INJECTION TIE-BREAKING RIGHT FUNCTIONAL DESIGN

PREPARED BY: ~~GAS WHOLEMARKET DEVELOPMENT~~MARKETS

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Version Release History

Version	*Date*	*By*	*Status*	*Change from last version*
1.0	1 May 12	Canh Diep	Final	Original version
1.1	2 Jul 12	Canh Diep	Final	Added clarification notes in Section 5.1.1 to highlight that the quantity of AMDQ allocated by AIHN recipients to AIHN injectors in accordance with Section 4.3.2 is deemed to have been used by the injectors even if the latter fail to submit AMDQ% and fail to use the allocated quantities.
1.2	26 Apr 16	Louis Chen	Draft	Update to reflect the AMDQ Rule changes made in March 2016, such that the AMDQ Credit Certificate associates with all Close Proximity Points, not just non-Longford Close Proximity Points. Added additional definition to AMDQ in Section 2.2 for clarity.

Contents

Glossary

TERM	MEANING
Authorised MDQ	Originally an acronym for 'authorised maximum daily quantity', it represents the gas transportation rights associated with Longford close proximity injection point held by a Market Participant.
Tariff V authorised MDQ	Authorised MDQ for tariff V withdrawal points. Tariff V withdrawal points are non-tariff D sites, which include residential and small to medium-sized commercial and industrial gas users.
AMDQ credit certificates	These are certified transportation rights associated with both Longford and non-Longford close proximity injection points that are issued to individual Market Participants by the declared transmission system service provider.
AMDQ credits	AMDQ credit certificates that are nominated to a site and/or to a reference hub are called AMDQ credits.
AMDQ	Authorised MDQ or AMDQ credits. A generic term for the transportation rights held by a Market Participant.
Close proximity injection point	means a group of system injection points that AEMO has determined can be regarded as the same injection point for the purposes of determining injection tie-breaking right and uplift hedge. *Note: The term 'close proximity point' has the same meaning as close proximity injection point.*
System injection point	A connection point on the declared transmission system that is designed to permit gas to flow through a single pipe into the declared transmission system.
Injecting MP	Market Participant that injects gas into the system: 1. for itself, and/or; 2. on a nominated Market Participants' behalf, where there is a valid agency injection hedge nomination between the two parties. *Note: The latter is also known as an agency injection hedge provider*
Recipient MP	A recipient of a valid agency injection hedge nomination, also known as an agency injection hedge recipient.
Injection hedge nomination	The amount of a Market Participant's scheduled injection that Market Participant (injecting MP) nominates to AEMO to use in the determination of its own uplift hedge.
Agency injection hedge nomination	The amount of a Market Participant's scheduled injection that Market Participant (injecting MP) nominates to AEMO to use in the determination of the uplift hedge of a nominated Market Participant (recipient MP).
AMDQ nomination	A proportion of its AMDQ for a close proximity injection point that a Market Participant nominates to AEMO for each system injection point in that close proximity injection point for the purpose of determining its injection tie-breaking right at each system injection point.
Declared transmission system	A gas transmission pipeline system that is owned by the declared transmission system service provider and operated by AEMO.

1. Preliminary

1.1 Introduction

Injection tie-breaking rights are defined in the National Gas Rule 214(d) which specifies that:

“where two or more injection bids are equally beneficial, then those injection bids that are associated with AMDQ credit certificates or authorised MDQ should be scheduled before other injection bids that are not associated with AMDQ credit certificates or authorised MDQ”.

This document presents the algorithm used by AMEO for determining the total injection tie-breaking right allocated to a Market Participant (MP). An MP’s injection tie-breaking rights (ITR) are calculated in accordance with quantities of its authorised MDQ and AMDQ credit nominated to each of the system injection points (SIP) in the Declared Transmission System (DTS) that it intends and has been accredited to inject gas from.

1.2 References

1. The National Gas Rules (NGR) (rule 211, 212 effective from 17 April 2012).
2. Technical Guide to Victoria’s Declared Wholesale Gas Market (version effective from April 2012)
3. WebExchanger User Guide (version effective from April 2012)
4. ~~Uplift Payment Functional Design v 9.0~~ Uplift Payment Functional Design v 9.1 (version effective from ~~17 April 2012~~xxx)
5. ~~AEMO Wholesale Market Uplift Payment Procedures (Victoria) v2.1~~ AEMO Wholesale Market Uplift Payment Procedures (Victoria) v2.2 (version effective from ~~17 April 2012~~xxx)

2. Overview of injection tie-breaking rights

2.1 Determination of injection tie breaking right

Injection tie-breaking rights provide MPs with priority rights for tied (equally priced) injection bids. Injection bids associated with injection tie-breaking rights will be scheduled ahead of those that are not associated with injection tie-breaking rights.

Injection tie-breaking rights are calculated:

- for each system injection point (SIP) associated with a close proximity injection point (CPP). Some CPP may only have one single SIP while other CPPs may have multiple SIPs associated with them. See Schedule 3 for the current CPP and the associated SIPs.[1]
- based on authorised MDQ or AMDQ credit which have been allocated to each MP at each designated CPP (the term AMDQ will be used to collectively refer to both authorised MDQ and AMDQ credit). MPs nominate their allocated AMDQ to each SIP associated with the CPP to which the allocated AMDQ is associated with. The nominations are done using the AMDQ nomination WebExchanger.

There are 3 steps in the process for determining a MP's total injection tie-breaking right (ITR) as described below.

1. Prior to 5am of each gas day, AEMO settlement system will update each MP's Tariff V and Tariff D authorised AMDQ at the Longford CPP, and AMDQ credit at all CPPs ~~other than Longford~~. See details in section 2.
2. MPs submit their AMDQ nominations prior to the relevant submission cut-off time.
3. For each MP, at each SIP associated with each CPP, and for each schedule during the gas day:
   a. injection hedge rights (IHR) is calculated based on the nominated AMDQ See details in section 3;
   b. agency injection hedge rights (AIHR) is calculated if the MPs are recipient of agency injection hedge nominations (AIHN). See details in section 4;
   c. residual injection hedge rights (RIHR) is calculated. This is the residual quantity of AMDQ not already used as IHR or AIHR. See details in section 5; and
   d. total tie-breaking rights (ITR) is calculated being the sum of IHR, AIHR and RIHR. See details in section 5.

The overall calculation process is depicted in the flowchart in Figure 1.

[1] New CPP may be created in future and the make-up of each CPP may also change to reflect new SIP added to the given CPP.

