BGÉ Northern Ireland (NI) Transmission Network Technical Capacity

June 2014

This document describes the methodology and process, including the assumed operating conditions, used in determining the technical capacity for the Gormanston and Carrickfergus Entry Points on the BGÉ NI system

Contents

1 Introduction

This document is an update to the BGÉ NI Transmission Network Technical Capacity document published in June 2012. The technical capacities of the Entry Points on the BGÉ NI system, Carrickfergus and Gormanston, have been revised as a result of changes to certain assumptions that are employed in the network analysis, which is undertaken to determine the technical capacities; the assumed minimum pressure limit on the network and the assumed distribution of demand across the network.

This document details the methodology and assumed operating conditions employed in determining the maximum technical capacity for the two Entry Points on the BGÉ NI transmission system, Carrickfergus and Gormanston, as per the TSOs requirements under European Regulation EC 715/2009[1].

The assumptions and network analysis detailed in this document will be reviewed on an annual basis, and an updated version of the document will be published if and when required.

1.1 Change to the Technical Capacities of Carrickfergus and Gormanston Entry Points

The capacities of the Carrickfergus and Gormanston Entry Points have been revised upwards from that which was published in 2012, 2.7 mscmd (29.8 GWh/d) and 5.1 mscmd (56.3 GWh/d). This change is a result of a revision to some of the assumptions in the network analysis, primarily;

- The minimum pressure limit; revised down from 27 barg to 12 barg
- The distribution of the increased load; previously the increased load was assumed at the end of NWP, i.e. Derry/Coolkeeragh, the increased load is now distributed across the entire network (see section 3.2)

2 The NI Transmission System

The overall NI transmission system comprises of four transmission pipelines;

- The Scotland to Northern Ireland Pipeline (SNIP) connects to the BGÉ UK system at Twynholm in South West Scotland. The pipeline is 135 km long and runs towards the coast near Stranraer and crosses the Irish Sea to terminate at Ballylumford Power Station.

- The Belfast Gas Transmission Pipeline (BGTP) comprises a further 35kms of pipeline which runs from Ballylumford via Carrickfergus to Belfast.

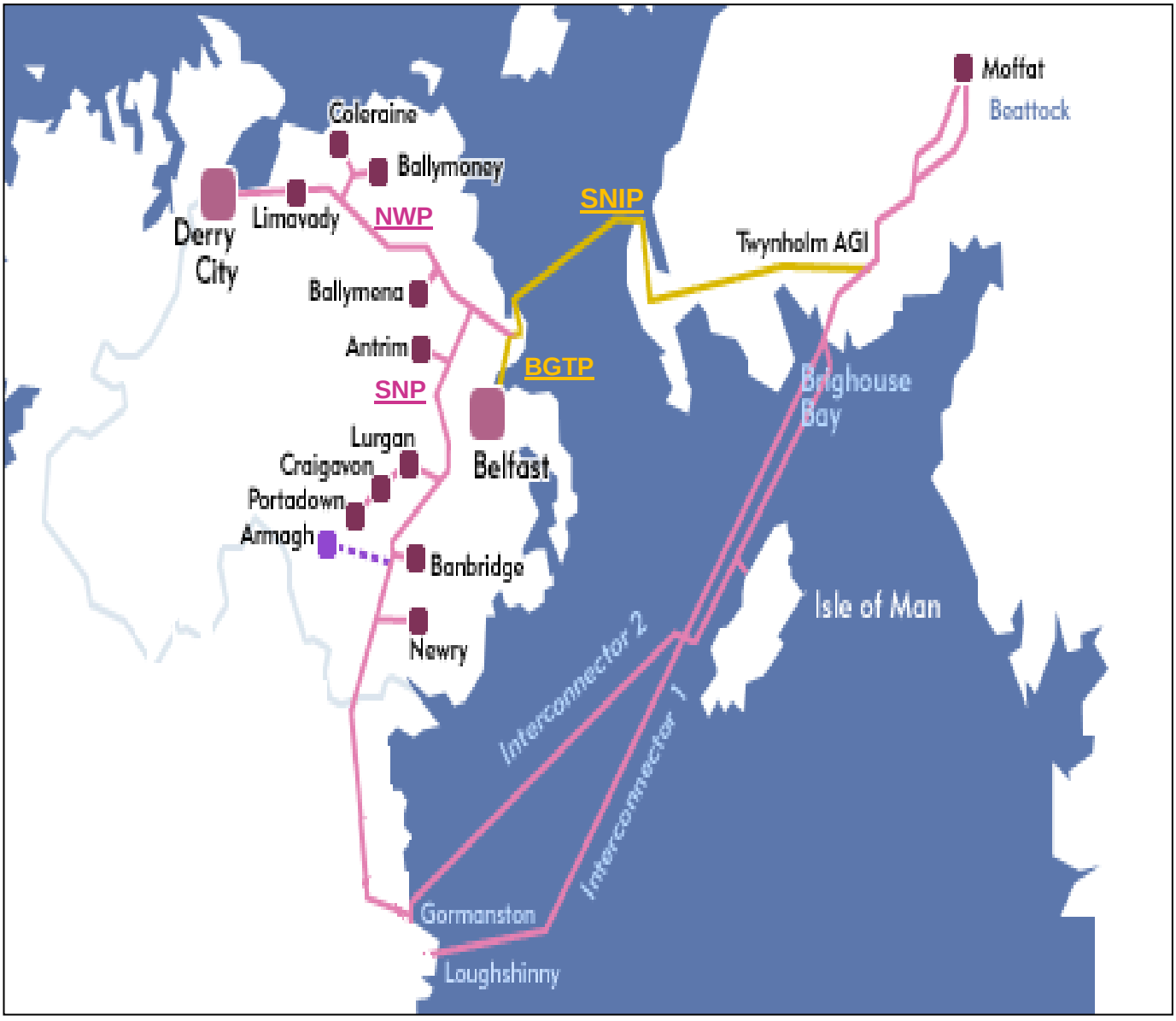
[1] *"Transmission System Operators shall publish a detailed and comprehensive description of the methodology and process, including information on the parameters employed and the key assumptions, used to calculate the technical capacity", where "technical capacity" is defined as "the maximum firm capacity that the TSO can offer to the network users, taking account of system integrity and the operational requirements of the network".*

