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Wholesale Market—Hub Options

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Wholesale market development—Status

Governance

- Market Rules, Participation Agreement, Standard Trading Terms practically complete

Platform development

- M-co well advanced with "tweaking" trading platform
- Acceptance testing shortly

Issues outstanding

- Crown Minerals Act, s.41
- Trading location, i.e. hub or all welded points

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Why do we need a hub?

Transparency & liquidity

Concentrating trading at one location allows:

- standardisation of products on offer
- easy price comparison → increases transparency
- homogeneity, which facilitates on-selling

Hub trading is expected to increase liquidity

- although some potential trades may be infeasible because of the hub location
- hub location should be selected to minimise infeasible trades

Without a hub…

Platform design is difficult

- Every deal is a “bespoke” arrangement
- Disparate trade locations makes price comparisons difficult
- Difficult to report meaningful market statistics
- Locational trades increases likelihood of identifying parties behind offers

Two options being considered

Virtual Hub (VH)

- Notional location at which trades are priced
- Separate from MPOC & OATIS
- Title transfer occurs at (delivery) welded points
- Limited opportunity to provide information to welded parties
- Title tracking by Gas Transfer Agent

Trading Hub (TH)

- Uses MPOC nominations to establish title
- Separates platform trading from other activity
- Requires Hub Operator to overcome OATIS limitations

TH is superior option

- platform information supports title tracking & transfer
- scalable—move to a second hub if demand exists
- easy to use and understand
  - platform price = contract price
- separates trading from other activity
- title-tracking & reconciliation service

But…

- requires agreement for use of pipeline services and OATIS

VH is backstop option

- Every trade requires a price adjustment to translate from hub location to physical WP
- Some complexity in setting price translation rules
- Potential for trading errors (where trader does not realise physical location requires backhaul)
- Requires Gas Transfer Agreement for each WP at which a trader might trade

Greatest advantage…

- can be implemented independently of OATIS limitations

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How does the VH work?

VH—notional location to set prices

- Trades are ***priced*** at a common location but ***executed*** at a receipt or delivery welded point
- Requires clear, unambiguous rules governing how hub price "adjusts" to the contract price

VH—basic price adjustment rules

Price

Contract Price = Hub Price + deemed transmission charge

Where:

Deemed transmission charge = transport cost from hub to non-shipper's WP, based on northward gas flow (NB can be negative for WP south of F Rd)

Other terms

Buyer pays Contract Price to seller

Shipper pays actual transmission charge

Title transfer occurs at 'non-shipper' welded point

VH price adjustment examples–#1

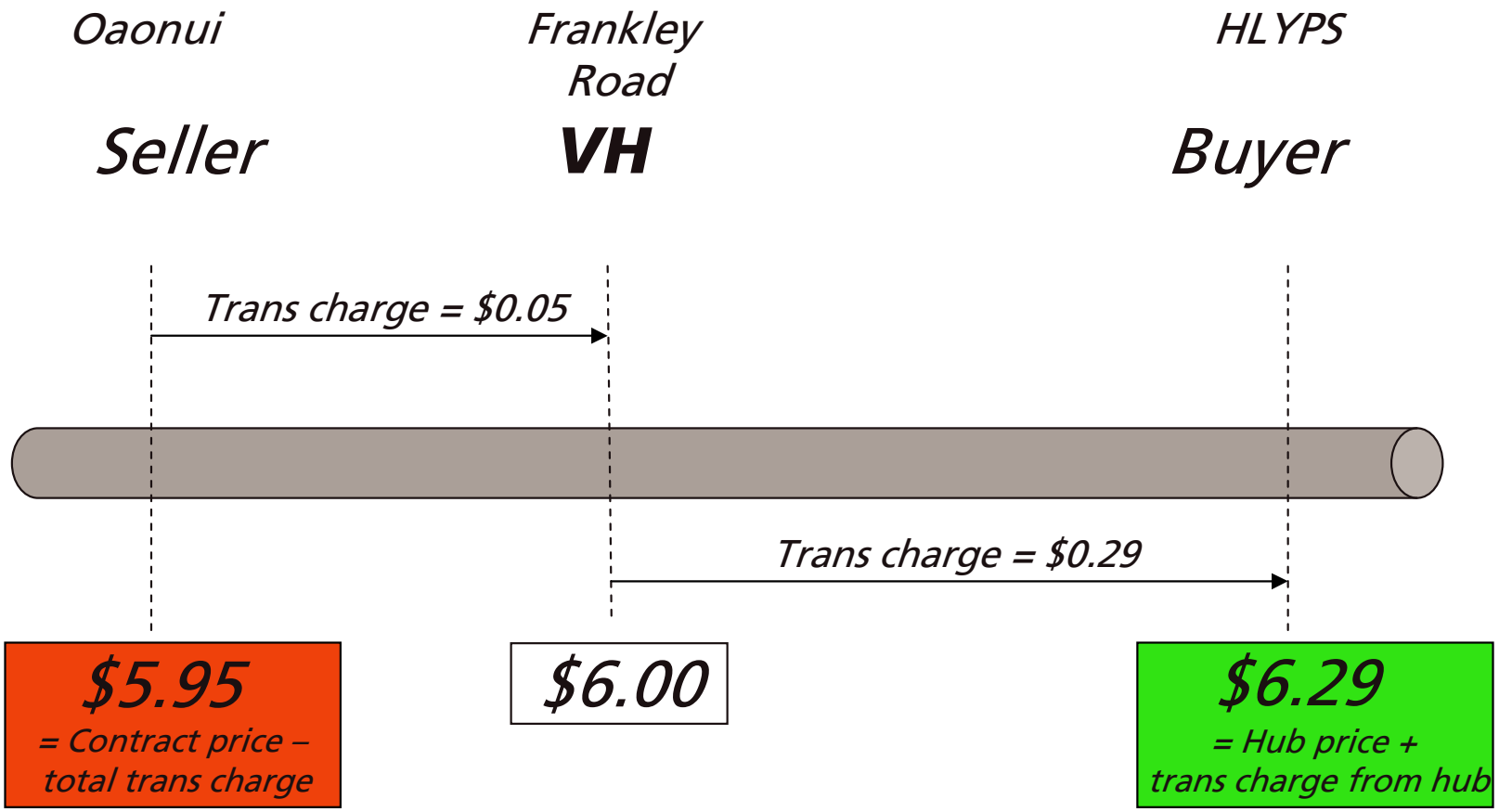
VH price:

Contract price:

Net price/cost for shipper

Example: northward trade

Seller is shipper



VH price adjustment examples–#2

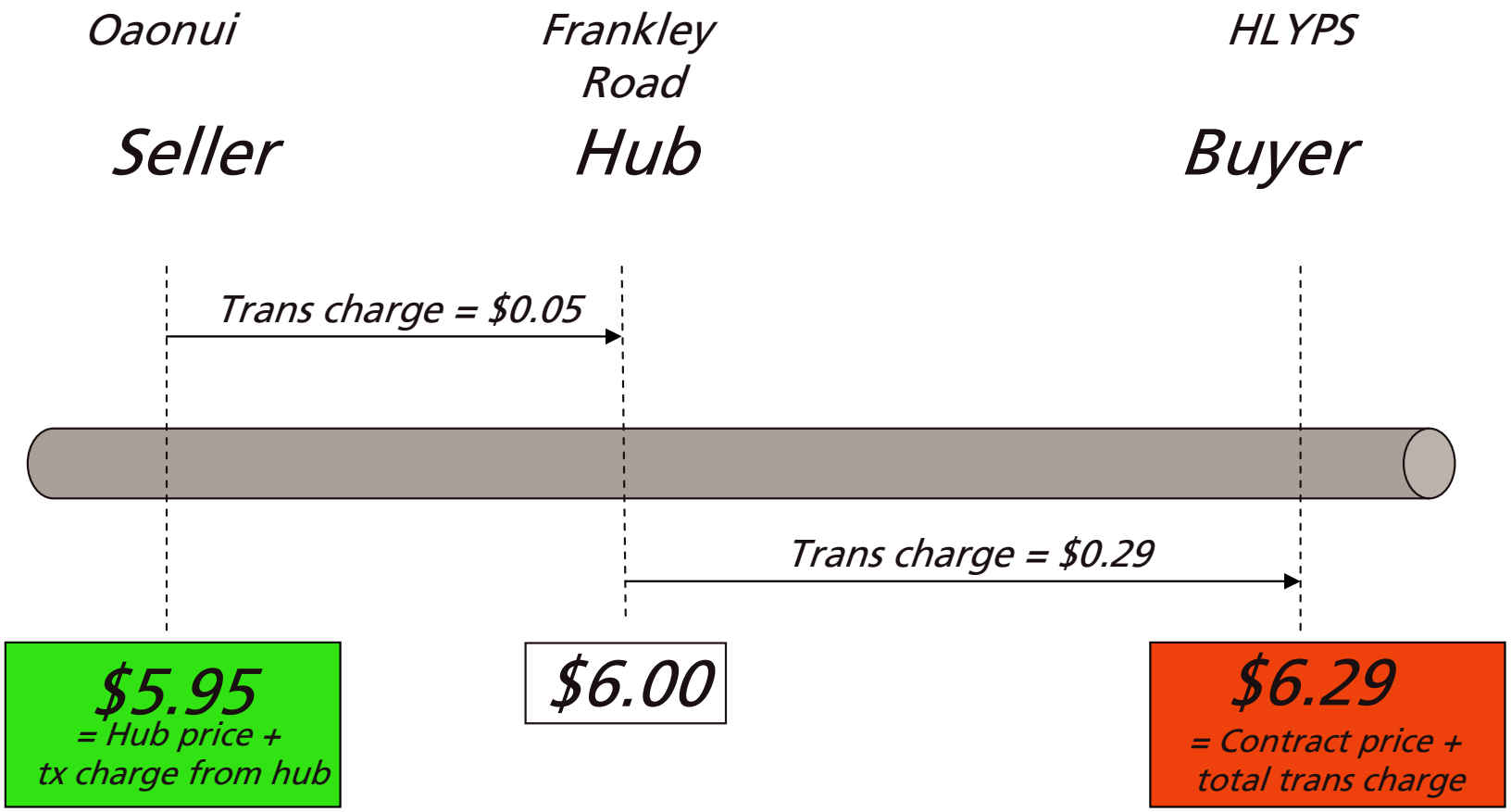
VH price:

Contract price:

Net price/cost for shipper

Example: northward trade

Buyer is shipper



VH price adjustment examples–#3

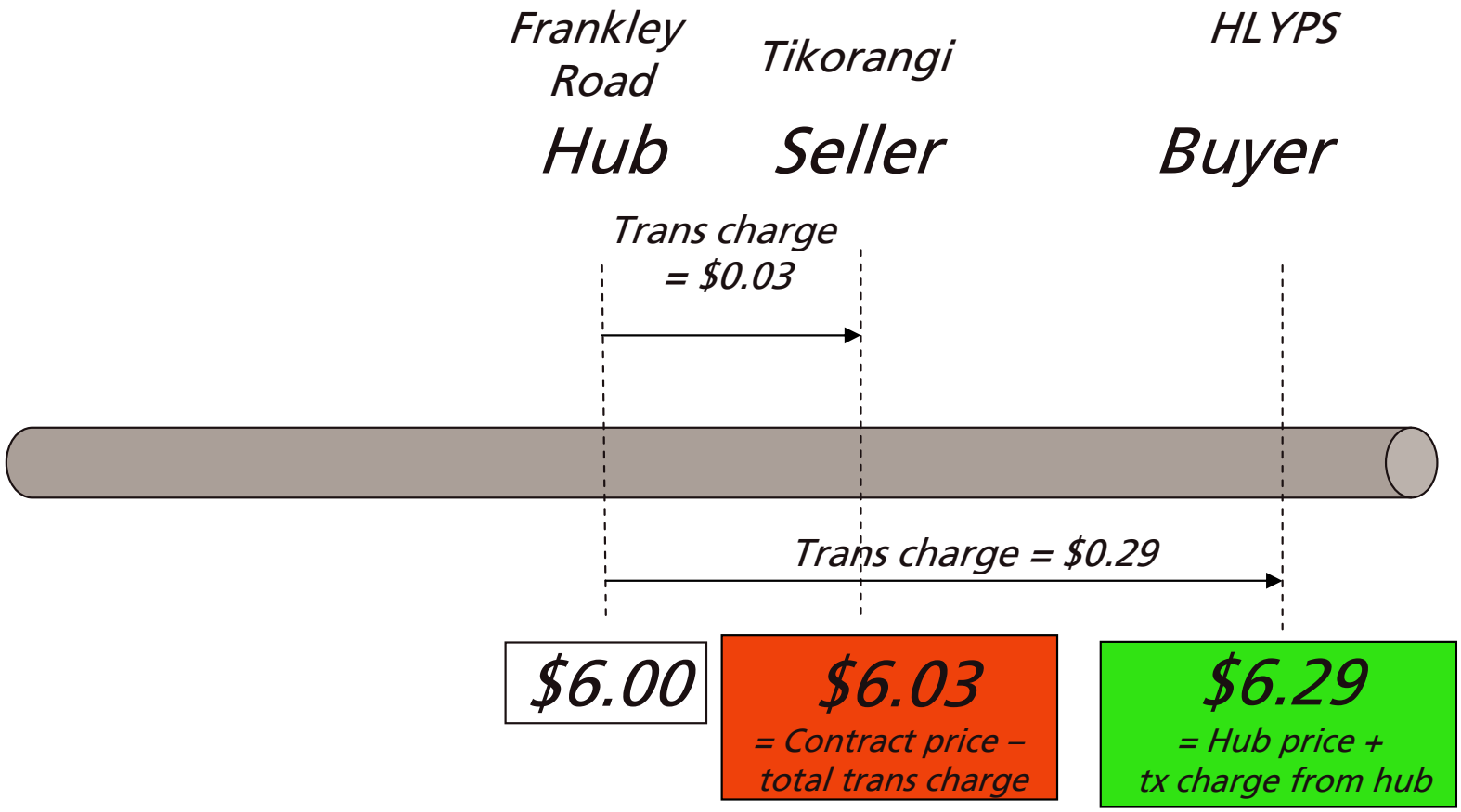
VH price:

Contract price:

Net price/cost for shipper

Example: northward trade

Seller is shipper



VH price adjustment examples–#4

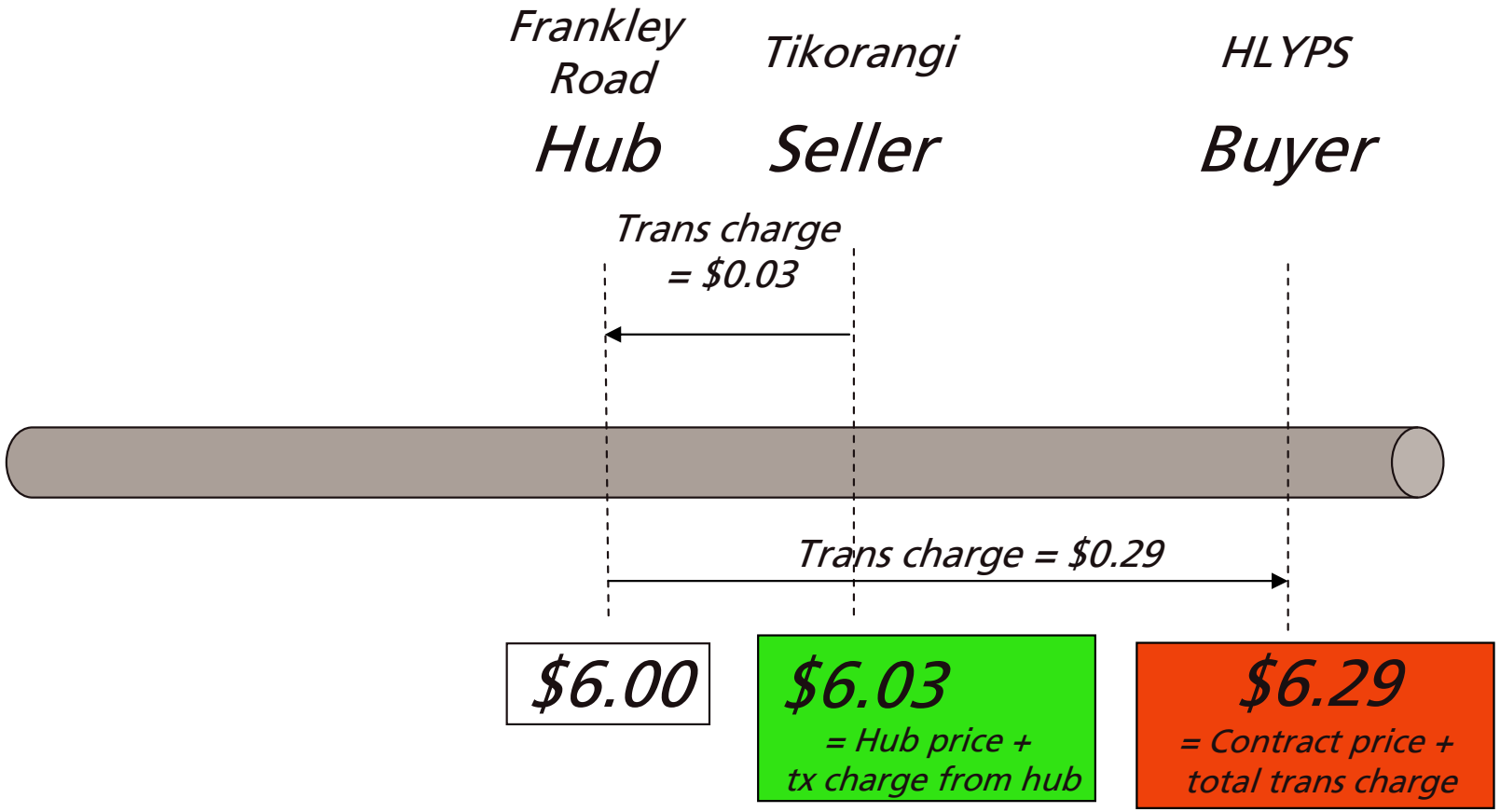
VH price:

Contract price:

Net price/cost for shipper

Example: northward trade

Buyer is shipper



VH price adjustment examples–#5

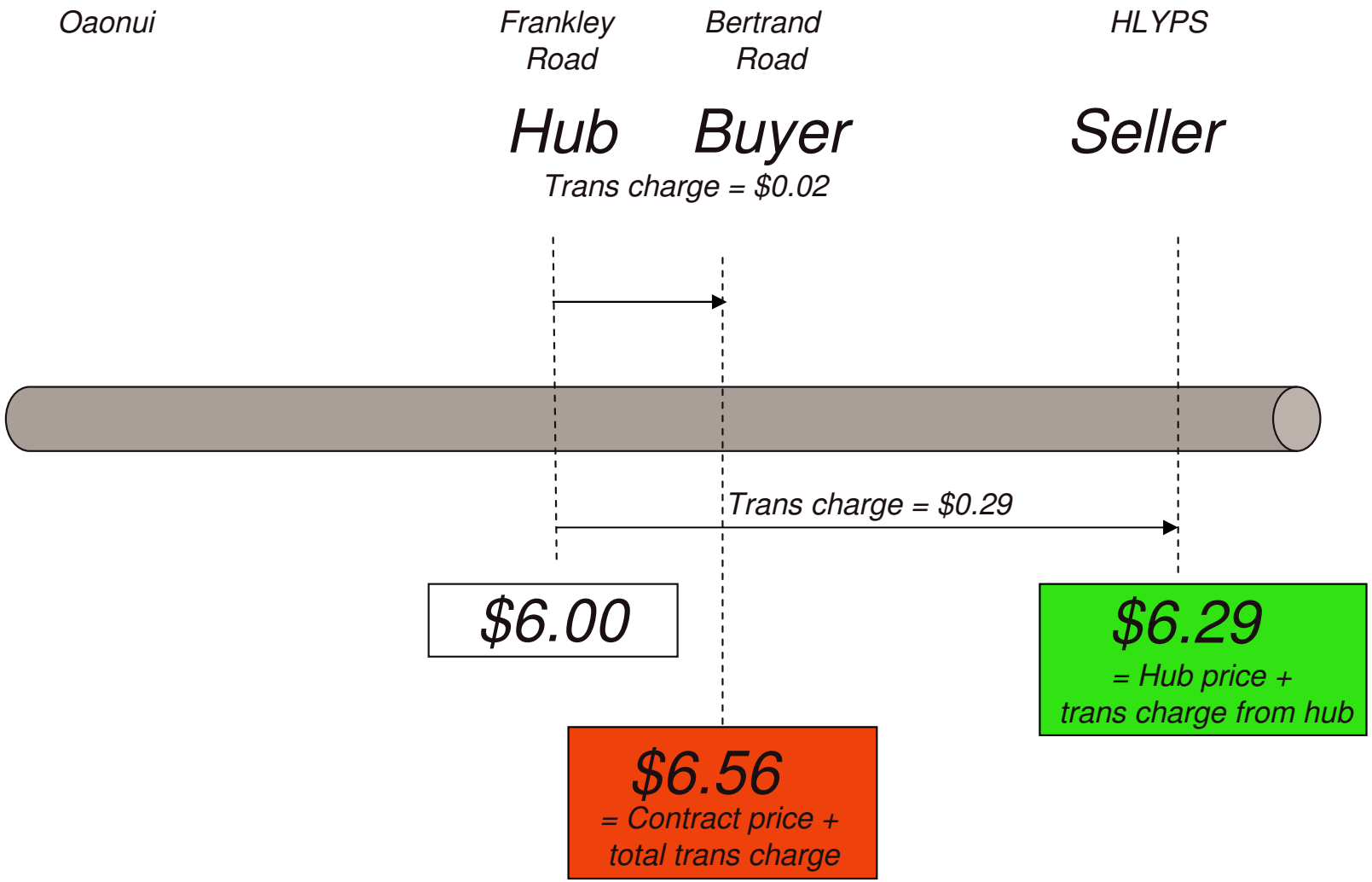
VH price:

Contract price:

Net price/cost for shipper

Example: southward trade

Buyer is shipper



VH price adjustment examples–#6

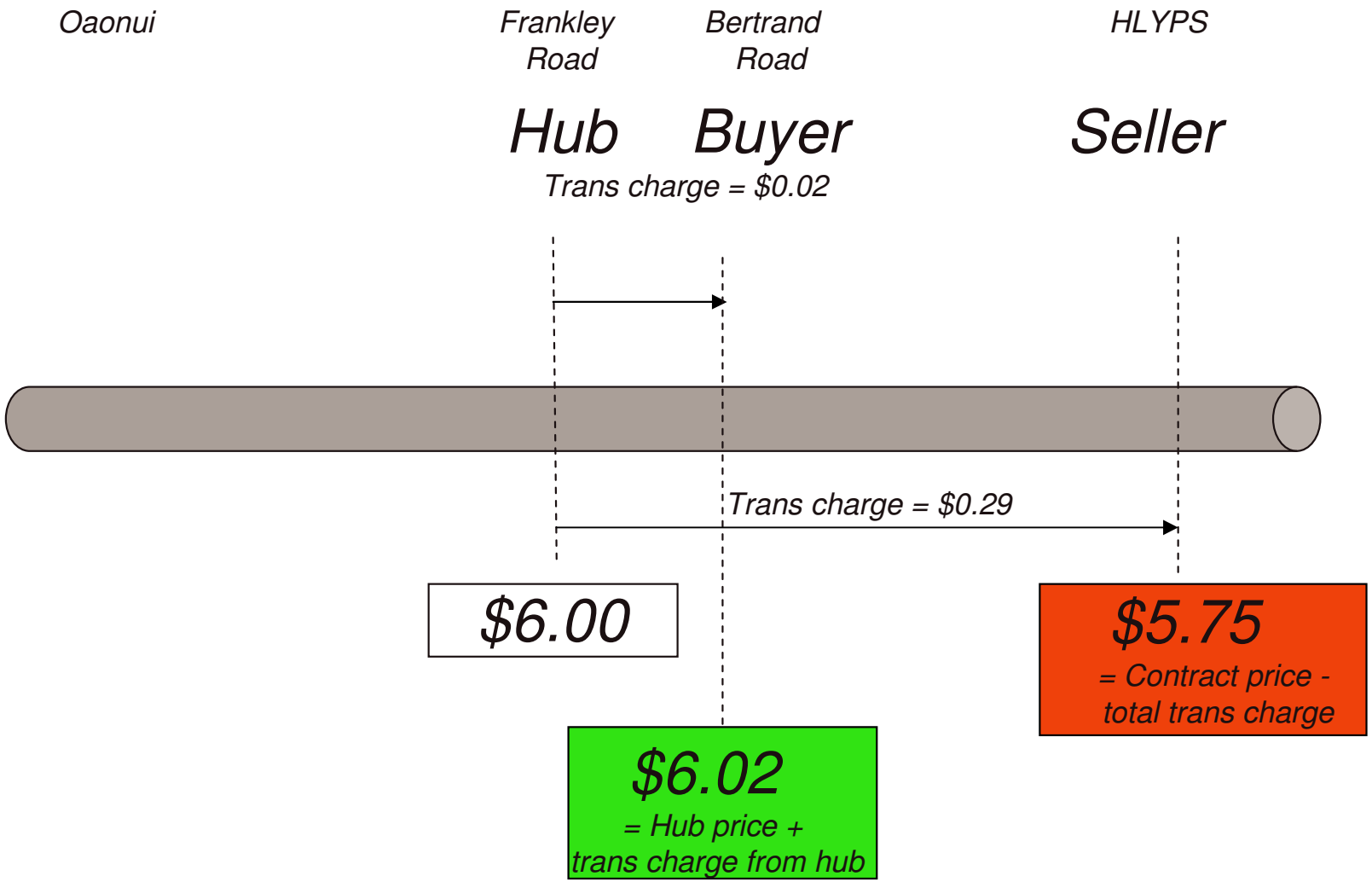
VH price:

Contract price:

Net price/cost for shipper

Example: southward trade

Seller is shipper



Application of price rules (no swaps)

- Application of these rules (assuming Frankley Rd hub @ $6.00/GJ) is shown below

Net cost/price to shipper $/GJ

Shipper not able to manage Tx charge via swaps

Accept shipper responsibility from:

Buy at:	*Oaonui*	*F Rd*	*Bertrand Rd*	*Pohokura*	*Tikorangi*	*Pokuru*	*Rotowaro*	*HLY PS*
Oaonui	5.95	6.05	6.10	6.10	6.10	6.48	6.62	6.64
F Rd	6.00	6.00	6.05	6.05	6.05	6.43	6.57	6.59
Bertrand Rd	6.02	6.02	6.02	6.03	6.03	6.40	6.54	6.56
Pohokura	6.03	6.03	6.03	6.03	6.03	6.40	6.54	6.56
Tikorangi	6.03	6.03	6.03	6.03	6.03	6.40	6.54	6.56
Pokuru	6.21	6.21	6.21	6.21	6.21	6.21	6.35	6.37
Rotowaro	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.30
HLY PS	6.29	6.29	6.29	6.29	6.29	6.29	6.29	6.29

Shipper not able to manage Tx charge via swaps

Accept shipper responsibility to:

Sell at:	*Oaonui*	*F Rd*	*Bertrand Rd*	*Pohokura*	*Tikorangi*	*Pokuru*	*Rotowaro*	*HLY PS*
Oaonui	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
F Rd	5.90	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Bertrand Rd	5.87	5.98	6.02	6.02	6.02	6.02	6.02	6.02
Pohokura	5.87	5.97	6.02	6.03	6.03	6.03	6.03	6.03
Tikorangi	5.87	5.97	6.02	6.02	6.03	6.03	6.03	6.03
Pokuru	5.68	5.79	5.83	5.84	5.84	6.21	6.21	6.21
Rotowaro	5.62	5.72	5.77	5.77	5.77	6.15	6.28	6.28
HLY PS	5.61	5.71	5.76	5.76	5.76	6.14	6.27	6.29

Prices versus 'true' values (no swaps)

Price distortion - % of 'true price' based on northward flow on Maui

Shipper not able to manage Tx charge via swaps

Accept shipper responsibility from:

Buy at:	*Oaonui*	*F Rd*	*Bertrand R*	*Pohokura*	*Tikorangi*	*Pokuru*	*Rotowaro*	*HLY PS*
Oaonui	0.0%	1.7%	2.5%	2.5%	2.6%	8.9%	11.2%	11.6%
F Rd	0.0%	0.0%	0.8%	0.8%	0.9%	7.2%	9.4%	9.8%
Bertrand Rd	0.0%	0.0%	0.0%	0.0%	0.1%	6.3%	8.6%	8.9%
Pohokura	0.0%	0.0%	0.0%	0.0%	0.0%	6.3%	8.6%	8.9%
Tikorangi	0.0%	0.0%	0.0%	0.0%	0.0%	6.3%	8.5%	8.9%
Pokuru	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2.2%	2.5%
Rotowaro	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
HLY PS	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Shipper not able to manage Tx charge via swaps

Accept shipper responsibility to:

Sell at:	*Oaonui*	*F Rd*	*Bertrand R*	*Pohokura*	*Tikorangi*	*Pokuru*	*Rotowaro*	*HLY PS*
Oaonui	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
F Rd	1.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bertrand Rd	2.5%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pohokura	2.5%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Tikorangi	2.5%	0.9%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
Pokuru	8.5%	6.9%	6.1%	6.1%	6.1%	0.0%	0.0%	0.0%
Rotowaro	10.6%	9.0%	8.2%	8.2%	8.2%	2.2%	0.0%	0.0%
HLY PS	10.9%	9.3%	8.5%	8.5%	8.5%	2.5%	0.3%	0.0%

0-2% ***2-5%*** ***5+%***

Price distortion (assuming northward tariff is 'correct')

Application of price rules (with swaps)

- Application of these rules (assuming Frankley Rd hub @ $6.00/GJ) is shown below

Net cost/price to shipper $/GJ

Shipper able to manage Tx charge via swaps

Accept shipper responsibility from:

Buy at:	*Oaonui*	*F Rd*	*Bertrand Rd*	*Pohokura*	*Tikorangi*	*Pokuru*	*Rotowaro*	*HLY PS*
Oaonui	5.95	6.00	6.02	6.03	6.03	6.21	6.28	6.29
F Rd	6.00	6.00	6.02	6.03	6.03	6.21	6.28	6.29
Bertrand Rd	6.02	6.02	6.02	6.03	6.03	6.21	6.28	6.29
Pohokura	6.03	6.03	6.03	6.03	6.03	6.21	6.28	6.29
Tikorangi	6.03	6.03	6.03	6.03	6.03	6.21	6.28	6.29
Pokuru	6.21	6.21	6.21	6.21	6.21	6.21	6.28	6.29
Rotowaro	6.28	6.28	6.28	6.28	6.28	6.28	6.28	6.29
HLY PS	6.29	6.29	6.29	6.29	6.29	6.29	6.29	6.29

Accept shipper responsibility to:

Sell at:	*Oaonui*	*F Rd*	*Bertrand Rd*	*Pohokura*	*Tikorangi*	*Pokuru*	*Rotowaro*	*HLY PS*
Oaonui	5.95	5.95	5.95	5.95	5.95	5.95	5.95	5.95
F Rd	5.95	6.00	6.00	6.00	6.00	6.00	6.00	6.00
Bertrand Rd	5.95	6.00	6.02	6.02	6.02	6.02	6.02	6.02
Pohokura	5.95	6.00	6.02	6.03	6.03	6.03	6.03	6.03
Tikorangi	5.95	6.00	6.02	6.03	6.03	6.03	6.03	6.03
Pokuru	5.95	6.00	6.02	6.03	6.03	6.21	6.21	6.21
Rotowaro	5.95	6.00	6.02	6.03	6.03	6.21	6.28	6.28
HLY PS	5.95	6.00	6.02	6.03	6.03	6.21	6.28	6.29

Prices versus "true values" (with swaps)

Price distortion - % of 'true price' based on northward flow on Maui

Shipper able to manage Tx charge via swaps

Accept shipper responsibility from:

Buy at:	*Oaonui*	*F Rd*	*Bertrand R*	*Pohokura*	*Tikorangi*	*Pokuru*	*Rotowaro*	*HLY PS*
Oaonui	0.0%	0.8%	1.3%	0.0%	1.3%	4.5%	5.6%	5.8%
F Rd	0.0%	0.0%	0.4%	0.0%	0.4%	3.6%	4.7%	4.9%
Bertrand Rd	0.0%	0.0%	0.0%	0.0%	0.0%	3.2%	4.3%	4.5%
Pohokura	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	4.3%	4.4%
Tikorangi	0.0%	0.0%	0.0%	0.0%	0.0%	3.1%	4.3%	4.4%
Pokuru	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	1.3%
Rotowaro	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
HLY PS	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Accept shipper responsibility to:

Sell at:	*Oaonui*	*F Rd*	*Bertrand R*	*Pohokura*	*Tikorangi*	*Pokuru*	*Rotowaro*	*HLY PS*
Oaonui	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
F Rd	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bertrand Rd	1.2%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pohokura	1.3%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Tikorangi	1.3%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Pokuru	4.3%	3.5%	3.1%	3.0%	3.0%	0.0%	0.0%	0.0%
Rotowaro	5.3%	4.5%	4.1%	4.1%	4.1%	1.1%	0.0%	0.0%
HLY PS	5.5%	4.7%	4.3%	4.3%	4.2%	1.3%	0.2%	0.0%

0-2% ***2-5%*** ***5+%***

Price distortion (assuming northward tariff is 'correct')

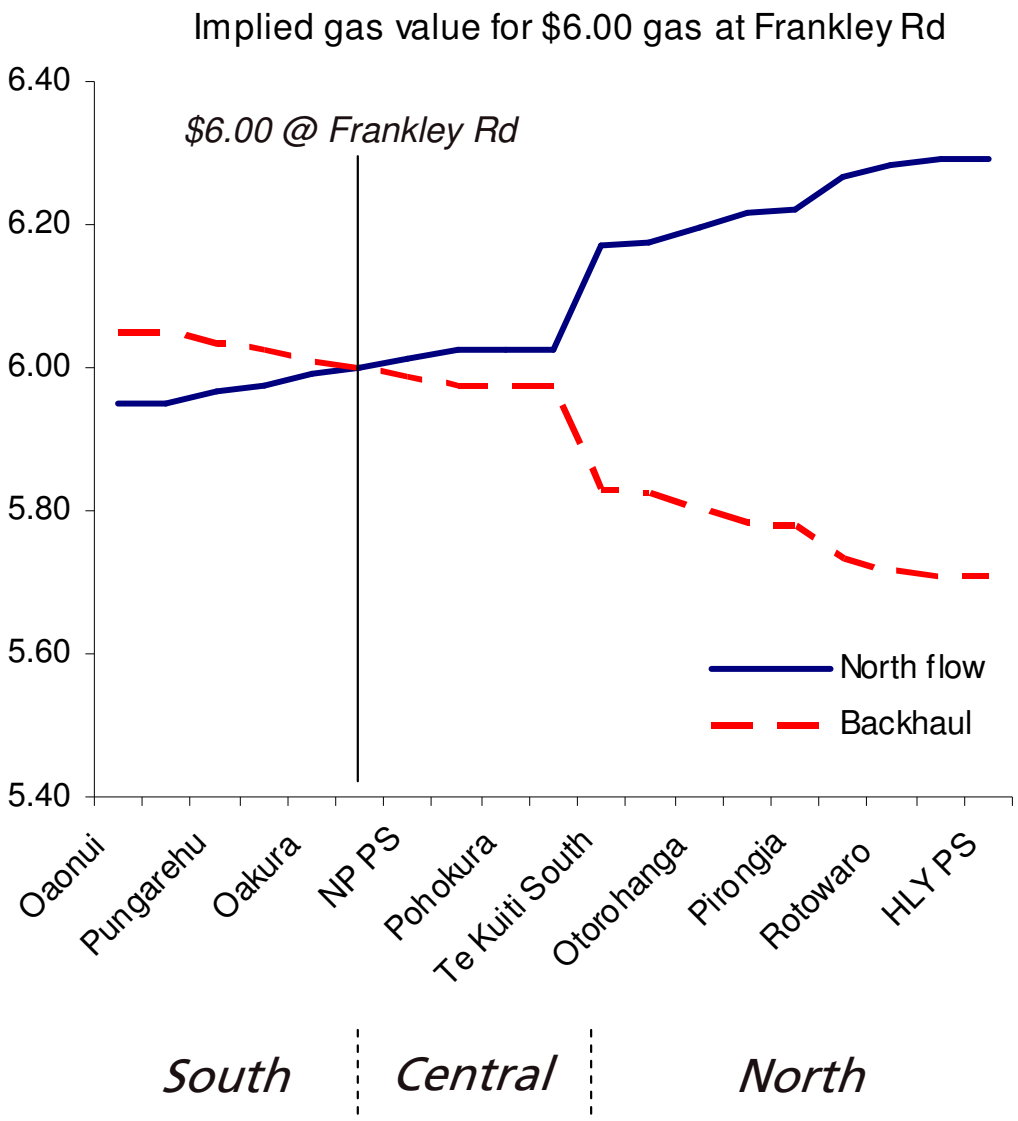
Locational issues

- Gas value varies according to distance-based transmission charges
- Traders need to avoid paying unnecessary transmission charges due to:
  - double payment of fixed charges – i.e. ensure that a shipper nomination is only required by buyer or seller, not both parties
  - any inadvertent backhaul of gas
- Basic pricing rules minimise problems provided location known in advance
  - but do not need precise location

Propose "zones"

- Provision of zonal flag would provide information for traders

- Propose 3 zones
  - South – south of Frankley Road
  - Central – Frankley Rd north to Tikorangi
  - North – north of Tikorangi



