

Pipeline Solutions for Oilsands Development

*Enbridge's Perspective on Markets and
Transportation*

**Economic Society of Calgary
Energy Markets Seminar
April 10, 2003**

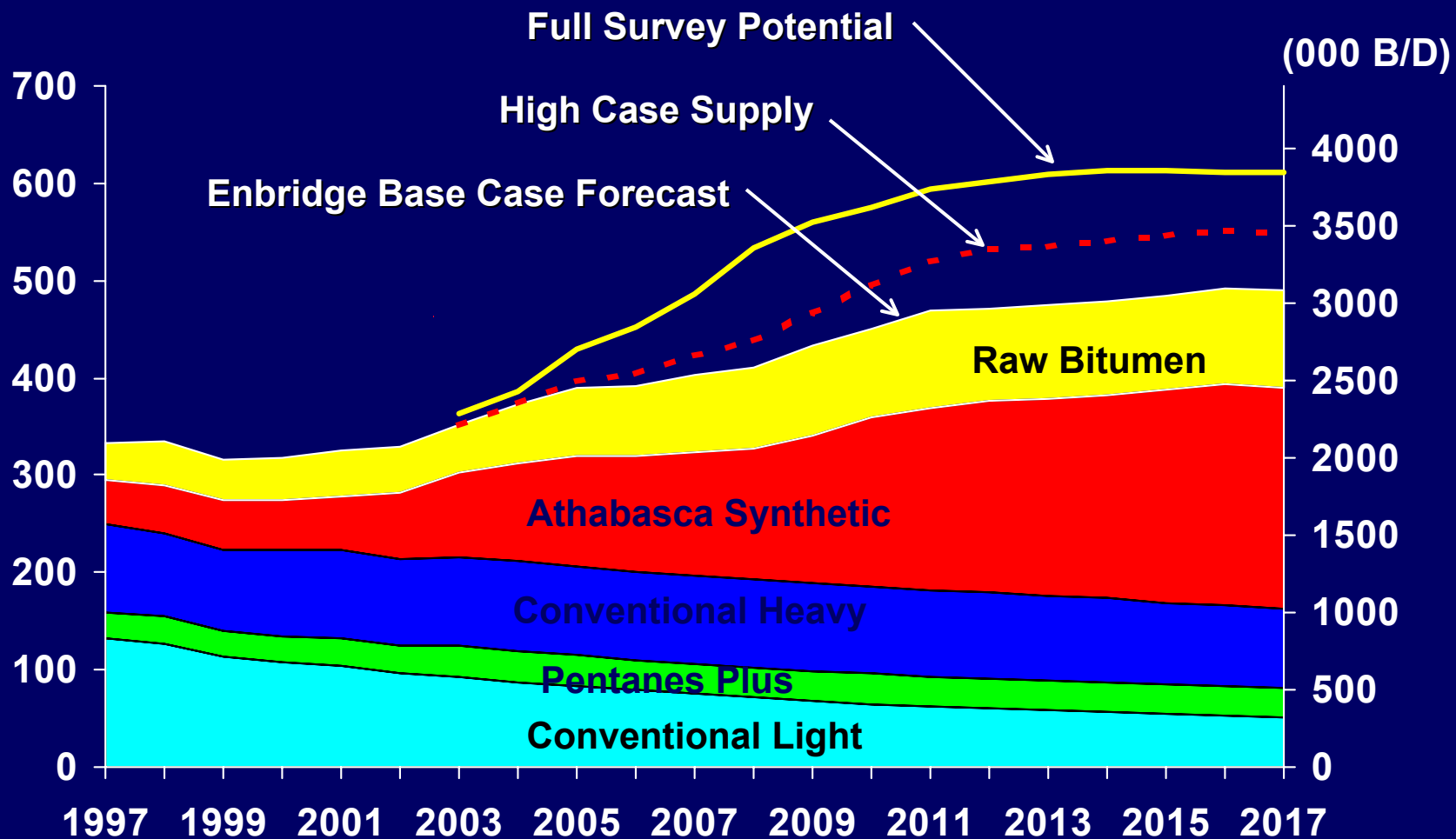
**Leon Zupan
Vice President Development and Services**



