



## Business Model Support via VMGSim at a Canadian Midstream Company

SIS Global Forum 2019 – September



**TIDEWATER**  
Midstream and Infrastructure Ltd.

- **Tidewater Corporate Profile**
- **Key Processing Facilities and Infrastructures**
  - Gas Processing Plants
  - Gas and NGL Pipeline Infrastructures
- **Recent and Current Developments**
  - Western Canada: Montney, Deep Basin
- **VMGSim Product Applications**
  - Modeling
  - Support for New Developments
  - Operational Troubleshooting
- **Corporate Responsibility**



# Tidewater Corporate Profile

Stock Symbol	TSX: TWM
Common Shares Outstanding	~331 million
<i>Insider Ownership (Fully Diluted)</i>	~6.0%
Market Capitalization <sup>1</sup>	\$453 million
Enterprise Value <sup>2</sup>	\$878 million
Total Midstream Processing Capacity (gross/net) and Length of Pipelines (gross/net)	>1.5 Bcf/day / >1 Bcf/day >2,500 mi / >1,900 mi
Replacement Value of Midstream Assets	> \$2.0 billion
Annual Dividend	\$0.04/sh.
Current Yield <sup>3</sup>	~2.9%

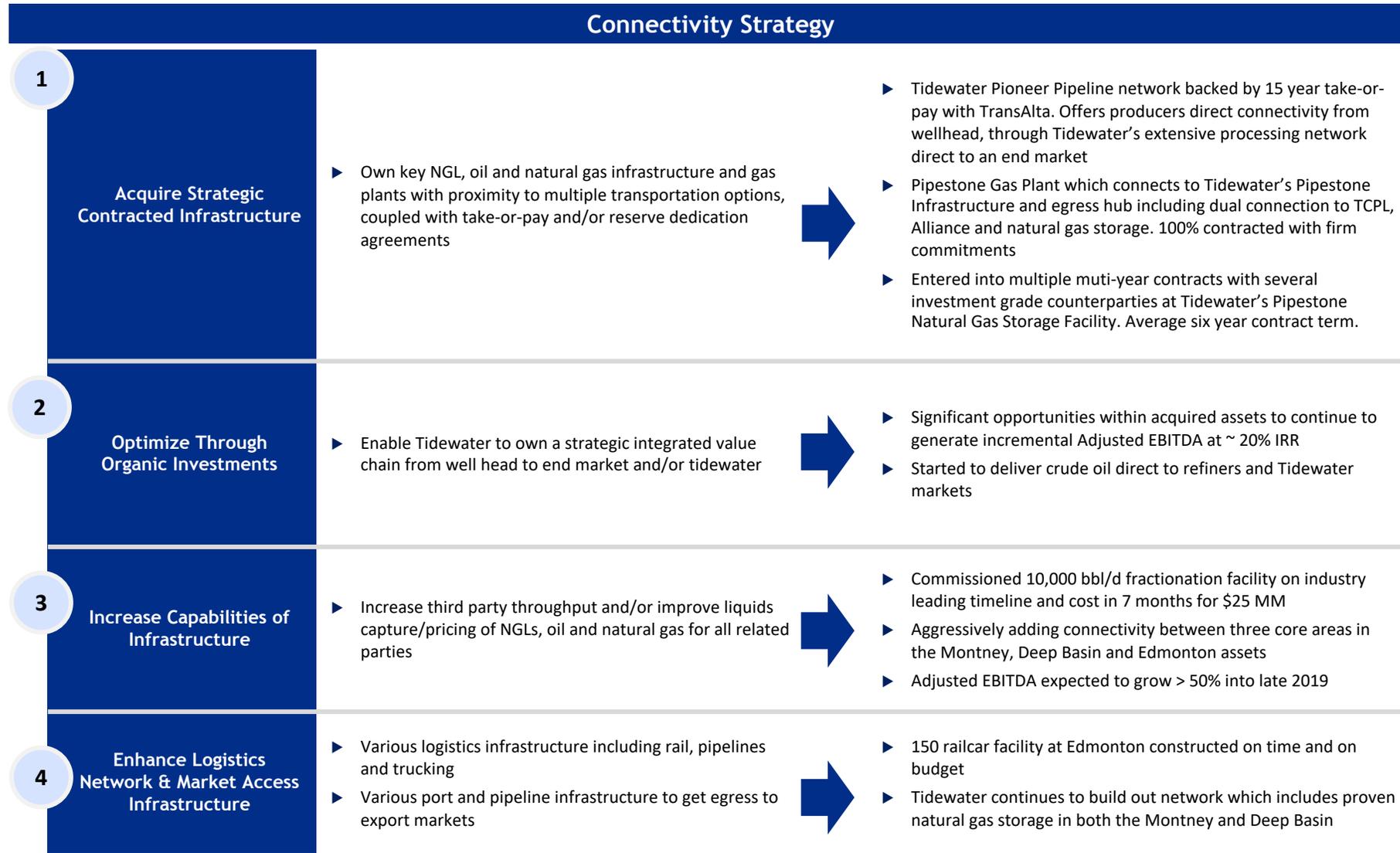
<sup>1</sup> The market capitalization is calculated by multiplying the Corporation's share price as at July 15, 2019 by the number of common shares outstanding.