- The North West Pipeline (NWP) extends 112km from Carrickfergus to Derry and Coolkeeragh Power station, with two spur transmission pipelines, connecting Coleraine/Ballymoney and Ballymena to the NWP.

- The 156 km South-North Pipeline (SNP) connects the NWP at Ballyalbannagh to the Interconnector (IC) system at Gormanston in the ROI, with a spur transmission pipeline connecting Armagh to the SNP.

NI has two separate TSOs; the SNIP and BGTP pipelines are operated by Premier Transmission Ltd (PTL) and the NWP and SNP pipelines are operated by BGÉ NI.

Twynholm is an Exit Point on the BGÉ UK system in S.W. Scotland and an Entry Point to the PTL transmission system. Carrickfergus is an Exit Point on the PTL Transmission system and an Entry Point to the BGÉ NI system. Gormanston is an Exit Point on the Gaslink (ROI) Transmission system and an Entry Point to the BGÉ NI system.



3 Methodology & Process

3.1 Overview

The technical capacities of the Carrickfergus and Gormanston Entry Points were determined by network analysis using hydraulic network modelling software, Pipeline Studio®.

Network Analysis was undertaken on a steady state basis and the following key assumptions (operating conditions) were included in the analysis;

3.2 Key Modelling Assumptions

- The network model is based on the current transmission network configuration; it does not take account of any future transmission network developments, proposed or otherwise.
- Demands were derived from the 2014/15 winter peak day forecast generated for the 2013 Northern Ireland Gas Capacity Statement (NI GCS).
- Carrickfergus AGI discharge pressure – 27 barg[2] (based on the NI GCS 2013 modelling results for the 2014/15 winter peak day).
- Gormanston (Phase II) AGI discharge pressure – 75 barg (Subject to the MOP of the SNP)
- A minimum network pressure limit of 12 barg[3] is assumed at the various off-takes (AGIs) on the SNP and NWP; this assumption is in-line with the guaranteed minimum pressure under the PTL NI transmission code of operations.
- A gas Calorific Value of 39.8 mj/scm is assumed.
- In order to determine the maximum technical capacities, demand in addition to the forecasted demands was included in the analysis. This additional demand was applied in the model as follows;
    - The non-power demand is increased (on a uniform percentage basis) at each of the off-takes (except for Coolkeeragh power station[4]) until the capacity limits of the system are reached, i.e. pressures reach the minimum pressure limit of 12 barg, at one or more of the AGIs.