Energy Delivery Infrastructure

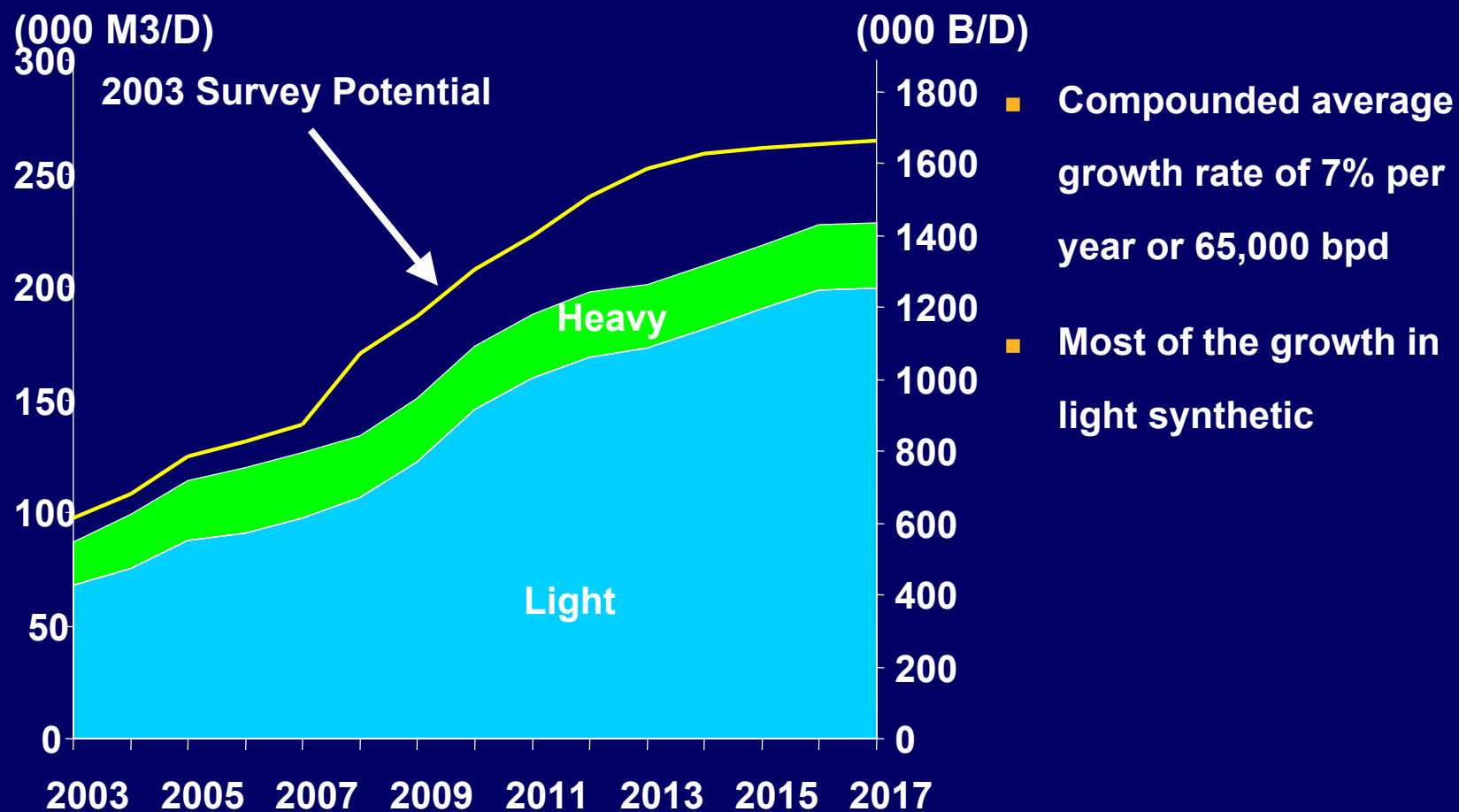


WCSB Preliminary Supply Forecast



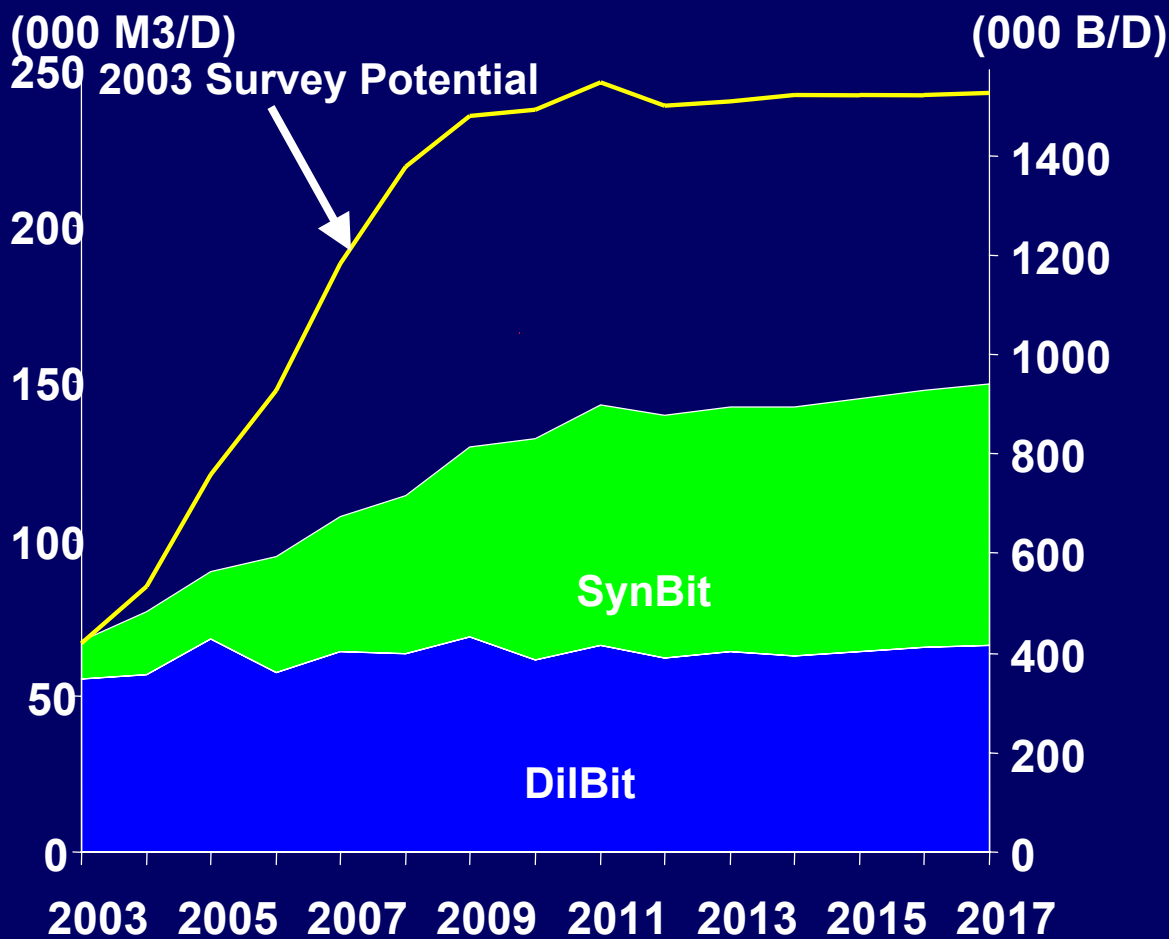
WCSB Athabasca Synthetic Production

(Excluding Husky and Newgrade)



