source of losses are shown in Section 3.

Figure 4: PE by operated hub

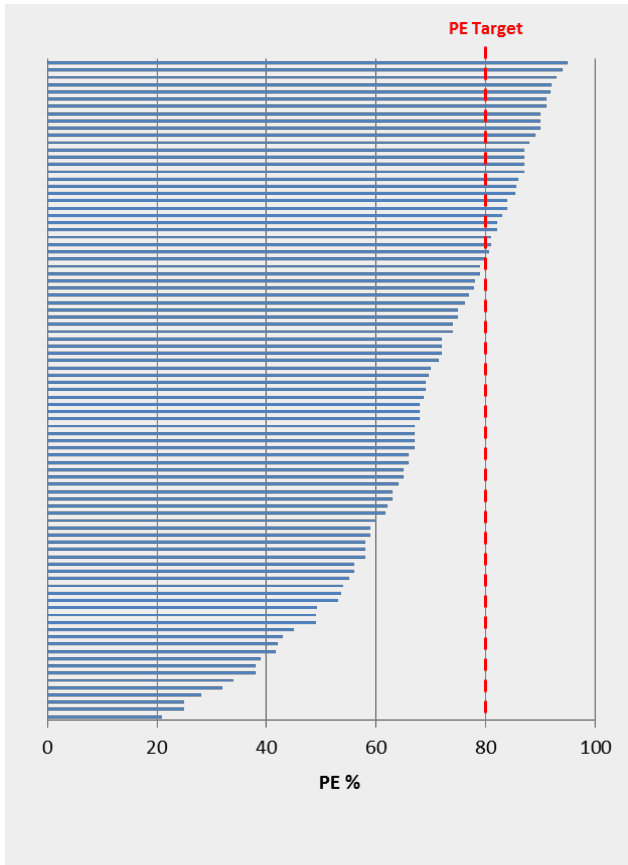


Figure 5: PE by operated hub and region

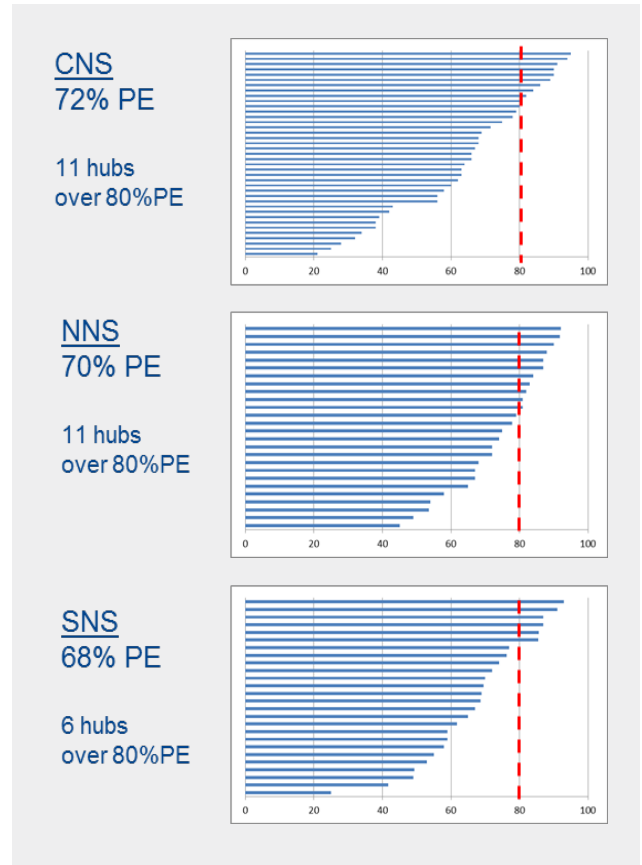
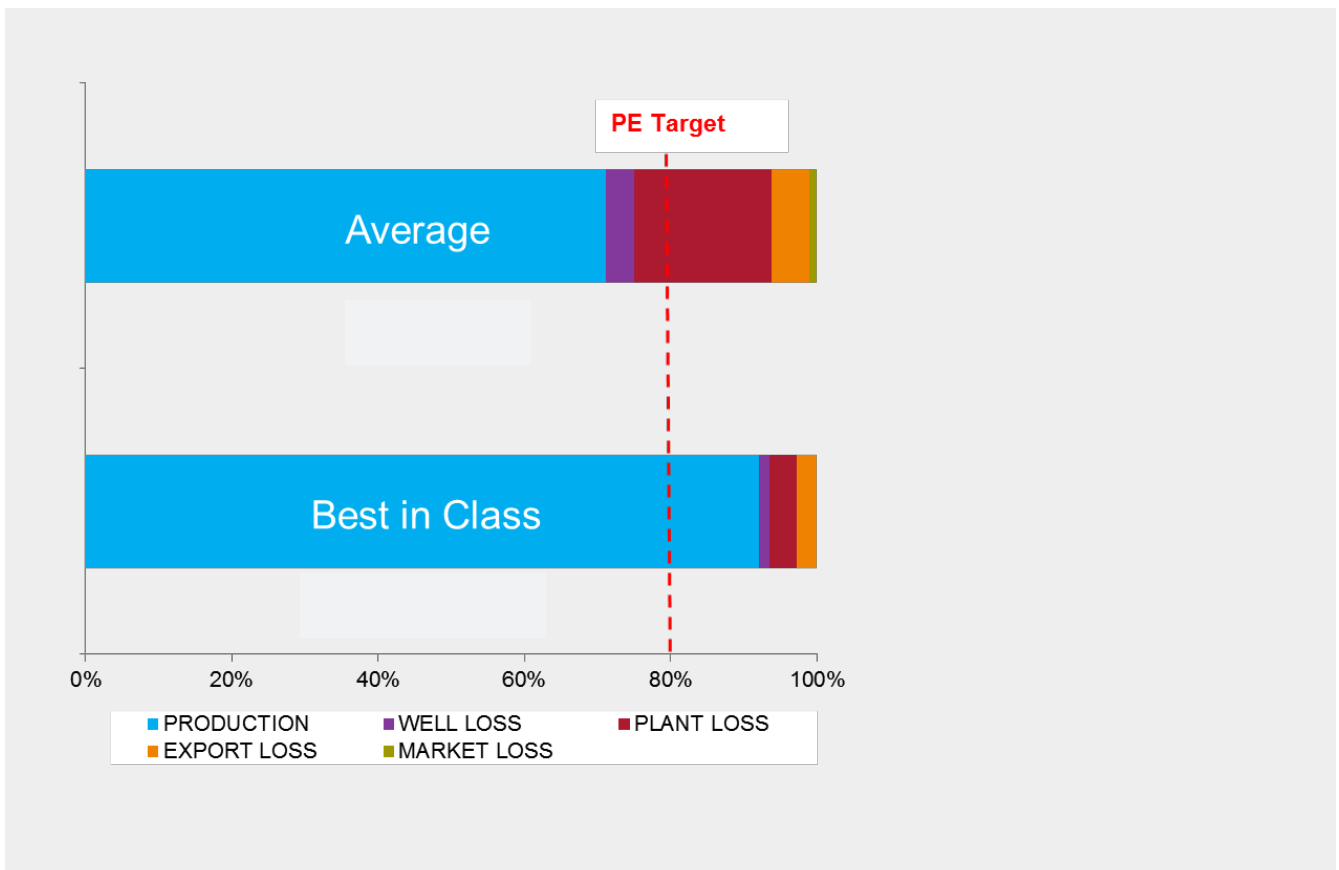


