



## **THE BENEFITS OF INTEGRATING THE BBL AND GTS TRANSMISSION SYSTEMS INTO THE TTF MARKET AREA**

April 2017

John Williams, Lucy Field and David Cox

---

# EXECUTIVE SUMMARY

## **Integrating the BBL and GTS transmission systems will lead to a single entry exit system in an enlarged TTF market area that will deliver benefits to the Dutch and UK gas markets**

- Integration of the BBL Interconnector into the TTF market is in line with the ambitions of the Gas Target Model Framework
- The integration will lead to more competitive and straightforward transportation of gas between the Dutch and UK markets
- The benefits of increased arbitrage opportunities between NBP and TTF will offset any reduction in arbitrage opportunities between the TTF and Zeebrugge, Netconnect and Gaspool as a result of a minor increase in transportation charges at other Interconnection Points
- The 'lost' capacity revenue from the interconnection point at Julianadorp represents only a small part of overall GTS revenue and any revenue redistribution will only have limited tariff effects
- There is a considerable benefit in reduced balancing costs to the Dutch gas market
- We anticipate minor IT costs associated with the planned integration

---

# INTRODUCTION

## Integrating the BBL interconnector into the TTF market area

- Gasunie Transport Services BV (GTS) and BBL Company (BBLC) intend to integrate their transportation systems so that the BBL Interconnector will become part of the TTF Market Area
- The integration will lead to a single entry exit system in the TTF market area that includes the Dutch GTS network points as well as BBLC interconnection point Bacton
- It is considered that this integration will deliver benefits to the Dutch and UK gas markets that will outweigh small IT costs and will have a minor effect on tariffs due to the redistribution of transportation revenue
- The purpose of this study is to examine the benefits and implementation costs of the integration process, and the redistribution effect of revenues from the planned integration of the BBL interconnector within the TTF Market Area
- GTS and BBLC have commissioned Pöyry Management Consulting to carry out this study

---

# BACKGROUND

## **BBL connects the two largest European markets and the most liquid of the European traded hubs – the TTF and the NBP**

- The establishment of interconnection points, as required by the European Network Codes, has resulted in:
  - An interconnection point at the GTS/BBL interface at Julianadorp
  - An interconnection point at the BBL/NGG interface at Bacton
- The integration of the GTS and BBL transmission systems will result in the removal of the GTS/BBL Interconnection Point, and will eliminate the requirement to book capacity at this interconnection point – with the corresponding removal of the current capacity tariff at Julianadorp. In addition shippers will no longer be required to nominate at the Julianadorp interconnection point
- This will reduce barriers to trading between the TTF and NBP and make arbitrage between the markets easier, deliver a reduction in balancing costs and several other benefits (including increased liquidity and simplified licencing arrangements)

---

# APPROACH

## We have adopted a credible and robust approach

- The starting point for this assessment was to identify the relevant costs and benefits associated with integrating the BBL Interconnector into the TTF Market Area through the removal of the Julianadorp interconnection point
- Where possible our assessment attempts to quantify the main cost and benefit categories set out by 'ACER' in its guidance for Cost Benefit Analysis (CBA)'. This approach is recommended by the National Regulatory Authorities for the consideration of structural reform
- Our CBA focusses on the overall impact on the market as a whole
- Through the application of this approach we have been able to develop robust recommendations for GTS/BBL and the TTF market area

# AGENDA

- 
1. Assessment overview
  2. Benefits to the Dutch market
  3. Benefits to the UK market
  4. Alignment with the GTM Framework
  5. Implementation costs
  6. Assessment of the cost and benefits
  7. Redistribution of the Julianadorp tariffs
  8. Risks, uncertainties and conclusions
-

# ASSESSMENT OVERVIEW – CBA ASSUMPTIONS

We have developed an Integration Case to test the impact of integrating the BBL interconnector into the TTF market area

Scenario	Details
<b>Base Case</b>	<ul style="list-style-type: none"><li>• Business As Usual – no additional costs or benefits</li></ul>
<b>Integration Case</b>	<ul style="list-style-type: none"><li>• Implementation costs related to Capex and Opex expenditure</li><li>• We assume that flows and price differentials continue in line with 2014/15 and 2015/16 data (2-year history) or 2011/12, 2012/13, 2013/14, 2014/15 and 2015/16 data (5-year history)</li><li>• We assume that the future GTS balancing actions are in line with 2011/12, 2012/13, 2013/14, 2014/15 and 2015/16 data</li></ul>

# AGENDA

1. Scenario overview
  2. Benefits to the Dutch market
  - 
    1. Increased arbitrage opportunities
    2. Avoided balancing costs
    3. Other benefits
  3. Benefits to the UK market
  4. Alignment with the GTM Framework
  5. Implementation costs
  6. Assessment of the cost and benefits
  7. Redistribution of the Julianadorp tariffs
  8. Risks, uncertainties and conclusions
-