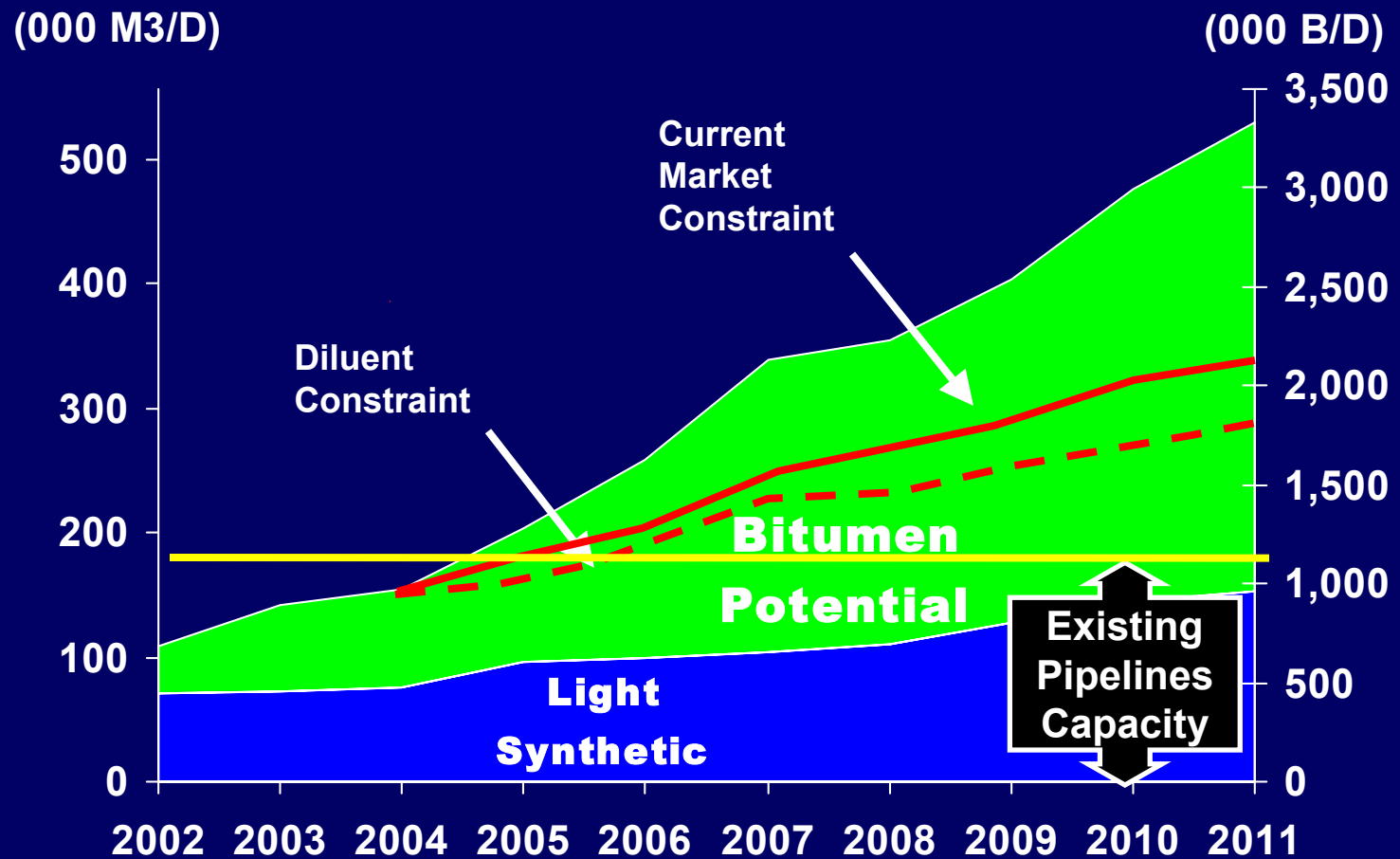
WCSB Blended Bitumen

Forecast 2003 - 2017

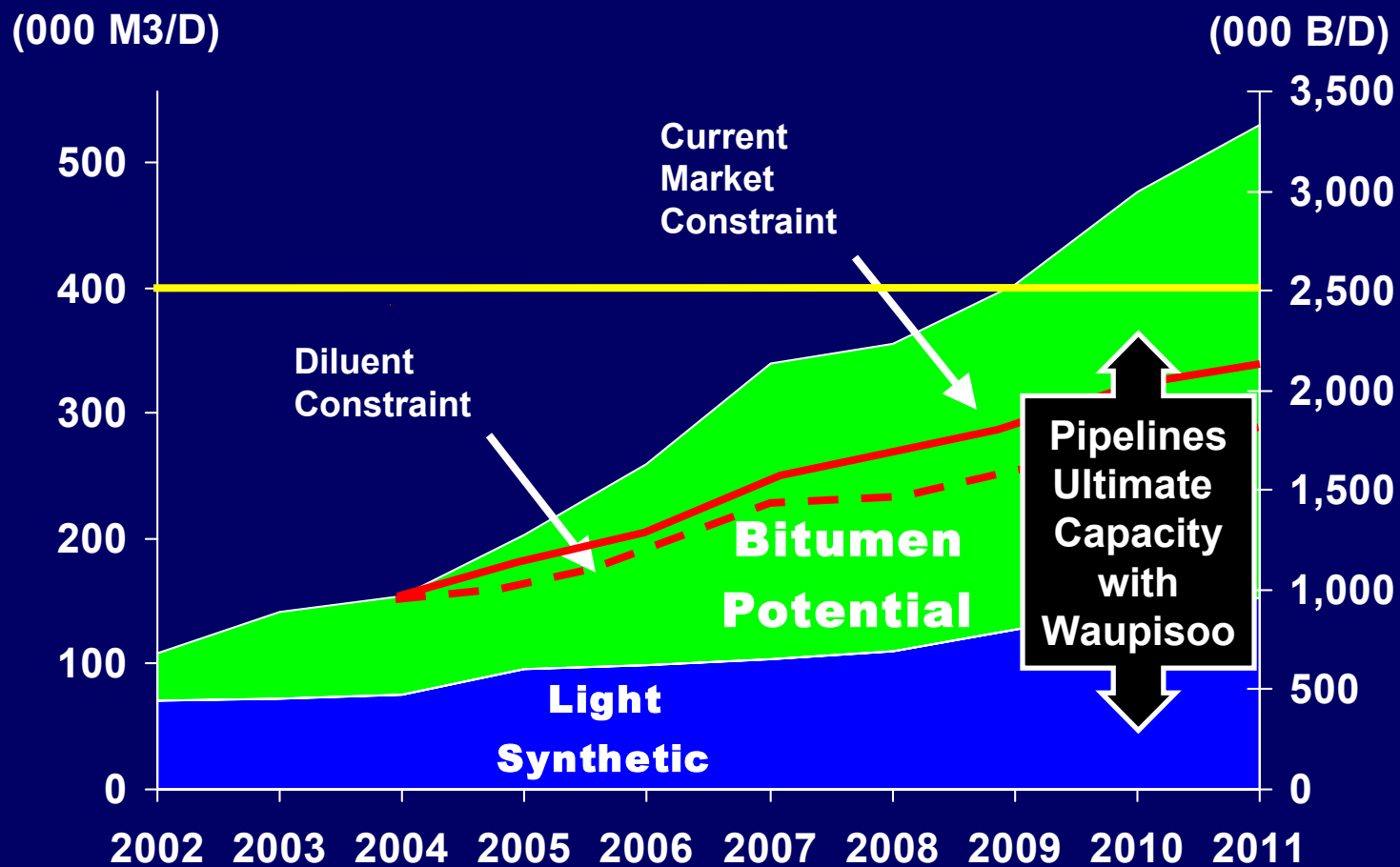