Figure 6: Average vs. best in class hub

3.3 Anonymised operator performance

61% of UKCS operated hubs are showing a PE improvement in 2015 relative to 2012, further demonstrating a cross-industry improvement (Figure 7). It is also evident that those who have shown little perceived PE improvement relative to 2012 are not necessarily poor performers, e.g. Operator X, who is shown to be a top performer in 2015 (Figure 8). In the cases of Operator Y and Operator Z, these operators unfortunately suffered significant platform outages in 2015.

When incorporating new entrants to the market since 2012 (Figure 9), the 2015 operator performance data clearly identifies hubs with the greatest opportunity for improvement by production volume. In total, approximately 95 million boe was lost by operators falling short of the 80% PE target. The net prize lost when taking in to account operators who exceeded expectations was approximately 75 million boe.

Figure 7: 2015 PE per cent point improvement ratio relative to 2012

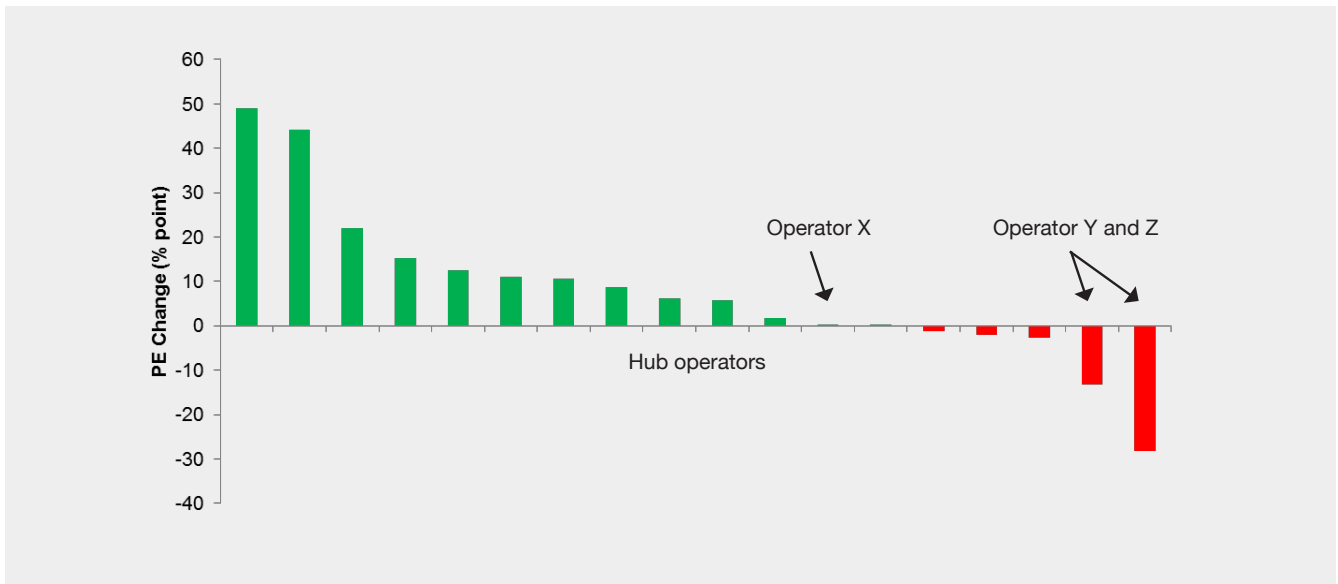


Figure 8: 2015 PE by hub operator

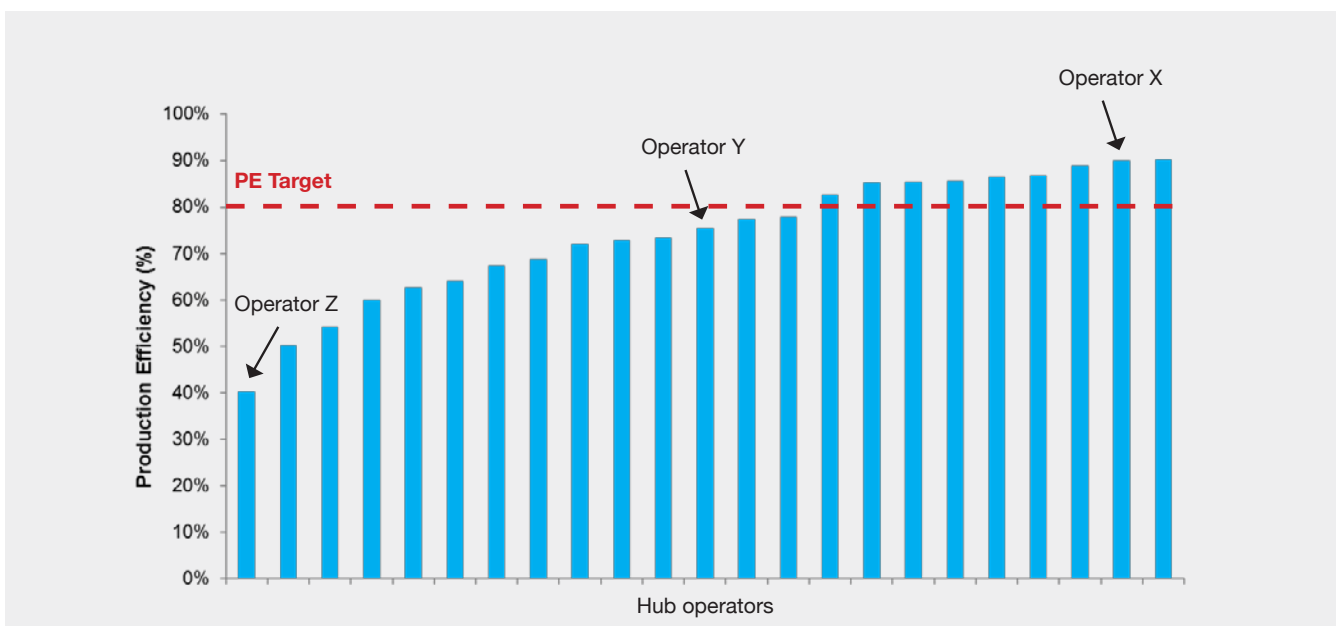
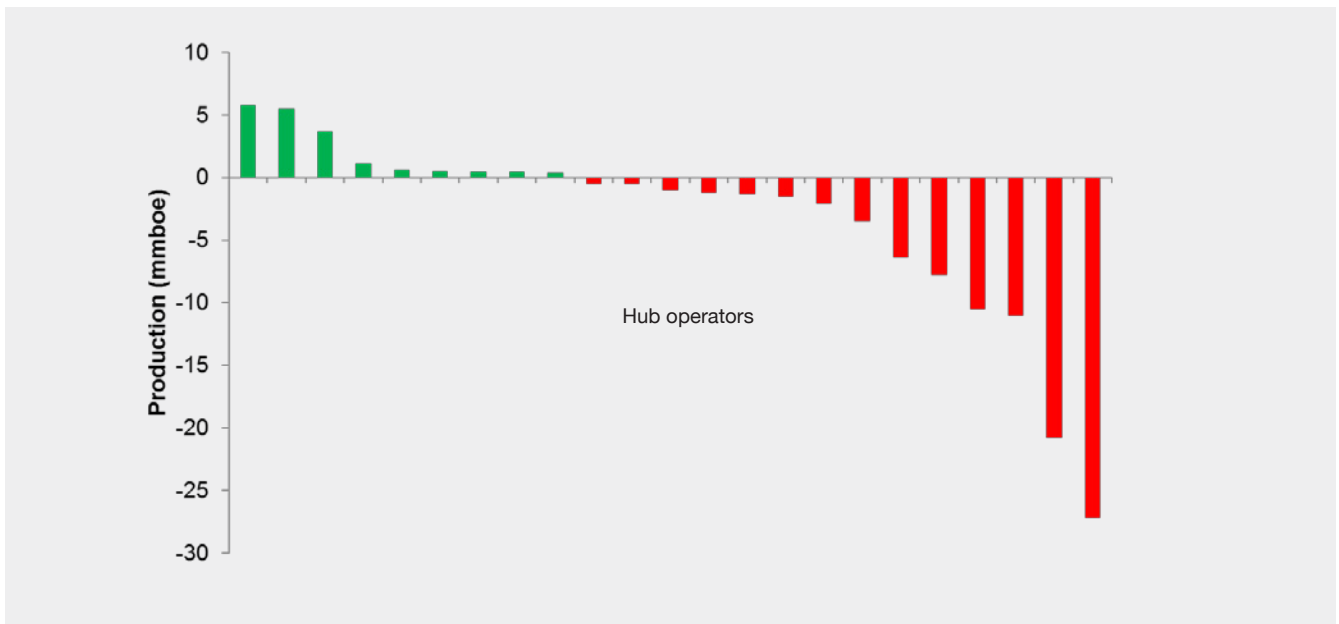


Figure 9: Losses/gains relative to 80% PE target

4. 2015 loss analysis

Total production losses measured 243 million boe in 2015.

Although significant improvements have been made in plant-related loss reduction following the establishment of the Production Efficiency Task Force (PETF), compression work group and the publication of the Oil & Gas UK TAR (turnaround) guidance on shut downs, plant related outages account for four of the five largest sources of production loss in 2015.

Loss categories by region can be seen in (Figure 11) where significant plant losses in the CNS account for 43% of total UKCS losses. The analysis does not distinguish between losses due to planned shutdowns which overran, and unplanned plant outages. The OGA is examining these losses further as part of its Asset Stewardship Strategy Tier 3 reviews which examines production optimisation.