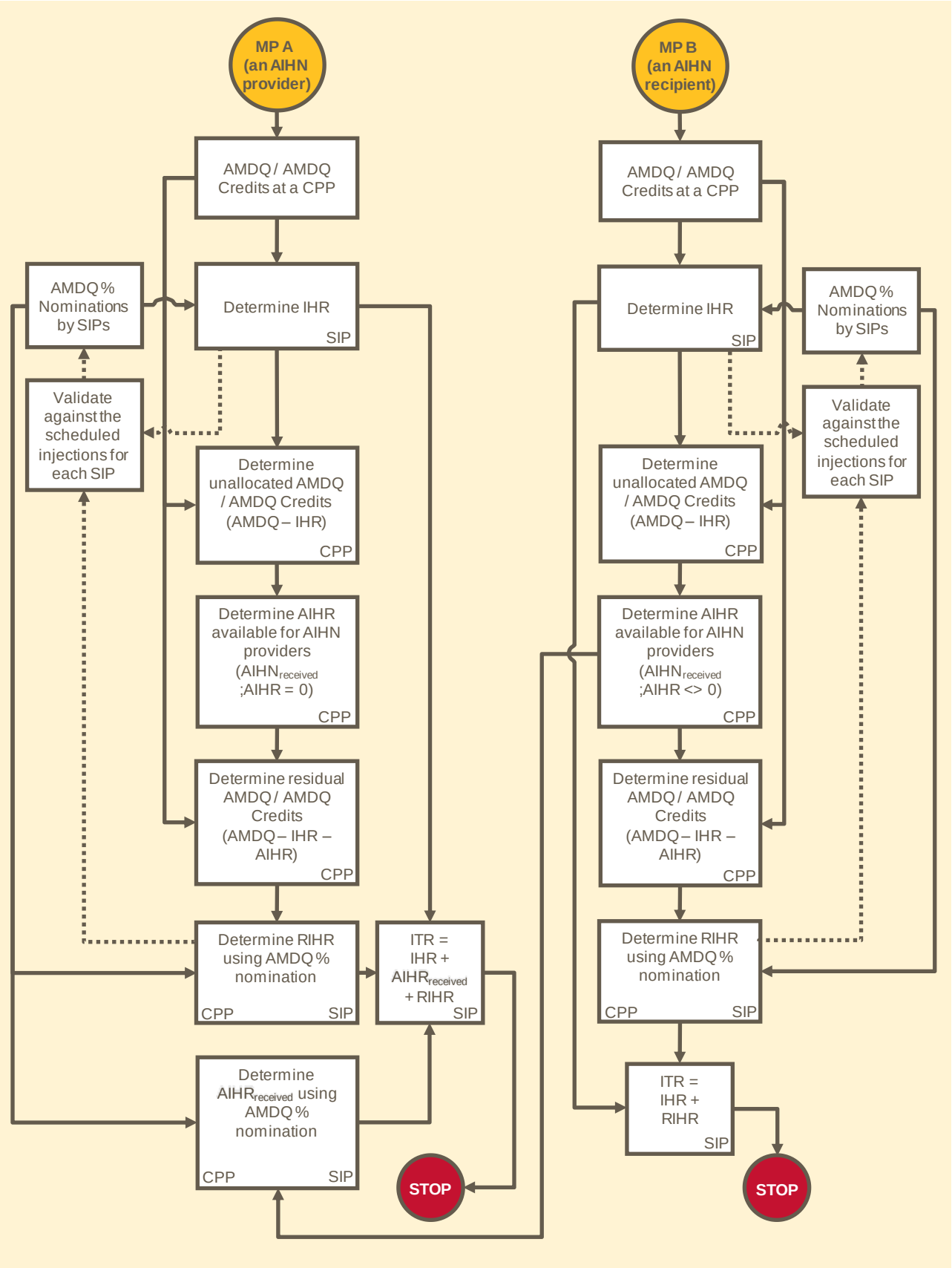

Figure 1 – Overview of Injection Tie-Breaking Right Calculation Process

2.2 Market Participants' authorised MDQ and AMDQ credit

An MP's authorised MDQ (associated with the Longford CPP) is the sum of its diversified authorised MDQ allocated to Tariff D sites and the hub, and its Tariff V authorised MDQ. The Tariff V authorised AMDQ allocated to a Market Participant is updated daily to account for net changes to the MP's total Tariff V customer numbers (total completed customer gains less total completed customer losses) occurred over the previous gas day.

$AMDQ_{(inj\ MP,\ CPP=\ LF)} = \text{Diversified Auth MDQ}_{(inj\ MP,CPP)} + \text{V Auth MDQ}_{(inj\ MP,CPP)}$

An MP's AMDQ credit ~~(associated with non-Longford CPP)~~ is the sum of its Diversified AMDQ credit allocated to sites and the hub.

$AMDQ^{cred}_{(inj\ MP,\ CPP\neq LF)} = \text{Diversified AMDQ}^{cred}_{(inj\ MP,\ CPP\neq LF)}$

For simplicity, an MP's authorised MDQ or AMDQ credit can be represented by the term

$AMDQ_{(inj\ MP,\ CPP)}$

and this generic term will be used throughout the rest of the document.

See reference 4 and 5 for details.

2.3 Rules for AMDQ nominations

An MP's injection hedge right (IHR) at a SIP is determined by the amount of AMDQ it nominates to that SIP in accordance with NGR 212(2A) and 212(5A).[2]

> *212(2A) By 5:00am on the day on which the gas day commences, a Market Participant may submit to AEMO:*
> *.....*
> *(b) a nomination of authorised MDQ or AMDQ credit;*
> *....*
> *for the gas day.*
>
> *212(5A) An updated nomination of authorised MDQ or AMDQ credit to a system injection point submitted under subrule (4) must be greater than or equal to the lesser of:*
> *(a) the current nomination of authorised MDQ or AMDQ credit, whichever is relevant, to that system injection point; and*
> *(b) the total quantity of gas scheduled for injection at that system injection point by that Market Participant for the current and preceding scheduling intervals of the gas day.*

[2] These rules will be effective from 17 April 2012. See details in www.aemc.gov.au.

3. Injection hedge right

3.1 AMDQ nomination WebExchanger

Through AMDQ nomination WebExchanger, MPs can nominate their AMDQ (as a percentage, AMDQ%, of their total AMDQ) to each individual system injection point (SIP) at the close proximity injection point (CPP) for the purpose of generating injection tie-breaking rights. The main features are:

- Only the CPPs containing biddable meters are viewable on the screen for the purpose of AMDQ nomination;
- The total nominated AMDQ% cannot exceed 100%, but can be less than 100%;
- An MP can update its AMDQ nominations in subsequent schedules, but the revised total nomination must not be less than the AMDQ needed to support injections that have been scheduled in earlier scheduling horizons.