---

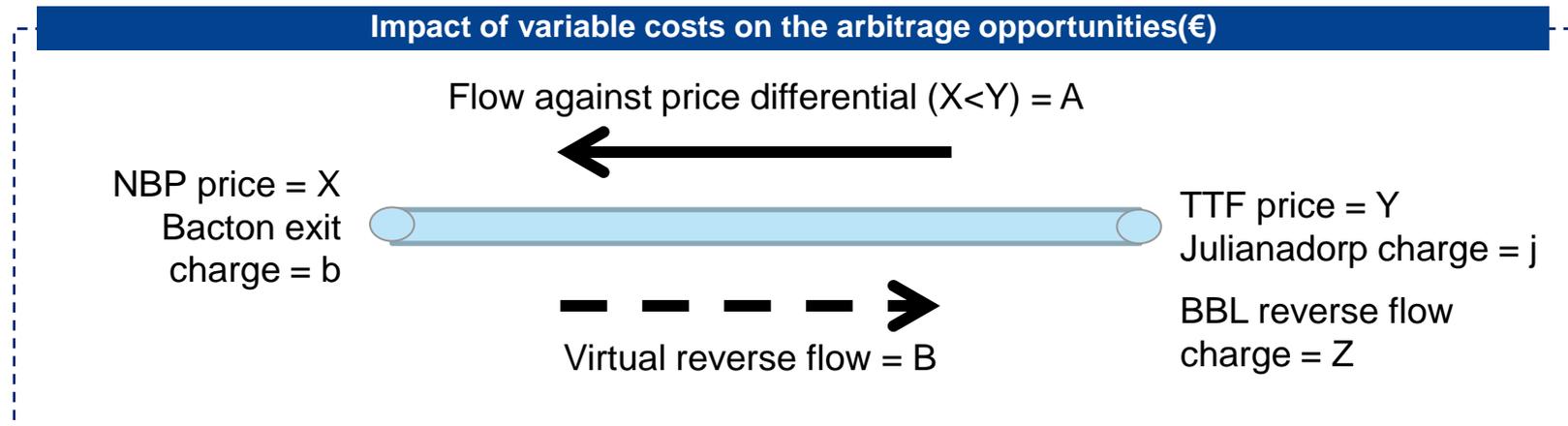
# INCREASED ARBITRAGE OPPORTUNITIES

## The removal of the Julianadorp interconnection point will create more arbitrage opportunities in the Dutch market

- Under the current arrangements there are occasions when the flow of gas on the BBL interconnector is against the day-ahead NBP–TTF price differential thereby creating arbitrage opportunities through virtual reverse flow from the UK to the Dutch market
- Since the BBL reserve price for reverse flow capacity is zero, the benefits will be the greatest when the flow on the BBL interconnector is against the day-ahead NBP-TTF price differential
- Currently arbitrage opportunities are being hampered by transport costs which are deterring full utilisation of the virtual reverse flow capacity, and by the fact that shippers need to book separately at two interconnection points
- In Section 3 we also quantify the benefits to the UK from having a more competitive source of gas. This is based on the occasions when the NBP price was higher than the TTF price, and there remained unsold and/or unutilised capacity in BBL

# INCREASED ARBITRAGE OPPORTUNITIES

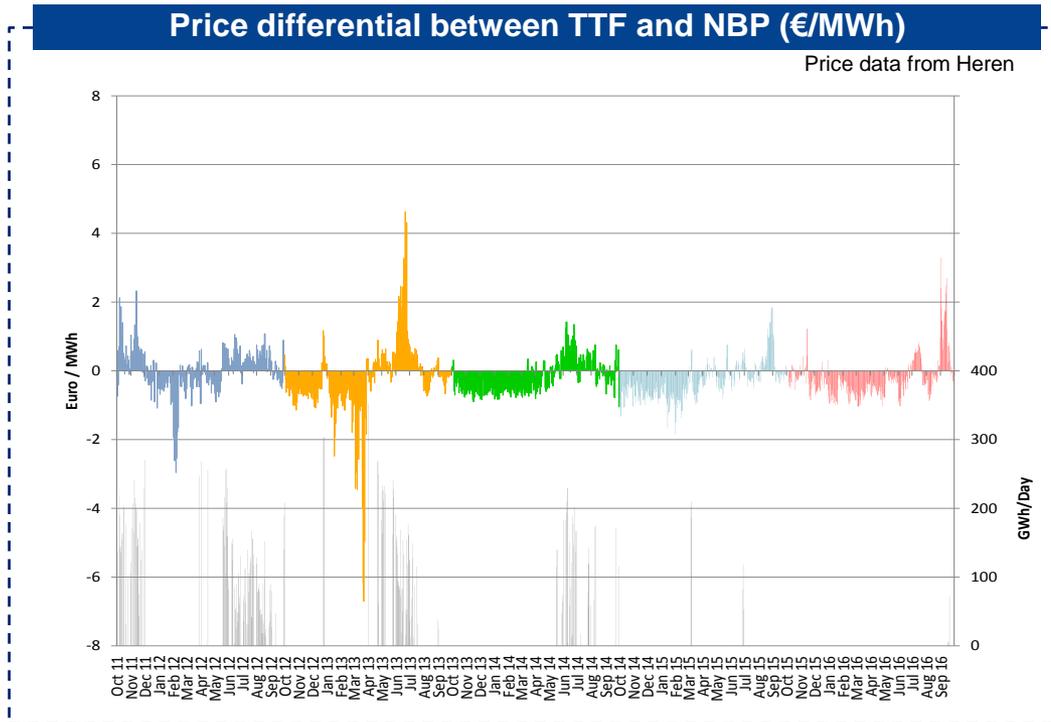
## Impact of removing the charge at Julianadorp for the integration case