<sup>2</sup> Enterprise Value is calculated as market capitalization plus net debt and is a measure of the Corporation's total value. Enterprise value is not a standard measure under GAAP.

<sup>3</sup> Current yield is calculated as annual dividends divided by current share price as at July 15, 2019. Current yield is not a standard measure under GAAP.



# Tidewater is a High Growth Midstream Company

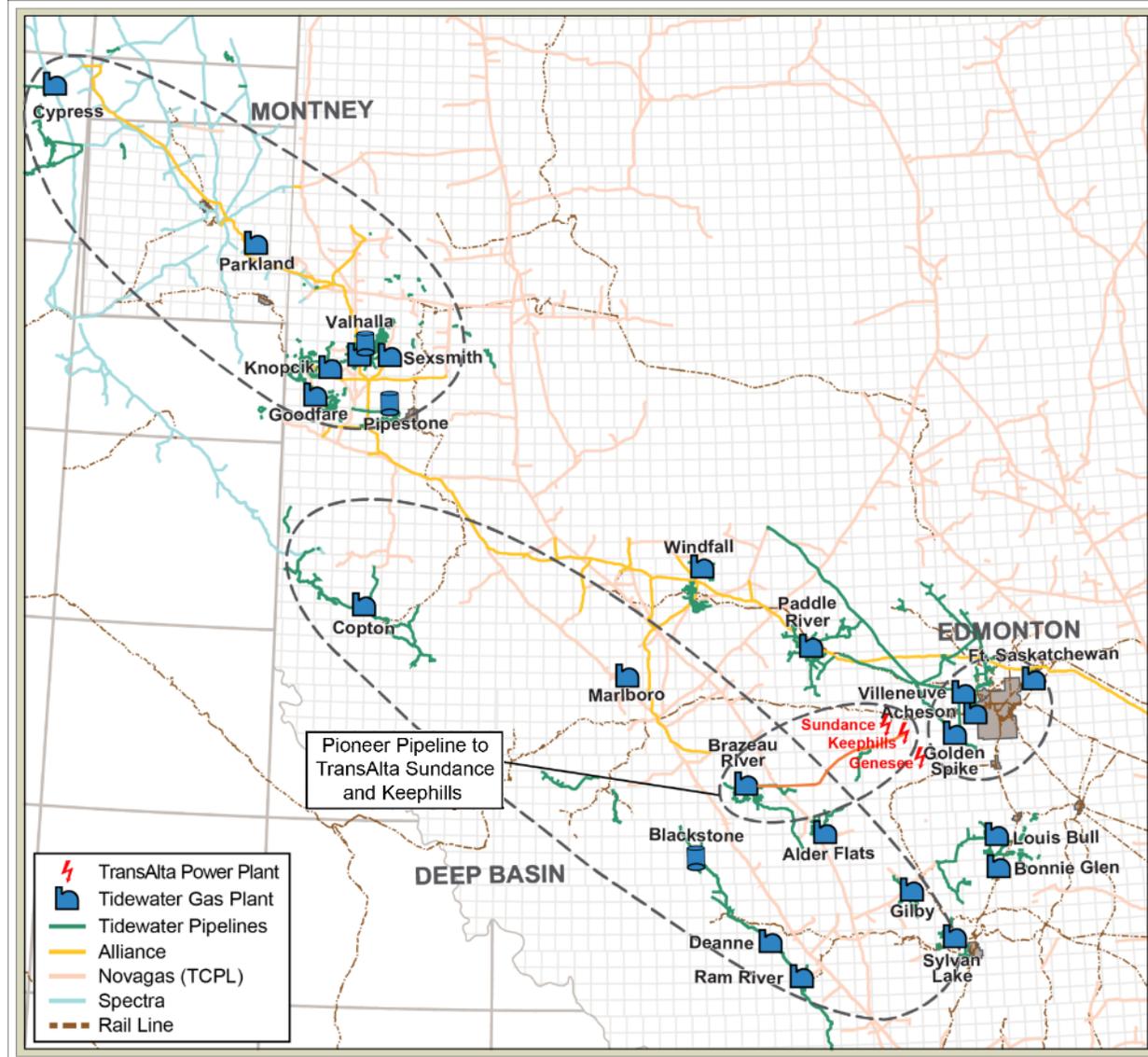


# Corporate Responsibility

- **Phasing Out Coal-Generated Electricity**
  - The Pioneer Pipeline increases the amount of natural gas TransAlta co-fires at its Sundance and Keephills generating stations to facilitate the reduction of carbon emissions and costs
- **Health, Safety & Environment**
