

Government of Alberta

BRIK Infrastructure and Bitumen Supply Availability

Submitted to Industry: November 2009

Executive Summary

- Based on bitumen production and BRIK volume forecasts the upgrader requirements of 75,000 bpd of bitumen can likely be met under the base case price scenario.
- Industry feedback has confirmed that there do not appear to be any material, infrastructure or commitment constraints that will prevent the Crown from meeting its supply commitment to the upgrader.
- There is sufficient unused pipeline capacity available both at Edmonton and Hardisty to meet the BRIK obligations up to 2018.
- Based on industry forecasts and ERCB approved projects in design and construction, the existing pipeline infrastructure is capable of meeting the bitumen production volumes from the Cold lake and Peace River Regions up to 2030.
- The pipeline infrastructure would require upgrading to meet the Athabasca bitumen production by 2018. The Athabasca Region bitumen production is expected to approximately double by 2018.
- There appears to be sufficient blended bitumen (dilbit) volumes available in Edmonton for third party transactions.
- Initially Crown will take delivery of BRIK volumes at Edmonton and/or Hardisty, which will provide both lower cost and lower risk. However, the Crown reserves the right to take volumes at the Royalty Calculation Point (RCP).
- Export commitments by producers will not limit the availability of bitumen volumes for BRIK. This also includes commitments on contract pipelines which normally are a percentage of total production.

This paper is for discussion purposes only and may be modified should an alternative proposal being advanced by CAPP prove feasible.

Introduction

The objectives of the Infrastructure and Supply Availability working group are two- fold and involve addressing the following questions:

With respect to Infrastructure:

1. Is there adequate infrastructure to deliver BRIK volumes to the Crown?
2. Is pipeline commitment a constraint to meeting BRIK obligation?

With respect to Bitumen supply Availability

3. Are there sufficient BRIK volumes in Edmonton in the event that the Crown wants to supply the RFP upgrader?
4. Is there sufficient supply of bitumen available for 3rd party transactions for producers to meet their BRIK obligation?

This paper is divided into the following main sections:

1. Infrastructure for BRIK
2. BRIK Supply Availability Forecast
3. Conclusions

1. Infrastructure for BRIK

Meetings were held with industry and consultants for the “Bitumen Availability and Infrastructure” working group. These meetings provided information on existing pipeline infrastructure and storage capacities. The unused capacity on the existing pipelines was established based on the information provided by the producers and pipeline operators. Producer and customer commitments were also obtained during one to one meetings.

All volumes in this paper are reported as:

- Blended bitumen (dilbit) for infrastructure, pipelines and storage
- Crude bitumen for production forecast and BRIK forecast.

BRIK-Physical Transfer Point-Delivery Location

An in-depth paper on the Physical Delivery location for BRIK is available and has been submitted to Industry.

In brief, the key points of the paper include:

- Producers will be required to act on behalf of the Crown to transport BRIK volumes to the major hubs in Edmonton and Hardisty. The crown will make adjustments to reflect transportation costs.
- The Crown should specify where the BRIK volume is to be delivered, taking into account the infrastructure limitations of the producer.
- There should be sufficient flexibility to allow producers to act as agents for the Crown to transport and sell bitumen blend volumes designated for export along with their volumes.
- The Crown should retain the option of taking physical delivery at the RCP.
- The Crown will reserve the following options for taking physical delivery at the RCP:
 - Take its share of bitumen and arrange for its own diluents and transport
 - Take its share of bitumen blend and arrange for its own transport.

Existing Pipeline Infrastructure Actual Volumes and Capacities:

a) Intra Alberta

There are 12 pipeline systems transporting dilbit, synbit, and SCO (made from bitumen) from three oil sands areas in Alberta (Athabasca, Cold Lake, and Peace River) to Edmonton and Hardisty. Dilbit and synbit are marketed as blends at the major hubs of Edmonton and Hardisty.