The following diagram shows a screenshot of the AMDQ nomination WebExchanger:

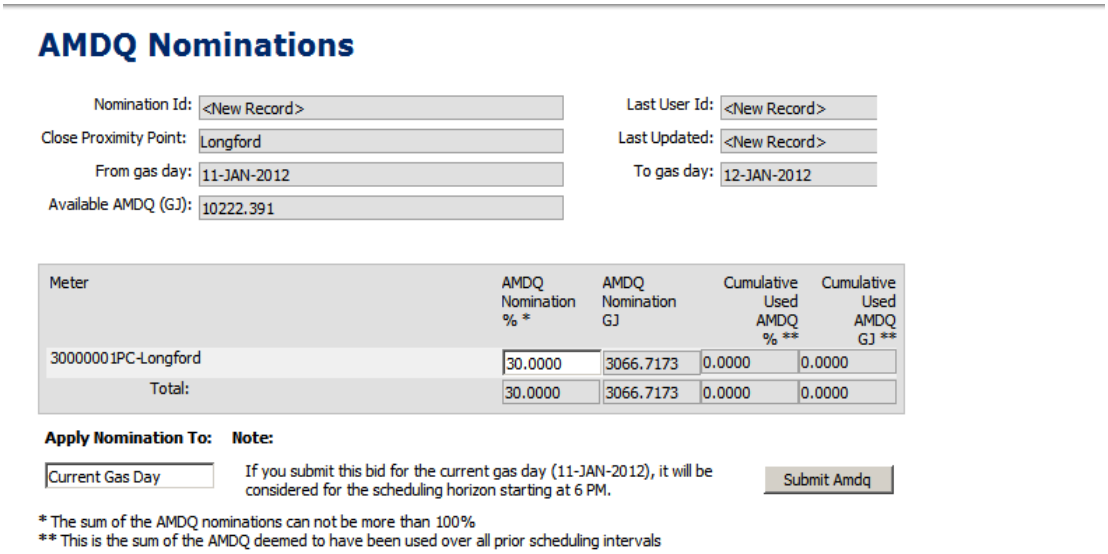

Figure 2 – A screenshot of AMDQ Nominations WebExchanger

3.2 AMDQ nominations and adjusted AMDQ nominations

Injecting MPs nominate the percentage of their AMDQ to each SIP for each CPP using the AMDQ nomination WebExchanger prior to the start of the gas day. In general, an injecting MP is expected to nominate all its AMDQ to maximise its injection tie-breaking. However, there are two possible scenarios when an injecting MP does not nominate 100% of its AMDQ at a CPP to the relevant SIPs:

- allocation errors due to data entry errors.
- the MP has arranged with other MPs to inject on its behalf at the relevant SIPs, and therefore intends to transfer some of its AMDQ as agency injection hedge right (AIHR) to other injecting MPs to support the latter's injection tie-breaking rights.

The nominated AMDQ percents may be updated in reschedules in accordance with NGR 212(5A).

- If a MP's re-nominated AMDQ% for any SIP for the relevant CPP is lower than the cumulative AMDQ% used up to the end of the current scheduling interval for that SIP, the AMDQ WEX will reject the values.
- Unless the MP re-submits valid values the last valid AMDQ% values will be used.

- If an MP does not nominate AMDQ% at the beginning of a Gas Day then the AMDQ% for all SIPs will be set to zero by default.

The following outlines the steps involved in the calculations of the adjusted AMDQ%.

Calculation of adjusted AMDQ nominations

For each injecting Market Participant (inj MP) injecting from an SIP (point) at a given CPP, and the first schedule S=1 of the gas day,

If the nominated AMDQ% is null

the adjusted AMDQ% is set to zero for all SIPs.

Else

the adjusted AMDQ% ($AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S=1)}$) is equal to the nominated AMDQ% ($AMDQ^{nom}_{pct\ (inj\ MP,\ point,\ CPP,\ S=1)}$)

For each injecting Market Participant (inj MP) injecting from an SIP (point) at a given CPP and for re-schedules S>1 of the gas day,

If the nominated AMDQ% ($AMDQ^{nom}_{pct\ (inj\ MP,\ point,\ CPP,\ S,\ S>1)}$) is less than the cumulative used AMDQ% ($Cum\_AMDQ_{GJ\ (inj\ MP,\ point,\ CPP,\ S-1,\ S>1)}$) for the previous schedule for any close proximity SIP

the adjusted AMDQ% $AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S,\ S>1)}$ is set equal to the adjusted AMDQ% of the previous schedule $AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S-1,S>1)}$

Else

the adjusted AMDQ% $AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S,\ S>1)}$ is equal to the nominated AMDQ ($AMDQ^{nom}_{pct\ (inj\ MP,\ point,\ CPP,\ S,\ S>1)}$)

This is calculated as follows:

For S=1,

If $AMDQ^{nom}_{pct\ (inj\ MP,\ point,\ CPP,\ S=1)}$ = NULL then

$AMDQ^{adj}_{pct\ (in\ MP,\ point,\ CPP,\ S=1)} = 0$

Else

$AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S=1)} = AMDQ^{nom}_{pct\ (inj\ MP,\ point,\ CPP,\ S=1)}$

For S>1,

If $AMDQ^{nom}_{pct\ (inj\ MP,\ point,\ CPP,\ S>1)} < Cum\_AMDQ_{pct\ (inj\ MP,\ point,\ CPP,\ S-1,\ S>1)}$ or is NULL for any close proximity injection point then

$AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S>1)} = AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S-1,\ S>1)}$

Else

$AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S>1)} = AMDQ^{nom}_{pct\ (inj\ MP,\ point,\ CPP,\ S,\ S>1)}$

where

The cumulative used AMDQ% $Cum\_AMDQ_{pct\ (inj\ MP,\ point,\ CPP,\ S>1)}$ for a close proximity SIP is defined in accordance with 3.3 below.

3.3 Injection hedge rights and used AMDQ

For each Market Participant (inj MP) injecting from an SIP (point) at a given CPP, and for each schedule S of the gas day,

- The injection hedge right ($IHR_{(inj\ MP,\ point,\ CPP,\ S)}$) for each SIP is determined by multiplying the adjusted AMDQ percentage ($AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S)}$) with the relevant authorised MDQ or AMDQ credit ($AMDQ_{(inj\ MP,\ CPP)}$) for that CPP held by the Market Participant. This is calculated as per the formula below.