  - Tidewater's health, safety and environmental policies set an expectation that everyone must share the responsibility to work safely to meet or exceed laws and regulations
- **Asset Integrity**
  - Tidewater takes preventative measures to minimize the likelihood of incidents and operational downtime while safeguarding employees, the environment and the communities in which it operates
- **Community Engagement**
  - Tidewater believes the communities in which we live and operate should be positively impacted
  - Our reputation of a respected and valued corporate citizen is paramount and Tidewater takes extra steps to ensure its investments add value to society



# Tidewater Facilities and Connectivity



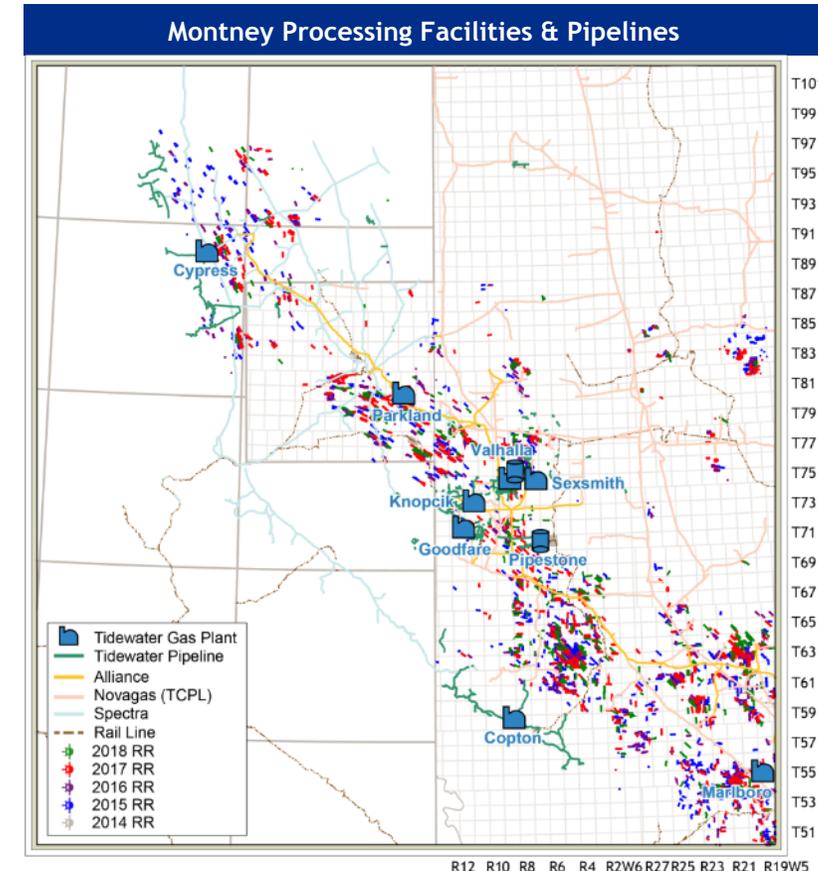
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R19 R17 R15 R13 R11 R9 R7 R5 R3 R1W5 R27 R25 R23 R21 R19W4