The total blended bitumen pipeline capacity from the Athabasca region to Edmonton is 800,000 bpd and to Hardisty is 375,000 bpd. The Actual volumes of blended bitumen transported to Edmonton and Hardisty are currently 286,000 bpd and 181,000 bpd respectively. The remaining pipeline capacities are available to transport BRIK volumes. The bitumen production from the Athabasca region is expected to double by 2018. The existing pipeline infrastructure will require upgrading by 2018 to meet the production and BRIK demand.

There are 4 pipeline systems from Cold Lake capable of transporting 247,000 bpd of blended bitumen to Edmonton and 431,000 bpd to Hardisty. The Actual volumes of blended bitumen transported to Edmonton and Hardisty are 165,000 bpd and 352,000 bpd respectively.

The Cold Lake System moves bitumen blend from the Cold Lake area to both Edmonton and Hardisty. The Cold Lake West Pipeline to Edmonton has a capacity of 247,000 bpd while the Cold Lake South to Hardisty has a capacity of 221,000 bpd. Because of the large export market for Alberta bitumen, it currently makes sense for most producers to ship to Hardisty. However, infrastructure is in place to support filling the Edmonton line to capacity and sending the excess to Hardisty

Peace River has one pipeline transporting blended bitumen to Edmonton. The total capacity of the pipeline is 200,000 bpd, and the actual capacity is 124,000 bpd. The remaining pipeline capacity would be available to transport BRIK volumes. Future Peace River bitumen production is expected to continuously decline from 2009 onward.

Table 1: Pipeline Capacities and Actual Volumes			
From Athabasca			
Pipeline	Pipeline Capacity (bpd)	Actual Volumes (bpd)	Residual Capacity (bpd)
To Edmonton			
Devon/Meg Access	150,000	36,000	114,000
Enbridge Waupisoo	350,000	70,000	280,000
IPF Corridor (Shell)	300,000	180,000	120,000
Pembina Horizon (SCO)	250,000	100,000	150,000
Suncor OSPL(SCO)	110,000	110,000	0
Syncrude AOSPL (SCO)	390,000	295,000	95,000
Total	1,550,000*	791,000*	759,000
To Hardisty			
Enbridge Athabasca	375,000	181,000	194,000
Total	375,000	181,000	194,000
From Cold Lake			
To Edmonton			
Cold Lake	247,000	165,000	82,000
Total	247,000	165,000	82,000
To Hardisty			
Cold Lake	221,000	157,000	64,000
Echo	75,000	62,000	13,000
Husky	135,000	133,000	2,000
Total	431,000	352,000	79,000
From Peace River			
To Edmonton			
Rainbow	200,000	124,000	76,000
Total	200,000	124,000	76,000

* Note these totals include SCO

The total unused capacity to Edmonton, including committed and SCO pipelines appears to be approximately 46% of today's total pipeline capacity. If the SCO pipelines are excluded, the unused capacity for the committed and common carrier pipelines to Edmonton is 54%. The total unused capacity to Hardisty appears to be 34% of the total pipeline capacity. The numbers are based on 2009 actual volumes. Existing infrastructure will meet the production demands beyond 2030 for all regions except Athabasca. For the Athabasca region, based on new projects coming on stream it is forecasted that the bitumen production will almost double by

2018. Investment would have to be made in the pipeline infrastructure before 2018 to meet increased production forecasts.

b) Export

Table 2 shows the existing and future export pipeline capacities. The total export capacity will be 3,839,000 bpd by 2011, with an additional 2,250,000 bpd of capacity planned for 2012 and beyond. Currently, the Express line originating at Hardisty is the only crude oil pipeline in western Canada that operates under long-term ship-or-pay agreements for a majority of its capacity. TransCanada’s Keystone pipeline will also be a contract pipeline. Export commitments are not expected to prevent producers from meeting BRIK obligations.

