

Wisbech IED Business Case

May 2018

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1 Executive Summary

Wisbech compressor station, constructed in 1980, has two gas turbine driven compressor units designed to operate independently of each other. The RB211, is affected by the Large Combustion Plant (LCP) elements of the Industrial Emissions Directive (IED) as the nitrogen (NOx) and carbon monoxide (CO) emission limit values from the units are outside permitted levels. The Avon replaced the Maxi-Avon unit, which was captured under LCP.

The station was primarily designed to provide network compression to move gas from the entry terminals at Easington, Theddlethorpe and Bacton into the south and west of the country. The use of compression at Wisbech has become increasingly variable over the last ten years. The site is now predominantly used to provide back up to other East area compressors, particularly Peterborough and Huntingdon, during outage periods.

As part of our May 2015 reopener submission we actively engaged with our stakeholders to get their input into our future compressor strategy. We received stakeholder support in 2015 to convert the Maxi-Avon on site to an Avon and to make use of the available derogations to comply with LCP. By January 2016, the Maxi-Avon had been converted to an Avon and the RB211 was placed on a 500 hour Emergency Use Derogation. These actions maintain network resilience and flexibility for our customers while emissions related works are ongoing at Peterborough and Huntingdon compressor stations.

We have continued to review the longer term need of this station balancing unit asset health costs against the resilience provided by the station. The network resilience the station provides while IED emissions related works are ongoing at Peterborough and Huntingdon confirm a current need for the station out to at least 2023. With further IED works required at Hatton and potential Medium Combustion Plant Directive (MCP) compliance works at other East area compressors in RIIO-T2, Wisbech will continue to provide valuable network resilience for a number of years.

Two options were assessed in detail for this station:

- **Option 0** – Keep the station as is with one unit on 500 hour EUD and the Avon on unrestricted operation until 2030 (Medium Combustion Plant Directive).
- **Option 1** – Decommission the RB211 unit within RIIO-T1
- **Option 2** – Decommission the compressor station in 2024

We presented all options considered for the station, along with the costs, to our stakeholders as part of our March 2018 consultation. We received four formal responses which supported our integrated plan for the network. In the stakeholder engagement sessions held in late 2017 our stakeholders were broadly supportive of decommissioning ageing units where it was no longer economic to continue to maintain them. Their main concern related to ensuring that any options considered would not compromise customer flexibility or network resilience longer term.

In assessing the options for this compressor station, we have taken our stakeholder's feedback into account, in addition to the long term expenditure required to maintain these ageing assets and the historic, current and forecast future use of this station. The least worst regrets option for Wisbech is to keep the RB211 operating under the 500 hour EUD for the foreseeable future. We will revisit the enduring requirement for this station as part of our RIIO-T2 business plan.

In our RIIO-T1 proposals we had intended to replace both units, therefore we will now incur additional asset health costs over our RIIO-T1 submission. The cost to convert the Maxi-Avon to an Avon and asset health costs associated with maintenance on the Avon form our May 2018 reopener funding request.

Funding Request Summary (09/10 price base)

The Wisbech funding request is less than £10m.

RIIO-T1 Output - To convert the Maxi-Avon to an Avon and undertake asset health works to maintain the existing compressor units.

2 Introduction

Wisbech compressor station is in a rural location near to the town of Wisbech. The station has two gas turbine driven compressor units; both were commissioned in 1980 to provide network compression to move gas from the entry terminals at Easington, Theddlethorpe and Bacton into the south and west of the country.



Figure 2.1: Wisbech Compressor Site Location

The use of compression at Wisbech has become increasingly variable over the last ten years. This is in part due to the increase in demand in the southern half of the country which resulted in additional feeders being added between Hatton, Peterborough and Huntingdon reducing the need for Wisbech to support flows and pressures in the south west. The long term decline in flows from Theddlethorpe entry terminal has continued which also reduces the need for compression at Wisbech. A further impact on operating hours at Wisbech was the commissioning of the trans-Pennine pipeline between Pannal and Nether Kellet at the end of 2007. This provides an alternative route to move gas over onto the west coast. The site is now predominantly used to provide back up to other East area compressors, particularly Peterborough and Huntingdon, during outage periods.