- If  $X + b + j + Z < Y$ , in theory shippers would utilise all the virtual reverse capacity available and  $B = A$
- However, the level of the charge at Julianadorp ( $j$ ) means that  $X + b + j + Z < Y$  is not often the case
- Under an **integration scenario**  $j=0$  and  $Z=0$  ( $Z$ , the BBL reverse flow charge, is at present already 0)
- Analysing 2 – 5 years of data, and assuming  $j=0$  &  $Z=0$ , then when  $X + b < Y$ ,  $B=A$
- The value of this gas *not leaving the NL* =  $B * (Y - X)$
- However, because a variable exit charge remains at Bacton, on the occasions when  $Y - X < b$ , then the virtual reverse capacity will not be utilised and  $B = 0$

# INCREASED ARBITRAGE OPPORTUNITIES

## Price differential between TTF and NBP, and FAPD over the last five gas years



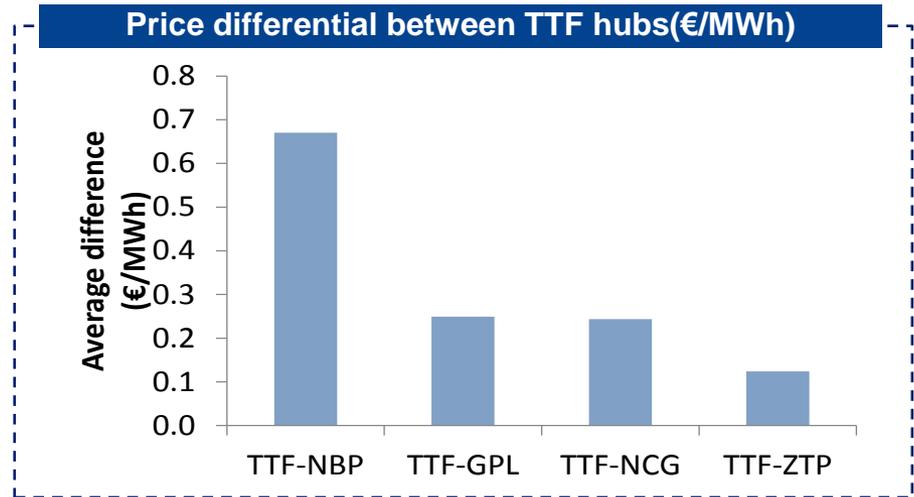
The positive prices are when the day-ahead price at the TTF is greater than the price at the NBP. The grey bars show the days on which gas flows against price differential and represent the potential arbitrage benefits for the Dutch market. In the integration case shippers will only have to book one bundled capacity product allowing them to access the vast majority of these arbitrage opportunities. In practice some of these flows against price differentials occur because of the way in which shippers manage their overall portfolios.

- In our analysis we assume the pattern of price differential remains similar to that seen over the last five gas years
- FAPD benefits are dependent on the future use of current long term contracts. It is expected that the number of long term contracts will decrease.
- Assuming most of the FAPD are arbitrated away, there is a benefit to consumers.
- We estimate the benefit will be within a range of:  
€0.5 million/year to €5.5 million/year
  - This range is based on the number of years (2-5 years) included in the calculation of the FAPD benefits
- We assume an average benefit of **€2.5 million/year**