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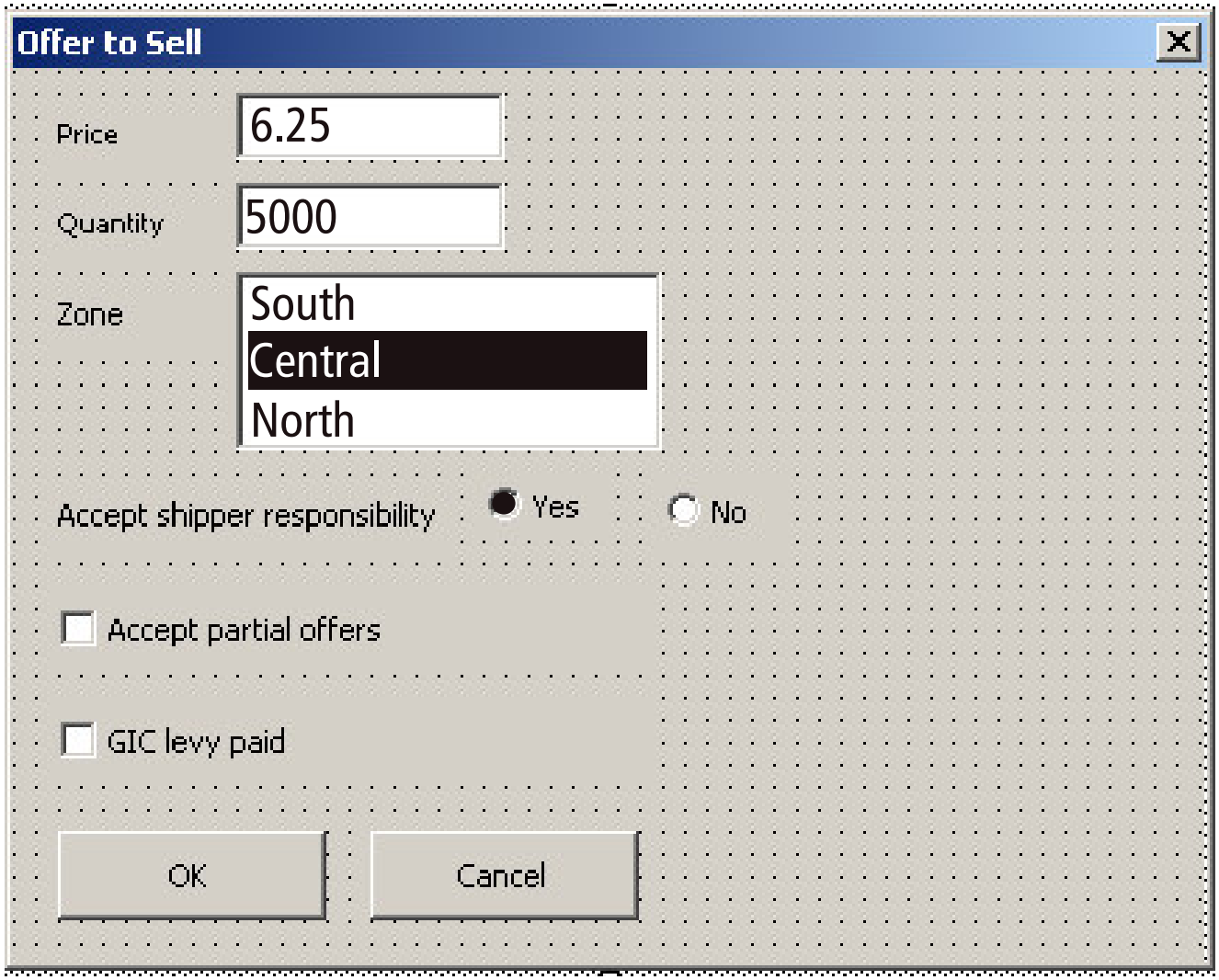
Mock-up of offer entry screen



How does the Trading Hub work?

goodfortune safepassage

TRANSACT

Hub Operator – why is one required?

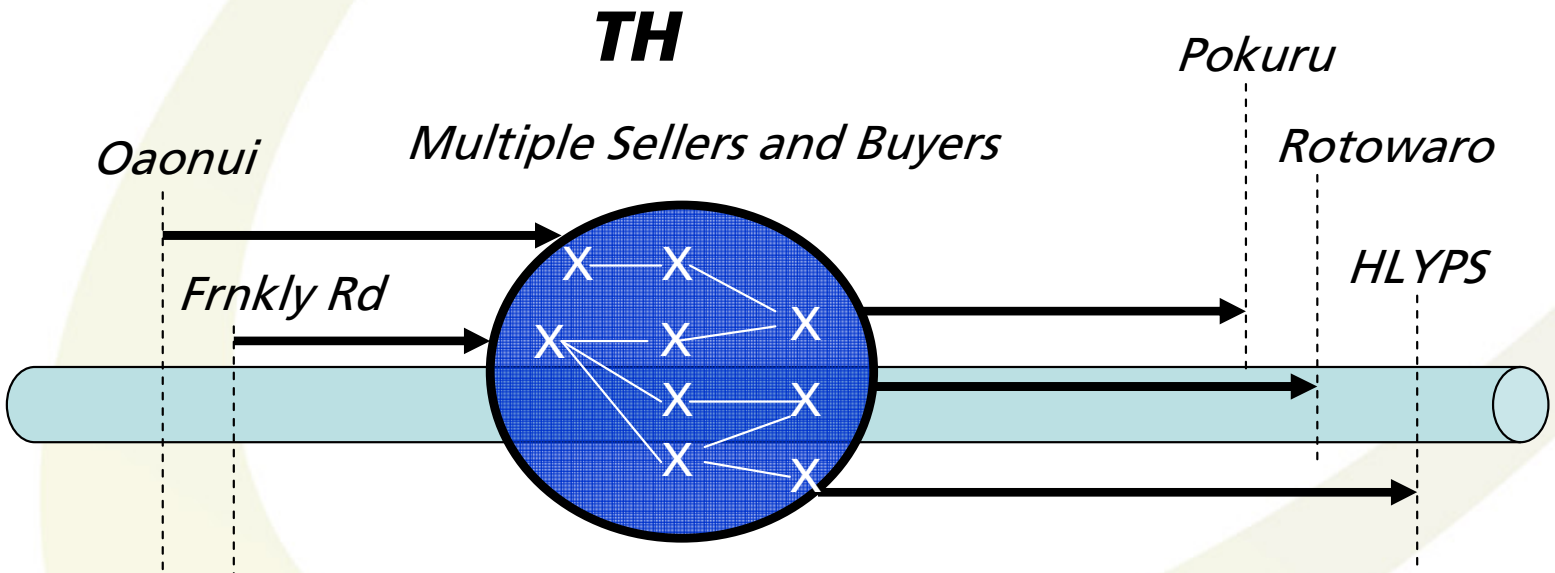
- the MPOC and OATIS were not designed to include the concept of a Trading Hub
- as a result, some imperfections exist with trying to introduce a conventional Trading Hub on the Maui Pipeline
- the primary goal is to have no or minimum impact to existing systems, processes and procedures related to the transmission and allocation of gas on the Maui Pipeline
- after looking at the feasibility of introducing a Trading Hub and finding some issues, it was determined that introducing a Hub Operator at the Trading Hub would assist in managing these issues
- much work has been done to date in analysing this solution which we think is feasible, however more investigation and communication with industry participants will be required to ensure the Trading Hub is a viable solution for the industry

Hub Operator Services include:

- creating the Title Transfer Tracking report
- creating the Required Nominations Report (if required)
- confirming Nominations and Monitoring Approvals at the Trading Hub
- providing a Balancing Service at the Trading Hub
- making Balancing Service Nominations
- managing Curtailment at the Trading Hub
- communication
- reconciliation (if required)
- training (if required)
- invoicing

Title Transfer Tracking Service

Title Transfer Tracking provides for a recording of changes in ownership of a specific gas package as title may transfer several times before it leaves the TH



Title Transfer Tracking will enable the Hub Operator to reconcile TH variances in a manner that will cause least disruption to market conditions and contractual arrangements

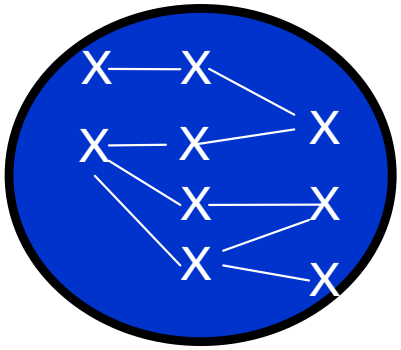
Trading Hub Scenarios

The following scenarios will highlight other Hub Operator services and provide for a deeper understanding of the Hub Operator role:

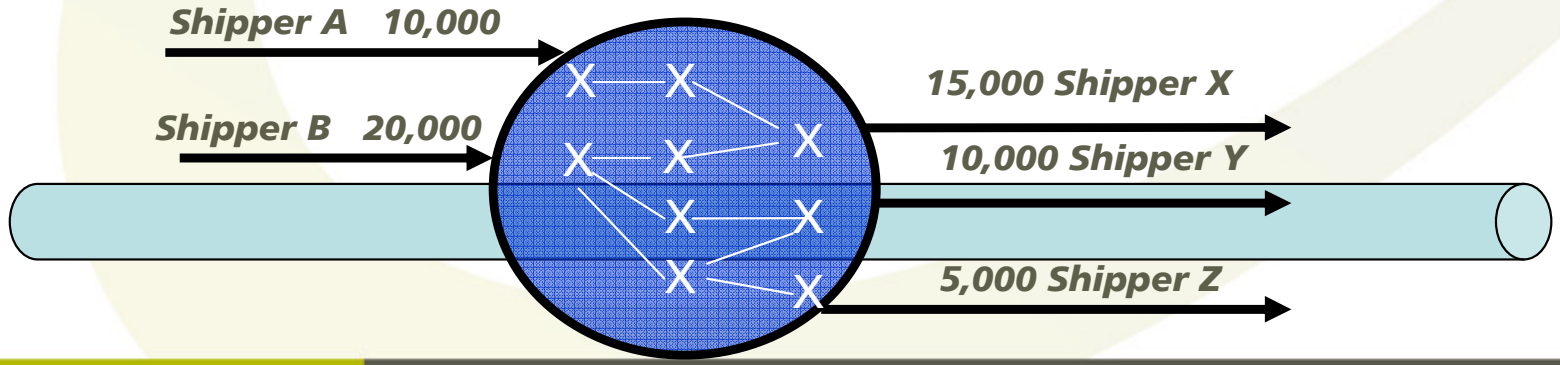
- Scenario 1: Day with no TH variances
- Scenario 2: Day with TH variances during confirmations ~ no balancing service provided
- Scenario 3: Day with TH variances during confirmations ~ balancing service provided
- Scenario 4: Day with TH variances due to pipeline approvals
- Scenario 5: Day with TH variances due to event curtailment

