

Selling the Alberta Advantage: Comparative Petrochemical Plant Economics in the North



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Introduction

Project funded by



- Original data Dec 2012
- Key variables updated Nov 2014

Agenda

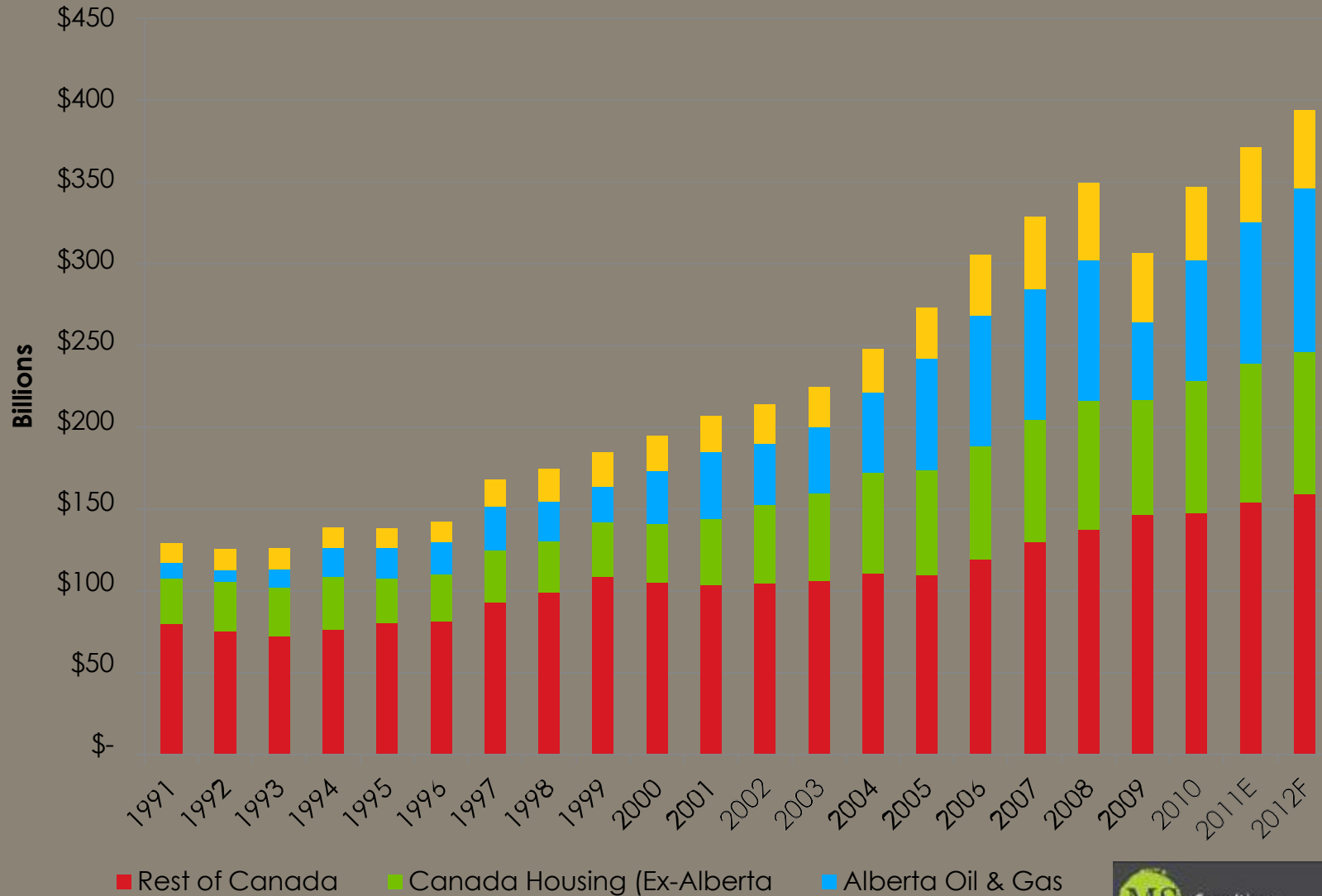
1. Motivation
2. Model Approach
3. Results
4. Impacts
5. Risk Analysis
6. Competitive Actions



1 Motivation

Why are international Investors afraid of Alberta?