  If $AMDQ_{(inj\ MP,\ CPP)}$ is NULL then

  $$AMDQ_{(inj\ MP,\ CPP)} = 0$$

  Else

  $$IHR_{(inj\ MP,\ point,\ CPP,\ S)} = AMDQ_{(inj\ MP,\ CPP)} * AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S)}$$

- The cumulative quantity of scheduled injections $Cum\_Qi_{(inj\ MP,\ point,\ CPP,\ S)}$ equals the sum of the scheduled injection quantities (Qi) up to the end of the current scheduling interval SI. This is calculated as per the formula below.

  $$Cum\_Qi_{(inj\ MP,\ point,\ CPP,\ S)} = \sum_{SI=1,..,S} Qi_{(inj\ MP,\ point,\ CPP,\ SI,\ S)}$$

  If $Qi_{(inj\ MP,\ point,\ CPP,\ SI,\ S)}$ is NULL then

  $$Qi_{(inj\ MP,\ point,\ CPP,\ SI,\ S)} = 0$$

- The cumulative amount of used AMDQ, $Cum\_AMDQ_{GJ\ (inj\ MP,\ point,\ CPP,\ S)}$, equals the lesser of the sum of injection hedge right (IHR) and residual injection hedge right (RIHR) and the cumulative scheduled injection. This is calculated as per the formula below.

  $$Cum\_AMDQ_{GJ\ (inj\ MP,\ point,\ CPP,\ S)} = \text{Min}\ (IHR_{(inj\ MP,\ point,\ CPP,\ S)} + RIHR_{(inj\ MP,\ point,\ CPP,\ S)},\ Cum\_Qi_{(inj\ MP,\ point,\ CPP,\ S)})$$

  where

  $RIHR_{(inj\ MP,\ point,\ CPP,\ S)}$ is the residual injection hedge right calculated in section 5.1.

- The cumulative percentage of used AMDQ ($Cum\_AMDQ_{pct\ (inj\ MP,\ point,\ CPP,\ S)}$) equals the cumulative used AMDQ divided by the AMDQ held by the Market Participant. This is calculated as per the formula below.

  If $AMDQ_{(inj\ MP,\ CPP)} = 0$ then

  $$Cum\_AMDQ_{pct\ (inj\ MP,\ point,\ CPP)} = 0$$

  Else

  $$Cum\_AMDQ_{pct\ (inj\ MP,\ point,\ CPP,\ S)} = Cum\_AMDQ_{GJ\ (inj\ MP,\ point,\ CPP,\ S)} / AMDQ_{(inj\ MP,\ CPP)}$$

3.4 Examples

The following examples assume:

- the Market Participant has an AMDQ of 100GJ;
- the Market Participant uses all of its AMDQ to support its IHN. As such the total AMDQ% nominated to the SIPs is 100%;
- there are 2 schedules and 2 SIPs at the given CPP;
- there is no tie-breaking in schedule 1; and
- SIP1 fails in schedule 2 and tie-breaking is critical at SIP2 in schedule 2.

For schedule 1in examples 1-3 below, the

- MP nominates 60% and 40% of its AMDQ to SIP1 and SIP2 respectively and effectively allocates 60GJ and 40GJ of injection hedge rights to these SIPs.
- scheduled injection for scheduling interval 1 is 25GJ and 20GJ for SIP1 and SIP2 respectively.
- Quantity of AMDQ deemed to have been used is 25GJ and 20GJ (25% and 20%) for SIP1 and SIP2 respectively.

Different possible market outcomes can occur depending on the Market Participant behaviour in schedule 2.

Note that the subscript x in Table 1 to Table 4 denotes inj MP = x.

Scenario 1: The Market Participant re-nominates its AMDQ% lower and the renominated values are not less than the cumulative used AMDQ%

Table 1: Determination of injection hedge right with valid resubmitted AMDQ nominations

		Market Participant x					
		Schedule 1			Schedule 2		
	Variable	**SIP1**	**SIP2**	**CPP**	**SIP1**	**SIP2**	**CPP**
Available AMDQ (GJ)	AMDQ $_{(x, CPP)}$	100					
1. Market Participants' inputs via WEX							
% AMDQ splits between SIPs	**AMDQ** ^{nom} $_{pct\ (x, point, CPP, S)}$	60%	40%		25%	75%	
Warning message on WEX screen							
Adjusted % AMDQ splits between SIPs	**AMDQ** ^{adj} $_{pct\ (x, point, CPP, S)}$	60%	40%	100%	25%	75%	100%
2. Injection hedge rights (GJ)							
IHR	**IHR** $_{(x, point, CPP, S)}$	60	40	100	25	75	100
3. Cumulative AMDQ/scheduled injections (GJ)							
Scheduled injections for current SI	**Qi** $_{(x, point, CPP, SI, S)}$	25	20	45	0	35	35
Cum scheduled injections including current SI	**Cum_Qi** $_{(x, point, CPP, S)}$	25	20	45	25	55	80
Cum used AMDQ GJ	**Cum_AMDQ** $_{GJ\ (x, point, CPP, S)}$	25	20	45	25	55	80
Cum used AMDQ %	**Cum_AMDQ** $_{pct\ (x, point, CPP, S)}$	25%	20%	45%	25%	55%	80%

Table 1 shows that for schedule 2,

- the MP re-nominates 25% and 75% of its AMDQ to SIP1 and SIP2 respectively and effectively moves 35% of its original AMDQ nominations from SIP1 to SIP2 in an effort to increase IHR at SIP2;
- the renominated AMDQ% are valid and accepted by the system (ie not less than the cumulative used AMDQ for preceding and current scheduling intervals).
- the MP achieves a total scheduled injection of 80GJ for the gas day for that CPP.

Scenario 2: The Market Participant re-nominates its AMDQ% lower and the renominated values are less than the cumulative used AMDQ%.

Table 2: Determination of injection hedge right with invalid resubmitted AMDQ nominations

		Market Participant x					
		Schedule 1			Schedule 2		
	Variable	**SIP1**	**SIP2**	**CPP**	**SIP1**	**SIP2**	**CPP**
Available AMDQ (GJ)	AMDQ $_{(x, CPP)}$	100					
1. Market Participants' inputs via WEX							
% AMDQ splits between SIPs	**AMDQ** ^{nom} $_{pct\ (x, point, CPP, S)}$	60%	40%		10%	90%	
Warning message on WEX screen					alert message appears		

		Market Participant x					
Adjusted % AMDQ splits between SIPs	**AMDQ** ^{adj} $_{pct\ (x,\ point,\ CPP,\ S)}$	60%	40%	100%	60%	40%	100%
2. Injection hedge rights (GJ)							
IHR	**IHR** $_{(x,\ point,\ CPP,\ S)}$	60	40	100	60	40	100
3. Cumulative AMDQ/scheduled injections (GJ)							
Scheduled injections for current SI	**Qi** $_{(x,\ point,\ CPP,\ SI,\ S)}$	25	20	45	0	20	20
Cum scheduled injections including current SI	**Cum_Qi** $_{(x,\ point,\ CPP,\ S)}$	25	20	45	25	40	65
Cum used AMDQ GJ	**Cum_AMDQ** $_{GJ\ (x,\ point,\ CPP,\ S)}$	25	20	45	25	40	65
Cum used AMDQ %	**Cum_AMDQ** $_{pct\ (x,\ point,\ CPP,\ S)}$	25%	20%	45%	25%	40%	65%