[2] It should be noted that the pressure assumed at Carrickfergus, is greater than the minimum pressure guaranteed at a transmission network Exit Point (Carrickfergus on the PTL system) under the NI Code of Operations, i.e. 12 barg.
[3] The technical capacity was previously based on an assumed minimum pressure of 27 barg; an optimal pressure for the NWP. Assuming a lower minimum pressure for 12 barg will result in an increase in the technical capacity of the Carrickfergus Entry Point; it also results in a decrease in the capacity of the AGIs (off-takes).
[4] Coolkeeragh's peak hour load is equivalent to the maximum hourly demand for this off-take (in line with is maximum generating capacity).

- The analysis also takes account of the capacity of the AGIs with respect to the increase in demand, i.e. the demand assumed at an off-take may be limited by the technical capacity of the AGI for that off-take (for the assumed gas conditions).

- The analysis assumed supply from a single Entry Point in each of the two network models, i.e. Carrickfergus was the only Entry Point supplying gas to the BGÉ NI network in determining the Carrickfergus technical capacity and Gormanston was the only Entry Point supplying gas to the BGÉ NI network in determining the Gormanston technical capacity.

3.3 Network Modelling

Figure 3.1 and 3.2 details the resultant pressures at a number of peripheral and midpoint off-takes, which were determined by the network analysis for the Carrickfergus and Gormanston Entry Points respectively.

Figure 3.1 is representative of the existing configuration/arrangement, i.e. gas is currently supplied to the BGÉ NI system via the Carrickfergus Entry Point only. Figure 3.2 illustrates the effect of using the Gormanston Entry Point, which is not being currently utilised.