Figure 10: Losses by category summary

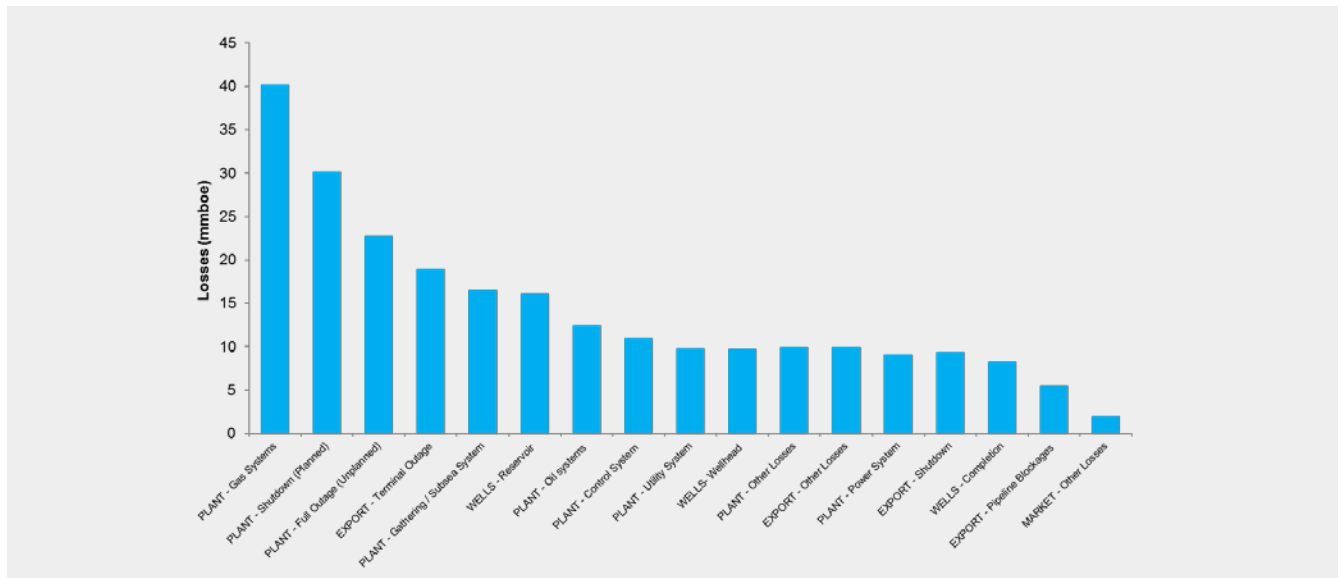
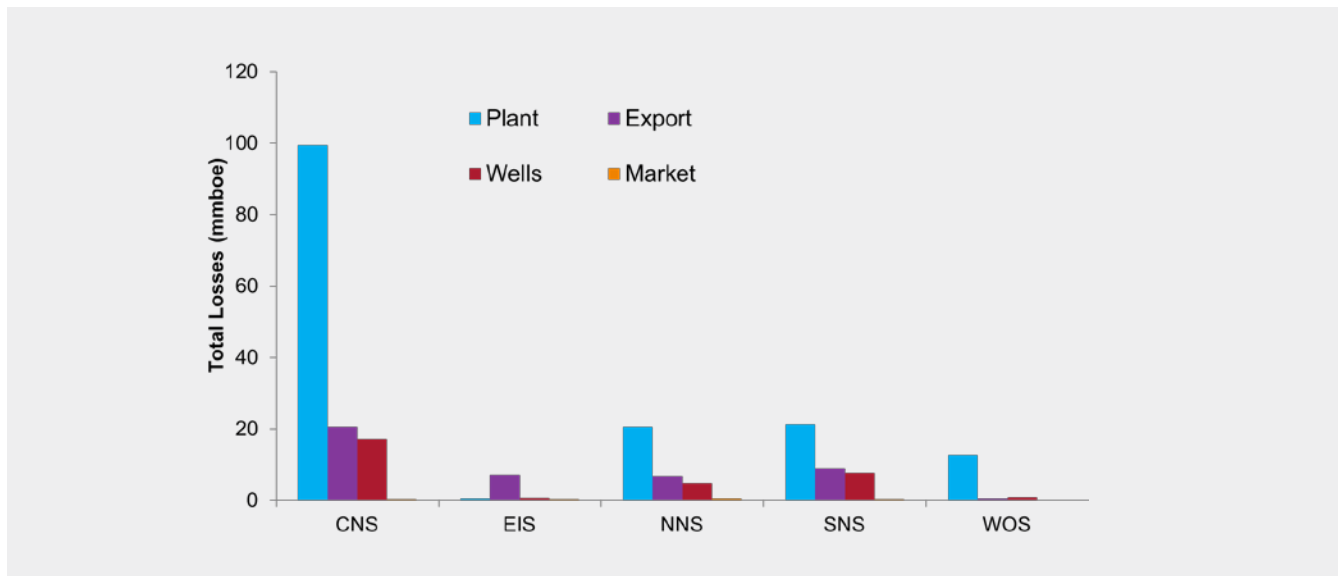


Figure 11: Losses by category and region



4.1 Plant specific losses

Plant losses made up 72% of total production losses in 2015.

Approximately 50% of the plant losses were attributed to 14 hubs (Figure 12) with the majority of plant losses sourced in the CNS and dominated by a small number of operators (Figure 13).

Excluding full plant shutdown related losses, gas systems and gathering systems are shown to be significant contributors where these two hub operators hold significant volumes (Figure 14).

The OGA and the PETF have engaged with the industry trade association Subsea UK to share the high level anonymised findings of this survey and aim to build on the historic successes of the PETF by supporting Subsea UK's interest in developing a similar loss reduction campaign for gathering systems.

