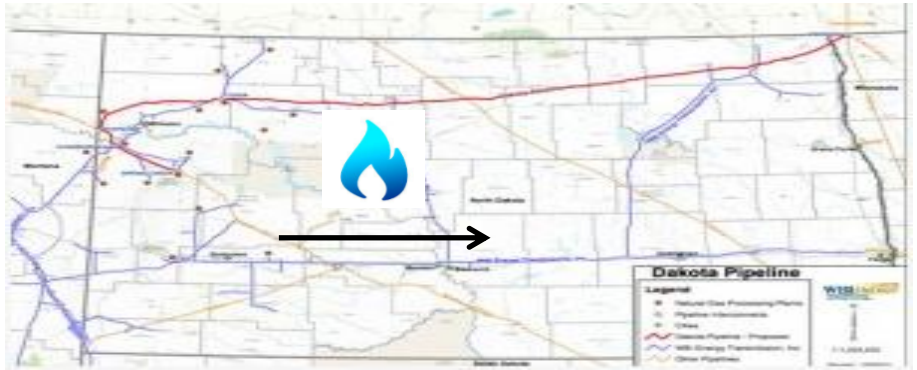
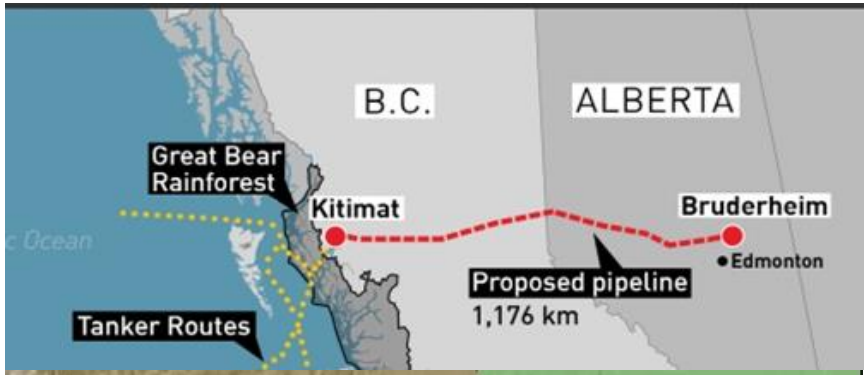
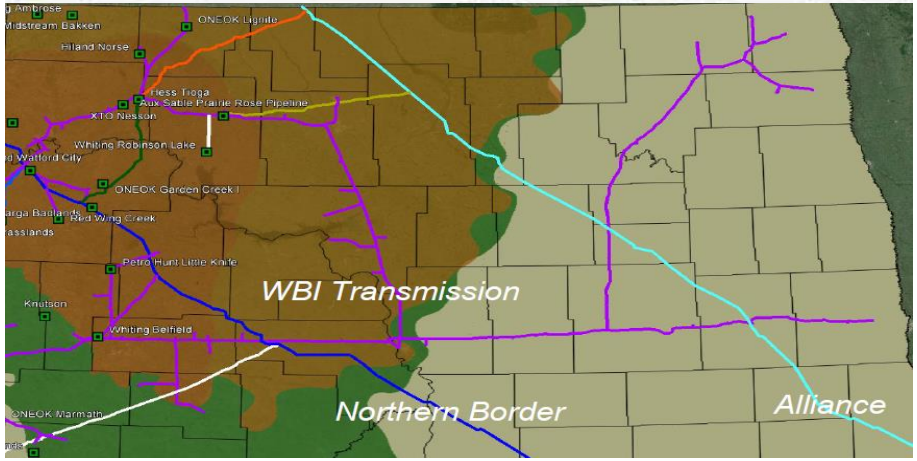
The Cost of the Missing Pipeline

Constraints and Adaptation







An Alternative View on Pipeline Projects

Case 1 – WBI Transmission Pipeline / Dakota Pipeline in the Bakken area in North Dakota

- Gas Pipeline from the Bakken to Minnesota
- Biggest / longest pipeline proposed by WBI
- Approved but 'on-hold' since disappointing 'open season' in 2014