Table 2: Export Pipeline Capacities	
From 2010 to 2011	
Pipeline	Pipeline Capacity (bpd)
Enbridge Mainline including Clipper	2,450,000
Trans Mountain including TMX 1	300,000
Express	285,000
Keystone including Cushing Expansion	590,000
Milk River/Bow River	129,000
Rangeland	85,000
Total Export Pipeline capacity	3,839,000
Potential Future Additions 2012-2015	
Keystone XL	500,000
Northern Gateway	525,000
TMX North	400,000
TMX South	400,000
Altex	425,000
Potential Total capacity 2012-2015	2,250,000

Pipeline Commitments

Based on consultations with producers, pipeline commitments do not appear to pose a contractual constraint on their ability to meet their BRIK obligations. Producer’s pipeline commitments vary from 6 months to 20 years. Average contract duration can be 17 years but the volume committed only represents a fraction of their

production. Producers distribute transportation between contract and common carrier pipelines. Most producers commit less than 50% of their volumes to contract carriers with long term commitments and more than 50% of their volumes to common carrier pipelines.

Likewise, based on consultations with pipeline operators, pipeline commitments will not pose a contractual issue as there typically is substantially more monthly nominated common carriage than there is long term contract carriage. There is potential for an increase in common carrier tolls on some export pipelines due to some commitments on contract pipelines.

Small Operator's Commitments

The supply commitments from small operators have not been thoroughly investigated. However based on the aggregate non committed volumes available, including volumes from small operators, there appears to be sufficient volumes available to meet BRIK commitments.

2. Bitumen Supply Availability Forecasts

By implementing BRIK, the Crown will potentially own a significant amount of blended bitumen volumes. To optimise the value of the Crown's share of oil sands resource, the Crown has a range of options available to meet this objective. One of the options potentially available is to support new upgrading initiatives in Alberta by supplying the Crown's bitumen in kind royalty (BRIK) volumes.

BRIK Supply Forecast at Edmonton

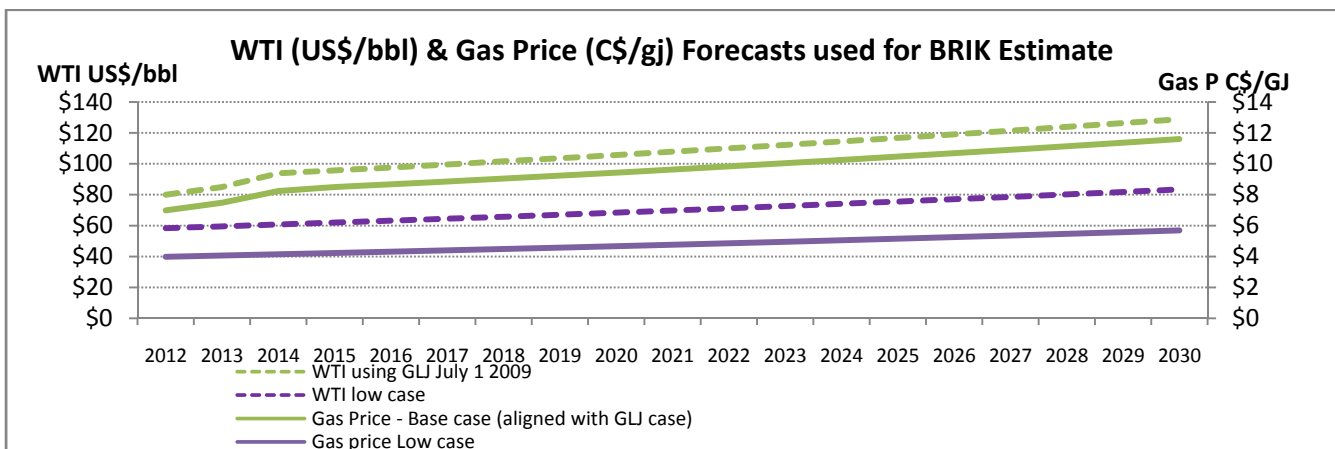
The Crown has issued a Request for Proposal (RFP) on an Alberta upgrader to start accepting bitumen blend volumes around the 2016-2018 timeframe. It is expected that any upgrader to be built will most likely be located in the Industrial Heartland, gaining physical access to bitumen supply coming into Edmonton. Under the terms of the RFP, the Crown is expected to supply 75,000 bpd of bitumen to the upgrader. To assess the Crown's ability to meet this commitment, it is necessary to evaluate and forecast Crown's potential BRIK volume supply at Edmonton.