- Conventional diluent shortfall replaced by synthetic diluent

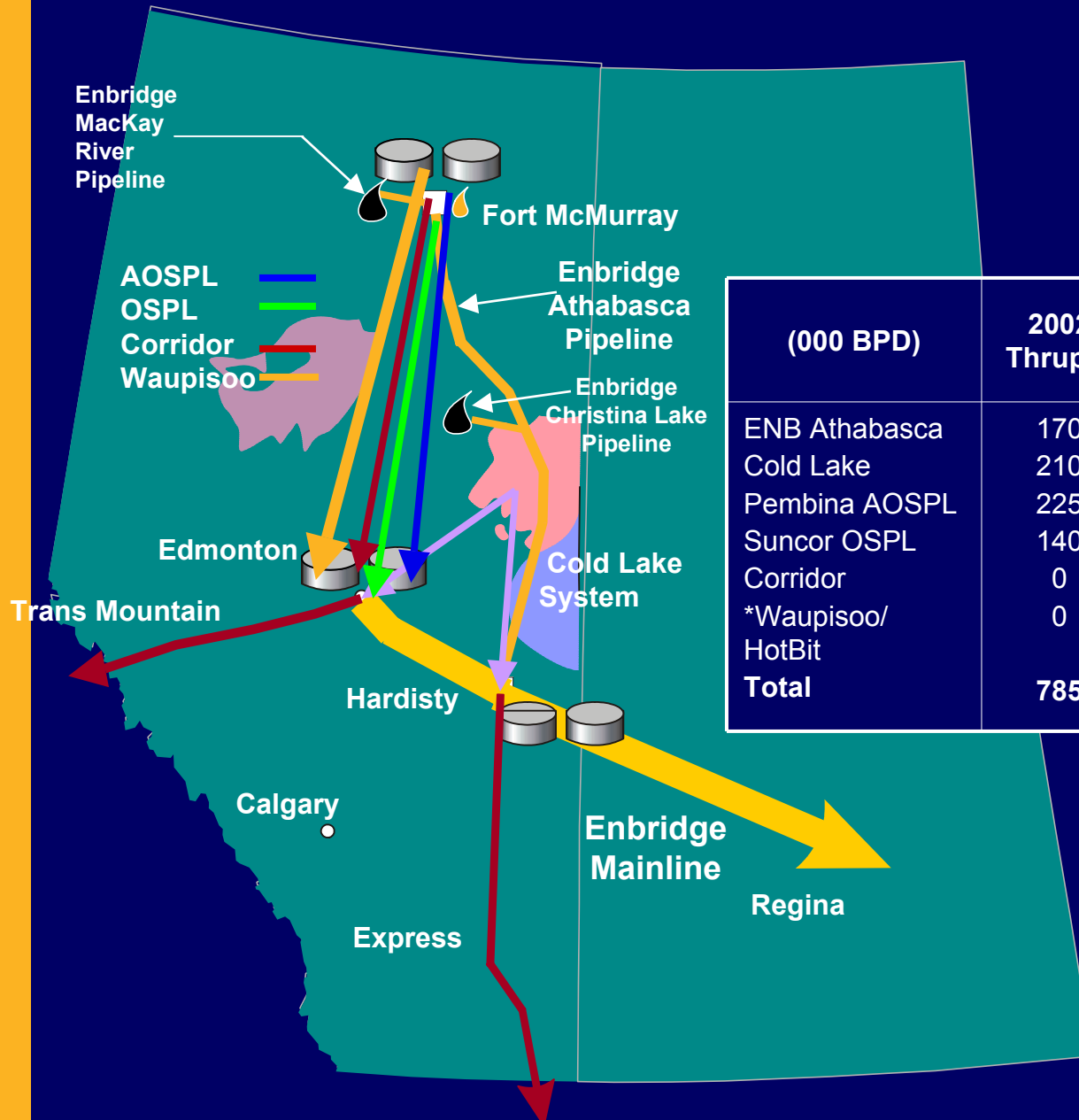
Constraints on Oilsands Potential Current Pipeline Capacity