Figure 12: Plant loss by hub

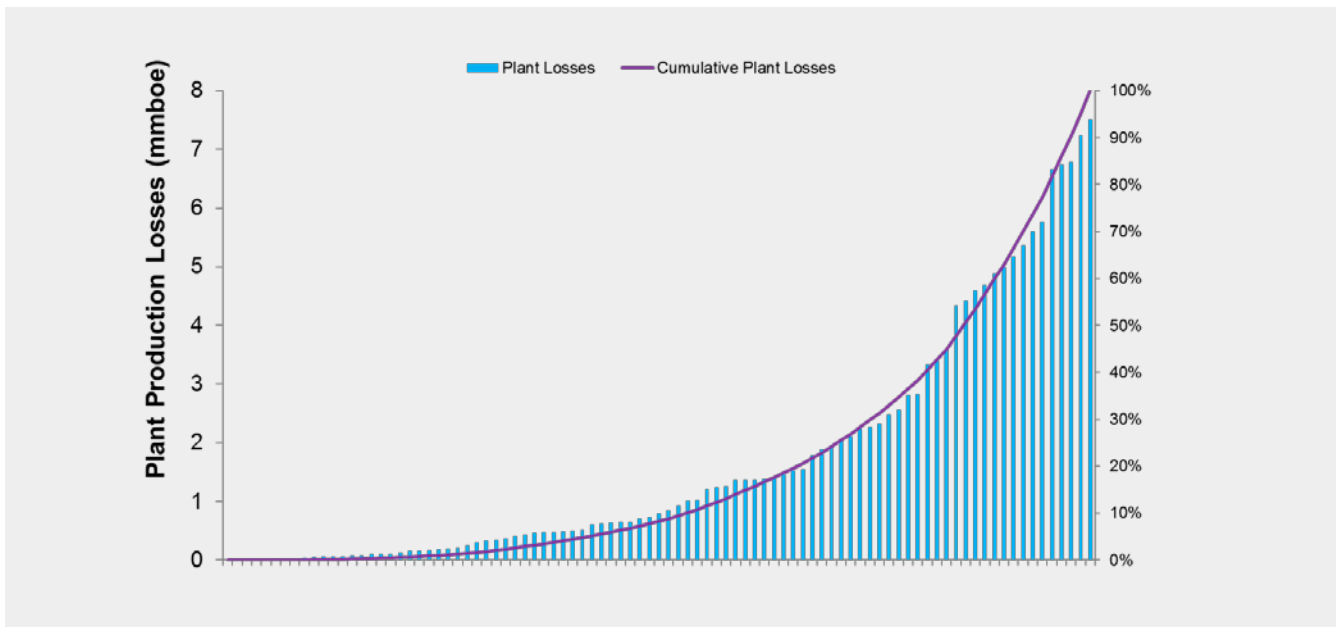


Figure 13: Plant losses by hub operator and region

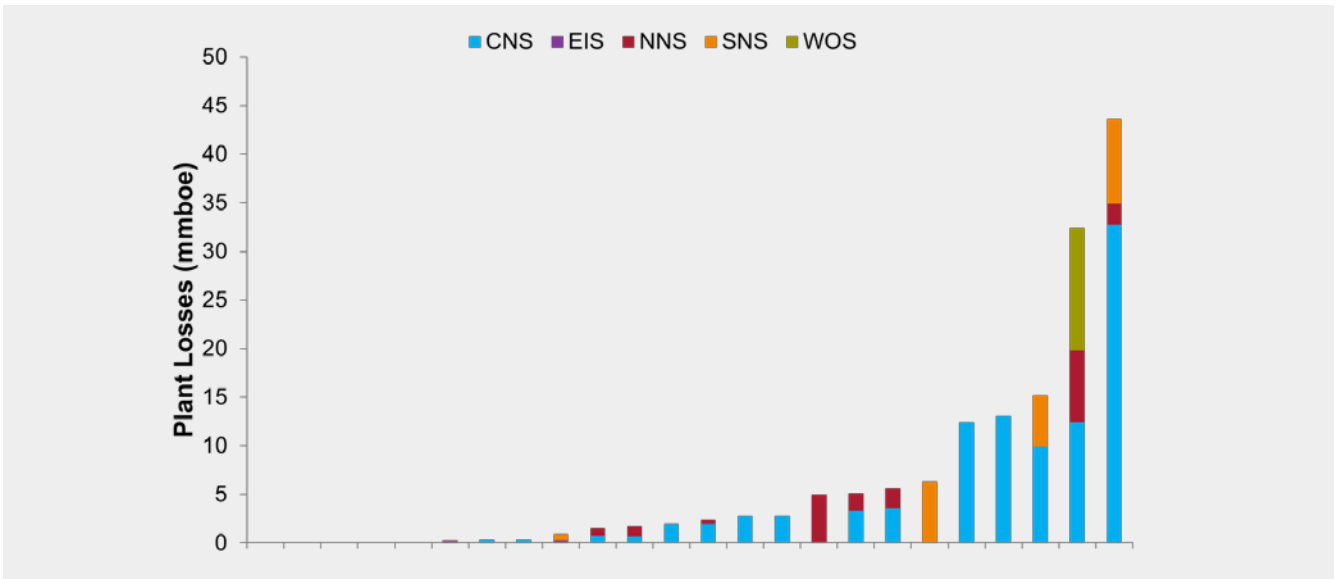
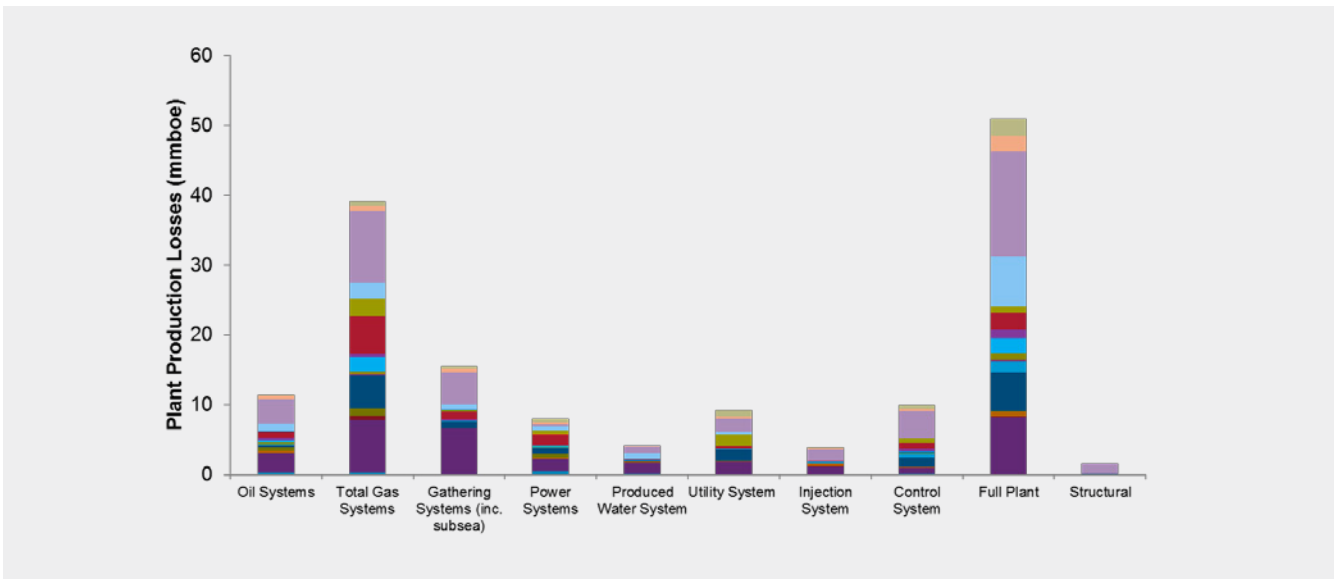


Figure 14: Plant losses by hub operator and category



4.2 Export specific losses

The most significant export losses for both oil and gas are associated with terminal outages. Two oil pipelines (Figure 15) and five gas pipelines (Figure 16) are responsible for nearly all of the pipeline back-out and pipeline blockages losses.