Capital Investment In Canada



Rest of Canada

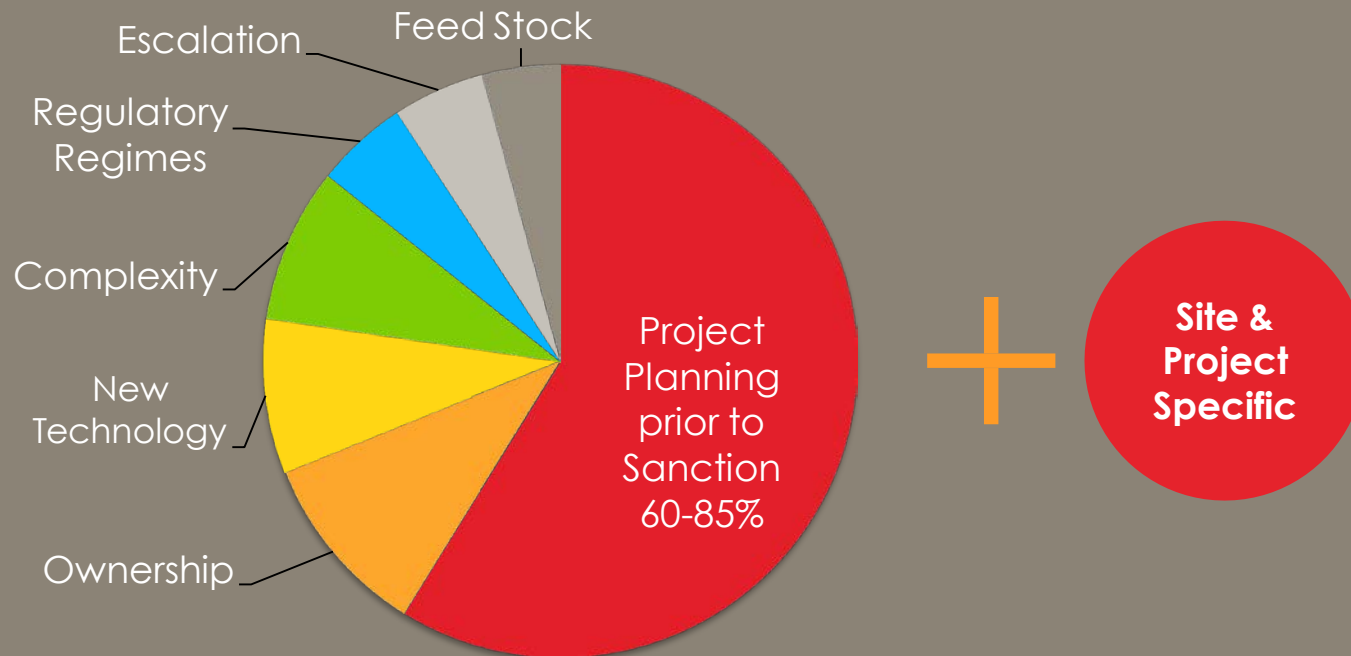
Canada Housing (Ex-Alberta)

Alberta Oil & Gas

Perceptions of Alberta

Not Capital Cost Effective

- Oil Sands over runs 61% to 107%
 - Theory predicts oil sands over runs!
- Not true for all Alberta Projects
 - Dow Chemical LHC-1 Project 15% under



2 Model Approach

Is the perception valid?

Approach



- Life cycle cost of petrochemical plant (methanol)
- Apples to apples comparison
- Locations: AIH, USGC, RMWB
- Verifiable & objective
- Economic model for investors

Why Methanol?



- Globally traded
- Many uses:
 - Fuel/biofuel/diluent
 - Feedstock
 - Plastics/fibres
- World-class sized plant
- Proven technology
- Reference plants

Plant Description



- ~ US\$1B

- Methanol Plant
 - 3-year build
 - Capacity 300 MMg/year
- Natural gas feedstock
- “Clean and level site”



Assumptions



1. Revenue: Tide-water world market prices
 1. US\$1.42/gal
 2. Supply has no impact on price
 3. Unit train rail distribution to Vancouver
4. Economic model ~100 variables
 1. “Real” model
 2. \$0.88 Cdn/USA
 3. WACC 8.9%
 4. D/E 1.63
 5. Terminal values profit in perpetuity
3. Class V Capital Cost
4. Market price natural gas feedstock
5. Standard Government tax treatment

Capital Cost Estimate

Inside Battery Limits (ISBL)	USGC Standard Factor	USGC US\$ MM	AIH US\$ MM	RMWB US\$ MM	Notes
Owner's Costs	7%	\$29	\$29	\$29	Independent of location (same owner)
Equipment	20%	\$81	\$82	\$83	Equipment purchased globally
Materials	19%	\$77	\$78	\$79	Materials and bulks sourced globally
Engineering	16%	\$67	\$67	\$67	Globally sourced for ISBL (local for OSBL)
Construction	37%	\$176	\$254	\$400	Construction is local & stick-built
ISBL Total		\$430	\$509	\$657	
Total		\$819	\$937	\$1,156	OSBL+ISBL+ Working Capital + Other Soft
%USGC		100%	115%	142%	