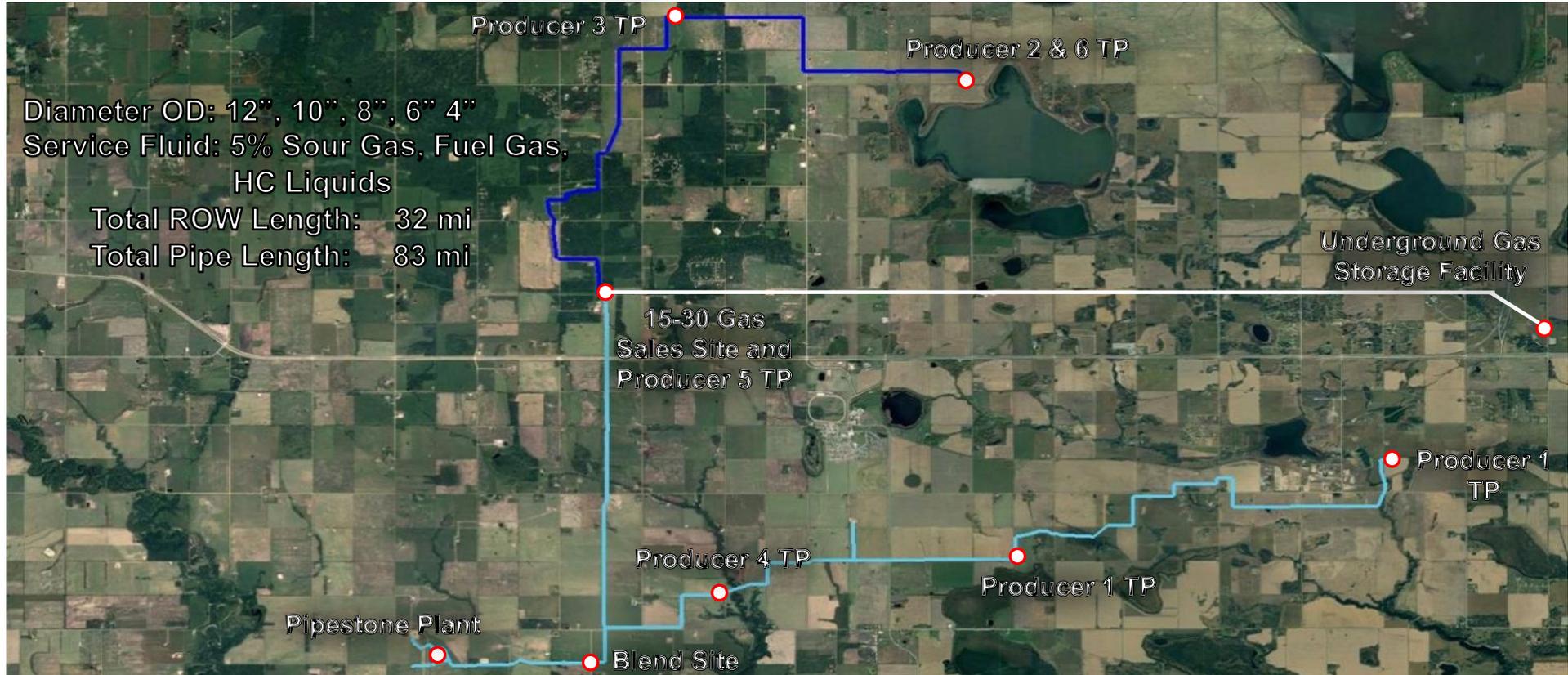


# Montney Assets & Newly Commissioned Pipestone Gas Plant

- Pipestone Gas Plant built and fully contracted
  - 100 MMscfd 5% Sour Gas Processing Facility, Deep Cut, 150 bbls/MMscf condensate stabilization, 100 bbls/MMscf C2+ recovery
  - Construction complete August 2019, Operations Start-up ongoing
  - 22-month development FID to Commissioning
  - 100% contracted with firm commitments
  - Seven-and-a-half-year take-or-pay with 12Bcf volume commitment
  - Five year reserve dedication
  - Executed processing agreement with a second investment grade counterparty
  - Connected to Tidewater infrastructure/egress hub which provides three natural gas egress options in TransCanada, Alliance and natural gas storage
  - C2+ and C5+ storage with pipeline connections to Pembina for NGL's and condensate
- Completed 24km, 30 inch natural gas pipeline connecting the Pipestone Gas Plant to the Pipestone Gas Storage Facility in addition to both Alliance and TransCanada.
- Executed gas storage agreements with multiple investment grade counterparties
- Tidewater has significant support for future gas processing and liquids handling expansions at Pipestone