The site is equipped with two gas turbine driven compressors. Unit A is powered by a Rolls Royce RB211 with Unit B currently powered by a Rolls Royce (now Siemens) Avon gas turbine. Unit A is currently affected by the regulatory requirements of the Large Combustion Plant (LCP) element of the Industrial Emissions Directive (IED). These regulations require us to comply with limits on the gaseous emissions to atmosphere of oxides of nitrogen (NOx) and carbon monoxide (CO) to manage local air quality. See our IED Overarching Document for more detail about the IED legislation and its impact on our compressor fleet.

As part of our May 2015 reopener we actively engaged with our stakeholders to incorporate their views into our future compressor strategy¹. We received stakeholder support to make use of the derogations available as part of IED rather than decommissioning stations. Stakeholders felt that the derogations offered more flexibility to adapt in such an uncertain gas market. Therefore to comply with LCP, Unit A (thermal inputs >50 MW) was entered onto 500 hour Emergency Use Derogation (EUD) in January 2016. The EUD means that the unit is restricted to operating for less than 500 hours per year; and this restriction on running hours means it is exempt from the LCP emission limit values.

Unit B was originally powered by a more powerful variant of the standard Avon engine known as a Maxi-Avon. The increased power output meant that this unit was required to comply with the requirements of LCP. As part of our May 2015 reopener we proposed to our stakeholders that we could convert the Maxi-Avon to an Avon which would exempt the unit from compliance with the LCP emission limit values (ELV) with only a small reduction in capability. This conversion was made in late 2015 to maintain capability at Wisbech as a back up site while the IED compressor programme of works were completed at both Peterborough and Huntingdon. Our stakeholders agreed that this was a prudent approach as both Peterborough and Huntingdon could be on outage for prolonged periods of time while the works were completed. The works at both sites are due to be completed in 2021 with the units fully operational by 2023. The Avon is captured by the Medium Combustion Plant Directive (MCP), however this unit can operate unrestricted until 1st January 2030.

This business case assesses if there is an ongoing need for compression at Wisbech and details all credible options considered for this station. Further stakeholder engagement as part of the May 2018 reopener submission summarised the options considered and gauged stakeholder opinion on the future of the Wisbech compressor station.

3 The site: Assets and Operation

3.1 Current Assets

Wisbech Compressor Station was constructed and commissioned in 1980 with two gas turbine driven compressor units – a Rolls Royce RB211 (unit A) and a Rolls Royce Maxi-Avon 1534 (unit B). The Maxi-Avon in the unit B berth was converted to a standard Avon 1533 in late 2015. The units can only be used singly; there is no parallel or series configuration option.

The above ground installation (AGI), associated with the Wisbech compressor station currently lies within the boundary fence of the compressor station and is called Tydd St Giles AGI.

3.2 Current Asset Condition

Unit A was installed in 1980 and is approaching its technical asset life of 40 years. The age of the site and assets mean that there are asset health issues that need to be addressed to ensure continued safety and environmental compliance at the site. The cost and effectiveness of the various maintenance, repair and replacement options for the

¹ <http://www.talkingnetworkstx.com/ied-what-is-ied.aspx>

compressor assets impact not just the large items that make up the machinery train (gas turbine, power turbine, gas compressor) but also the ancillary systems such as compressor wet gas seals, cab infrastructure (including ventilation systems) and the auxiliary systems such as the exhaust stack and control and protection systems.

3.3 Current Operation

Wisbech compressor station was originally designed to provide network compression to facilitate entry flows from terminals on the east coast and to move this south and west.

The station was originally designed:

- to facilitate baseline entry flows from Easington and Theddlethorpe;
- to support entry flows from Bacton;
- to provide back up and resilience to Peterborough and Huntingdon; and
- to support exit requirements in the south and west.

Wisbech compressor site use is increasingly variable year on year; the following table provides a summary of running hours for the last 12 years.

	Individual Unit Running Hours (<i>financial year</i>)											
	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18
Unit A	3	9	9	3	4	12	27	94	21	47	11	9
Unit B	414	38	4	8	16	10	285	151	30	420	772	65
Total	418	47	12	11	20	22	312	246	51	467	782	74

Table 3.1: Wisbech Historic Running Hours

The significant decline in use from 2007/08 coincides with the commissioning of the trans-Pennine pipeline between Pannal and Nether Kellet at the end of 2007 which introduced an alternative route to move gas over onto the west coast. The increase in usage in 2015/16 and 2016/17 is as a result of an increasing number of outages at Peterborough and Huntingdon to facilitate the IED compressor programme of works.