Overheated Market Consideration



Hot market

- Rates go up
and
- Productivity goes down

“Market heat scale”=
Unemployment
Job Vacancies

Market Heat Productivity Impact



7 = Cold Market, 20% bonus

3 = Neutral

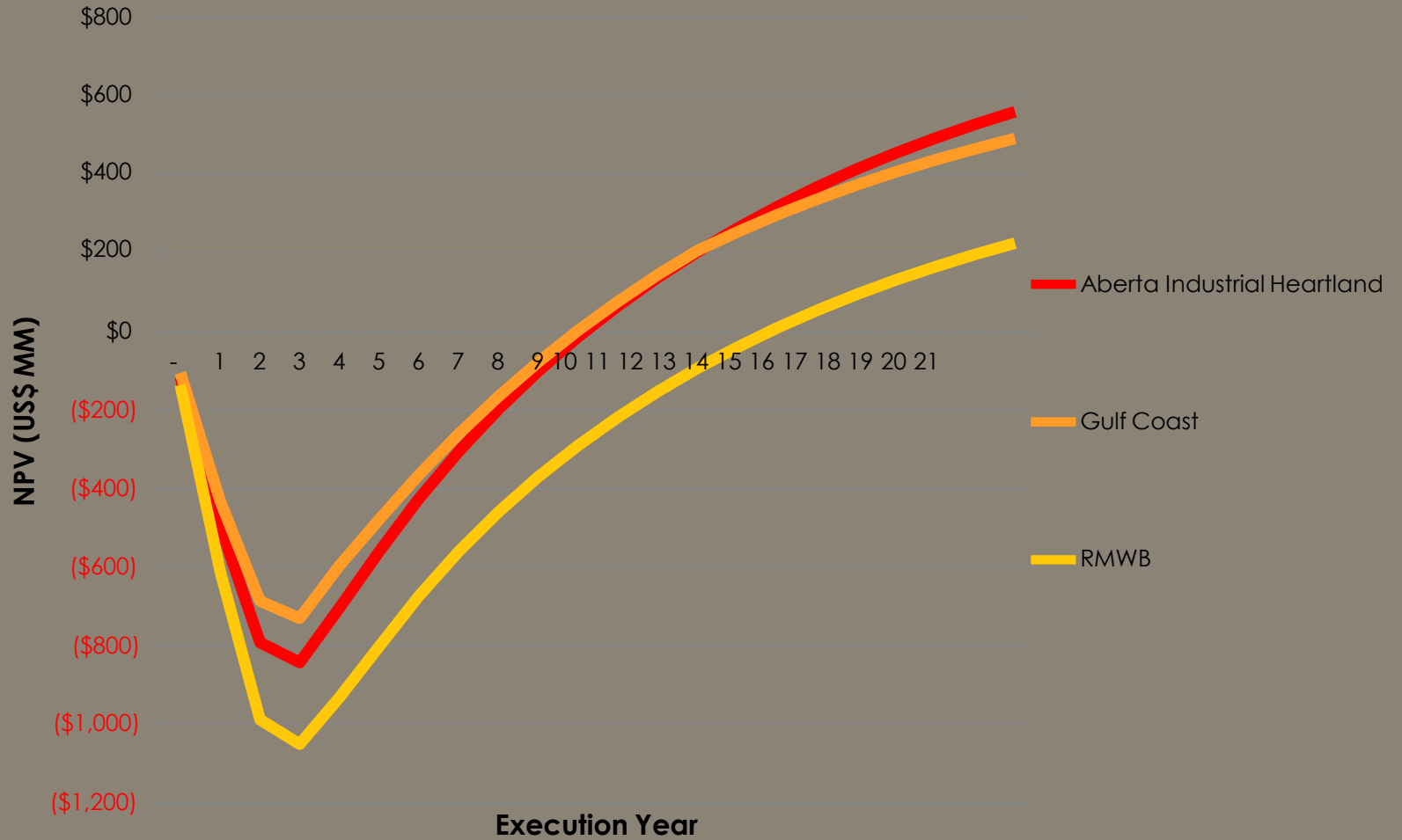
(Compass Intl Standard)