Case 2 – Enbridge Northern Gateway in Western Canada

- Dual pipeline taking natural gas liquids from Kitimat B.C. to Bruderheim in the Alberta Oil Sands and Bitumen in the reverse direction for shipment to Asia by tanker
- The NGL's are used to 'lighten' the bitumen so it flows through the pipeline
- Cancelled in late 2016 by the Canadian federal government
- To be 'replaced' by Line 3 (moving southwest to Wisconsin)
- Or is there an alternative through the through Spectra pipeline system

Methodology

i. Valued opportunity costs and substitution effects for energy sellers/ buyers and pipeline companies
ii. Used financial calculations similar of the type used internally in corporate project analysis
iii. Used public databases and company financial reporting

Sources – Case 1

i. Energy Information Agency database
ii. North Dakota Oil and Gas Division database
iii. Publications of the North Dakota Pipeline Authority
iv. Annual reports of MDU Resources (WBI), Whiting Petroleum, Continental Resources, ONEOK

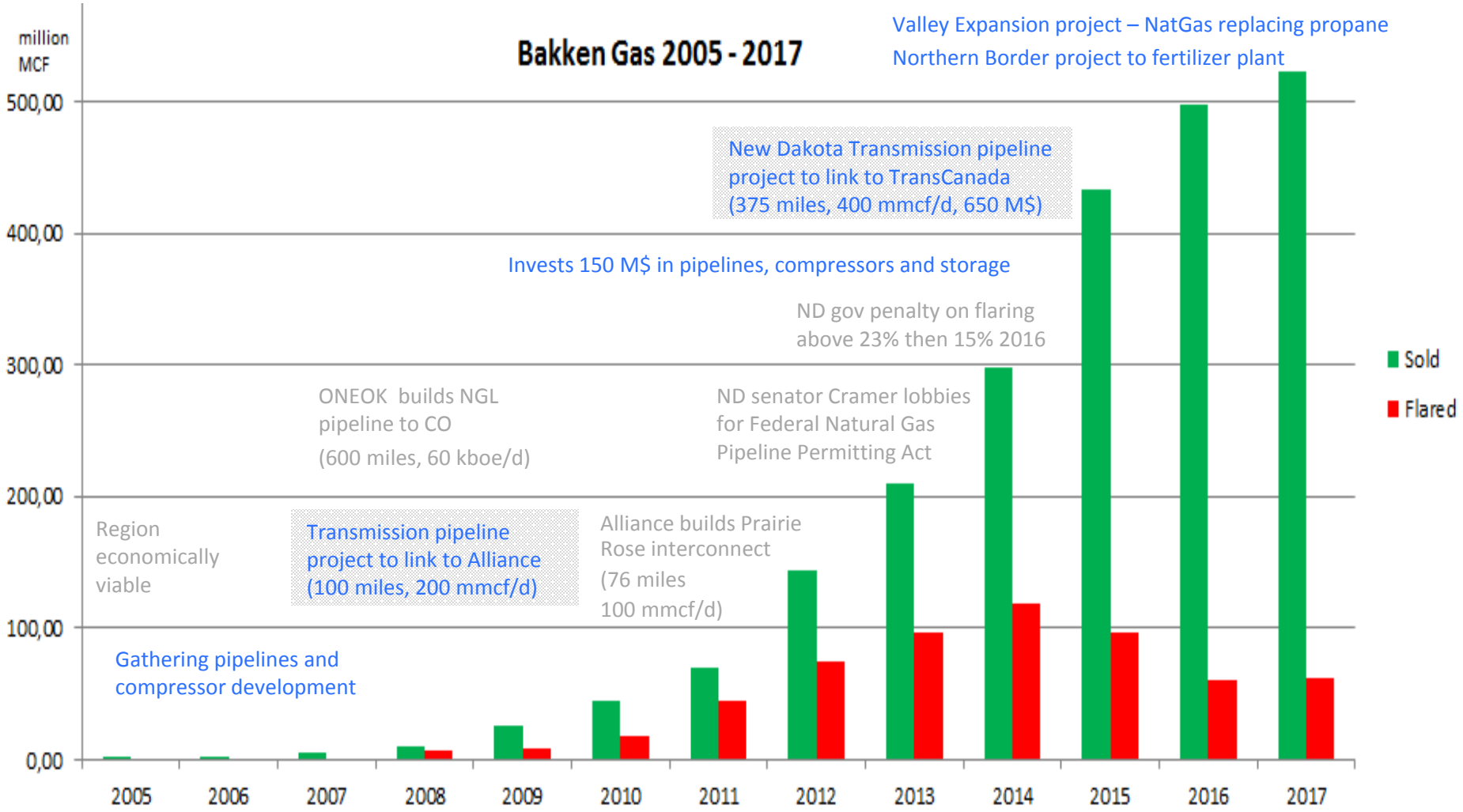
Sources – Case 2

i. Database of the Canadian Association of Petroleum Producers
ii. Annual reports of Enbridge, Suncor

Pipeline Development in the Bakken 2005 - 2017

Actions by WBI Energy and Others

Missing Pipeline



The Cost of not having the Dakota Pipeline

ENERGY SELLERS