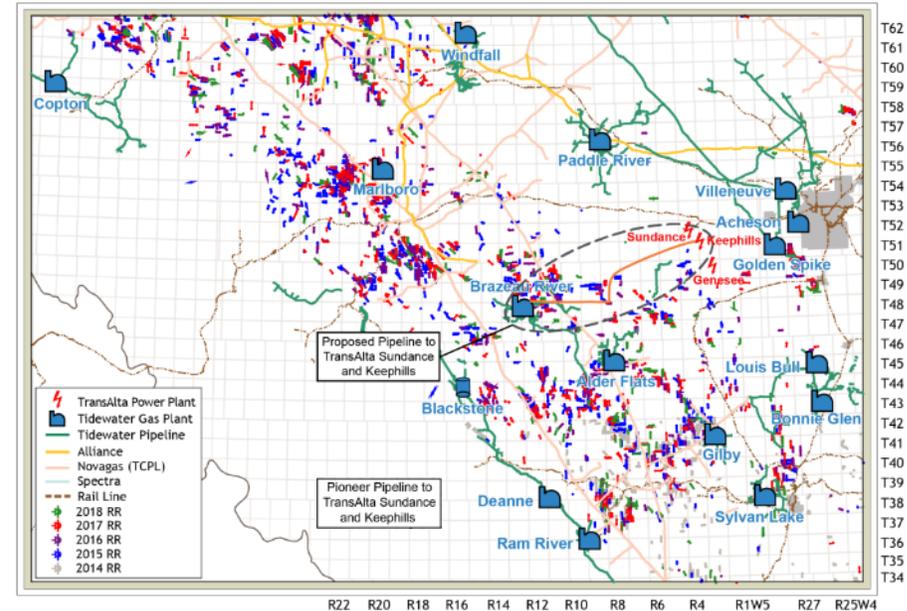
# Pipestone Development



# Overview of Deep Basin Assets

- Pioneer Pipeline physically connects Tidewater's largest gas processing complex (Brazeau River Complex-BRC) to a large new demand source in TransAlta's Sundance and Keephills power plants and is anchored by a 15 year take-or-pay
  - Construction and commissioning completed in 20 months from FID
  - Ability for expansion to ~ greater than 400 MMcf/day
  - Ability to connect Montney producers to new end market and avoid large transmission lines restrictions
  - TransAlta exercised its 50% working interest
- East Duvernay activity continues to increase around Tidewater's Deep Basin assets, with large investment grade entities in addition to some well capitalized private companies like Vesta, Artis and Kiwetinohk Resources Corp (former 7Gen team) becoming increasingly active
- In March 2018, Tidewater announced a five year 17.2 net Bcf volume commitment with an investment grade counter party at Ram River
- In August 2018, Tidewater signed an agreement for an incremental 18 MMcf/day on a five year take-or-pay at Ram River
- The Brazeau River NGL Fractionation facility is fully contracted for the first time in Tidewater's history including signed agreements with two new investment grade counter parties
- Tidewater commissioned 40 MMcf/day deep cut and 10,000 bbl/d NGL Fractionation in May 2017 on an 8-month schedule for a cost of \$45 million, significantly improving NGL recoveries at the BRC
- BRC egress includes natural gas storage facilities currently capable of injecting approximately 40mmcf/day of natural gas and offering producers improved natural gas pricing option

## Deep Basin Processing Facilities & Pipelines



Pioneer Pipeline Construction Progress – Early 2019



# Pioneer Coal to Gas Project

**Diameter OD:** 20" NPS, 1,440 psi MOP  
**Service Fluid:** Sweet Natural Gas  
**Total Length:** 81 mi  
**Mainline Length:** 119 km  
**Sundance Lateral:** 11 km

**Capacity:**  
**Startup (2019):** 130 MMscf/d  
**Future:** 400+ MMscf/d  
**Purpose:** Power Generation, Coal Displacement



Brazeau River Facility



Sundance Station



Keephills Station



## Case 1: Effective Transportation of Raw Feed/Sales Products at Tidewater Facilities

### Decision process supported by VMGSim (Process) and Pipe Workspace

- **Selection of optimal pipe diameter for current commercial demand and future growth**
  - Case study based analysis to process multiple volume rates through multiple pipe diameters
- **Line designation: multi-phase or single phase (raw feeds)**
  - Steady state based analysis of estimated hydraulics and flow regimes using data to tune
- **What additional supports are required to support thermodynamics of the system**
  
- **Thermodynamic assessment to review hydrate formation, temperature profiles, compression and pumping requirements**
  - Pipestone Gathering and Gas Storage System
  - Pioneer Pipeline Infrastructure
  - Brazeau River Complex Gathering System Capacity