# INCREASED ARBITRAGE OPPORTUNITIES

## Price differential between TTF and other interconnected hubs are smaller

- The removal of the Julianadorp interconnection point will lead to a tariff redistribution. The tariff effect on the remaining interconnection points of GTS will be very limited
- Moreover, the average spread between TTF and its neighbouring hubs other than the NBP (TTF-GPL, TTF-NCG and TTF-ZTP) is significantly smaller than the TTF-NBP spread
- Therefore, the effect on arbitrage opportunities between TTF and its neighbouring hubs other than the NBP will not be significant, and there may not be any impact at all
  - The current price differential between the TTF and the other non-NBP hubs is such that the spread is unlikely to cover the capacity costs, therefore it is not economic to try and arbitrage between the markets. So while an increase in the capacity cost may make the decision to arbitrage less likely, it should not impact on the shippers decision (on a purely economic basis) to arbitrage or not
- Furthermore, the increase of arbitrage opportunities between TTF and NBP following the removal of the interconnection point at Julianadorp will clearly outweigh any possible decrease of arbitrage opportunities between TTF and its neighbouring hubs



---

# SUMMARY

## Integration will result in increased arbitrage opportunities

- The effects of this minor increase in tariffs at other interconnect points is expected to have a limited impact on arbitrage opportunities between TTF and German and Belgium hubs
- Based on historical data the day ahead spread between TTF and NBP is generally greater than the spreads of TTF with the other interconnected hubs
- Furthermore, the reduced costs for virtual reverse flow capacity between TTF and NBP allows shippers to take advantage of the arbitrage opportunities compared to the arbitrage opportunities between TTF and German and Belgium hubs. This is because of the higher capacity costs at the interlinking interconnection points

# AGENDA

1. Scenario overview
  2. Benefits to the Dutch market
    1. Increased arbitrage opportunities
    2. Avoided balancing costs
    3. Other benefits
  3. Benefits to the UK market
  4. Alignment with the GTM Framework
  5. Implementation costs
  6. Assessment of the cost and benefits
  7. Redistribution of the Julianadorp tariffs
  8. Risks, uncertainties and conclusions
- 