The first step in forecasting the BRIK volumes at Edmonton is to forecast the total bitumen supply forecast from BRIK projects. BRIK volumes will initially be limited to non-integrated projects. To forecast the total bitumen supply from these projects, the following methodology was conducted.

- Good Faith Estimates (GFEs) and operator's ten year forecasts submitted in January 2009 were used.

- Operator forecasts were modified to reflect more recent information obtained from consultations with the operators throughout the summer of 2009.
- The rate at which new or suspended projects are predicted to ramp up were aligned to be consistent with OSR applications and company announcements, and discounted production based on actual performance.
- Two price scenario forecasts were generated for the period 2012-2030: i) Base case using GLJ's July 1, 2009 WTI price forecast which ranges from US \$80 to \$128 and ii) Low price case of WTI ranging from US \$58 to \$83.

Figure 1: WTI & Gas Price Forecasts for BRIK Estimates

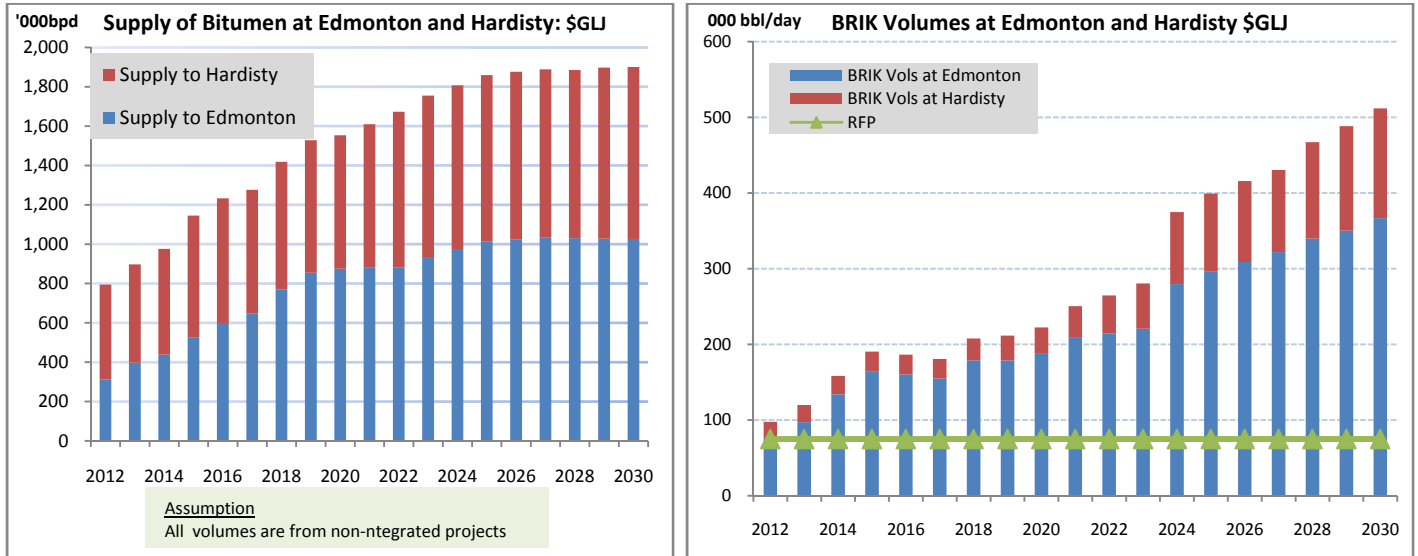


Preliminary analysis and the resulting charts are based on the following assumptions:

- All projects, including projects with small physical royalty obligation deliver BRIK obligation volumes (i.e. assumes no cash royalty trigger for de-minimus projects).
- BRIK volumes delivered meet the full royalty obligation (ie. No royalty adjustments and true ups). In practical terms, projects will unlikely to be delivering the exact BRIK obligation, but will either under or over deliver with the adjustment settled in cash. The BRIK volumes actually delivered will be highly dependent on the royalty estimation process which will be addressed by the BRIK Royalty Working Group.
- All Cold Lake Bitumen BRIK volumes using the Cold Lake pipeline line (Imperial Cold Lake, EnCana Foster Creek, CNRL, and Shell Orion) are directed to Edmonton in order to supply the RFP upgrader with the Crown Agent providing sufficient notice period to the producers.
- All BRIK volume streams meet the quality specifications for the RFP upgrader. In reality, the upgrader may be limited to specific bitumen quality.