Figure 3.1: Carrickfergus Entry Point Network Analysis - Resultant Pressures

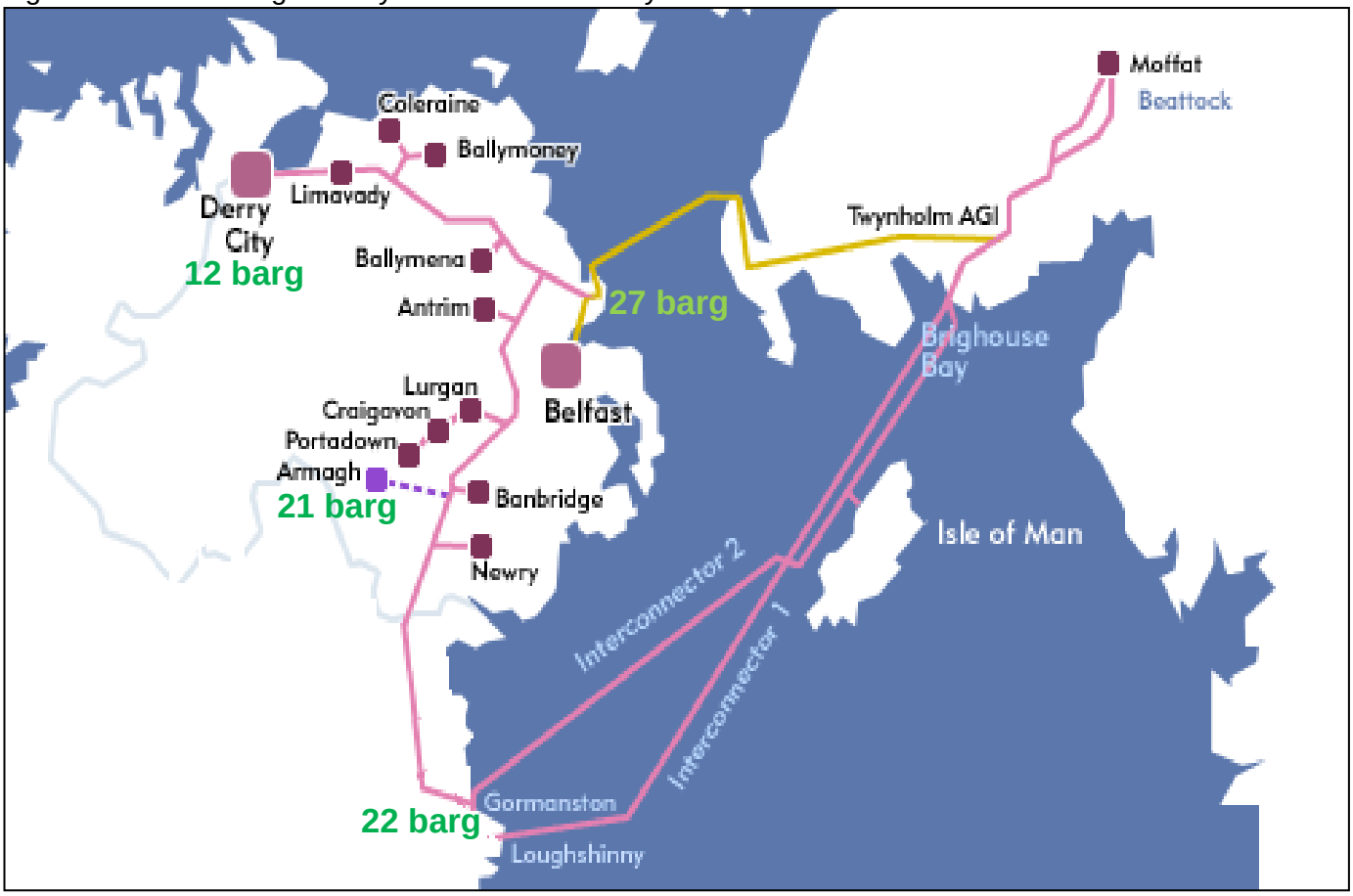
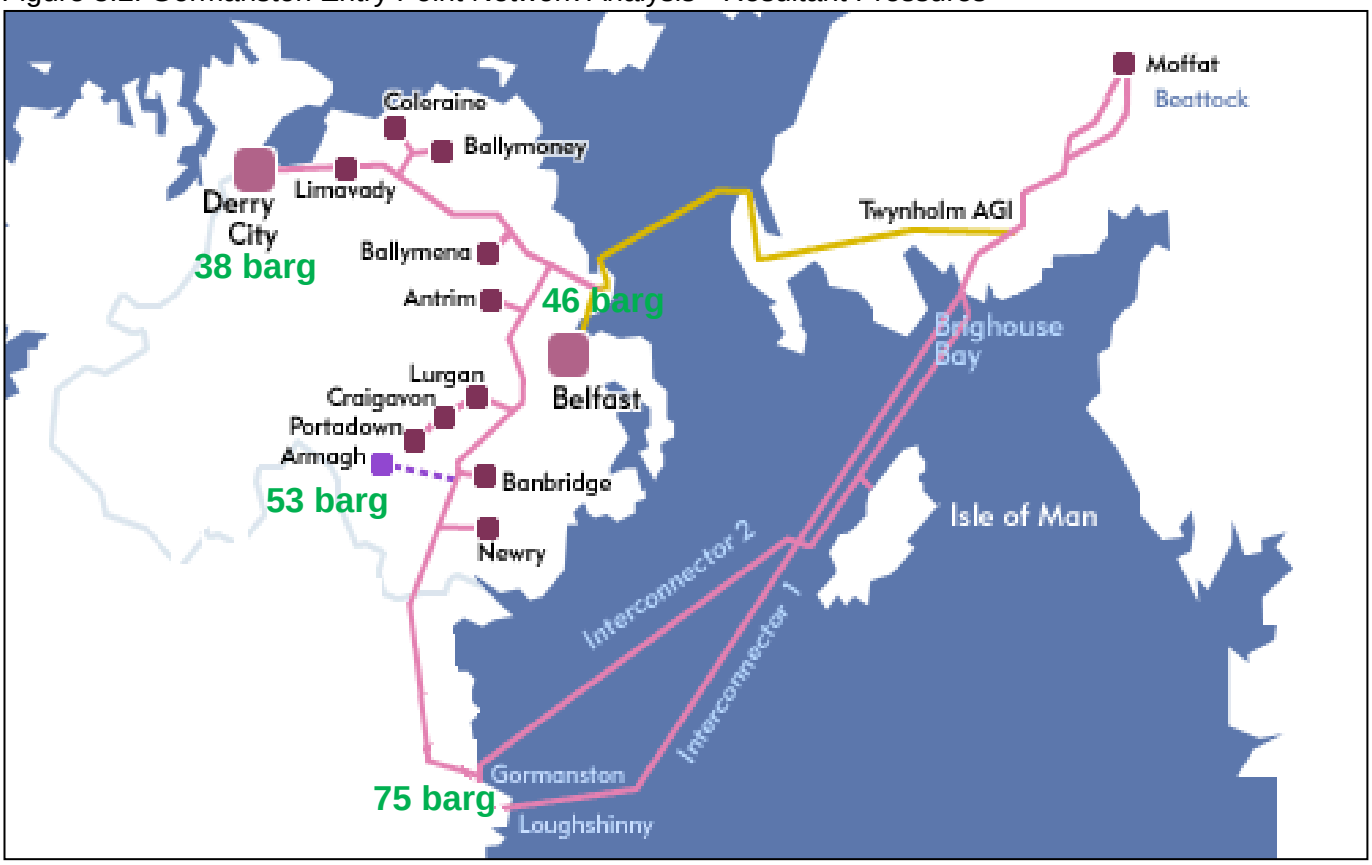