Table 2 shows that for schedule 2,

- the MP re-nominates 10% and 90% of its AMDQ to SIP1 and SIP2 respectively.
- because the renominated AMDQ% for SIP1 is less than the cumulative used AMDQ% of 25% in schedule 1 the re-submitted values are rejected.
- A warning message is displayed on the WEX screen requesting the MP to re-submit the values.
- The MP fails to re-submit valid AMDQ%. The last valid adjusted AMDQ% in S1 are used, i.e. 60% and 40% for SIP1 and SIP2 respectively.
- As a result, the MP over-allocates its AMDQ to the failed SIP1 and fails to move its AMDQ to SIP2. It only achieves 65GJ of scheduled injection for the gas day for that CPP.

Scenario 3: The Market Participant does not re-submit its AMDQ% in schedule 2.

Table 3: Determination of injection hedge right with no AMDQ nominations in schedule 2

		Market Participant x					
		Schedule 1			Schedule 2		
	Variable	**SIP1**	**SIP2**	**CPP**	**SIP1**	**SIP2**	**CPP**
Available AMDQ (GJ)	AMDQ $_{(x,\ CPP)}$	100					
1. Market Participants' inputs via WEX							
% AMDQ splits between SIPs	**AMDQ** ^{nom} $_{pct\ (x,\ point,\ CPP,\ S)}$	60%	40%				
Warning message on WEX screen							
Adjusted % AMDQ splits between SIPs	**AMDQ** ^{adj} $_{pct\ (x,\ point,\ CPP,\ S)}$	60%	40%	100%	60%	40%	100%
2. Injection hedge rights (GJ)							
IHR	**IHR** $_{(x,\ point,\ CPP,\ S)}$	60	40	100	60	40	100
3. Cumulative AMDQ/scheduled injections (GJ)							
Scheduled injections for current SI	**Qi** $_{(x,\ point,\ CPP,\ SI,\ S)}$	25	20	45	0	20	20
Cum scheduled injections including current SI	**Cum_Qi** $_{(x,\ point,\ CPP,\ S)}$	25	20	45	25	40	65
Cum used AMDQ GJ	**Cum_AMDQ** $_{GJ\ (x,\ point,\ CPP,\ S)}$	25	20	45	25	40	65
Cum used AMDQ %	**Cum_AMDQ** $_{pct\ (x,\ point,\ CPP,\ S)}$	25%	20%	45%	25%	40%	65%

Table 3 shows that for schedule 2,

- the MP does not re-nominate.
- the last valid adjusted AMDQ% in S1 are used, i.e. 60% and 40% for SIP1 and SIP2 respectively.
- the MP achieves the same market outcome as in scenario 2.

Scenario 4: The Market Participant does not nominate in schedule 1.

Table 4: Determination of injection hedge right with no AMDQ nominations in schedule 1

		Market Participant

		Market Participant					
		Schedule 1			Schedule 2		
	Variable	**SIP1**	**SIP2**	**CPP**	**SIP1**	**SIP2**	**CPP**
Available AMDQ (GJ)	AMDQ $_{(x, CPP)}$	100					
1. Market Participants' inputs via WEX							
% AMDQ splits between SIPs	**AMDQ** ^{nom} $_{pct\ (x, point, CPP, S)}$				10%	90%	
Warning message on WEX screen							
Adjusted % AMDQ splits between SIPs	**AMDQ** ^{adj} $_{pct\ (x, point, CPP, S)}$	0%	0%	0%	10%	90%	100%
2. Injection hedge rights (GJ)							
IHR	**IHR** $_{(x, point, CPP, S)}$	0	00	0	10	90	100
3. Cumulative AMDQ/scheduled injections (GJ)							
Scheduled injections for current SI	**Qi** $_{(x, point, CPP, SI, S)}$	25	20	45	0	20	20
Cum scheduled injections including current SI	**Cum_Qi** $_{(x, point, CPP, S)}$	25	20	45	25	40	65
Cum used AMDQ GJ	**Cum_AMDQ** $_{GJ\ (x, point, CPP, S)}$	0	0	0	10	40	50
Cum used AMDQ %	**Cum_AMDQ** $_{pct\ (x, point, CPP, S)}$	0%	0%	0%	10%	40%	50%

- Table 4 shows that in schedule 2, the MP:
- does not nominate its AMDQ% in schedule 1. No injection hedge right is allocated to this MP in schedule 1. Because there is no tie-breaking in S1 there is no impact on the MP's scheduled injections.
- nominates 10% and 90% of its AMDQ to SIP1 and SIP2 respectively. The nominated AMDQ% are valid and accepted by the system.
- under-allocates its AMDQ to SIP1 and over-allocated its AMDQ to SIP2 in schedule 2 and the total scheduled injection at the CPP is only 50GJ.

4. Agency injection hedge rights

4.1 A recap of agency injection hedge nominations

When an MP wishes to nominate a portion of its scheduled injection at a SIP to be used by another (or multiple) MP(s) to generate uplift hedge for the latter MP(s), this is called an Agency Injection Hedge Nomination (AIHN).

There are at least two parties involved in the AIHN.

The injecting MP (inj MP) for AIHN:

- normally holds spare injection capacity at a SIP and contracts with recipient MPs to transfer some of its scheduled injection quantity at that SIP to support the recipient MPs' uplift hedge;
- must submit AIHN to all the contracted recipient MPs using the AIHN WebExchanger. The required information includes the name of the recipient MP, the AIHN, the CPP, the nomination period and the allocation method for its scheduled injections; and
- must use the achieved injections to first satisfy its injection hedge nomination (IHN) before meeting the AIHN requirements. If there is not sufficient gas injection to meet all recipient MPs' AIHN then one of the following allocation methods – as nominated by the injecting MP – will apply.

Table 5: Agency injection hedge nomination method

Option	Description
Pro-rata	Under this option, gas will be allocated proportionately (in % terms) among all recipient participants based on the AIHN.
Preference	Under this option, gas will be allocated to the first recipient MP at the top of the priority list If there is spare injection after meeting the above requirement it will be used to meet the second AIHN in the priority list. The allocation process continues down the list until all the available injection quantity is fully allocated to the nominated recipient MPs in the list.

The recipient MP (Rmp) for AIHN:

- normally holds spare AMDQ but cannot achieve sufficient injections from the associated CPP to support its uplift hedge;
- will receive agency injection hedge from the injecting MP if the AIHN is met; and
- may provide some of its unused AMDQ to the injecting MP to support the latter's injection tie-breaking right via agency injection hedge right (AIHR).