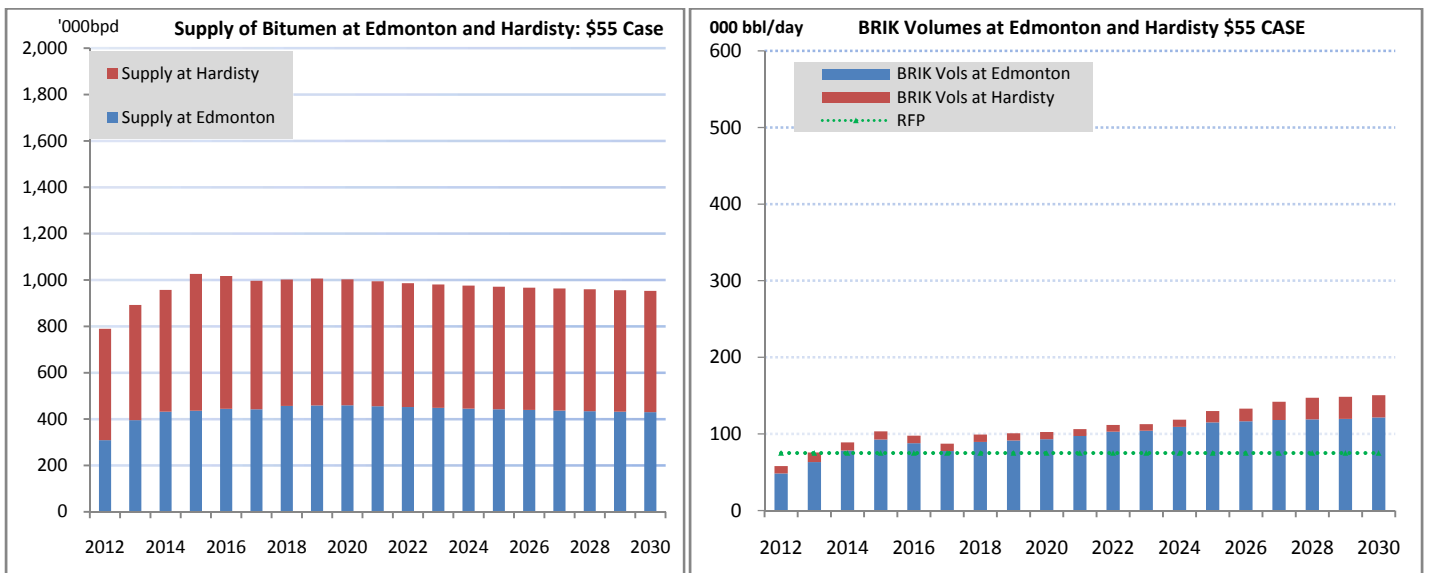
- Projects that truck their volumes or have supply commitments and therefore unable to deliver their own project volumes are able to meet the BRIK obligation through 3rd party market purchases.
- Project costs have been adjusted to be more aligned with oil price (Higher oil price yields higher costs, lower oil price yields lower costs)

Figure 2: Forecasted Total Bitumen Production and BRIK volumes (\$GLJ case) from non-integrated projects



Preliminary analysis shows that under a base case price scenario of US\$80-\$129 (GLJ WTI price case), the Crown appears to have sufficient BRIK volumes at Edmonton to meet the 75,000 bpd of bitumen RFP supply commitment (See Figure 2). In fact, it appears that under this price scenario, the Crown may have excess supply and would have to be active in selling Crown Volumes or use the excess supply to support other value added initiatives.