Common steps for all Scenarios

- Step 1: receive trade detail from Trading Platform (TP)

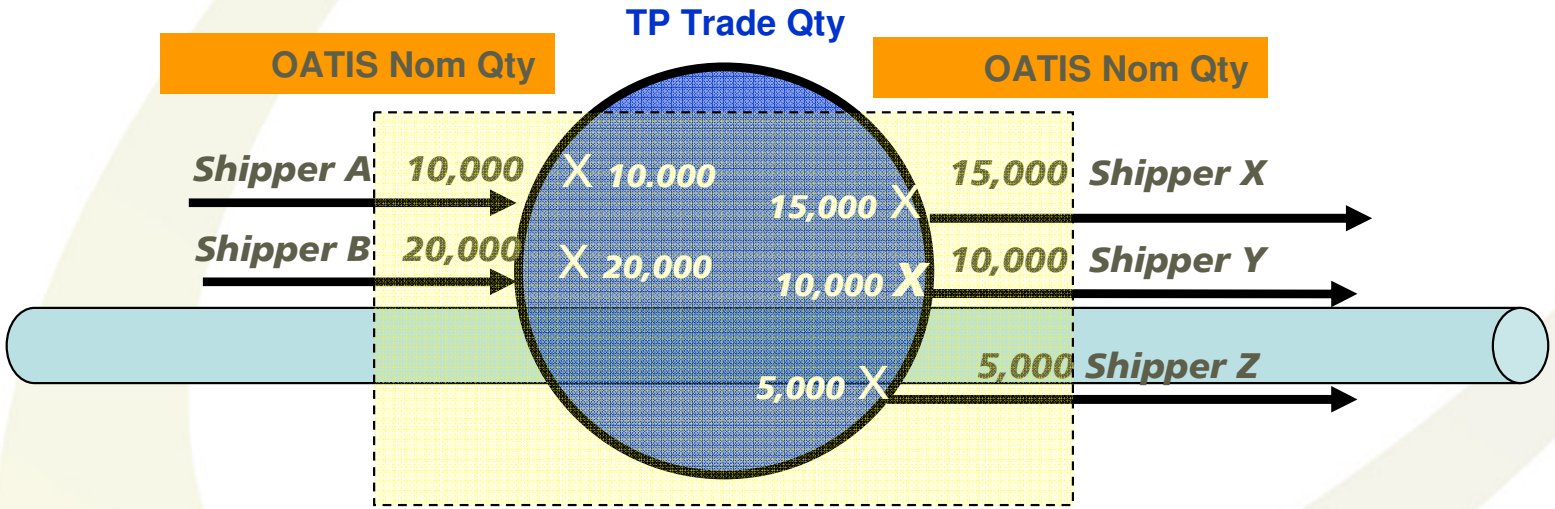


- Step 2: create Title Transfer Tracking Report
- Step 3: create and issue Required Shipper Nomination report



Scenario 1: Day with no TH variances

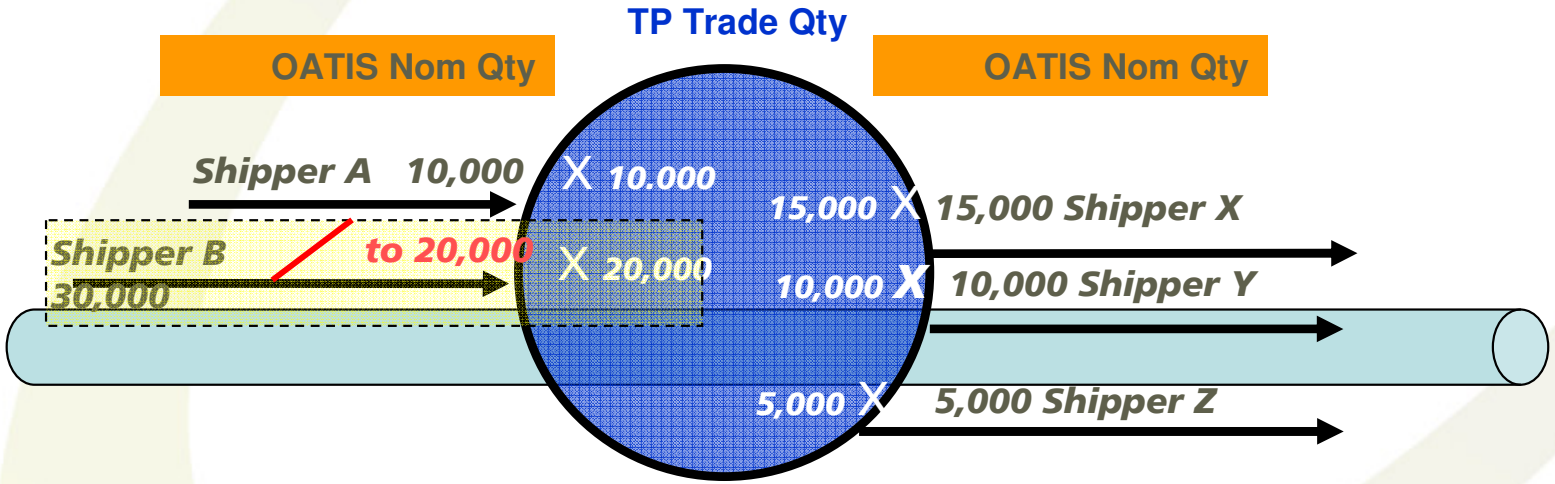
- perform confirmations at the TH



- after pipeline approvals process, view the TH to ensure no TH variances exist between the OATIS Approved Nominated Quantity and the TP trade quantity

Scenario 2: Day with TH Variances during confirmations ~ No balancing service

- perform confirmations at the TH **(NQ > TQ)**



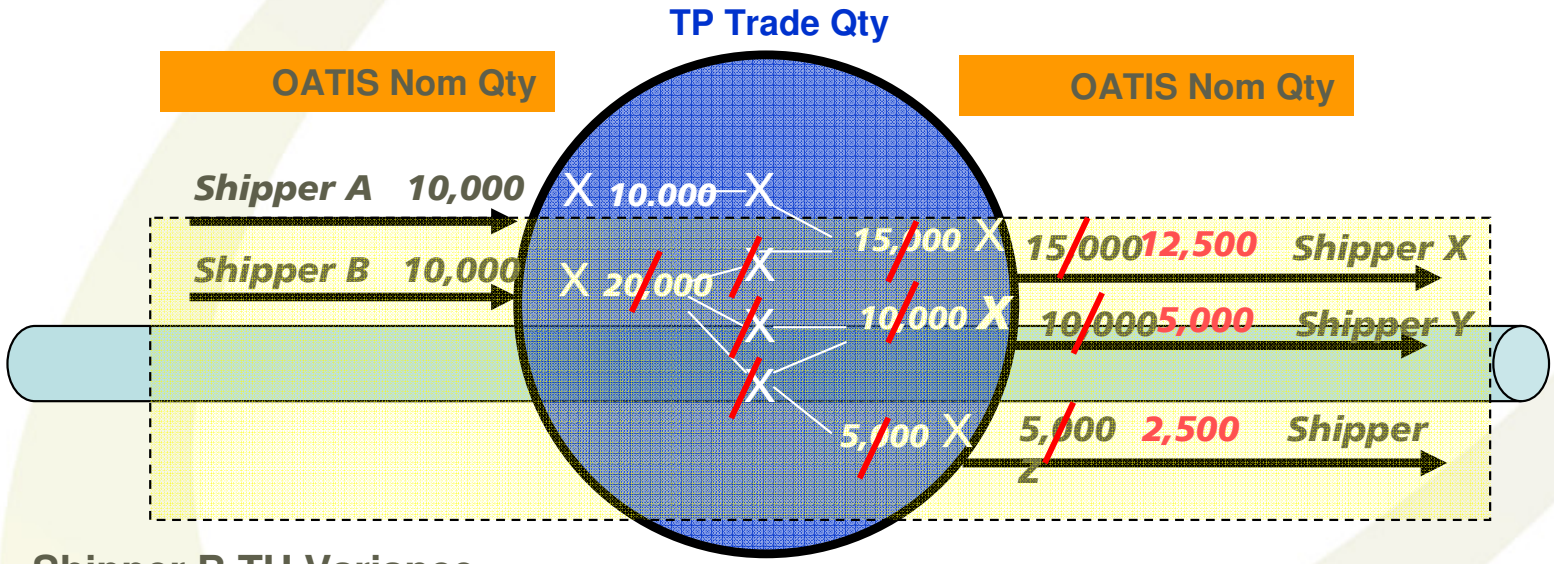
Shipper B TH Variance

Shipper B Gas Sale	***20,000***
Shipper B Nomination	**- 30,000**
Shipper B Variance =	**-10,000**

- HO applies the lesser of rule and confirms Shipper B's nomination of 30,000 down to match their trade quantity of 20,000
- TH is balanced

Scenario 2: Day with TH Variances during confirmations ~ No balancing service

- perform confirmations at the TH **(TQ > NQ)**

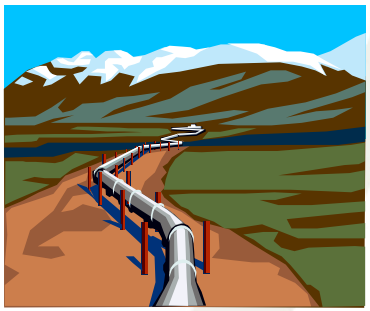


Shipper B TH Variance

Shipper B Gas Sale
20,000 **Shipper B Nomination -**
10,000
Shipper B Variance = 10,000