Constraints on Oilsands Potential Ultimate Pipeline Capacity



Oil Sands Development



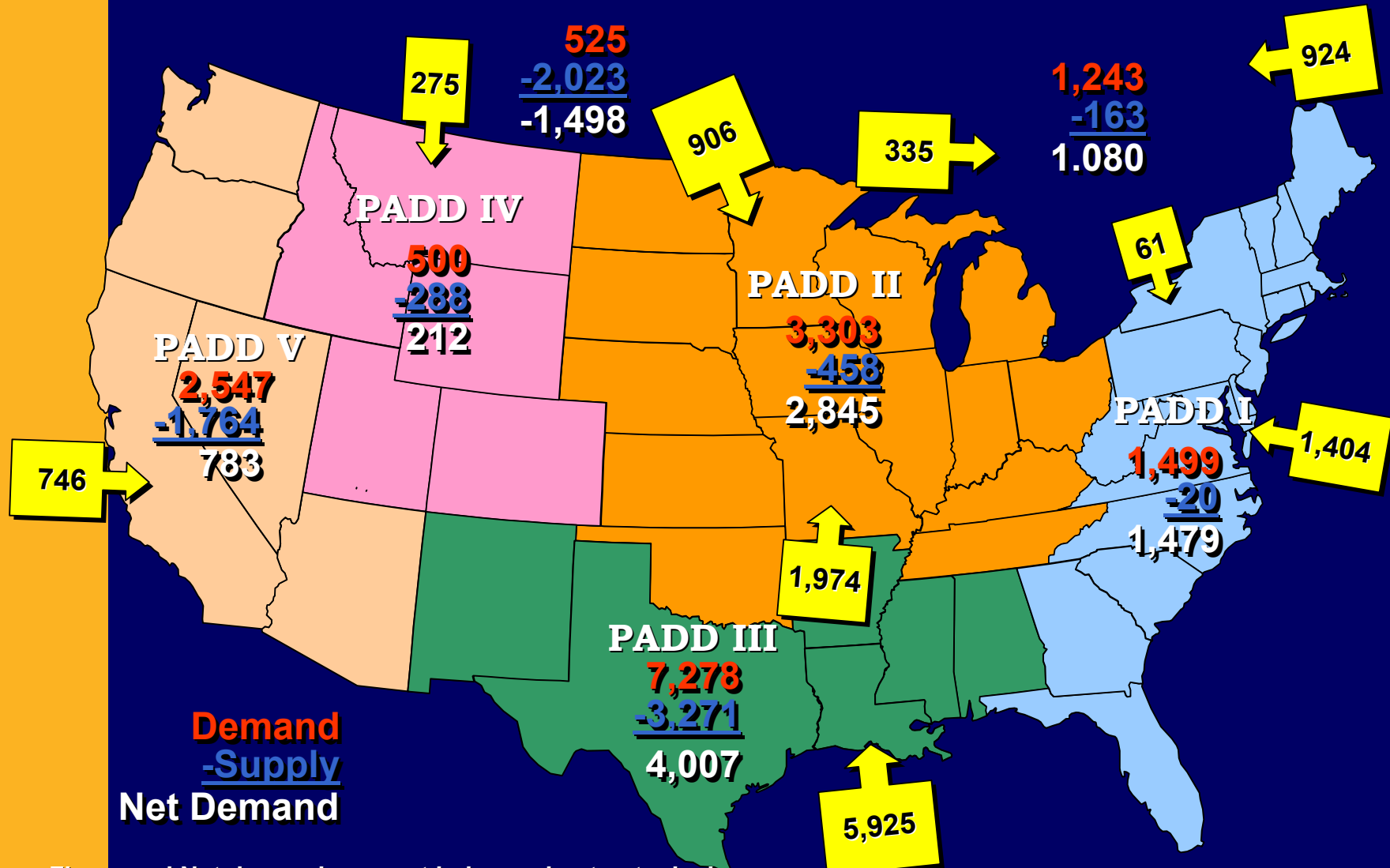
(000 BPD)	2002 Thruput	2002 Capacity	Ultimate Capacity
ENB Athabasca	170	240	570
Cold Lake	210	450	690
Pembina AOSPL	225	225	430
Suncor OSPL	140	140	140
Corridor	0	215	315
*Waupisoo/ HotBit	0	350+	350 +
Total	785	1,155	2,500