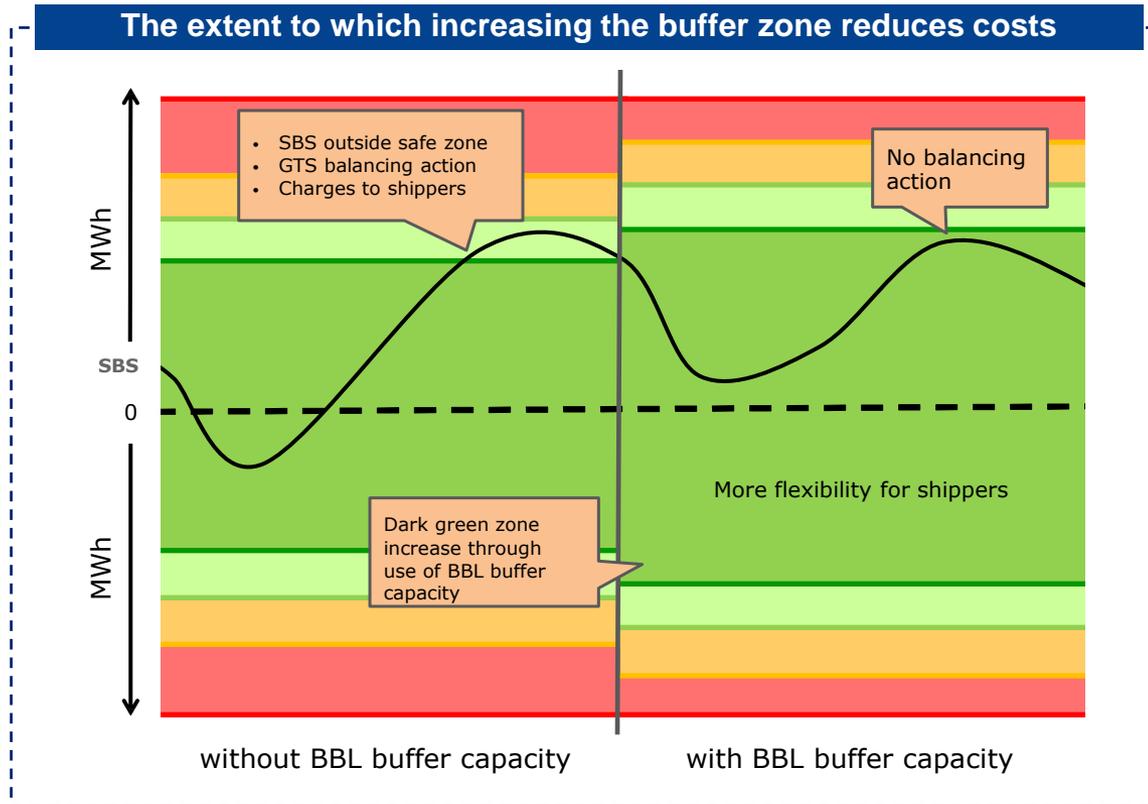
# AVOIDED BALANCING COSTS

## Overview

- The GTS balancing regime uses linepack that GTS has available when transport is not maximal. This linepack makes it possible for shippers to balance their portfolios and to help balance the GTS network efficiently
- The linepack volume is defined by the dark green balancing zone (see next slide). If all shippers act well the System Balance Signal (SBS) remains in this dark green zone. If not, the GTS network becomes short or long and the SBS could enter the light green, orange or red zone. If the SBS is short and enters the light green, orange or red zone, GTS buys gas on the ICE Endex gas exchange. If the SBS is long and leaves the dark green zone, GTS sells gas on the ICE Endex gas exchange
- Once integrated, system support between BBL and GTS will become significantly easier. A limited amount of BBL buffer capacity could be made available for use by GTS, and as a result the dark green zone can be enlarged, making it easier for shippers to stay within the limits. The BBL will continue to operate on an in = out basis which is not affected
- The benefits have been calculated on the basis of historical balancing actions and related costs over the gas years 2011/12 – 2015/16, by recalculating the GTS buy and sell actions, assuming there was a larger dark green zone
- GTS and BBL have concluded that around 20% enlargement of the dark green zone is possible, being on average around 10 million kWh – this will significantly reduce the costs of balancing for shippers

# AVOIDED BALANCING COSTS

## The extent to which increasing the buffer zone reduces costs



- When the SBS is outside the green zone GTS takes a balancing action (buy/sell)
- If the dark green zone is extended less balancing actions are required
- Reduced balancing costs are calculated on the basis 20% increase in the green zone
- The potential reduction in exposure will lead to an average benefit (based on the last five gas years) of **€1.5 million/year**

# AGENDA

1. Scenario overview
2. Benefits to the Dutch market
  1. Increased arbitrage opportunities
  2. Avoided balancing costs
  3. Other benefits

---

3. Benefits to the UK market
4. Alignment with the GTM Framework
5. Implementation costs
6. Assessment of the cost and benefits
7. Redistribution of the Julianadorp tariffs
8. Risks, uncertainties and conclusions



# BENEFITS OF INCREASED GTS UTILISATION

## Greater utilisation is not projected in this analysis but could potentially offer further benefits

- Following integration, it is possible that the utilisation of the GTS & BBL system will improve compared to the status quo
  - Overall lower costs of transporting gas to UK may increase transit flows
  - GTS and BBL may be a more attractive route to the UK than alternatives
  - The transfer of gas between the NBP and TTF market areas is simplified which will result in better pricing
  - A single bundled capacity product between TTF and NBP eliminates the risk of non-matching capacities for shippers
- The removal of the Julianadorp interconnection point will lead to reduced transportation costs to and from the UK
- The increased attractiveness of the transit route to the UK might lead to greater utilisation of other GTS entry points. This will increase capacity bookings, enhance transportation revenue recovery and result in relatively lower transportation tariffs - which could more than compensate for the removal of the Julianadorp tariff

# OTHER BENEFITS TO THE DUTCH AND UK GAS MARKET

**Integration reduces the complexity and risk for a shipper that wishes to arbitrage between the Dutch and UK gas markets, including:**

- **Simplified capacity booking process and nominations procedure:** For example to flow gas from TTF to NBP, a shipper currently has to book GTS exit capacity and BBL entry capacity at Julianadorp, together with BBL exit capacity and NGG entry capacity at Bacton; nominations for these capacities have to be sent separately to GTS, BBLC and NGG  
Following integration, the shipper will only have to book BBL and NGG capacity at Bacton and send nominations for this capacity to BBLC and NGG. In line with NC CAM the option for the single sided nomination at Bacton will remain such that shippers will only have to send one nomination message to flow gas to the UK
- **Further liquidity increases at the TTF:** Greater utilisation of the GTS network and greater arbitrage opportunities will lead to an increase in the attractiveness of the TTF as a trade hub, and will improve price formation as the TTF is increasingly used for price formation and indexation of supply contracts for gas. This will further increase liquidity to the benefit of the Dutch gas consumer
  - Note: We did not quantify the benefits of improved liquidity due to the lack of robust information. We have focussed our quantitative analysis on the arbitrage and balancing benefits, where the available information is more robust
- **Simplified licencing arrangements:** BBLC and GTS will align their licencing processes – this will result in a simplification of the process shippers must go through in order to become active with both TSOs in the TTF market area
- **BBLC shippers will be able to trade on the TTF:** The new market model will share some characteristics of a trading region as defined in ACER's GTM Framework and the ability for BBL shippers to use the TTF may be the most important