- Lost sales margin assuming that the total pipeline capacity of 146 MBOE represents lost sales

	in M$ *at 2014 prices*	in M$ *at 2016 prices*
Missing Revenue	798	239
Missing Costs	-251	-251
of which pipeline transport	*-67*	*-67*
Missing Margin	547	-12

- Flaring Penalty (= blocked oil sales if > 15%)
  - Over 1 B$ lost revenue per year for large producers like Whiting and Continental
  - Around 100 M$ lost revenue per year for a median producer
- Substitution effects clearly present as gas sales increase by 75 BCF per year 2012 – 2017 without Dakota (There are other pipelines – many smaller projects)

Conclusion – they have adapted and don't need it

PIPELINE COMPANY

- Lost sales/margin from not having the new pipeline assuming full usage within current cost structure

	in M$ *marginal impact*	% increase *P&L WBI*
Missing Revenue	73	51%
Missing Costs	-29	48%
Missing Margin	44	54%

- But, **pipeline will cost 675 M$**. To breakeven (NPV over 30 years) they need to earn 90 M$/yr in margin per year to return 10% or 65 M$ /yr to return 5%

Conclusion

- **They were right not to build the Dakota pipeline**
- Instead they did a number of other smaller pipelines that solidify their future revenue flows

ENERGY BUYERS

- Prices pushed down by regulatory/substitution effects

Gas price per mcf vs Reference Price		
	2016	2014
Whiting	1,40	5,53
Continental	1,87	5,40
Avg	*1,64*	*5,47*
Henry Hub	2,61	4,53