Figure 3: Forecasted Total and BRIK volumes at Edmonton and Hardisty (\$55-low price) from non-integrated projects



Under the low price case scenario (See *Figure 3*), total production is assumed to decrease (with producers delaying expansions or new projects). BRIK volumes decrease substantially due to the lower royalty rate (function of WTI) and lower production volumes. Under a low price scenario, the Crown is more likely to have insufficient BRIK volumes to meet the supply commitment for the RFP at Edmonton during the early years and would therefore have to enter the bitumen market to make up for the shortfall.

Preliminary analysis also shows that while BRIK volumes in Edmonton may initially be short in terms of meeting the RFP obligation, in terms of TOTAL BRIK volumes at both Edmonton and Hardisty, there appears to be sufficient volumes (certainly at the base case price). This suggests that the Crown could potentially swap Hardisty volumes for Edmonton volumes or sell Hardisty volumes and buy Edmonton volumes to meet the RFP supply commitment.

Bitumen Supply available for 3rd party Transactions

Under the BRIK programme design, producers unable to meet their royalty obligation by delivering their project volumes to the Crown, will have the option of purchasing 3rd party volumes from the market. This mechanism is particularly important for integrated projects which cannot physically deliver project volumes and therefore have to rely on 3rd party purchases to meet their royalty obligation. With integrated projects announced to be initially exempt from BRIK, the issue of 3rd party bitumen supply availability is not currently viewed as being a significant issue.

Nonetheless, it is important to understand the 3rd party bitumen market at Edmonton as the Crown may have to purchase additional volumes to meet its RFP supply commitment if it is short of BRIK volumes.

To forecast the supply available for 3rd party transactions, the following forecast components are required:

	Total Non-integrated Bitumen production
Less	BRIK volumes from Non-integrated projects
Less	Physically undeliverable volumes
Equals	Net supply of bitumen available for purchase

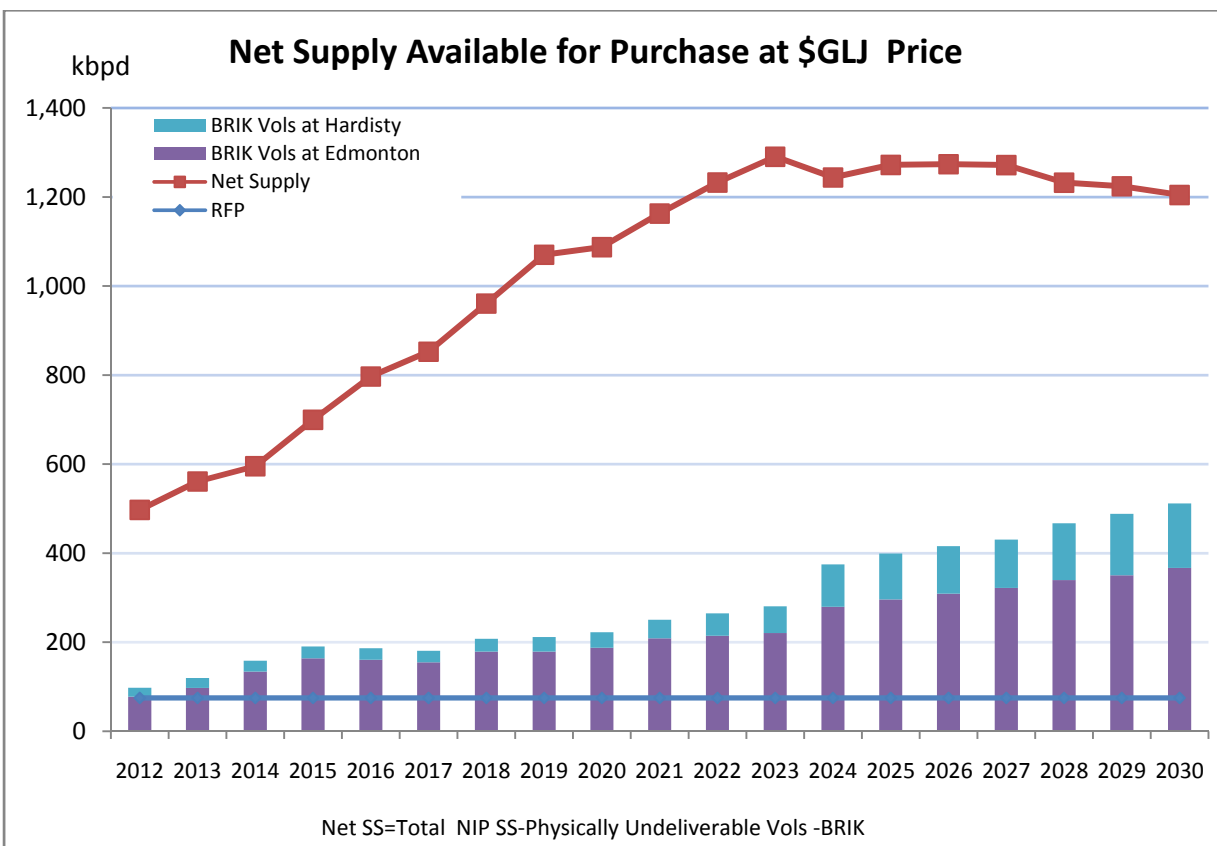
Forecasting the physically undeliverable volumes is more complex. This component requires identifying the volumes that have a supply commitment and would not be available in the market under any price as well as