Post Terrace Phase III Mainline Development



Net Demand and Crude Movements

2001 Actual (thousand barrels per day)



Flows and Net demand may not balance due to stock change and rounding

PADD IV - Rockies Market



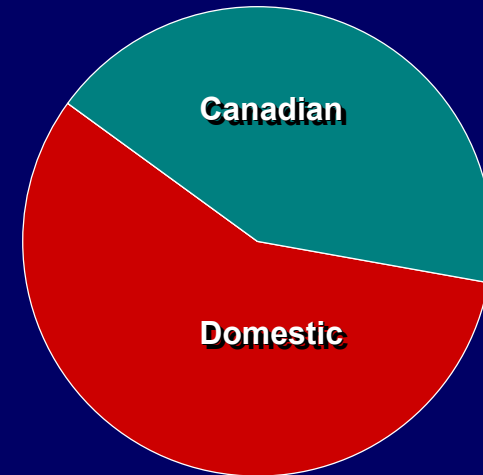
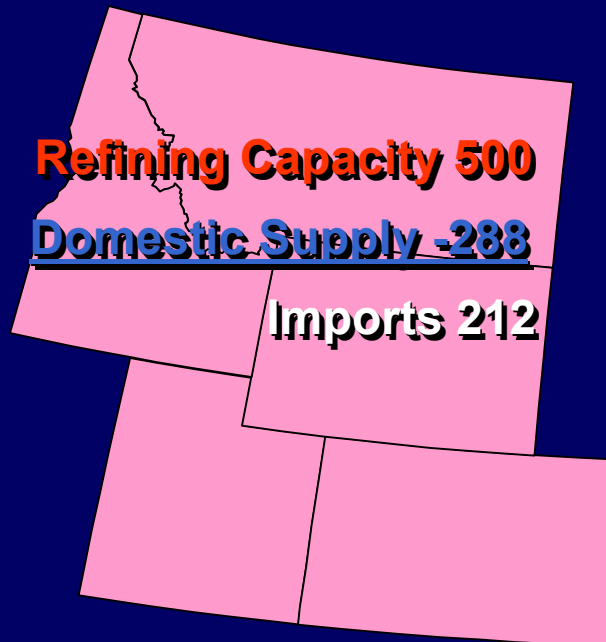
Refineries: 16

Refining Capacity 500 kbpd

Refiner Type: Simple, Light Supply





Avg. Sulfur %/wt - 1.31%

Avg. API Density^o - 32.9^o



Oilsands Growth - PADD IV Infrastructure



PADD IV Pipelines	
Express	
Western Corridor	
Eastern Corridor	
Frontier	

PADD II - Midwest Market



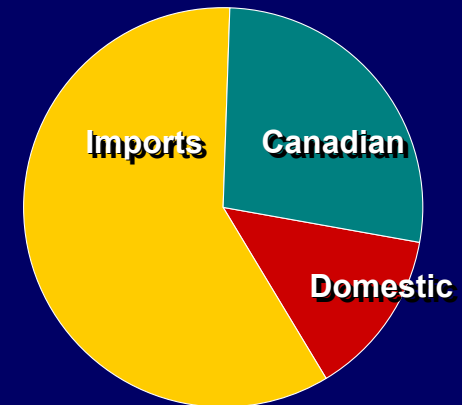
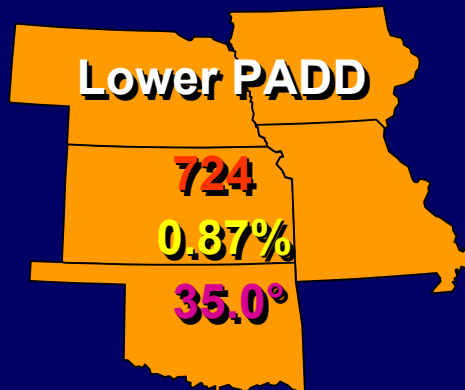
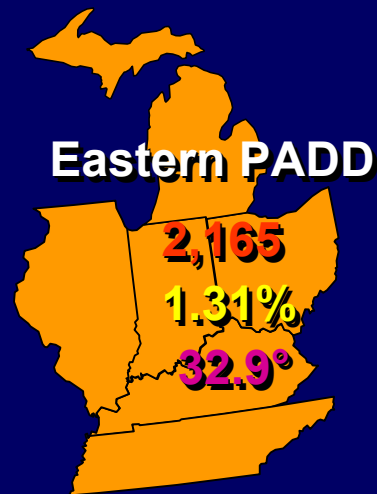
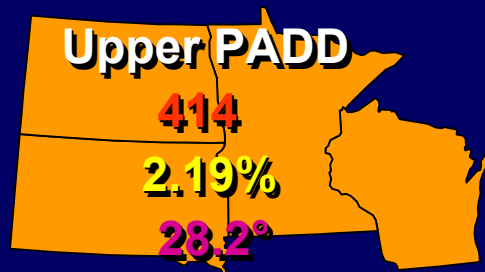
Refineries: 27