Wisbech compressor station is now predominantly used to provide resilience to compression at Peterborough and Huntingdon. It is specifically required to support pressures in the south west when both compressor sites are unavailable. The following figure shows the monthly usage of Wisbech over the last 5 years.

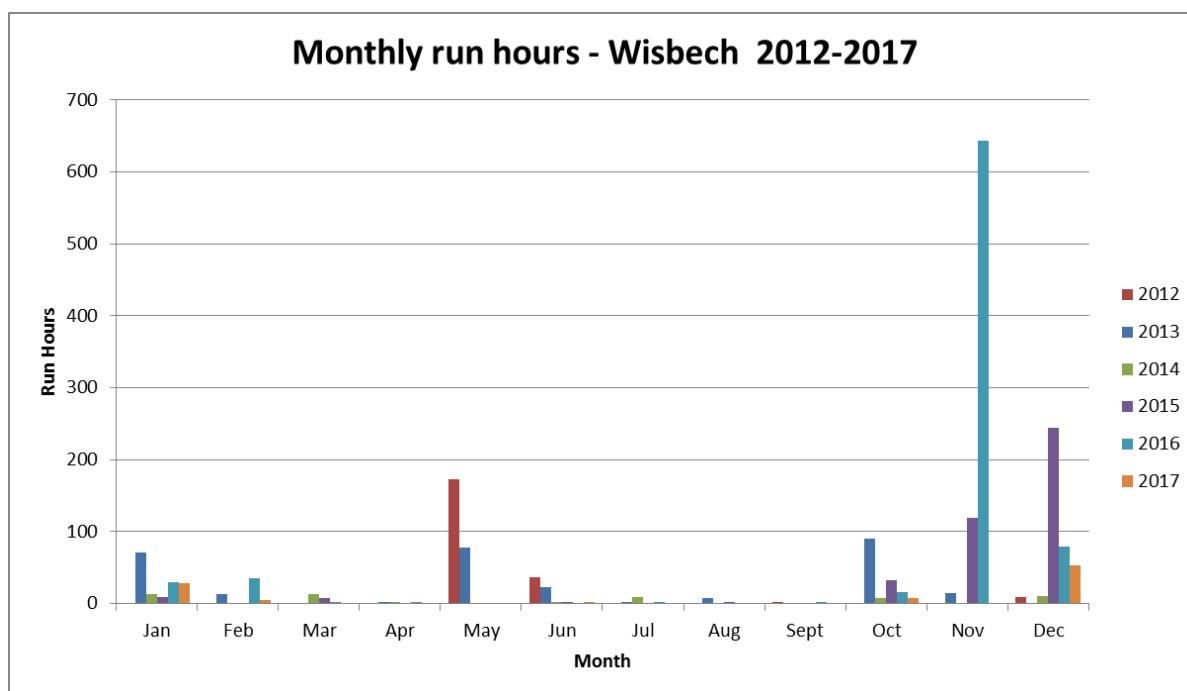


Figure 3.1: Monthly Run Hours for Wisbech Compressor Station (2012-2017)

The high run hours seen in November 2016 were due to a delay in returning Peterborough to operation following an extended outage. The higher run hours seen in November and December 2015 were as a result of a network trial to assess the impact on network operability without both Peterborough and Huntingdon available over a winter season. The trial was run from October to December 2015. This illustrates the importance of compression capability at Wisbech throughout the construction phase of works at Peterborough and Huntingdon. The IPPC Phase 3 and 4 compressor works are due to be completed at both sites by 2021. There may be further works required at both sites in the mid-2020s to comply with the MCP element of the IED legislation.

4 Emissions and the impact of IED

Prior to our May 2015 reopener submission we engaged with stakeholders from across the energy industry to capture their views on our future compressor strategy. Our stakeholders supported our proposal to convert the Maxi-Avon, captured by the LCP element of IED, to an Avon by the end of 2015 to provide unrestricted resilience while the IED compression works at Peterborough and Huntingdon were ongoing.

In January 2016 a decision had to be made on the other compressor unit at the site which was also not compliant with the LCP element of IED. Based on the low usage of this unit, the decision was made to put this unit on 500 hour EUD to comply with the LCP element of IED. Both of these decisions would ensure that the site was still available to provide resilience in the event of an outage at Peterborough or Huntingdon.

5 Future Operational Requirements

There are no existing or forecast market signals which would indicate an increased need for the use of Wisbech in the near future. Therefore the assumption is that the station will run for

no more than 1000 run hours per year for the foreseeable future, with a majority of the hours on the unrestricted Avon unit with the 500 hour EUD unit providing backup.