- HO must look through the title transfer tracking chain and reduce all associated trades until reaching the other side of the TH to reduce those affected Shippers
- TH is balanced

Scenario 3: Day with TH Variances during confirmations ~ balancing service available



- <u>OPTION 1: Balancing service using Line Pack (LP)</u> (subject to endorsement by MDL)
  - used to manage small variances at the TH and is limited by LP availability
  - requires systems to identify the causer(s) and the volume(s)
  - a cost would be attributed for the use of the LP on behalf of the Shipper
- <u>OPTION 2: Balancing service with HO sourcing physical gas</u>
  - if LP is not a viable option or the TH variance is too large for LP to accommodate, the HO shall attempt to source physical gas from parties who are willing to trade
  - requires systems to identify the causer(s) and the volume(s)
  - a cost would be attributed for the gas trades on behalf of the Shipper

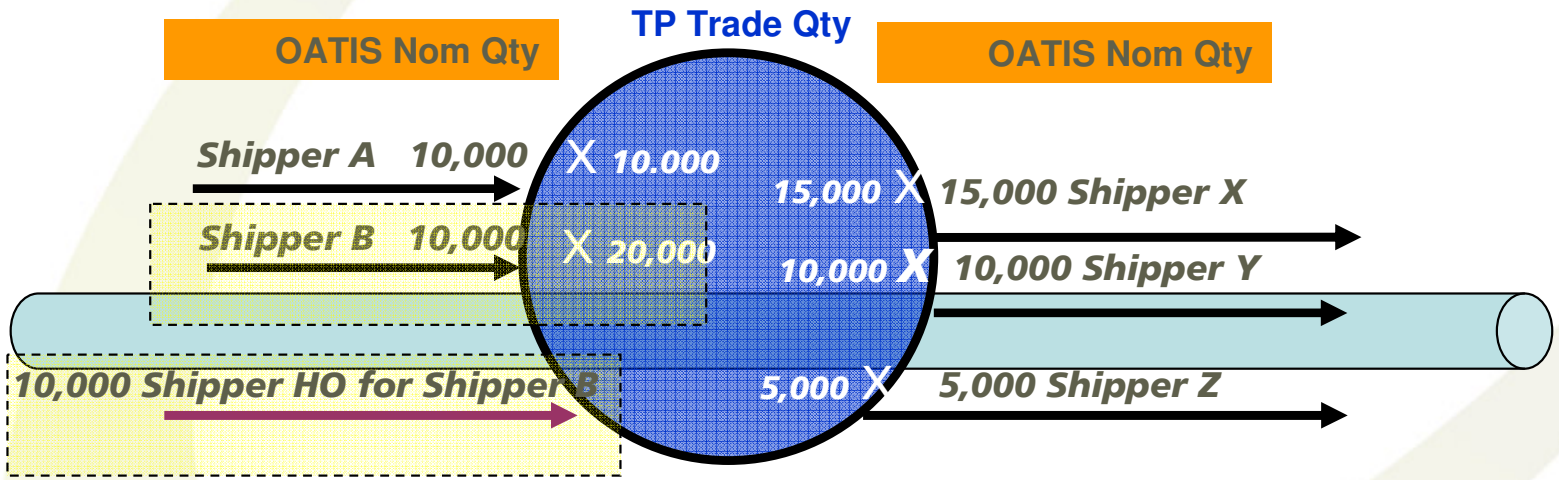
If options 1 and/or 2 are not available, the HO will balance the TH by applying the lesser of rule between the OATIS nominated quantity and the Trading Platform trade quantity

Balancing Service rules

- Balancing services do not apply
  - when the Shipper has nominated to transport to the TH more than they have sold (net) on the Trading Platform
  - when the Shipper has nominated to transport away from the TH more than they have purchased (net) on the trading platform
  - in these scenarios, the HO will simply confirm the Shipper Nominated Quantity as the Trading Platform trade quantity to balance the TH
- Balancing services do apply (in concept)
  - when the Shipper has nominated to transport to the TH less than they have sold (net) on the trading platform
  - when the Shipper has nominated to transport away from the TH less than what they have purchased (net) on the trading platform
  - in these scenarios, the HO will provide balancing gas to cover these TH variances thereby keeping the variance at the perimeter of the TH and avoiding the impact to all affected trades across the TH

Scenario 3: Day with TH Variances during confirmations ~ balancing service available

- perform confirmations at the TH **(TQ > NQ at TH Delivery)**



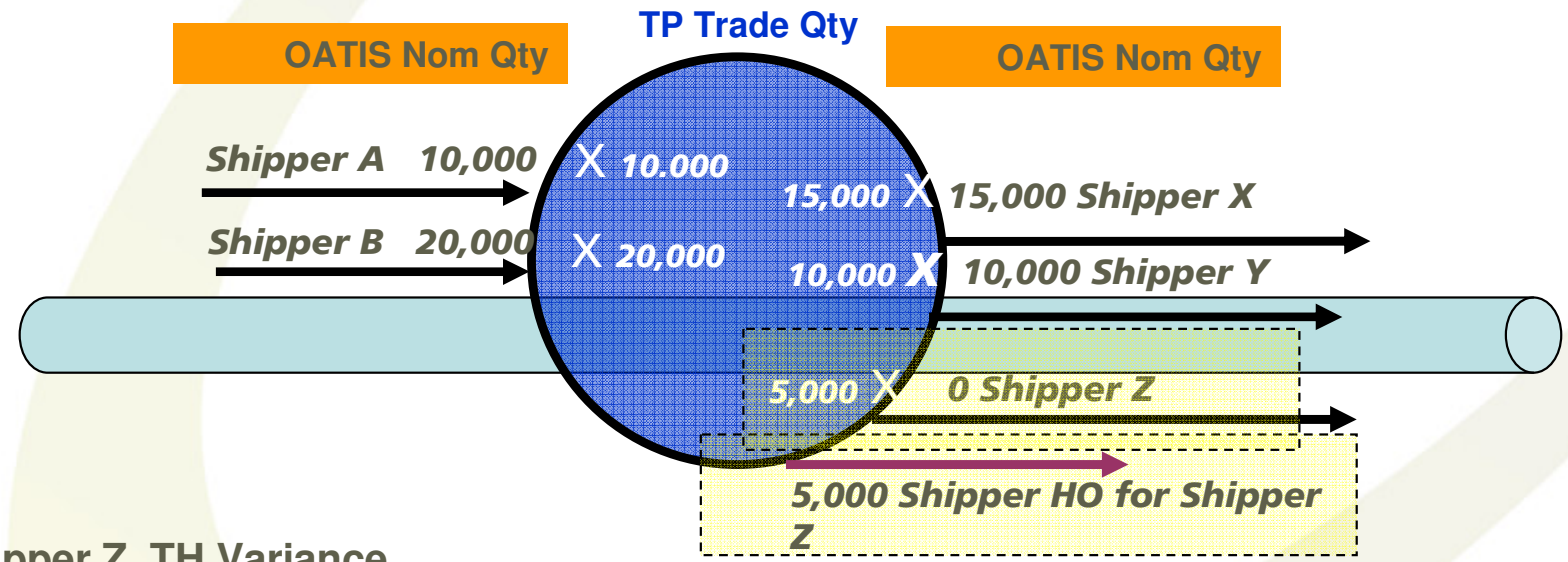
Shipper B TH Variance

Shipper B Gas Sale	**20,000**
Shipper B Nomination	**-10,000**
Shipper B Variance =	**10,000**

- HO provides Shipper B a balancing service by taking the 10,000 to the TH on their behalf
- TH is balanced

Scenario 3: Day with TH Variances during confirmations ~ balancing service available

- Perform Confirmations at the TH **(TQ > NQ at TH Receipt)**

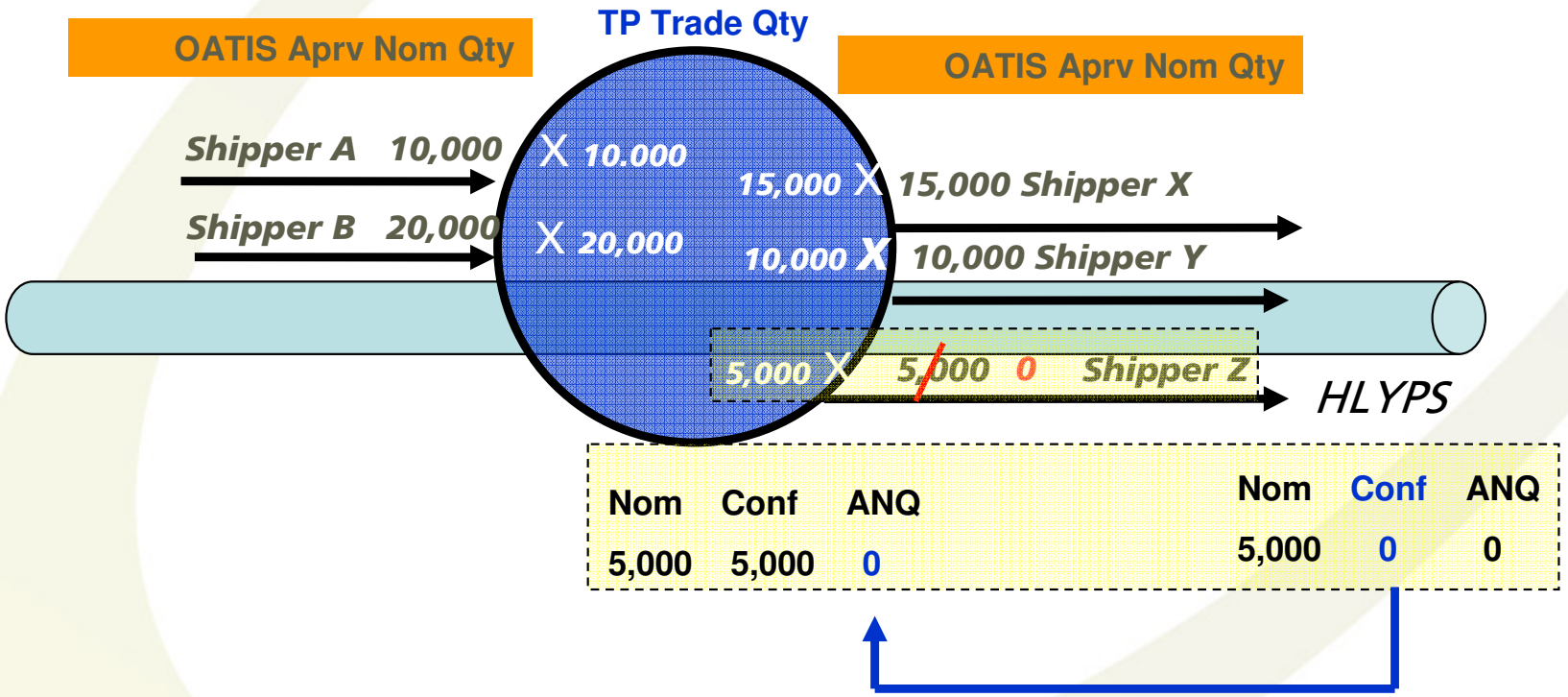


Shipper Z TH Variance

Shipper Z Gas Purchase	***5,000***
Shipper Z Nomination	**- 0**
Shipper Z Variance =	**5,000**