those volumes that are trucked to an Alberta upgrader and therefore cannot physically be delivered using pipeline to a market hub. The assumptions used to generate this forecast component includes:

- ❖ Production from various projects which have long term supply agreement to Alberta upgraders and production from projects that truck to the upgraders (physically, these projects do not have access to pipeline to a market hub)
- ❖ Bitumen volumes that are committed to the WCS stream (CLB, LLE, CSB, MKH)
- ❖ Volumes that are committed to pipelines and equity refineries have NOT been included. Producers have indicated that if the price is “right”, the volumes will be available in the market. Additional work may be required on this assumption.

Preliminary analysis shows there would be sufficient 3rd party bitumen volumes available for purchase at Edmonton to meet potential Crown/ RFP demand as well as for non-integrated projects unable to meet their BRIK obligation with their own volumes (See Figure 4).

Figure 4: Bitumen supply for 3rd party Transactions at Edmonton and Hardisty



Summary

BRIK volumes are highly dependent on the price of WTI, light-heavy differentials, project costs, payout status and royalty rates. During the early stages of BRIK, the Crown could be in a position, depending on oil price, of having insufficient BRIK volumes at Edmonton to meet the RFP supply commitment. However, in total (at Hardisty and Edmonton), it should have sufficient vols. This preliminary result is based on the key assumptions that all BRIK volumes independent of stream quality will be acceptable to the upgrader and that the Crown will receive full physical BRIK obligation volumes.

With respect to supply availability for 3rd party transactions, preliminary analysis shows that there would be more than sufficient volumes available in the market for purchases. Initially, with integrated projects exempt from BRIK, even with supply commitments, there will be sufficient volumes available. However, further analysis will be required on this component if 3rd party transaction rules regarding acceptable deliverable quality of bitumen form part of the BRIK design programme.

3. Conclusions

Initial concerns of bitumen availability and infrastructure constraints to BRIK were evaluated through research and consultation. The group has concluded that adequate pipeline capacity should exist now and in the foreseeable future to transport blended bitumen in dilbit or synbit blend to Edmonton and Hardisty. Pipeline infrastructure will require upgrade by 2018 to meet the Athabasca Region bitumen production which is expected to double by 2018. Cold Lake and Peace River region bitumen production will be met by the existing infrastructure up to 2030.

Preliminary forecasts conclude that sufficient blend volumes should be available (BRIK volumes and 3rd party purchases) to meet upgrader requirements if the upgrader is able to take a wide range of feedstock quality and if bitumen prices remain robust. BRIK volumes will be very volatile given that they are highly dependent on a range of factors and therefore will likely require the Crown to be an active player in the bitumen market.

Producer's pipeline commitments are for the most part not binding, and do not prevent them from meeting their BRIK obligations. However, small producers do tend to commit a larger portion of their production and meeting BRIK obligation may be more burdensome for these producers.