# AGENDA

1. Scenario overview
  2. Benefits to the Dutch market
  -  3. Benefits to the UK market
  4. Alignment with the GTM Framework
  5. Implementation costs
  6. Assessment of the cost and benefits
  7. Redistribution of the Julianadorp tariffs
  8. Risks, uncertainties and conclusions
-

# BENEFITS TO THE UK MARKET

## Quantifying the potential benefit of a more competitive source of gas to the UK

- There were many occasions over the last five gas years when the NBP price was higher than the TTF price, and there remained unsold and/or unutilised capacity in BBL
- If the exit charge through Julianadorp were removed through the integration of BBL it would increase the incentive to supply gas to the UK through BBL. However actual benefits for the UK will depend on the characteristics of shipper contracts. This is because some shippers have current long term forward flow contracts, and as a result the costs for transport are considered 'sunk', meaning they can take advantage of the arbitrage opportunities independent of the present tariffs
- This gas will be in competition with other sources of gas available to the UK, however, if the full capacity of BBL had been utilised on each day the 'NBP price >TTF price' over the last five gas years the benefits to UK would have been significant, see the following slide

# BENEFITS TO THE UK MARKET

## Quantifying the potential benefit of a more competitive source of gas to the UK

- The aim of this analysis is to attempt to quantify the benefits to the UK from having a more competitive source of gas
- The analysis is based on the fact that there were many occasions over the assessment period when the NBP price was higher than the TTF price, and there remained unsold and/or unutilised capacity in BBL
- When the NBP was greater than the TTF (+ variable cost e.g. National Grid entry tariff plus BBL Forward Flow tariff) we calculated the potential revenue from the use of ‘unsold capacity in the BBL’
- This resulted in a potential revenue benefit during each gas year

Gas year	Possible benefits to UK (€m)
2011-12	5
2012-13	19
2013-14	1
2014-15	7
2015-16	4

- Although there are many uncertainties to projecting the amount of gas that would be sourced via BBL to the UK - it is clear that there is significant potential for the UK gas market to benefit from a more competitive source of gas

# AGENDA

1. Assessment overview
  2. Benefits to the Dutch market
  3. Benefits to the UK market
  -  4. Alignment with the GTM Framework
  5. Implementation costs
  6. Assessment of the cost and benefits
  7. Redistribution of the Julianadorp tariffs
  8. Risks, uncertainties and conclusions
-

# ALIGNMENT WITH THE EU GAS TARGET MODEL FRAMEWORK

## **An integrated and competitive European gas market that is sustainable, offers choice to customers and promotes security of supply**

- The Gas Target model Framework (GTM) has the following aims:
  - to secure well-functioning wholesale markets in Europe
  - to ensure wholesale markets are interconnected and cross border flows of gas are achieved
  - to achieve security and diversity of supply
  - to provide economic investment signals
- The aims are to be achieved by developing interconnected, well-functioning wholesale markets based on entry-exit principles that encourage cross border trade. With these aims in mind the GTM seeks to ensure all European consumers benefit from the secure gas supplies and effective retail competition
- The GTM also places an obligation on each National Regulatory Authority (NRA) to review liquidity and to explore ways of improving integration with adjacent markets
  - The single entry exit system will terminate the interconnection point at Julianadorp, leading to a more efficient connection between the TTF and NBP gas market areas through the BBL interconnector
  - Integration will allow current BBL users, and shippers currently active in the TTF area, easier access to the NBP market area
  - Integration will increase the likelihood of ‘physical reverse flow capability’ being installed on the BBL interconnector in the future
- The updated GTM envisages several ways to increase integration of markets. Integrating the BBL interconnector into the TTF market area is therefore in line with the aspirations of the GTM

# AGENDA

1. Scenario overview
  2. Benefits to the Dutch market
  3. Benefits to the UK market
  4. Alignment with the GTM Framework
  - ➔ 5. Implementation costs
  6. Assessment of the cost and benefits
  7. Redistribution of the Julianadorp tariffs
  8. Risks, uncertainties and conclusions
-

# IMPLEMENTATION COSTS

## Integration will require changes in the IT infrastructure

- The determination of the additional IT costs is based on an internal assessment by GTS/BBLC
- Based on this assessment two cost categories have been defined:
  - Capex integration costs associated with new IT infrastructure requirement (based on our initial investigations, we expect that IT Capex will be less than €1.5 million, however for the purposes of the CBA we have assumed €1.5 million)
  - Opex integration cost associated with ongoing IT infrastructure requirement (set at 5% of Capex)
- The magnitude of these costs are presented in the table below

Scenario	Cost of Integration
Scenario 1 – Base Case	-
Scenario 2 – Integration	€1,500,000 one-off IT Capex €75,000 annual IT Opex