Refining Capacity 3,300 kbpd

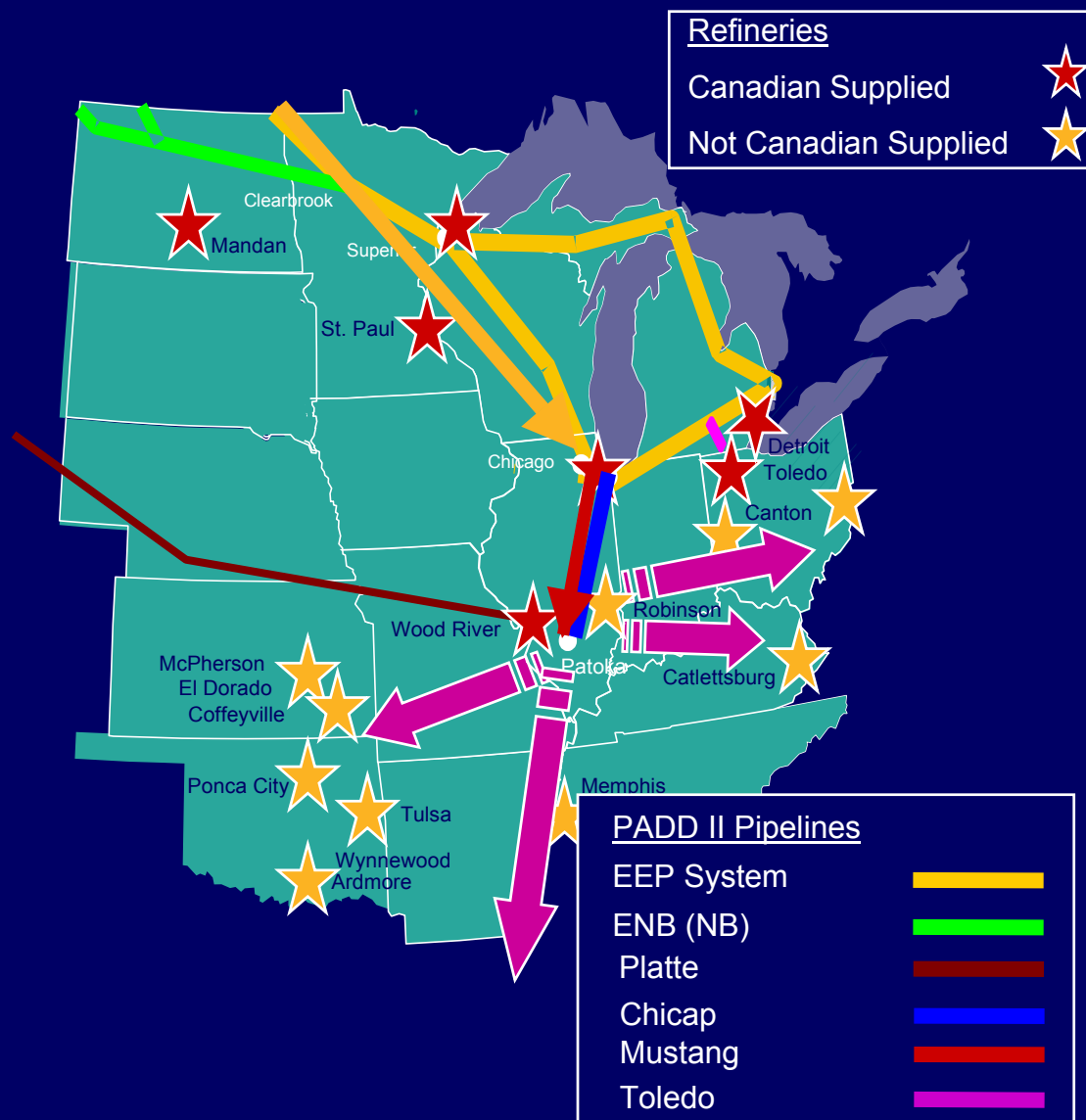
Refiner Type: Simple, Light Supply

Avg. Sulfur %/wt - 1.31%

Avg. API Density - 32.9°



Oilsands Growth - Mainline Extensions



PADD V - California Market



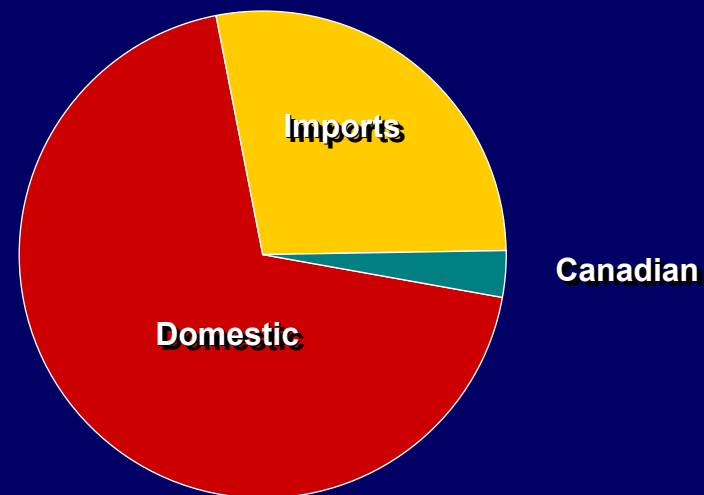
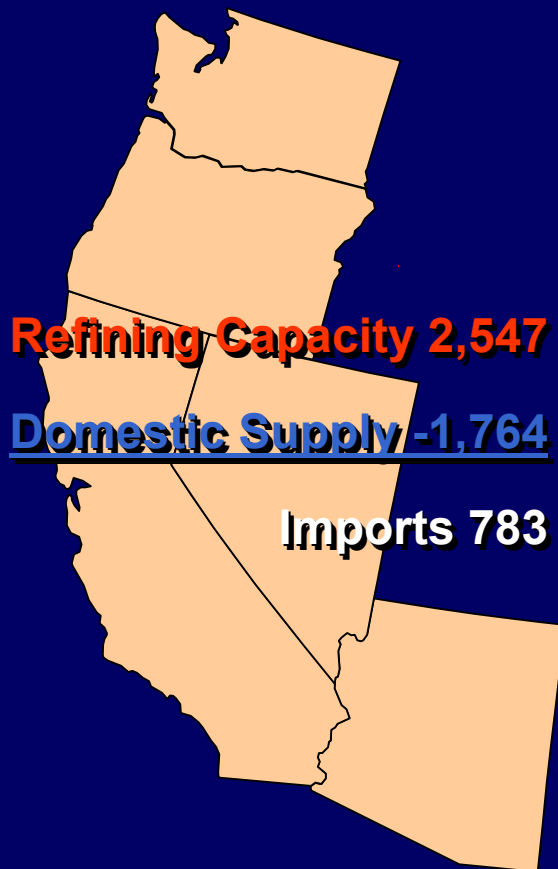
Refineries: 37

Refining Capacity 2,547 kbpd

Refiner Type: Complex, Heavy Supply

Avg. Sulfur %/wt - 1.23%

Avg. API Density - 26.8°



Mainline Ext. / New Markets

Gateway – 400,000 BPD



Far East - Asian Market

Refineries: 108

Refining Capacity 13,800 kbpd

Refiner Type: Simple, Light Supply

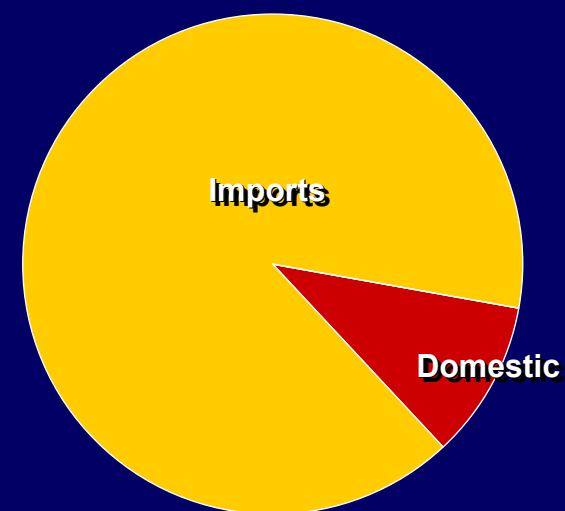