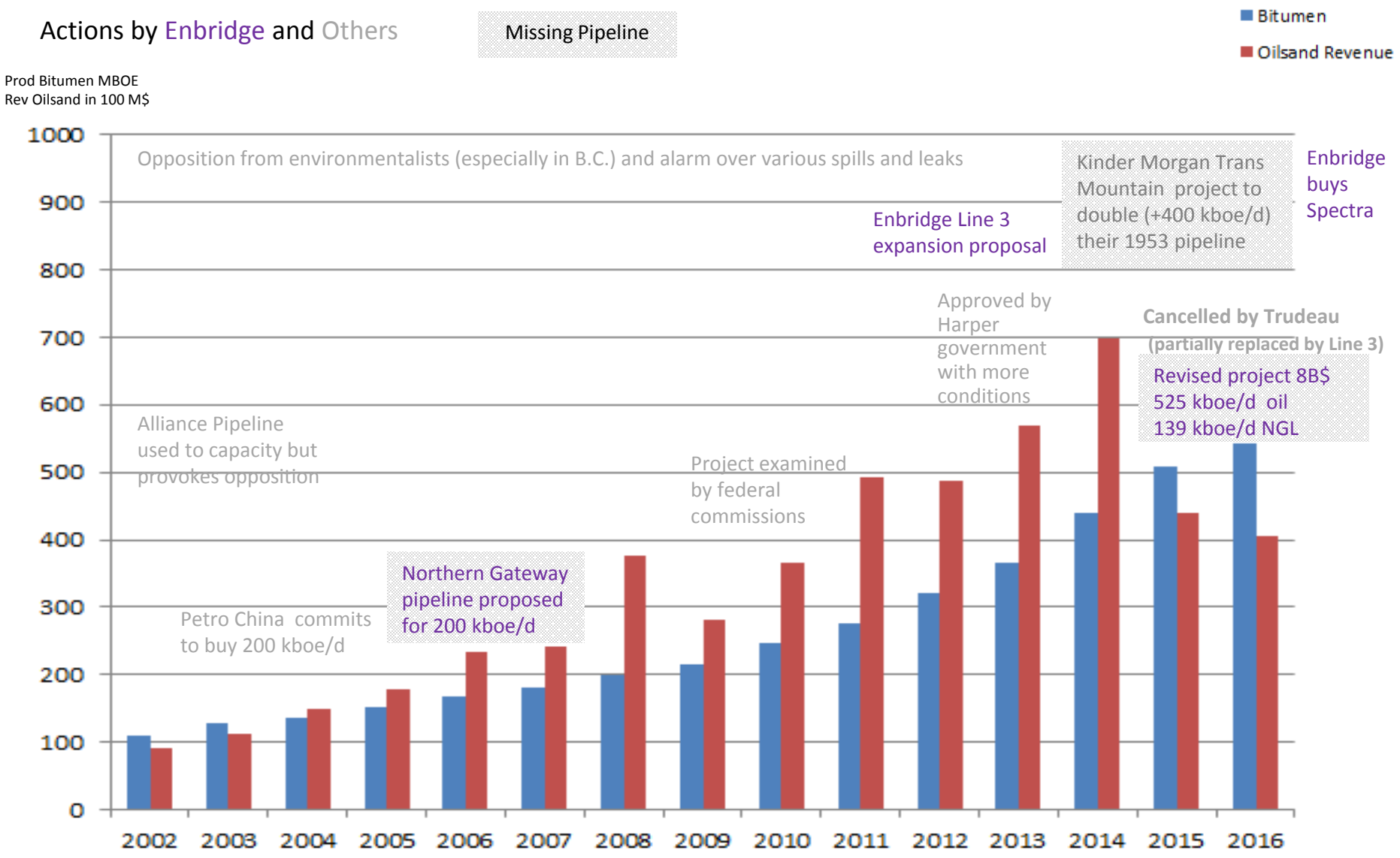
ENVIRONMENTAL EXTERNALITIES

- Flaring reduced from 120 BCF 2014 to 60 BCF 2016
- **Dakota Pipeline was not necessary to reduce flaring** - it was gathering pipelines that mattered
- Regulatory penalty had other positive impacts like gas electricity generation

Oilsands Production in Alberta 2002 - 2016

Actions by Enbridge and Others

Missing Pipeline



The Cost of not having the Northern Gateway Pipeline

ENERGY SELLERS

- Major producer Suncor has 8 BBOE in reserves
- Northern Gateway can carry 190 MBOE in a year

	in M$ *at 2014 prices*	in M$ *at 2016 prices*
Missing Revenue	5663	14104
Missing Costs	-4800	-5372
of which pipeline transport	*-764*	*-764*
Missing Margin	863	8732

- Transport by rail costs 3 times as much
- Substitution effects will come in from the Line 3 expansion which picks up 130 MBOE / yr (covers about half the amounts shown above)
- Kinder Morgan expansion will bring products to Vancouver also help push product to market
- Spectra pipelines may be used to import NGL's

Conclusion – reserves available for sale, continued demand for pipeline services

PIPELINE COMPANY

- Sales and margins not split out by region and type of pipeline.
- **Pipeline would cost 8 B$**. To breakeven (NPV over 30 years) they need to earn 1100 M$/yr in margin per year to return 10% or 775 M$ /yr to return 5%. This implies an average margin of 3,50 to 4,50 $/barrel.
- Line 3 expansion costs 7,5 B$ for one third less throughput.
- There is another project in the region called the oilsands optimization project.
- Rumors abound on the possible use of Spectra pipelines to make up for loss on Northern Gateway

Conclusion

- **Enbridge is determined to pursue pipeline development in Alberta area**

ENERGY BUYERS

- Project initiated in response to demand from Petro China.
- Price impact on Asian buyers: WCS Hardisty plus transport cost is at least 5$ below Brent

ENVIRONMENTAL EXTERNALITIES

- Fear of damage to the Great Bear Rainforest is one of the drivers of project cancellation