## Case 2: Operational Troubleshooting

- Assessing shallow and deep cut gas processing units to source changes in plant recoveries or means to improve plant recoveries; advising on means to easily monitor systems with available data
- Assessing impact of Trucked-in feed to fractionation plant operation and product quality. Provided means to monitor and mitigate impact of changes in feed quality and composition
- Methanol and water tracking through IFPEXOL process to maximize C3+ product quality
- Mercaptan tracking through sour gas plant and process parameter adjustments to maximize spec product quality in fractionation plant
- Hydrocarbon component tracking and fluid characterization with PIONA to maximize quality of product blends
- Identify problems within plant metering systems using variance from predicted results from plant model



# Virtual Materials Group (VMG) Product Value Applications

## Case 2: Operational Troubleshooting (cont'd)

- Maximize C2 content in C2 spec streams and maximize C3-mix product that is ideal for fractionation
- Optimizer functionality built into model of a processing facility with four gas processing trains accounting for relevant system constraints:
  - Required detailed rating model of certain components (eg. Brazed aluminum exchanger, turbo expanders) to make model appropriately predictive
  - Optimizer used to identify operating parameters that maximize desired product outcomes:
    - C2 content in C2 spec streams and high quality C3+ output
    - Highest value when system is operating beyond design capacity

The screenshot displays the Aspen Plus Optimizer interface. The main window shows the 'Optimizer' settings and results. The 'Objective Function' table is as follows:

Active	Name	Path	Mode	Current Value	Weight	Contribution	Optimizer Value	Optimizer Contribution [Units]
<input checked="" type="checkbox"/>	Obj Fn 1	ABSOLUTE_PenaltyOnC2UpdLn1223Value	Maximize	1857.83	1.00	1857.83	26534.30	
<input checked="" type="checkbox"/>	Obj Fn 2	SALES_SalesP2_DeepCut313A253 Uq Volume Flow	Maximize	29.693	1.00	29.69	33.117	33.12 m3/h

The 'Manipulated Variables' table is as follows:

Active	Name	Path	Lower Limit	Current Value	Upper Limit	Optimizer Value [Units]
<input checked="" type="checkbox"/>	Manipulated Var 1	SALES_SalesP2_DeepCut5F10FlowFraction	0.0000	0.6800	0.9000	0.6803 [Fraction]
<input checked="" type="checkbox"/>	Manipulated Var 2	SALES_SalesP2_DeepCut5TnT	-30.0	27.0	-20.0	-27.0 [C]
<input checked="" type="checkbox"/>	Manipulated Var 3	SALES_SalesP2_DeepCut5F10FlowFraction	0.0000	0.6803	0.9000	0.6803 [Fraction]
<input checked="" type="checkbox"/>	Manipulated Var 4	SALES_SalesP2_DeepCut5TnT	-30.0	-24.0	-20.0	-27.0 [C]
<input checked="" type="checkbox"/>	Manipulated Var 6	IC3TurboSPTFlowFraction	0.0000	0.7000	0.9000	0.7000 [Fraction]

The 'Constraints' table is as follows:

Active	Name	Path	Lower Limit	Current Value	Upper Limit	Optimizer Value [Units]
<input checked="" type="checkbox"/>	Constraint Var 1	SALES_SalesP2_DeepCut313A253 Uq Volume Flow	0.000	18.875	40.000	21.005 [m3/h]
<input checked="" type="checkbox"/>	Constraint Var 2	SALES_SalesP2_DeepCut313A253 Gas Volume Flow		5.0237E-11	5.10E-11	4.0666E-11 [MMSCFD]
<input checked="" type="checkbox"/>	Constraint Var 3	P1_Sour_InletFracC3+ to Plant_P_1_Inlet Uq Volume Flow	0.000	15.000	0.000	0.000 [m3/h]
<input checked="" type="checkbox"/>	Constraint Var 4	P1_Sour_InletFracC3+ to Pembina_LWP_Uq Volume Flow	0.000	6.122	40.000	6.122 [m3/h]
<input checked="" type="checkbox"/>	Constraint Var 5	SALES_SalesP2_DeepCut5F10FlowFraction	-0.5000	0.00	0.5000	0.00
<input checked="" type="checkbox"/>	Constraint Var 6	IC3+ PCalcMgSH110 Value	-0.5000	0.00	0.5000	0.00
<input checked="" type="checkbox"/>	Constraint Var 7	IC2+ PCalcMgSH110 Value	-0.5000	0.00	0.5000	0.00
<input checked="" type="checkbox"/>	Constraint Var 8	IC3+ PCalcMgSH110 Value	-0.5000	1.00	0.5000	0.00
<input checked="" type="checkbox"/>	Constraint Var 9	IC2+ PCalcMgSH110 Value	-0.5000	0.00	0.5000	0.00
<input checked="" type="checkbox"/>	Constraint Var 10	ICAPCalcMgSH110 Value	-0.5000	0.00	0.5000	0.00