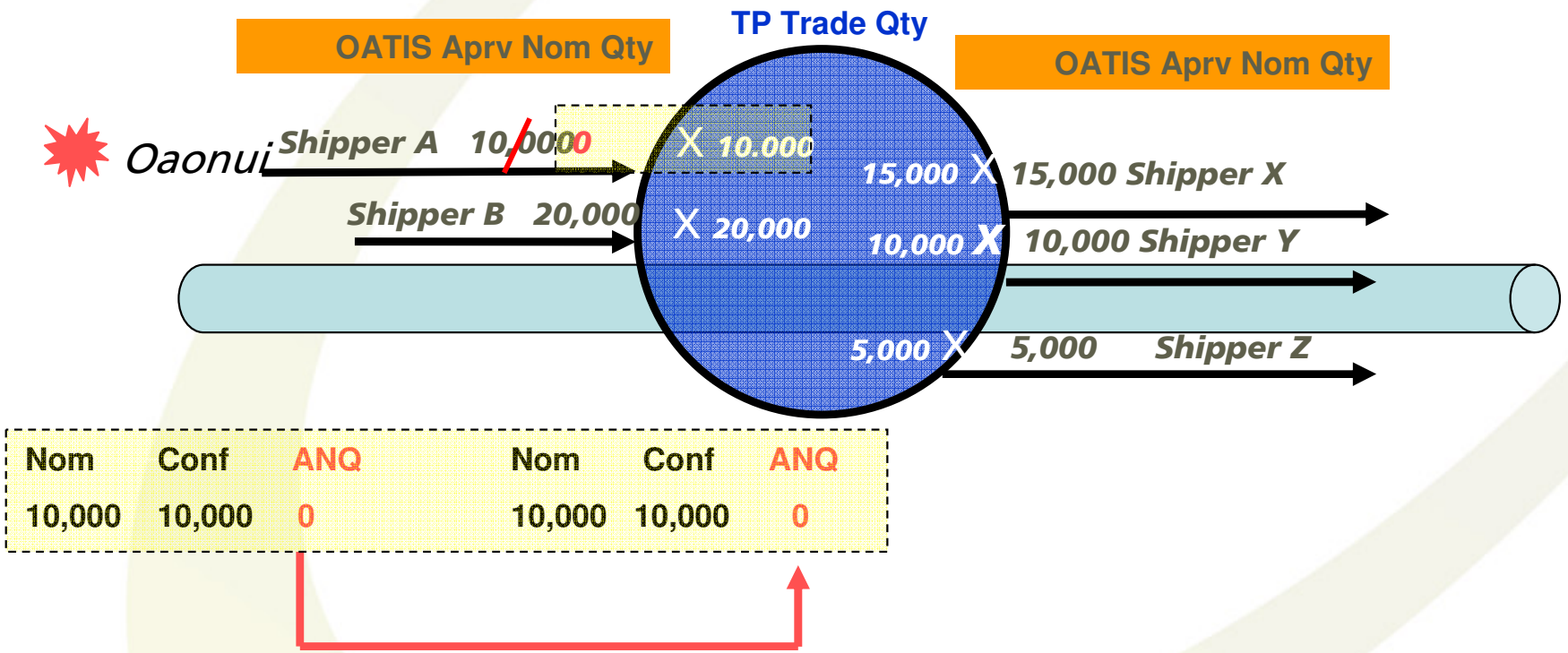
- HO provides Shipper Z a balancing service by taking the 5,000 away from the TH on their behalf
- TH is balanced

Scenario 4: Day with TH Variances after pipeline approvals



- Huntly confirms 0 causing a variance at the TH
- TH is out of balance
- there is a potential for this to occur after each cycle

Scenario 5: Day with TH Variances after event curtailment



- an event occurs at Oaonui resulting in an ANQ of 0 causing a variance at the TH
- TH is out of balance
- there is a pote[illegible]

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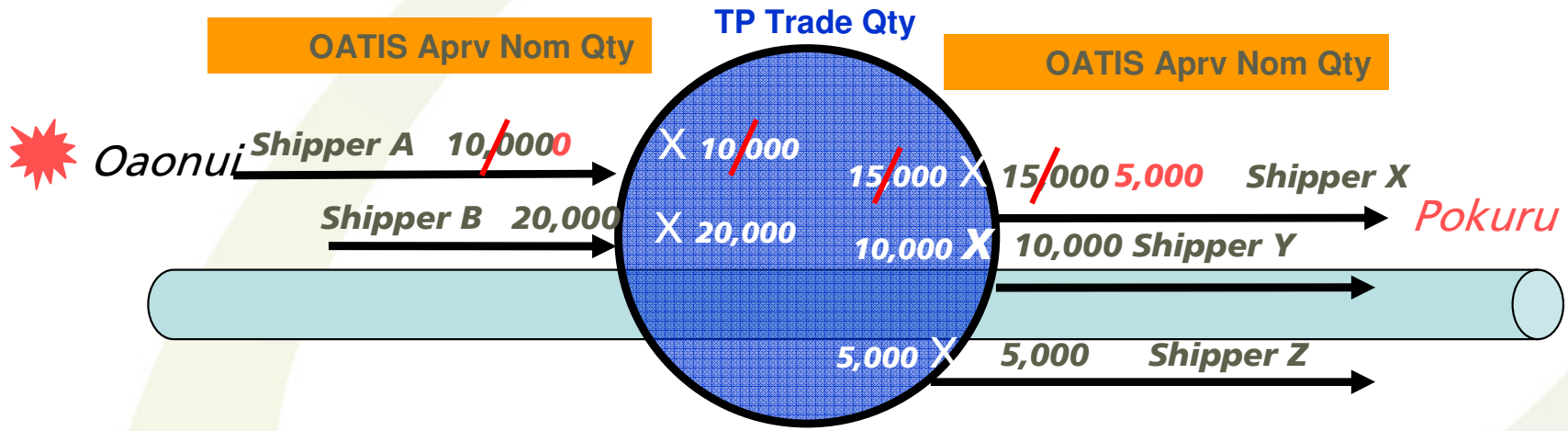
TRANSACT

Managing TH Variances after Approvals or Curtailment

- current OATIS functionality will only reduce the Approved Nominated Quantity from the Welded Point where the reduction has occurred back to the TH Welded Point

- options for balancing the TH
  - balance the TH during the confirmations period of next available ID cycle
    - there is still no guarantee that subsequent approvals or curtailment will not result in TH variances
  - balance the TH back to the Physical Point
    - requires manual work around

Balance the TH Back to the Physical Point



- the HO would balance the TH by means of unpacking the associated gas trades (using the Title Transfer Tracking report) and identifying the Shipper nominating the gas away from the TH and the physical delivery point that requires reduction to balance the TH
- the Pokuru Welded Party would need to be notified that a reduction of 10,000 has occurred at their Welded Point
- this reduction can be only be reflected in OATIS after ID4 via retro nomination, at which time OATIS will update the Scheduled Quantities at Pokuru and recalculate the Operational Imbalance quantities

Trading Hub ~ Challenges

- MDL approval may be required for
  - possible adjustment to tariffs associated with TH location to ensure unnecessary increases in transmission fees do not occur
  - implementation of a non standard ICA for the Hub Operator at the TH Welded Points
  - potential use of Line Pack for balancing service
  - etc.
- Feasibility of the TH will need to be confirmed against existing OATIS functionality for items such as:
  - type of Welded Point options for a TH location
  - managing TH variances due to event curtailment
  - managing TH variances due to pipeline approvals at opposing end Welded Points
  - determining viable balancing service options
  - Displaced Gas effects at the TH
  - Shipper Mismatch effects at the TH
  - AQ effects at the TH
  - etc.

In Summary

- Trading Hub concept appears to be sound
- Potential solutions have been identified for working around most of the issues
- More work is required to ensure the feasibility of the TH
- Next steps include:
  - MDL agreement
  - Increase dialogue with industry participants on how all of this might work
  - Potential communication with owners of OATIS for any tweaks or changes that may be required. However, this design attempts to follow as closely as possible to existing systems and processes.

Conclusion

Trading Hub is best long-term solution

- cleanest interface for trading
- less error-prone
- scalable
- Implementation requires further "proving"
  - Need to clarify interfaces with MPOC & OATIS
  - MDL requires a proposal it can respond to

Virtual Hub allows market trial to commence

- platform & governance well-advanced
- tweaks required to Standard Trading Terms to reflect VH price adjustment