1 = Hot Market, 25% penalty

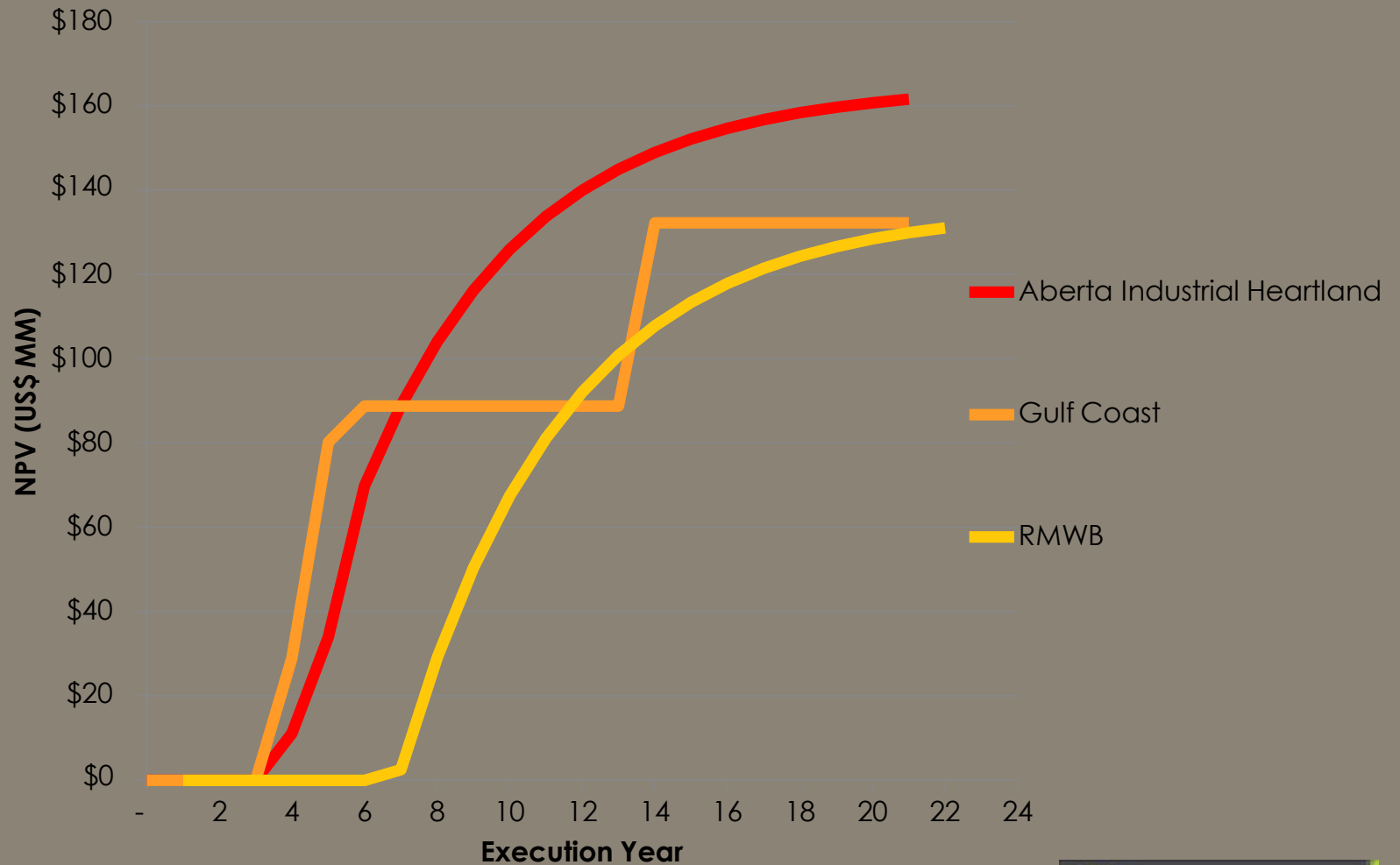
3 Results

So does Alberta stack up?