# Virtual Materials Group (VMG) Product Applications

## Case 3: Gas Processing, Operator Training

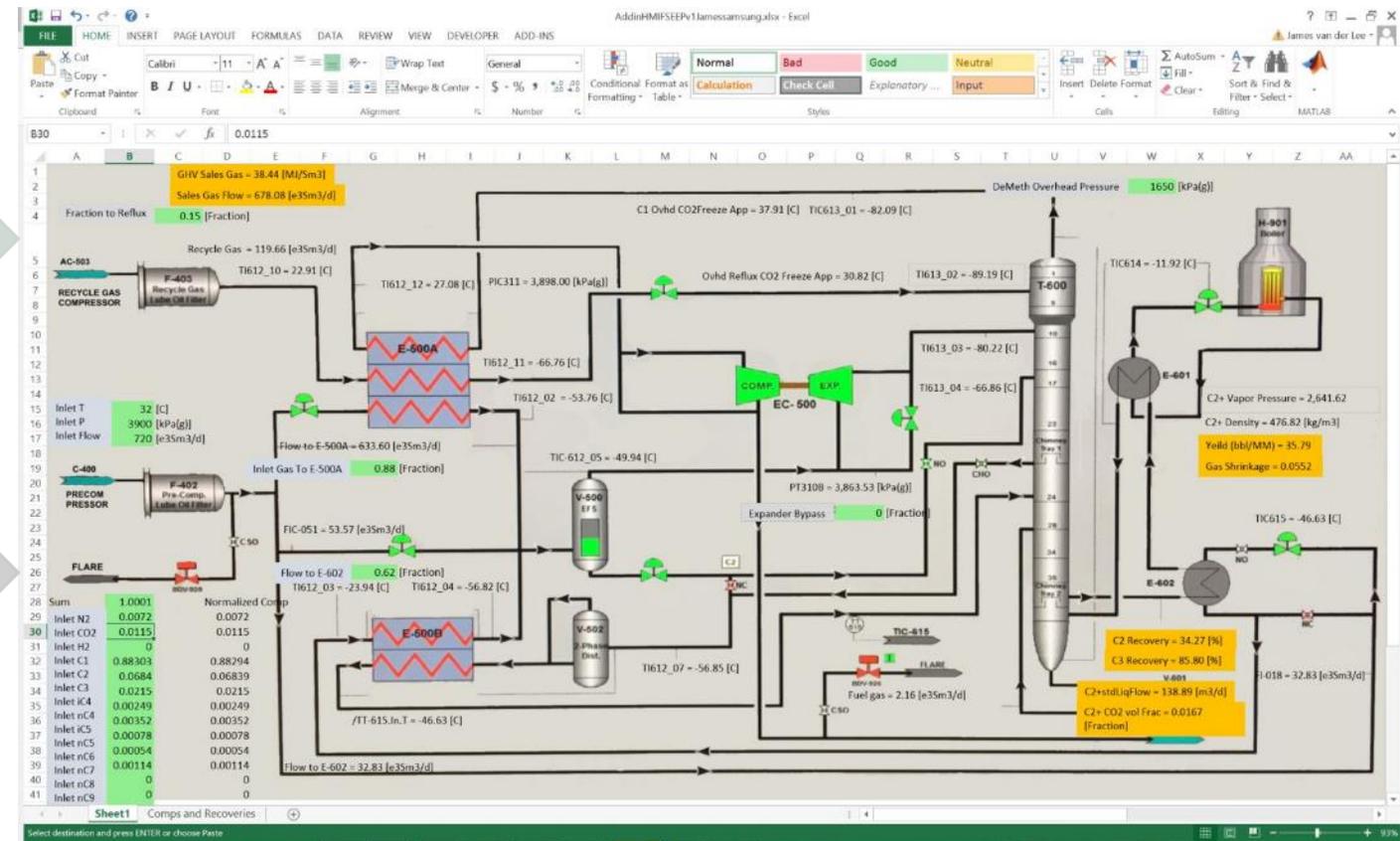
- Fort Saskatchewan Plant Operator Screen
  - Operator HMI image imbedded into Excel and Symmetry linked via Excel Add-In
  - Provides familiar workspace and displays only data operations can historize
  - Used to test operating parameters, reflux modes, verify process data