# AGENDA

1. Scenario overview
  2. Benefits to the Dutch market
  3. Benefits to the UK market
  4. Alignment with the GTM Framework
  5. Implementation costs
  -  6. Assessment of the cost and benefits
  7. Redistribution of the Julianadorp tariffs
  8. Risks, uncertainties and conclusions
-

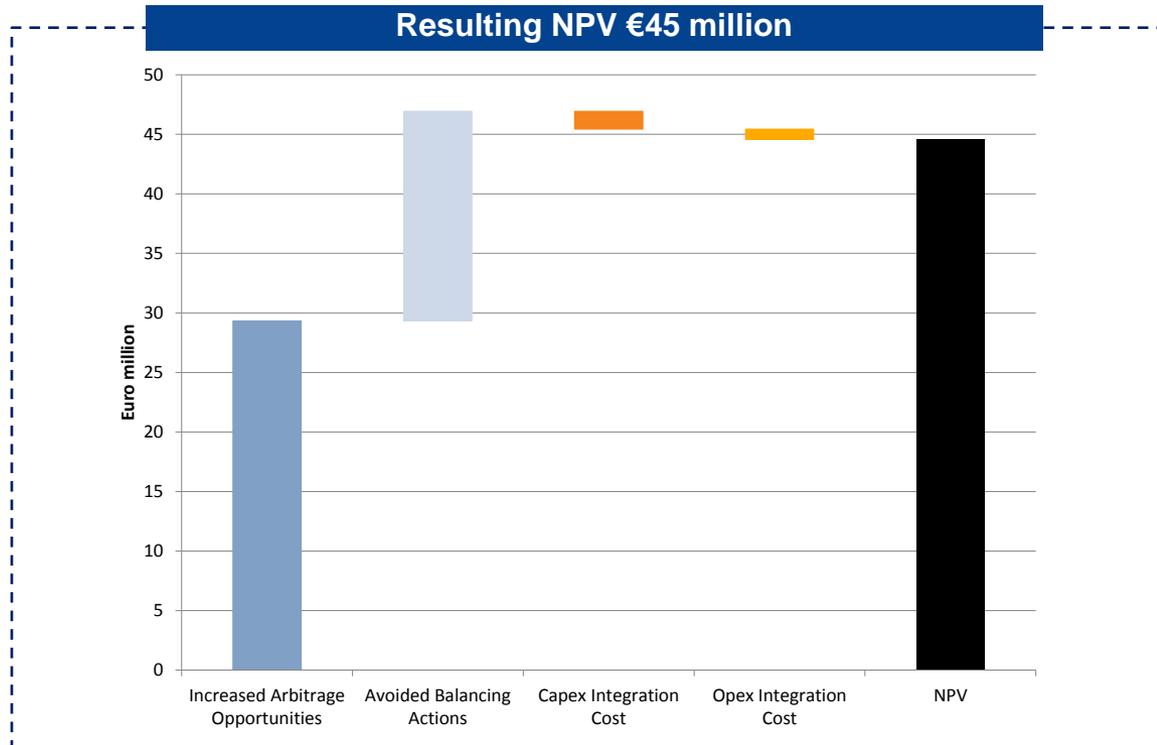
# COST-BENEFIT ANALYSIS: SUMMARY

## Key Assumptions

- The net benefit to the TTF market area is presented as a Net Present Value (NPV) calculation over a 20 year period
- We assume a discount rate of 6.5%. This discount rate has been chosen to find a balance between the risk faced by a regulated company with an allowed revenue, and the increased uncertainty regarding future contracts and flows through the BBL

Scenario	Implementation costs	Increased arbitrage opportunities	Avoided balancing actions
Base Case	-	-	-
Integration Case	€1.5 million IT Capex €0.075 million/year IT Opex	€2.5 million/year	€1.5 million/year

# COST-BENEFIT ANALYSIS: INTEGRATION CASE



Costs/Benefits for the TTF market area	NPV @ 20 years
Increased arbitrage benefit	€29m
Avoided balancing actions	€18m
Implementation costs (Capex + Opex)	-€2m
<b>NPV</b>	<b>€45m</b>

---

# AGENDA

1. Scenario overview
  2. Benefits to the Dutch market
  3. Benefits to the UK market
  4. Alignment with the GTM Framework
  5. Implementation costs
  6. Assessment of the cost and benefits
  -  7. Redistribution of the Julianadorp tariffs
  8. Risks, uncertainties and conclusions
-