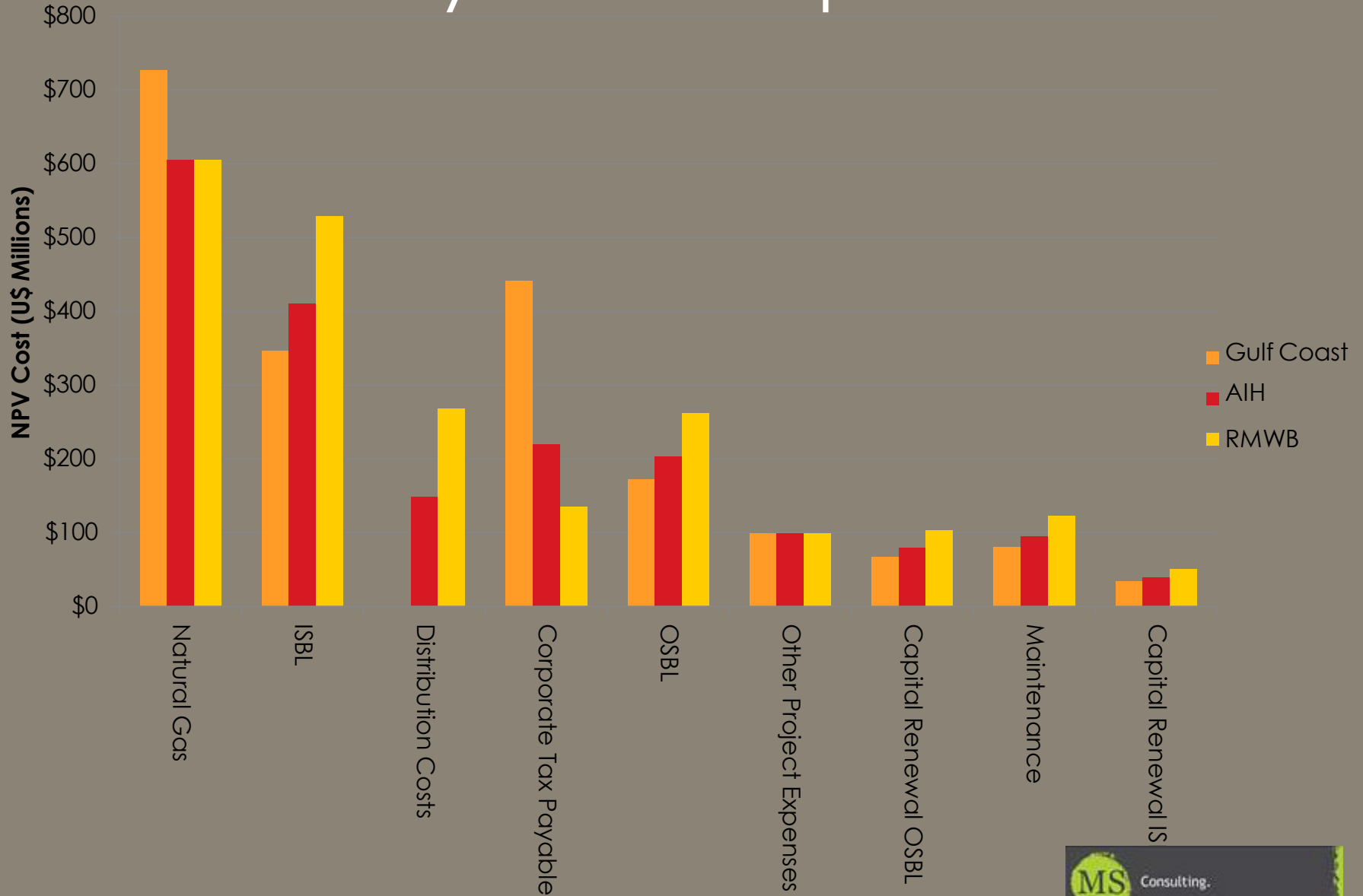
Cumulative NPV



Operating Income

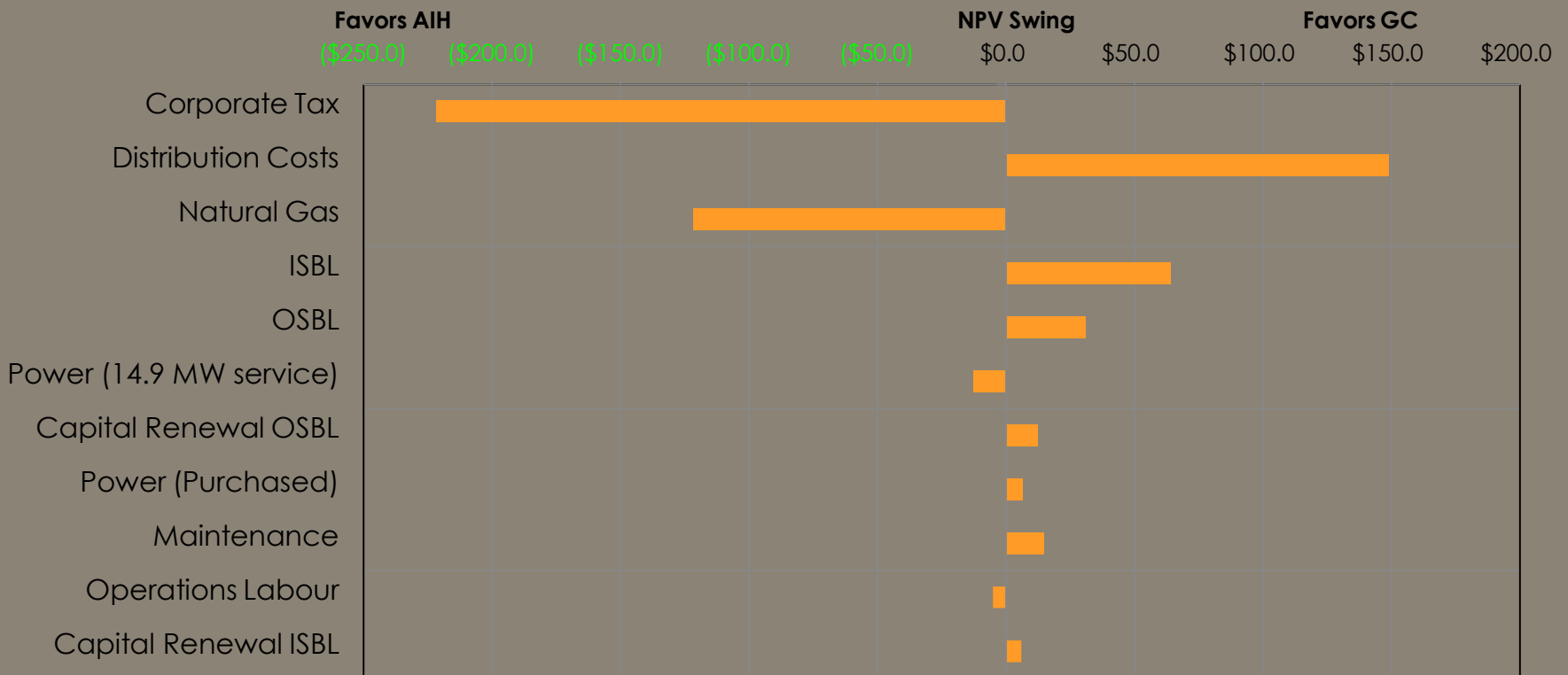


NPV Life-cycle Comparison



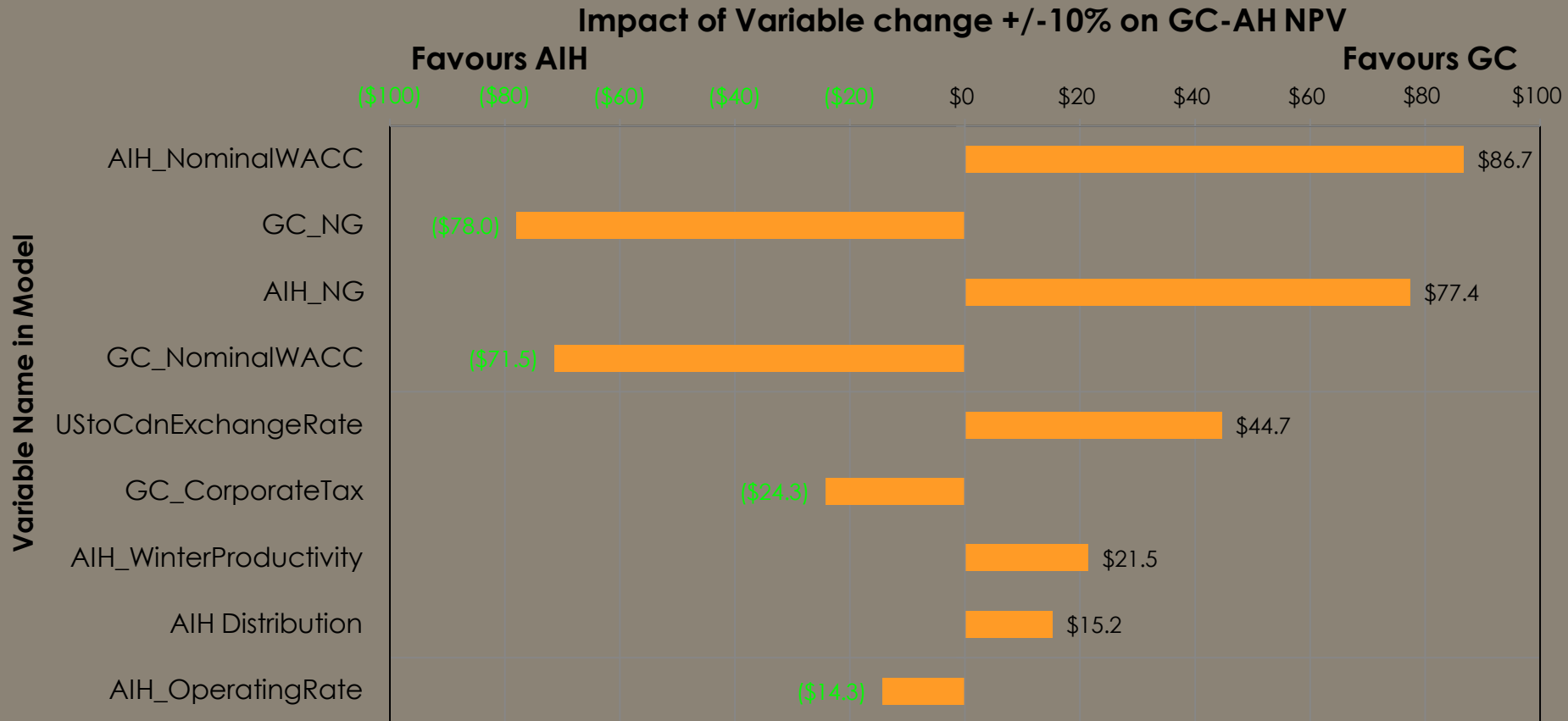
Differences

NPV Differential Gulf Coast minus Alberta Industrial Heart Land