These insights have resulted in the PETF (with OGA support) establishing a terminals work group comprising industry terminals representatives who aim to identify common collaborative mitigations to the losses, similar to the work of the compression workgroup. This work group is in the process of establishing a terms of reference.

Figure 15: Oil export losses by pipeline

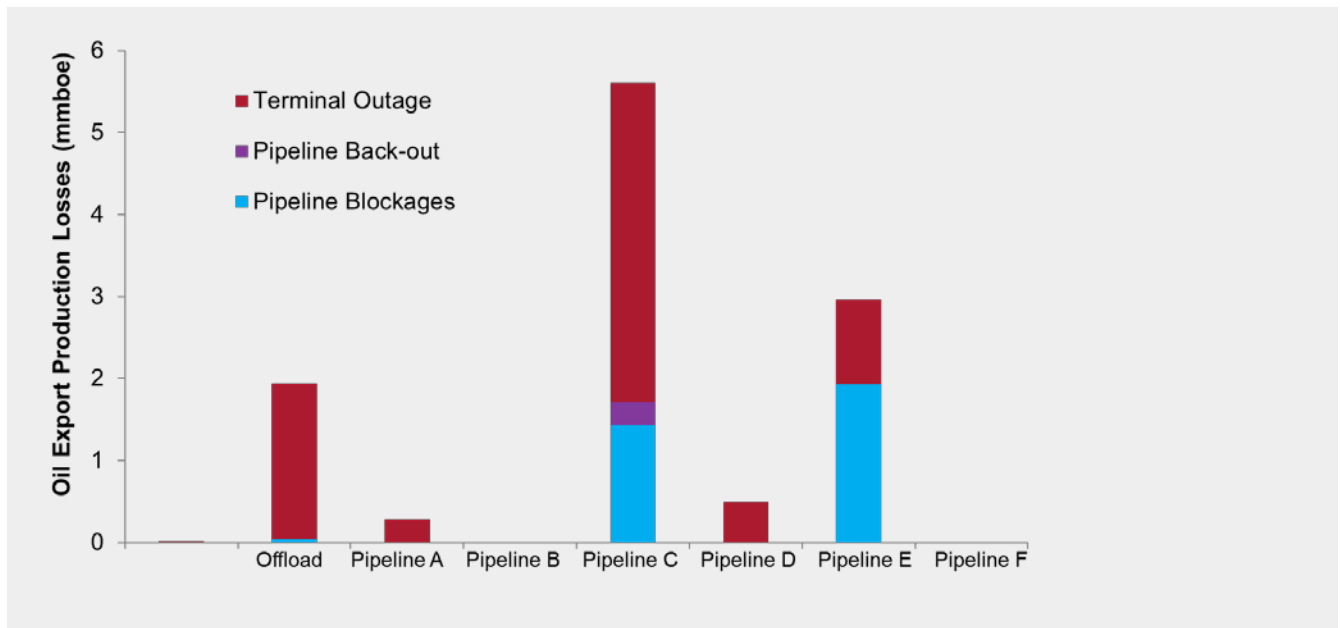
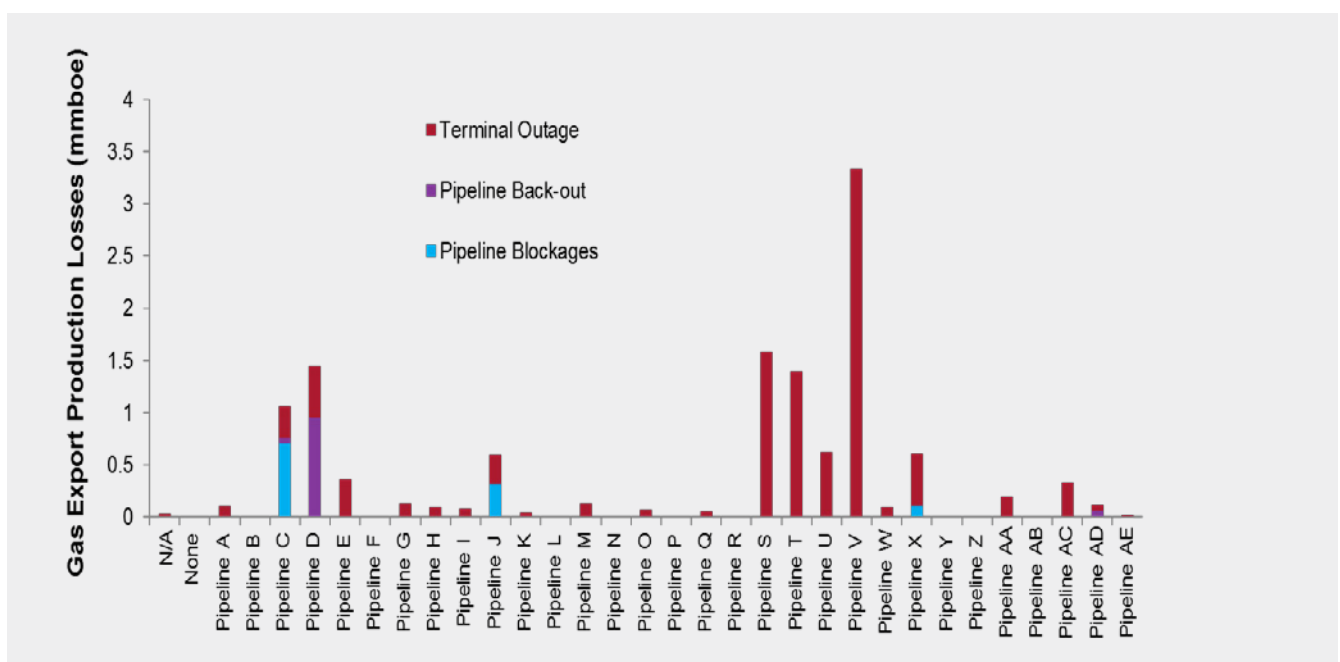


Figure 16: Gas export losses by pipeline



4.3 Well specific losses

When considering well specific losses, approximately 50% of these were attributed to nine hubs (Figure 17) however these were not necessarily hubs with the greatest well production potential (Figure 18).

Reservoir losses are shown to be the most prominent well loss category (Figure 19) where two hubs account for approximately 25% of total well – reservoir losses (Figure 20).