# REDISTRIBUTION OF THE JULIANADORP TARIFFS

## Integration will remove the Julianadorp tariff

- Under the current arrangements BBLC and GTS receive revenues through the application of tariffs at the Julianadorp network point
- Integration of the BBL Interconnector into the TTF Market Area implies the removal of the interconnection point at Julianadorp, and consequently the removal of related charges and revenues
- Both BBL and GTS will take care of their own revenue loss:
  - Lost GTS revenues will be recovered through tariff redistribution at the other GTS entry and exit points
  - BBLC's tariff at Julianadorp is removed and will be added to the BBLC's tariff at Bacton interconnection point
- To understand the impact of integration we have made assumptions on what we expected the future booking of GTS capacity at Julianadorp would be under the Base Case
  - These assumptions are based on an analysis of actual bookings, an understanding of historic booking behaviour and an expectation on the level of the Julianadorp tariff in the future

# REDISTRIBUTION OF THE JULIANADORP TARIFFS

## Integration will remove the Julianadorp tariff

- When Julianadorp revenue is lost, it will cause a small increase in the charges at other entry/exit points on the GTS system (related to GTS allowed revenue and the regulatory framework)
  - The redistribution of the BBL Julianadorp tariff to Bacton will not change the total costs of transport through the BBL interconnector
- Individual shippers, who use Julianadorp and other GTS entry/exit points will be compensated by:
  - lower balancing costs
  - removal of the tariff at Julianadorp
  - better arbitrage opportunities between TTF and NBP that are expected to offset the arbitrage disadvantages from the minor tariff increase at other IPs
- Greater utilisation of the GTS system - as the Dutch -UK transportation route becomes more commercially attractive – will lead to an overall reduction in transportation charges as capacity bookings increase at other GTS points
  - This will result in a lower tariff increase at other GTS entry/exit points to compensate for the ‘lost’ revenue from the removal of the Julianadorp tariff
- Greater liquidity at the TTF will benefit all market participants through increased competition
- Based on the current 2018 capacity bookings and tariffs, the redistribution effect at GTS of Julianadorp revenue is approximately €8.8 million on all other GTS entry and exit tariffs – this is expected to be about 1%

---

# AGENDA

1. Scenario overview
  2. Benefits to the Dutch market
  3. Benefits to the UK market
  4. Alignment with the GTM Framework
  5. Implementation costs
  6. Assessment of the cost and benefits
  7. Redistribution of the Julianadorp tariffs
  8. Risks, uncertainties and conclusions
- 



# RISKS AND UNCERTAINTIES

- In this study we have not undertaken modelling of how the future market will change as a result of the decarbonisation of the energy market. The expectations of future revenues have been based on historic flow data and historic price spreads
- If shippers were able to trade more efficiently at the day-ahead and within-day stage (as opposed to yearly, quarterly or monthly), and the tariffs did not present a barrier, then they might be able to react to changes in the price differential more accurately. If this were the case, the difference in the arbitrage opportunities within the 'Integration Case' and within the 'Base Case' would be reduced, leading to a reduction in the NPV
- Another uncertainty are the future forward flows on the BBL interconnector. Reduced flows will correspondingly reduce the potential for virtual reverse flow. This would reduce the arbitrage opportunities available under the Integration Case and negatively impact the NPV. On the other hand a future increase of forward flows would correspondingly increase the potential for virtual reverse flow and positively impact the NPV
- Ultimately, one should consider that future forward flows are likely to be proportionate to the future forward flow contracts. And as reverse flow benefits will again be proportional to future forward flows we can assume that lower benefits from backhaul arbitrage will be accompanied by lower (to be redistributed) costs related to the forward flow contracts. This mitigates the uncertainty on a positive NPV
- The discount rate chosen for our analysis is designed to take account of some of the risk identified

# CONCLUSIONS

- The net present value of the benefit to the Dutch gas market of integrating BBL into the TTF market area is €45 million without taking into account less robustly quantifiable other benefits
- The greatest benefit of integration is the increased arbitrage opportunities between the NBP and the TTF market areas, allowing for more efficient market operation
- Our analysis suggests these benefits will outweigh the reduced price differentials (through increased tariffs) at the other TTF boundary points
- There is a considerable benefit in reduced balancing costs to the Dutch gas market
- The 'lost' capacity revenue from the interconnection point at Julianadorp represents only a small part of overall GTS revenue and any revenue redistribution will only have limited tariff effects
- We have also set out a number of additional benefits resulting from the integration of the BBL into the TTF market, these include:
  - Increased utilisation of the GTS network
  - Increased liquidity at the TTF
  - Simplified licencing and capacity booking process
  - Consistent with the objectives of the GTM Framework to improve market integration and increase consumer benefits
  - Benefits to the UK market from a more competitive source of gas



*The leading advisor to the world's capital and resource intensive industries.  
Clients choose us for the sharpness of our insight, deep industry  
expertise and proven track record – because results count.*

## **Pöyry Management Consulting**

All rights reserved. No part of this document may be reproduced in any form or by any means without permission in writing from Pöyry.  
Copyright © Pöyry