An ongoing and potentially increased need for Wisbech could result from:

Theddlethorpe

There is a risk that supply at Theddlethorpe entry point, which Wisbech compressor station is ideally placed to support, could increase if shippers buy capacity. Current indications are that the probability of this occurring is very low.

Southern Exit Capability

Wisbech aids high South East Exit capability by increasing the suction pressure at Cambridge compressor station which enables a higher discharge pressure. Wisbech however is not required to meet the current Exit Sold Capacity in the South West or the South East. If an incremental signal for exit capacity is received there are local projects that would give greater capability than can be achieved with the compression at Wisbech.

Resilience to compression at Peterborough and Huntingdon

Due to their locations Peterborough and Huntingdon are two of the most critical compressor stations on the system, required to run under almost all supply scenarios and critical to maintaining supplies to the South of the network. Wisbech currently provides effective resilience for compression outages at both Peterborough and Huntingdon. The IPPC Phase 3 and 4 compressor works are due to be completed at both sites by 2021. There may be further works required at both sites in the mid-2020s to comply with the MCP element of the IED legislation.

Resilience to other network compression

IED Phase 2 works are being proposed at Hatton as part of this reopener submission (see the Hatton IED Business Case for more detail). A majority of the proposed works are due to take place in RIIO-T2 when the station will need to be on outage to allow the work to be completed. Wisbech is ideally located to provide network resilience while Hatton is on outage.

Wisbech has also been identified as providing useful network resilience to Kings Lynn compressor station by facilitating Bacton entry flows. Works are expected to be required at Kings Lynn in RIIO-T2 for both asset health and MCP compliance drivers.

6 Options Considered

As was outlined in the previous section, the compressor use at Wisbech has become increasingly more variable. The station is ideally located to provide resilience other East area compressor stations, in particular Peterborough and Huntingdon, which is why the Maxi-Avon was converted in 2015 to an Avon and the RB211 unit was placed on 500 hour emergency use derogation in 2016. The works to convert Unit B from a Maxi-Avon to an Avon were completed in December 2015.. This cost was incurred to ensure compliance with IED and will form part of the funding request in this business case.

The decision to retain both units for resilience purposes longer term needs to be balanced against asset health costs associated with ageing units.

All credible options considered must:

- comply with emission legislation;
- minimise cost to the end consumer; and
- provide a robust long term solution for the NTS.

6.1 Commercial Options

No suitable commercial options were identified that would provide an alternative to compression capability at Wisbech.

6.2 Asset Options

Several asset options were considered for Wisbech compressor station, these are as follows:

- **Option 0** – Keep the station as-is with one unit on 500 hour EUD and the Avon on unrestricted operation until 2030 (Medium Combustion Plant Directive).
- **Option 1** – Decommission the RB211 within RIIO-T1
- **Option 2** – Decommission the station

Option 0 - Keep the station as-is (Counterfactual)

This option is maintaining the status quo at the site by keeping the RB211 on 500 hour EUD for the foreseeable future and the Avon on unrestricted operation until 1st January 2030. This option represents the minimum intervention required to ensure compliance with the IED legislation. The predominant cost associated with this option relates to the asset health spend required to maintain the compressor units and keep them running for the foreseeable future.

This option offers future flexibility as it will keep the site operational and available for future adaptations if required. This option also ensures that this site remains available to provide resilience for the surrounding compressor fleet.

Option 1 – Decommissioning the RB211 within RIIO-T1

This option proposes decommissioning unit A, the RB211, within the RIIO-T1 period. Unit B would continue to be operational on the site. This option would maintain resilience for the surrounding compressor fleet while IED works are ongoing but there would be no back up at Wisbech for the Avon.

This option would ensure that the Avon remains available to provide resilience for the surrounding compressor fleet. However the disruption required to decommission the RB211 would mean that the station would need to be on outage to facilitate the works. If this is done within the RIIO-T1 period then this would mean this station may not be available to provide resilience during the peak construction period at Peterborough and Huntingdon. Therefore this option has been discounted at this stage as it would compromise network resilience.

Option 2 – Decommissioning the station in 2024

This option proposes decommissioning the Wisbech compressor station in 2024. This option involves maintaining both units at the compressor station until 2023 and decommissioning the station in 2024. This option would maintain resilience for the surrounding compressor

fleet while IED works are ongoing for several more years before decommissioning. In 2015 Amec Wheeler Foster completed an assessment which outlined what would be required to decommission the Wisbech station.