Figure 3.2: Gormanston Entry Point Network Analysis - Resultant Pressures



4 Technical Capacity

4.1 Technical Capacity of the Carrickfergus Entry Point

The maximum technical capacity of the Carrickfergus Entry Point is determined / limited by the minimum capacity of the following;

- The capacity of Carrickfergus AGI; or
- The capacity of the network (SNP and NWP)[5] downstream of Carrickfergus AGI, which is subject to;
    - The discharge pressure at Carrickfergus AGI; and
    - The minimum pressures limits for the various AGIs (off-takes) located on the North West Pipeline (NWP) and South North Pipeline (SNP).

The capacity of Carrickfergus AGI is 4.8 mscmd[6] (53.0 GWh/d); however the (downstream) network does not have the capacity to transport this volume of gas, based on the assumed pressure at Carrickfergus, 27 barg, and downstream pressure requirements.

[5] In addition to the physical characteristics of the infrastructure, the capacity of a network (pipeline) is subject to the difference in the assumed pressures at the start (supply) and end (off-take) of the pipeline, the 'Dp'; an increase in the 'Dp' implies an increase in capacity and conversely, a decrease in the Dp results in a decrease in capacity.

Network Analysis determined the network downstream of Carrickfergus AGI can transport 3.8 mscmd (42.0 GWh/d), based on the assumed pressure of 27 barg at Carrickfergus and the assumed minimum pressures limit of 12 barg at the various off-takes. Therefore, *the technical capacity of the Carrickfergus Entry Point has been revised upwards to 3.8*[7] *mscmd (42.0 GWh/d) from the previously stated 2.7 mscmd (29.8 GWh/d).*

Maintaining pressures above minimum pressure limits ensure the safe and secure operation of the various AGIs that supply gas to the downstream customers at the off-takes located on the NWP and SNP.

4.2 Technical Capacity of the Gormanston Entry Point

The maximum technical capacity of the Gormanston Entry Point is determined / limited by the minimum capacity of the following;

- The capacity of Gormanston AGI (Phase II); or
- The capacity of the network (SNP and NWP)[5] downstream of Gormanston AGI, which is subject to;
    - The discharge pressure at Gormanston (Phase II) AGI; and
    - The minimum pressures limits for the various AGIs (offttakes) located on the North West Pipeline (NWP) and South North Pipeline (SNP)

The capacity of Gormanston AGI (Phase II) is 6.0 mscmd[8] (66.3 GWh/d). Network Analysis determined the network downstream of Gormanston (Phase II) AGI can transport 6.9 mscmd (76.1 GWh/d) of gas without breaching the assumed minimum pressure limits on the NWP and SNP. Therefore the technical capacity of Gormanston Entry Point is 6.0 mscmd (66.3 GWh/d).

BGÉ NI has been advised the amount of 'Available Capacity' on the network upstream of Gormanston AGI (Phase II), i.e. the subsea Interconnector, is subject to;

- The technical capacity of the subsea Interconnector system, 22.9[9] mscmd (252.9 GWh/d); less
- Contracted capacity on the subsea Interconnector system (currently Gaslink Shippers at Moffat)

4.3 Future Revisions

The technical capacity of the BGÉ NI Entry Points will be reviewed on annual basis and may be revised subject to any amendment(s) to the assumptions regarding system integrity and/or operational requirements of the network, and consequently any change will result in an updated version of this document being issued.

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[6] The AGI capacity has been determined under design conditions
[7] The capacity of the Carrickfergus Entry Point is 0, if a pressure of 12barg is assumed at Carrickfergus.
[8] The capacity of Gormanston AGI (Phase II) is also equivalent to the Gormanston Exit Capacity on the Gaslink system, 6.0 mscmd.
[9] Based on the technical capacity of the Moffat Entry Point, 31 mscmd, less the contractual entitlement at Twynholm, 8.08 mscmd.