Sensitivity

GC - AIH Net Present Value



4 Impacts

What are the key differences?

- 1. Tax*
- 2. Distribution*
- 3. Natural Gas Price*
- 4. Construction*
- 5. Sensitivities*

1 Tax Rates

Alberta 25%

- Stable, surplus governments
- \$ 18-50MM annually
- \$222MM NPV impact

Louisiana 43%

- Ability to negotiate
- Massive deficit governments



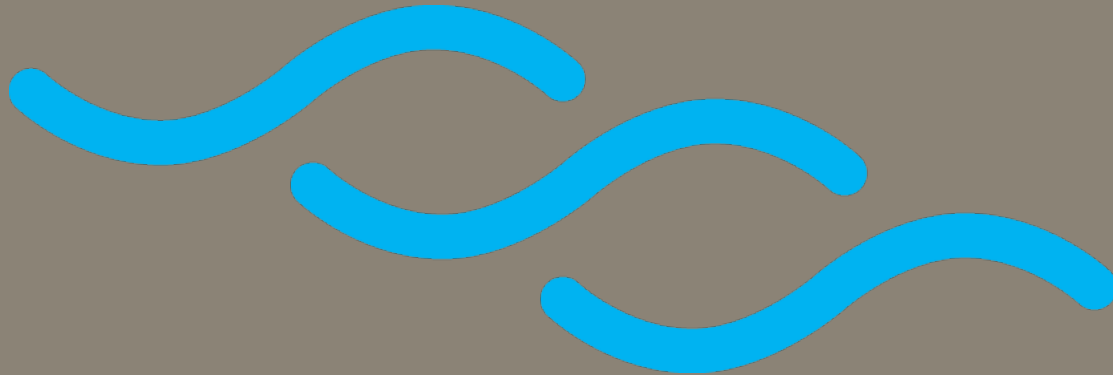
2 Distribution Costs

AIH

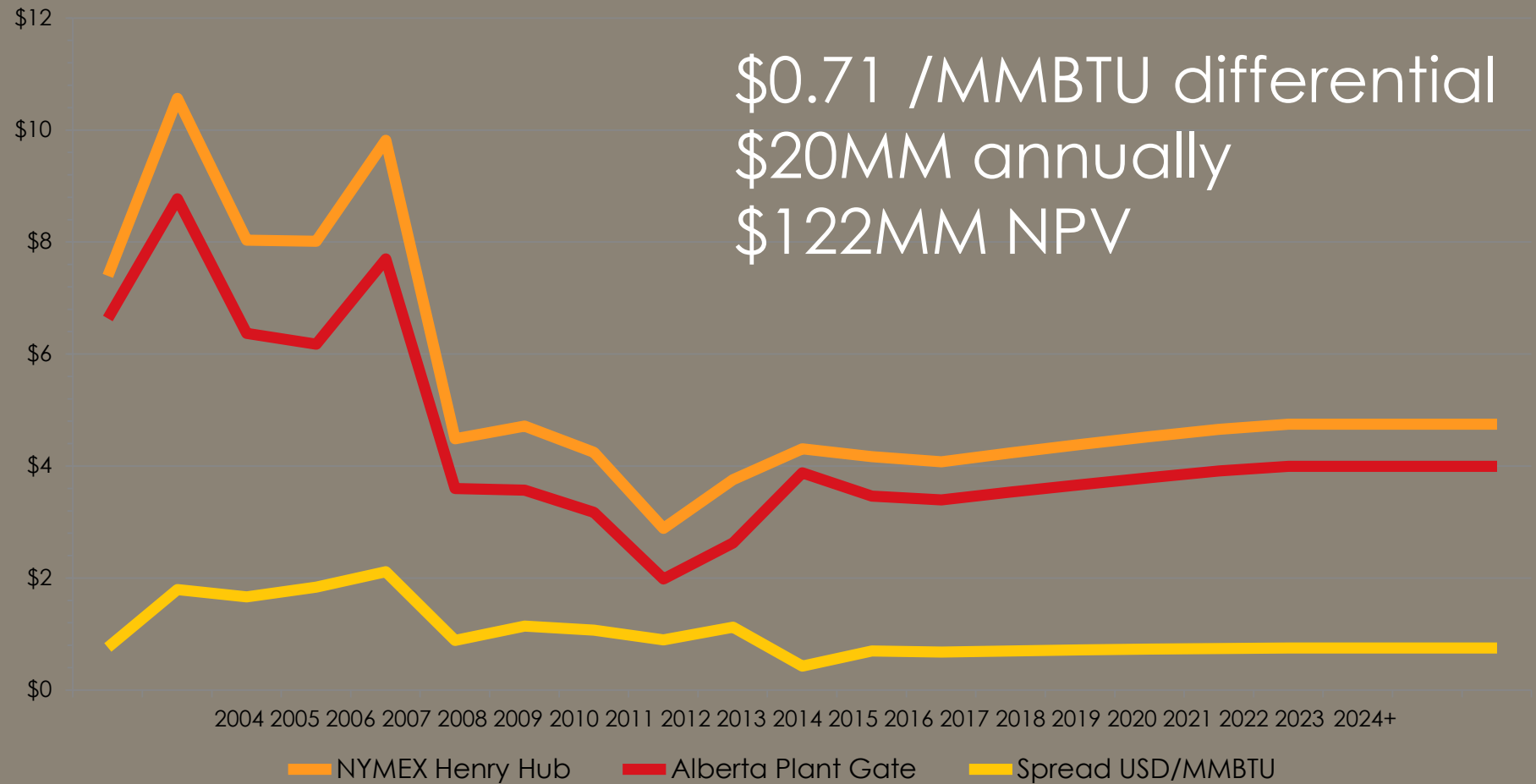
- Unit train to **tide water**
- \$24MM annually
- \$150MM NPV Impact