An injecting MP at a SIP can be a recipient of AIHN at a SIP if other parties have been contracted to inject on its behalf at that SIP.

The AIHR is determined by the following process:

- Calculate the amount of AMDQ for each injecting MP which has not been allocated as its IHR. This is to determine whether that injecting MP has excess AMDQ to support its AIHN if it wishes another MP to inject on its behalf. See section 4.2 below.
- Calculate the total AIHR for each injecting MP received from all the recipient MPs for which it will inject on behalf of. See section 4.3 below.

4.2 Calculate AMDQ not allocated as Injection hedge right

The amount of unallocated AMDQ for an injecting MP at each CPP in schedule S, $AMDQ^{UA1}_{(Inj\ MP,\ CPP,\ S)}$, is the residual amount of AMDQ not allocated as IHR. In general, injecting MPs will allocate all of its AMDQ in order to achieve the optimal injection tie-breaking rights.

The unallocated AMDQ is calculated as follows.

$$AMDQ^{UA1}_{(inj\ MP,\ CPP,\ S)} = AMDQ_{(inj\ MP,\ CPP)} - \sum_{point\ =1,..,n} IHR_{(Inj\ MP,\ point,\ CPP,\ S)}$$

Table 6: Determination of unallocated AMDQ

Injecting MP	Close Proximity Point (CPP)	AMDQ (inj MP, CPP)	Point	AMDQ adj pct (inj MP, point, CPP, S>1)	IHR (inj MP, point, CPP, S)	AMDQ^{UA1} (inj MP, CPP)
X	Longford	100	LF	0%	0	= 100 – (0 + 20) = 100 - 20 = 80
			VicHub	20%	20	
Y	Longford	100	LF	20%	20	= 100 – (20 + 30) = 100 - 50 = 50
			VicHub	30%	30	
Z	Longford	100	LF	50%	50	= 100 – (50 + 50) =100 - 100 = 0
			VicHub	50%	50	

(Note: LF = Longford SIP)

The example in Table 6 illustrates the calculations of unallocated AMDQ and assumes:

- there are 3 MPs (X,Y,Z) injecting at the Longford CPP. Each has 100TJ of AMDQ (Authorised MDQ);
- MP X nominates 0% and 20% of its AMDQ to LF and VicHub SIP respectively and achieves 0TJ and 20TJ of IHR for these SIPs. The unallocated AMDQ is therefore 80TJ;
- MP Y nominates 20% and 30% of its AMDQ to LF and VicHub SIP respectively and achieves 20TJ and 30TJ of IHR for these SIPs. The unallocated AMDQ is therefore 50TJ; and
- MP Z nominates 50% and 50% of its AMDQ to LF and VicHub SIP respectively and achieves 50TJ and 50TJ of IHR for these SIPs. The unallocated AMDQ is therefore 0TJ.

4.3 Calculate total agency injection hedge right for injecting Market Participants

4.3.1 Calculate agency injection hedge right transferred from recipient Market Participant to injecting Market Participant at each CPP

If there is unallocated AMDQ not used for IHR and the MP is a recipient of AIHN the unallocated AMDQ will be allocated as AIHR. The AIHR will be transferred from the recipient MP to the injecting MP to support the latter's injection tie-breaking right.

Note: For clarity, $AMDQ^{UA1}_{(Rmp, CPP,S)}$ instead of $AMDQ^{UA1}_{(inj\ MP, CPP,S)}$, will be used in here, to reflect that the AIHR allocations are from AIHN recipient's AMDQ only.

The amount of the recipient MP's unallocated AMDQ ($AMDQ^{UA1}_{(Rmp, CPP,S)}$) to be allocated as AIHR:

- will be the lesser of the sum of all the AIH nominations it receives from all the associated injecting MPs at that CPP and the quantity of unallocated AMDQ.
- to each injecting MP is proportional to the AIHN it receives from that injecting MP.

This is calculated as follows:

If $AMDQ^{UA1}_{(Rmp, CPP,S)}$ or $AIH^{nom}_{(inj\ mp, point, CPP, Rmp)}$ = 0 or Null then

$$AIHR_{(inj\ mp, CPP, Rmp, S)} = 0$$

Else

$$AIHR_{(inj\ MP, CPP, Rmp, S)} = Min\ [1, (AMDQ^{UA1}_{(Rmp, CPP, S)} / \sum_{inj\ MP=1,..,n} AIH^{nom}_{(inj\ MP, CPP, Rmp)})] * AIH^{nom}_{(inj\ MP, CPP, Rmp)}$$

where

The total agency injection hedge nomination (AIH^{nom}) for each injecting MP at each CPP is calculated for "preference" method:

$AIH^{nom}_{(inj\ MP, CPP, Rmp)} = \sum_{Pref=1, n} AIH^{nom}_{(inj\ mp, CPP, Rmp, Pref)}$

and for pro-rata method:

$AIH^{nom}_{(inj\ MP, CPP, Rmp)} = \sum_{Prior=1, n} AIH^{nom}_{(inj\ mp, CPP, Rmp, Prior)}$

Refer to section 4.3 of the Uplift payment functional design for calculations of AIHN by preference and pro-rata methods.

Table 7: Determination of AIHR provided to injecting MP

Recipient MP holding AMDQ	CPP	Injecting MP (Receiving AIHR)	$AIH^{nom}_{(inj\ MP, CPP, Rmp)}$	$AIHR_{(inj\ MP, CPP, Rmp, S)}$
X	Longford	X	NA	0
		Y	10	= Min [1, (80 / (10+50))] * 10 = 10
		Z	50	= Min [1, (80 / (10+50))] * 50 = 50
		Total all injecting MP	60	60
Y	Longford	X	40	= Min [1, (50 / (40+60))] * 40 = 20
		Y	NA	0
		Z	60	Min [1, (50 / (40+60))] * 40 = 30
		Total all injecting MP	100	50
Z	Longford	NA	NA	0

Table 7 illustrates the calculations of AIHR provided by recipient MPs to each injecting MP at each designated CPP. For the Longford CPP shown in the above example,

- MP X:
  - is the recipient MP of 60TJ of AIHN (10TJ and 50TJ of AIHN from injecting MP Y and Z respectively);
  - has 80TJ of available unallocated AMDQ (see calculations in Table 6). However only 60TJ (minimum of 60TJ of AIHN and 80TJ of available unallocated AMDQ) of unallocated AMDQ is allocated as AIHR (10TJ and 50TJ for injecting MP Y and Z respectively).
- MP Y:
  - is the recipient MP of 100TJ of AIHN (40TJ and 60TJ of AIHN from injecting MP X and Z respectively);
  - has 50TJ of available unallocated AMDQ (see calculations in Table 6) with 20TJ and 30TJ allocated to injecting MP X and Z respectively).
- MP Z:
  - has allocated all its AMDQ as IHR and hence there is no unallocated AMDQ;
  - does not receive AIHN from any other injecting MPs; and
  - has not achieved AIHR.