Avg. Sulfur %/wt - 1.87%

Avg. API Density - 31.9°

Refining Capacity 13,800

Domestic Supply -1,402

Imports 12,398

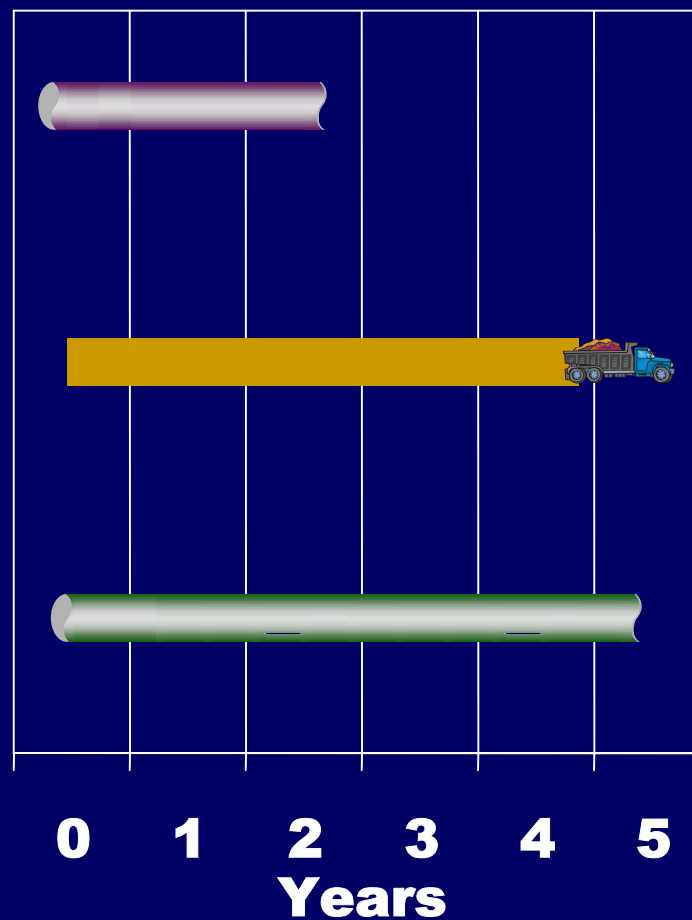


Real Constraints - Time

**Feeder Pipeline
(Athabasca)**

**Oil Sands
Projects**

**New Market
Pipeline**



Oil Sands Markets Study

- **What volumes to which markets will maximize netbacks for oil sands producers?**
- **What mix of raw bitumen, synthetic and fully saturated synthetic will best fit the available markets?**
- **What pipeline expansions, extensions, reversals and new development will be required?**

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