USCG

- Free!



3 Natural Gas Price



4 Construction Costs



AIH Penalty

Productivity 26%

Winter 35% for 1/3rd of build = 12%

Hot Market 24% absolute = 9%

Remote Factor = 0%

Exchange rate = (6%)

= 45% construction cost penalty

15% Capital cost penalty

\$126 MM

\$95MM NPV

5 Sensitivities

1. WACC – higher favours USGC
2. Gas price volatility – favours AIH
3. Falling C\$ - favours AIH
4. Interest rates – higher favours USGC
5. Market heat – favours AIH



Market Heat	USGC	AIH
2012	2.4	0.6
2014	1.8	1.1

5 Risk Analysis

What about other factors?

Risk = probability * impact

RBS

- Political
- Economic
- Social
- Technical
- Legal & Regulatory
- Environmental

Risk Assessment Matrix							
Effect on Scope, Schedule, Budget	Catastrophic	Increasing Impact	Yellow	Red	Red	Red	Red
	Major		Green	Yellow	Red	Red	Red
	Significant		Green	Yellow	Yellow	Red	Red
	Limited		Green	Green	Yellow	Yellow	Red
	Negligible		Green	Green	Green	Green	Yellow
			Increasing Probability of Occurrence				
			Remote	Unlikely	Possible	Likely	Almost Certain
			Likelihood of Occurrence				

Qualitative screen favours AIH

	Risk Description	USGC	AIH
P1	Political Instability	Green	Green
P2	Profit Repatriation	Green	Green
Ec4	Availability of other Process Inputs	Green	Green
Ec6	Currency Fluctuation	Green	Green
T1	Site Availability	Green	Green
S1	Social License	Yellow	Green
L2	Legal	Yellow	Green
Ev2	Environmental Sensitivity	Yellow	Green
Ev1	Severe weather	Yellow	Green
Ec5	Access to Market	Green	Yellow
L1	Regulatory efficiency and effectiveness	Yellow	Yellow
Ec3	Workforce Availability	Yellow	Yellow
Ec2	Feedstock	Red	Yellow
Ec1	Capital Cost and Schedule Variance	Red	Red

6 Competitive Actions

So what do we do?

Competitive Actions

- Local consumption
 - Fuel
 - Diluent
 - Chemical production
- Winter construction
 - Modularization
- Tailored planning
 - Understanding & adapting to local conditions
 - Focus on profit
 - Political support

Summary

AIH

- ✓ Lower taxes
- ✓ Feedstock price
- ✓ Feedstock availability
- ✓ Declining Cdn\$
- ✗ Winter construction
- ✗ Market Access

USGC

- ✓ Lower Capital Cost
- ✓ Tidewater
- ✗ Extreme weather
- ✗ Environmental sensitivity
- ✗ Social License
- ✗ Feedstock competition



Alberta Is Competitive With USGC

Alberta:

Higher Cost

Higher Profit

Questions?