4.3.2 Calculate the total agency injection hedge right received by each injecting Market Participant at a CPP

This step involves the aggregation of all the AIHR received by each injecting MP from all the recipient MPs (it injects on behalf of) at a CPP and for schedule S. This is calculated as follows.

$AIHR_{(inj\ MP,\ CPP,\ S)} = \sum_{Rmp=1,..,n} AIHR_{(inj\ MP,\ CPP,\ Rmp,\ S)}$

Table 8: determination of total AIHR received by each injecting MP

Injecting MP (Receiving AIHR)	CPP	$AIHR_{(inj\ MP,\ CPP,S)}$ (See values in Table 7)
X	Longford	=0+20+0 =20
Y	Longford	= 10+0+0 =10
Z	Longford	=50+30+0 =80

Table 8 shows the AIHR received by each injecting MP. The numbers are derived by summing the AIHR values shown in the last column in Table 7 for each injecting MP shown in the third column in the same table.

From the values shown in Table 7, for the Longford CPP shown in the above example, the total AIHR received by injecting MP:

- X is 20TJ (0TJ, 20TJ and 0TJ from MP X,Y and Z respectively);
- Y is 10TJ (10TJ, 0TJ and 0TJ from MP X,Y and Z respectively); and
- Z is 80TJ (50TJ, 30TJ and 0TJ from MP X,Y and Z respectively).

4.3.3 Allocate total AIHR received by each injecting Market Participant at each SIP within a CPP

The last step of the process is to allocate the total quantity of AIHR received by each injecting MP at a given CPP to the relevant SIPs. This is achieved by apportioning the total AIHR each relevant SIP according to that SIP's share of the total adjusted AMDQ% ($AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S)}$) for the given CPP.

If $AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S)} = 0$ or $\sum_{point=1,..n} AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S)} = 0$ then

$$AIHR_{(inj\ MP,\ point,\ CPP,\ S)} = 0$$

Else

$$AIHR_{(inj\ MP,\ point,\ CPP,\ S)} = AIHR_{(inj\ MP,\ CPP,\ S)} * AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S)} \Big/ \sum_{point=1,..n} AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S)}$$

Table 9: Allocation of received AIHR to SIPs

Inj MP	Close Proximity Point (CPP)	$AIHR_{(inj\ MP,\ CPP,\ Rmp,\ S)}$ (See values in Table 8)	Point	$AMDQ^{adj\ pct}_{(inj\ MP,\ point,\ CPP,\ S)}$ (See values in Table 6)	$AIHR_{(inj\ MP,\ CPP,\ point,\ S)}$
X	Longford	20	LF	0%	= 20 * 0% /(0%+20%) =0
			VicHub	20%	= 20 * 20% /(0%+20%) = 20
Y	Longford	10	LF	20%	= 10 * 20% /(20%+30%) = 4
			VicHub	30%	= 10 * 30% /(20%+30%) = 6
Z	Longford	80	LF	50%	= 80 * 50% //(50%+50%) = 40
			VicHub	50%	= 80 * 50% /(50%+50%) = 40

Table 9 shows the final split of the received AIHR to each SIP at the Longford CPP for each injecting MP:

- X: 20TJ of AIHR is 100% allocated to VicHub.
- Y: 10TJ of AIHR is allocated to LF and VicHub SIP in 40%/60% split
- Z: 80TJ of AIHR is split equally between LF and VicHub.

5. Total injection right

5.1 Calculate residual AMDQ and residual injection hedge right

If there is residual AMDQ which has not been allocated as IHR and/or AIHR then it will be allocated as residual injection right in accordance with the following steps.

5.1.1 Calculate residual AMDQ

The residual AMDQ ($AMDQ^{UA2}_{(inj\ MP,\ CPP,\ S)}$) for an injecting MP at a CPP and schedule S is the quantity of AMDQ unallocated after accounting for IHR and all the AIHR that it has provided to other injecting MP who inject on its behalf. (i.e. these latter injecting MPs are recipient MPs with respect to AIHN). The AIHR provided to the injecting MPs is deemed to have been allocated in accordance with section 4.3.2, regardless of whether the injecting MPs have nominated an adjusted AMDQ% ($AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S)}$) within that CPP. The AIHR is therefore unavailable for re-allocation back to the recipient MP as RIHR.

$$AMDQ^{UA2}_{(inj\ MP,\ CPP,\ S)} = AMDQ^{UA1}_{(inj\ MP,\ CPP,\ S)} - \sum_{inj\ MP=1,..n} AIHR_{(inj\ MP,\ CPP,\ Rmp=inj\ MP,\ S)}$$

Table 10: Determination of residual AMDQ not allocated as IHR and/or AIHR by CPP

Injecting MP	Close Proximity Point (CPP)	$AMDQ^{UA1}_{(inj\ MP,\ CPP,\ S)}$ (See values in Table 6)	$\sum_{inj\ MP=1,..,n} AIHR_{(inj\ MP,\ CPP,\ Rmp=inj\ MP,\ S)}$ (See values in Table 7)	$AMDQ^{UA2}_{(inj\ MP,\ CPP,\ S)}$
X	Longford	80	60	= 80 – 60 = 20
Y	Longford	50	50	= 50 – 50 = 0
Z	Longford	0	0	= 0

Table 10 shows that:

- injecting MP X has 20TJ of residual of Longford AMDQ which has not been allocated as IHR or AIHR. The residual AMDQ will be allocated to each SIP in accordance with section 5.1.2; and
- there is no residual AMDQ for injecting MP Y and Z.

5.1.2 Determine residual injection hedge right

The residual AMDQ ($AMDQ^{UA2}_{(inj\ MP,\ CPP,S)}$) for each injecting MP at the CPP is apportioned to each SIP within that CPP according to that SIP's share of the total adjusted AMDQ% ($AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S)}$) for that CPP. This is the residual injection hedge right (RIHR).