This option would ensure the station remains available to provide resilience for the surrounding compressor fleet until 2023. The site itself would still be required as the AGI would be retained. This option includes essential asset health works on the units but avoids the need to incur the compressor ancillary asset health costs in RIIO-T2 as shown in Option 0.

6.3 Summary of options taken forward

Options 0 and 2 were taken forward to the cost benefit analysis stage for this site. The table below illustrates the costs associated with each of the options.

Option	T1 funding request (£m)	Forecast T1 Capex (£m)	Forecast Capex 2021/22 to 2034/35 (£m)	Total (£m)
Option 0	<10	<10	20-40	<40
Option 2	<10	<10	<10	<10

Table 6.1: Wisbech option cost summary

Of the two options being taken forward there is no difference in the RIIO-T1 funding request.

7 Option Evaluation

Of the options taken forward, Option 0 has been defined as the counterfactual as this is effectively the do minimum option. This option ensures that we remain compliant with IED and provides network resilience to surrounding compressor sites.

A high level cost benefit analysis (CBA) has been undertaken using the Spackman methodology to calculate the present value for each of the options being considered for Wisbech compressor station. This method uses the weighted average cost of capital (WACC) to calculate the cost of capital investments, these are then amortised over the full assessment period. All the costs and benefits are then discounted using the social time preference rate (STPR) to allow comparison of costs and benefits being accrued during different time periods. The total of these present values results in the Net Present Value (NPV) for each option as outlined in the chart below. The CBA assessment is over a 45 year period and the price base is 2017/18. All of the costs and benefits are calculated for the first 30 years, and then discounted over a 45 year period in accordance with the RAV (Regulatory Asset Value).

The NPV for Option 0 is -£48m and for Option 2 it is -£11m. The longer assessment period in the CBA is the reason for the difference between the NPV calculated costs and the costs in Table 6.4. Option 2's relative NPV, when compared to Option 0 is +£37m. This indicates that this is the most favourable option from an economic perspective however the intangible benefits provided by the site e.g. long term network resilience are not quantified in this assessment. Option 2 removes the need for long term maintenance on ageing compressor units which is the main cost difference between the options.

As can be seen above Option 2 is significantly lower cost than Option 0. There is a relatively small amount of asset health spend required in RIIO-T1 in both options, a majority of the cost differences relate to long term compressor unit asset health, compressor station ancillary asset health, fuel usage, site opex and emissions.

The options considered for this site were presented to stakeholders in our March 2018 consultation document for feedback. We received four formal responses to the consultation, all of which broadly supported the compressor strategy proposed for the network. In the stakeholder engagement sessions held in late 2017 our stakeholders were supportive of decommissioning ageing units where it was no longer economic to maintain them. Their main concern related to ensuring that any options considered would not compromise customer flexibility or network resilience longer term. As a result of the feedback received the preferred option for Wisbech is to revisit the station requirements in RIIO-T2 once the IED Phase 2 works are complete and there is better visibility of future works for MCP compliance and asset health. The RIIO-T1 funding request is the same across both options considered.

8 Conclusion

In assessing the options for this compressor station, we have taken our stakeholder's feedback into account, in addition to the long term expenditure required to maintain these ageing assets and the historic, current and forecast future use of this station.

The use of compression at Wisbech compressor station has become increasingly more variable. With a fully intact network, compression at Wisbech is not required to support existing or forecast entry or exit obligations. However the station is ideally located to provide network resilience to other East area compressors.

Due to the ongoing compressor works at both Peterborough and Huntingdon, the proposed future works at Hatton, and the requirement for future works at Kings Lynn, the least worst regrets option for Wisbech is to maintain the status quo at the site. We will revisit the enduring requirement for this station as part of our RIIO-T2 business plan.

In our RIIO-T1 proposals we had intended to replace both units, therefore we will now incur additional asset health costs over our RIIO-T1 submission. The cost to convert the Maxi-Avon to an Avon and asset health costs associated with maintenance on the Avon form our May 2018 reopener funding request.

Funding Request Summary (09/10 price base)

The Wisbech funding request is less than £10m.

RIIO-T1 Output - To convert the Maxi-Avon to an Avon and undertake asset health works to maintain the existing compressor units.