The distribution of well related losses indicates that it is not so much of an industry wide problem rather it is a few key hubs significantly contributing. The OGA will work with operators through the stewardship process to improve performance of these hubs.

Figure 17: Well losses by hub

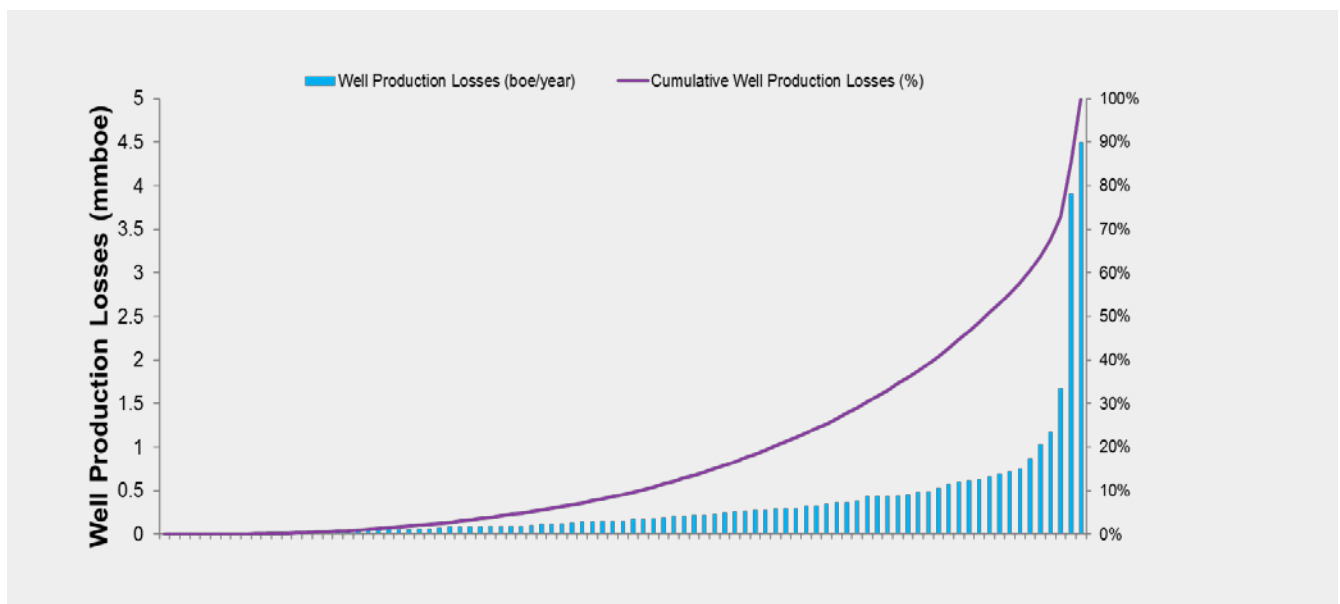


Figure 18: Cross-plot to show well losses by WMPP

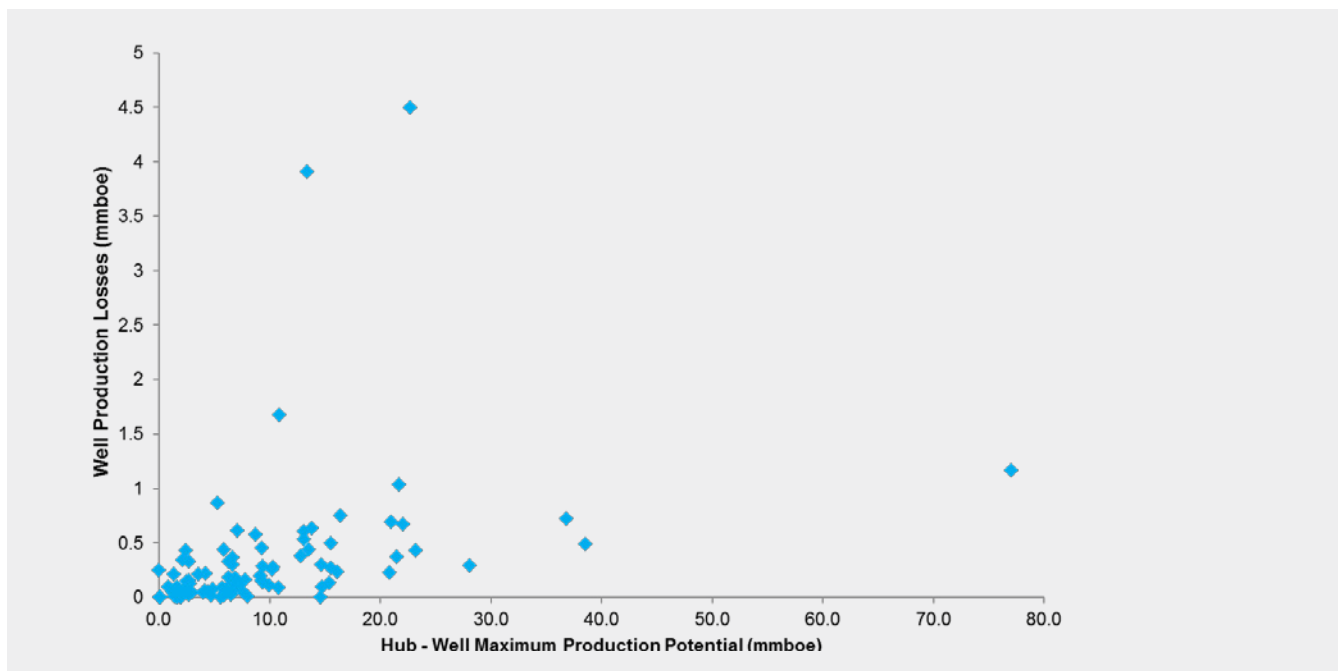
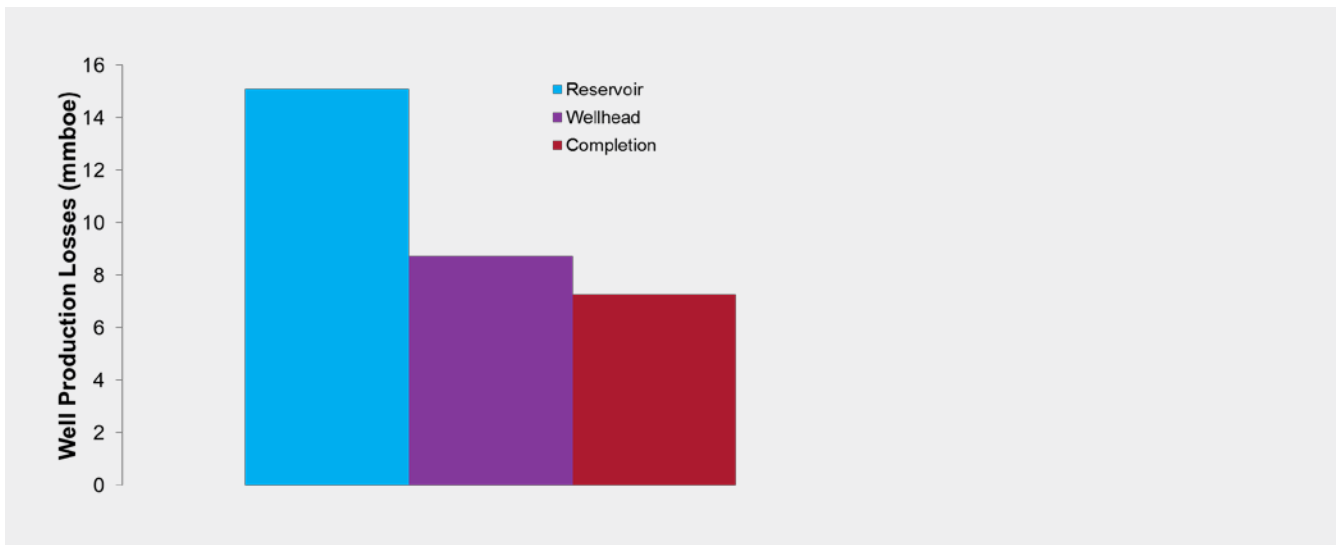
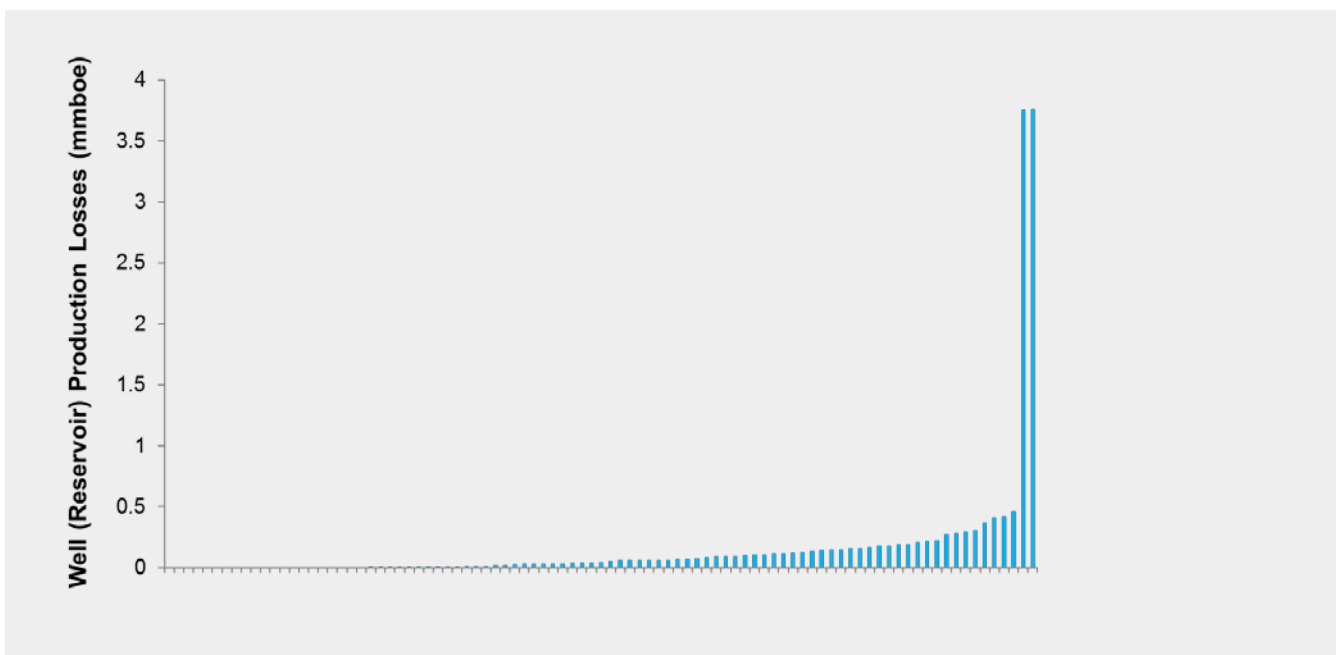


Figure 19: Well losses by well loss category**Figure 20: Reservoir losses by hub**

4.4 Market specific losses

As expected very little losses are associated with market losses.

5. Conclusions

The data gathered for 2015 shows clear evidence of improved performance across the UKCS in general, and specifically in certain hubs/operators and in certain areas of production losses.

Analysis clearly identifies several areas where improvements are achievable, and highlights a clear opportunity gap between average and best in class performance.

In 2015, 28 out of the 91 operated hubs surpassed the shared PE target of 80% with the majority of these high-performers located in the northern North Sea (NNS) and the CNS. When looking at individual oil and gas companies, 10 out of 24 passed the same target with 90.9% the highest recorded PE and 50.3% the lowest.

According to industry forecasts, increased levels of production in the North Sea are unlikely to be sustained in the medium to long term and against this backdrop of declining production it is more important than ever to maximise the returns on production efforts.

Output from historic PE surveys has been used successfully by cross industry bodies to focus in on areas of improvement such as compression systems and shutdowns and has to some extent contributed to the upturn highlighted by the report. The OGA will continue to work with oil and gas operators to share best practice and lessons learned through the new asset stewardship process.

Although the rewards of PE improvement efforts are being realised, the PE target of 80% at year-end 2016 is unlikely to be achieved.

The OGA will continue to gather and analyse PE data, benchmark and conduct detailed stewardship reviews with both high production efficiency assets (so that lessons can be learned) and with lower efficiency assets so that performance can be improved.



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