Based on forecasts for current projects in the Athabasca region that have ERCB approvals, bitumen production will almost double by 2018 if these projects are complete as per their planned schedule. In this case additional pipeline infrastructure will be required to transport the additional blended bitumen volumes

Appendix

Table A1: Intra-Alberta Pipeline Capacity and Route

Pipeline	Company	Committed / Common Carrier	Actual Capacity (bpd)	Current Capacity (bpd)	Ultimate Capacity (bpd)	Pipeline Type	Batch Vs Stream	Pipeline Origin	Stream
EDMONTON									
Corridor (Shell)	IPF*	Committed	180,000	300,000	465,000	Dilbit - 24"	Stream	N. Athabasca	
Access	Devon/Meg	Committed	36,000	150,000	350,000	Dilbit - 24"	Stream	S. Athabasca	AWB
Waupisoo	Enbridge	Common	70,000	350,000	600,000	Mixed - 30"	Batch	S. Athabasca	MKH, SHB
Cold Lake West	IPF*	Common	165,000	247,000	345,000	Dilbit - 24"	Stream	Cold Lake	CLB
Rainbow	Plains		124,000	200,000	200,000	Mixed	Batch	Peace River	PH,SE,WH
Horizon	Pembina	Committed	100,000	250,000	250,000	SCO - 24"	Stream	N. Athabasca	SCO
Suncor Oil Sands	Suncor	Committed	110,000	110,000	110,000	SCO - 16"	Stream	N. Athabasca	SCO
Syncrude/AOSPL	Pembina	Committed	295,000	390,000	390,000	SCO - 24"	Stream	N. Athabasca	SCO
Edmonton Total			1,080,000	1,997,000	2,710,000				
HARDISTY									
Athabasca	Enbridge	Common	181,000	375,000	570,000	Mixed - 36"	Batch	N. Athabasca	CSB,SCO
Cold Lake South	IPF*	Common	157,000	221,000	339,000	Dilbit - 24"	Stream	Cold Lake	CLB
Echo	CNRL	Common	62,000	75,000	75,000	Bitumen Conventional	Stream	Cold Lake	LLE,ESB
Husky	Husky		133,000	135,000	135,000	Heavy		Lloydminster	LLB
Hardisty Total			533,000	806,000	1,119,000				
ALBERTA TOTAL			1,613,000	2,803,000	3,829,000				

* Inter Pipeline Fund

Table A2: Ex-Alberta Pipeline Capacity and Route

Pipeline	Company	Current Capacity (bpd)	Pipeline Type	Pipeline Origin	Pipeline Destination	Start-up Year
EXISTING						
Mainline	Enbridge	2,000,000	Mixed	Edmonton	U.S. Border	
Trans Mountain	Kinder Morgan	300,000	Mixed - 24, 30 & 36"	Edmonton	B.C., U.S. West Coast and offshore	
Express	Kinder Morgan	285,000	Crude - 24"	Hardisty	U.S. Rocky Mountains / U.S. Midwest	
Keystone including Cushing Expansion	TransCanada	590,000	Crude 30 & 36"	Hardisty	Cushing Ok	
Milk River/Bow River		129,000		Hardisty	U.S. Rocky Mountains	
Rangeland		85,000		Sundre, Alberta	U.S. Rocky Mountains	
Total		3,389,000				
PROPOSED						
Keystone XL	TransCanada	500,000	Crude 36"	Hardisty	U.S Gulf Coast	2010 2012
Alberta Clipper	Enbridge	450,000	Crude	Hardisty	U.S. Midwest	2010
Gateway Pipeline	Enbridge	525,000	Crude	Edmonton	U.S. West Coast / offshore	2012-2014
TMX2	Kinder Morgan	400,000	Crude	Edmonton	B.C. / U.S. West Coast / offshore	2011
TMX3	Kinder Morgan	400,000	Crude	Edmonton	B.C. / U.S. West Coast / offshore	2012
Altex	Altex Energy	425,000	Bitumen	N.E. Alberta	U.S Gulf Coast	2012
Total		2,700,000				

Note. Express, Keystone & Keystone XL are contract Pipelines
 Note. Enbridge Mainline consists of multiple lines (5)