If $AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S)} = 0$ or $\sum_{all\ point} AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S)} = 0$ then

$$RIHR_{(Inj\ MP,\ point,\ CPP,\ S)} = 0$$

Else

$$RIHR_{(Inj\ MP,\ point,\ CPP,\ S)} = AMDQ^{UA2}_{(Inj\ MP,\ CPP,\ S)} * AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S)} \Big/ \sum_{all\ point} AMDQ^{adj}_{pct\ (inj\ MP,\ point,\ CPP,\ S)}$$

Table 11: Allocation of residual AMDQ to SIPs as RIHR

Injecting MP	Close Proximity Point (CPP)	$AMDQ^{UA2}$ (inj MP, CPP, S)	Point	$AMDQ^{adj\ pct}$ (inj MP, point, CPP, S)	RIHR (inj MP, CPP, point, S)
X	Longford	20	LF	0%	= 20 * 0% /(0%+20%) =0
			VicHub	20%	= 20 * 20%/(0%+20%) = 20
Y	Longford	0	LF	20%	= 0 * 20%/(20%+30%) = 0
			VicHub	30%	= 0 * 30%/(20%+30%) = 0
Z	Longford	0	LF	50%	= 0 * 50%/(50%+50%) = 0
			VicHub	50%	= 0 * 50%/(50%+50%) = 0

Table 11 shows that, for injecting MP X, the residual Longford AMDQ of 20TJ is totally allocated to VicHub as RIHR in accordance to the above apportionment method.

5.2 Calculate total injection right (ITR)

The total injection tie-breaking right for an injecting MP (ITR (inj MP, point, CPP, S)) for a SIP and schedule s is the sum of its injection hedge right, the total agency injection hedge right it receives from the recipient MPs it injects on behalf of, and the residual injection hedge right.

ITR (inj MP, point, CPP, S) = IHR (inj MP, point, CPP, S) + AIHR (inj MP, point, CPP, S) + RIHR (inj MP, point, CPP, S)

Table 12: Determination of total injection tie-breaking right

Injection MP	CPP	Point	IHR (inj MP, point, CPP, S) (See values in Table 6)	AIHR (inj MP, point, CPP, S) (See values in Table 9)	RIHR (inj MP, point, CPP, S) (See values in Table 11)	Total Injection Right ITR (inj MP, point, CPP, S)
X	LF	LF	0	0	0	0
		VicHub	20	20	20	=20+20+20 =60
Y	LF	LF	20	4	0	= 20+4+0 =24
		VicHub	30	6	0	= 30+6+0 =36
Z	LF	LF	50	40	0	=50+40+ =90
		VicHub	50	40	0	=50+40+ =90

Table 12 shows the ITR for each SIP at the Longford CPP. Each injecting MP starts with 100TJ of Longford AMDQ. Through AIHN and AMDQ allocations via the AMDQ WexExchanger, each injecting MP ends up with different total injection tie-breaking rights, but the total amount of 300TJ of Longford AMDQ remains unchanged.

Schedule 1: Definition of terms/variables

Variable	Description
AMDQ (inj MP, CPP= LF)	Longford authorised MDQ
AMDQ ^{cred} (inj MP, CPP≠ LF)	Longford and Non Longford AMDQ credit ~~certificates~~
Diversified Auth MDQ (inj MP,CPP)	Sum of Longford pipeline capacity allocated to tariff D sites (adjusted after applying load diversity factor) or hub
V Auth MDQ (inj MP,CPP)	Longford pipeline capacity allocated to a Market Participant to cover its portfolio of Tariff V customer load
Diversified AMDQ ^{cred} (inj MP, CPP≠ LF)	Non Longford and new additional Longford AMDQ credit certificates nominated ~~pipeline capacity allocated~~ to tariff D sites (adjusted after applying load diversity factor[RS1][LC2][RS3]) or hub
AMDQ (inj MP, CPP)	A generic term to denote Longford authorised MDQ plus Longford AMDQ credit, or Non Longford AMDQ credit ~~certificates~~[RS4][LC5][RS6]
AMDQ ^{nom} $_{pct}$ (inj MP, point, CPP, S)	The percentage of a Market Participant's AMDQ nominated to an SIP at a given CPP for a given schedule
AMDQ ^{adj} $_{pct}$ (inj MP, point, CPP, S)	The percentage of a Market Participant's AMDQ allocated to an SIP at a given CPP for a re-schedule if the Market Participant fails to submit valid re-nominations at the reschedule
ITR (inj MP, point, CPP, S)	The calculated total injection tie breaking right for a MP for a given schedule at an SIP within a given CPP
Qi (inj MP, point, CPP, SI, S)	A Market Participant's scheduled injection quantity within a scheduling interval for a given schedule at an SIP within a given CPP.
Cum_Qi (inj MP, point, CPP, S)	A Market Participant's cumulative quantity of scheduled injection for a given schedule at an SIP within a given CPP
Cum_AMDQ$_{GJ}$ (inj MP, point, CPP, S)	A Market Participant's used AMDQ (GJ) cumulated over current and preceding scheduling intervals
Cum_AMDQ$_{pct}$ (inj MP, point, CPP, S)	A Market Participant's used AMDQ (%) cumulated over current and preceding scheduling intervals
IHR (inj MP, point, CPP, S)	Injection hedge right for injecting MP at SIP (point) within close proximity point (CPP) for schedule S
AMDQ^{UA1} (inj MP, CPP, S)	The quantity of AMDQ for injection MP at close proximity point (CPP) for schedule S available for allocation as agency injection hedge right
AMDQ^{UA2} (inj MP, CPP, S)	The quantity of residual AMDQ for injection MP at close proximity point (CPP) for schedule S after allocation as injection hedge right and agency injection hedge right
AIHR (inj MP, CPP, Rmp, S)	Agency injection hedge right for injecting MP received from recipient MP at CPP for schedule S
AIHR (inj MP, CPP, S)	Total Agency injection hedge right for injecting MP received from all recipient MPs at CPP for schedule S
AIHR (inj MP, point, CPP, S)	Total Agency injection hedge right for injecting MP received from all recipient MPs at SIP (point) within close proximity point (CPP) for schedule S
AIH ^{nom} (inj MP, CPP, Rmp)	Agency injection hedge nomination by injecting MP to recipient MP at CPP for generating uplift hedge for recipient MP using injecting MP's scheduled injections.
RIHR (inj MP, point, CPP,S)	Residual Injection hedge right for injecting MP at SIP (point) within close proximity point (CPP) for schedule S

Schedule 2: List of subscripts

Subscript	Description
CPP= LF	Longford close proximity point
~~CPP≠ LF~~	~~Close proximity point other than Longford~~
X	Market Participant X
point	System injection point
CPP	Close proximity point
S	Schedule
SI	Scheduling interval

Schedule 3: List of Close Proximity Injection Points

Close proximity injection point	MIRN	Injection meter name
Longford	30000001PC	Longford
Longford	30000167PC	VicHub
Iona	30000154PC	Iona
Iona	30000168PC	SEA Gas
Iona	30000181PC	Otway
Iona	30000197PC	Mortlake
Culcairn	20000001PC	Culcairn
BassGas	30000170PC	BassGas