Model indicated an issue with liquid product GC readings

- Set DeC1 Tower Bottom Temperature
- Ensure Liquid product Specs

Once corrected, it enabled operators to significantly decrease DeC1 tower bottoms Temperature

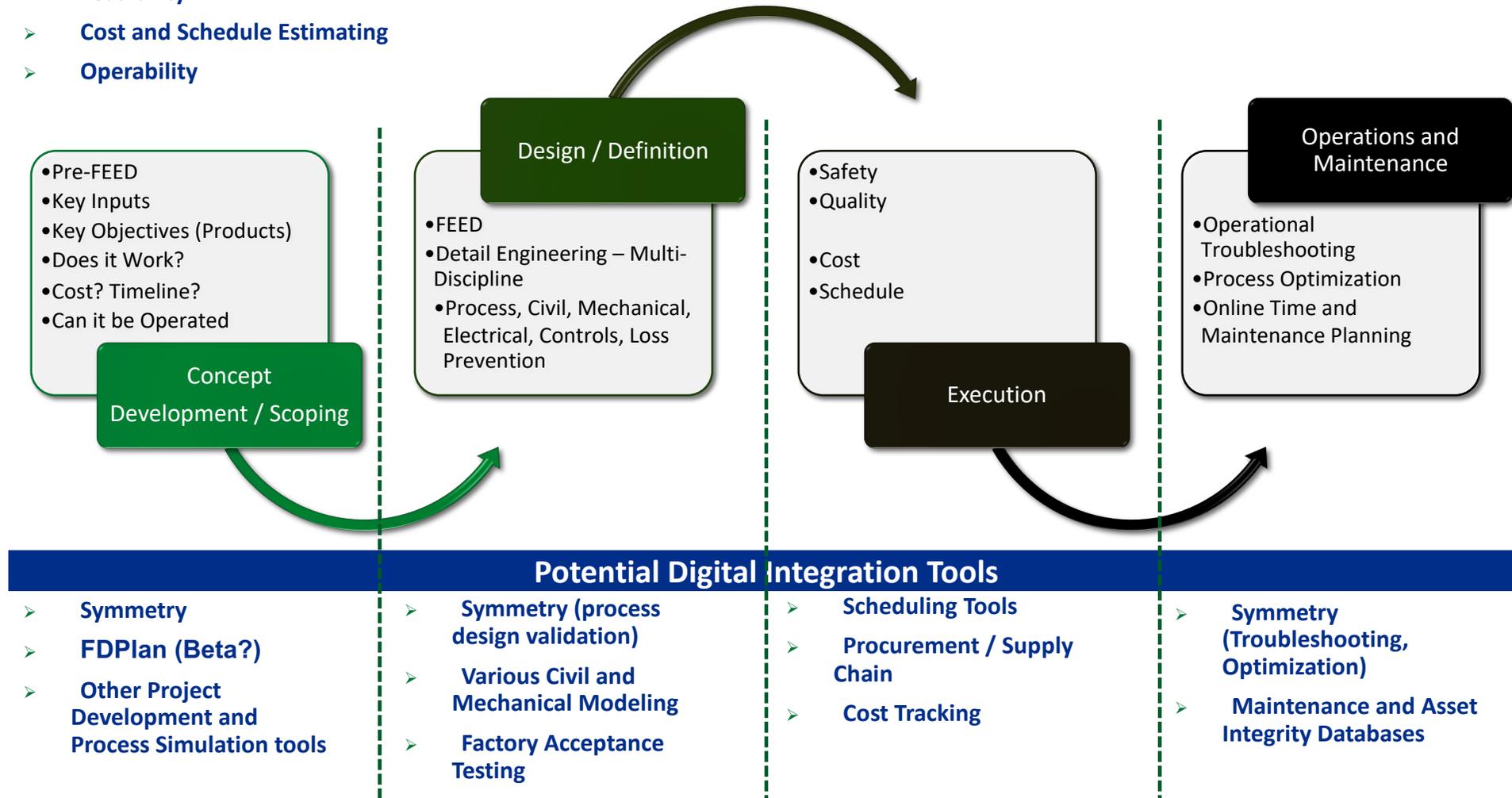
- Increase C2 Liquid Recoveries by as much as 30%



## Integrated Digital Technologies for Midstream Developments

### Asset and Project Development Decision Support

- Feasibility
- Cost and Schedule Estimating
- Operability



# Thank You / Questions



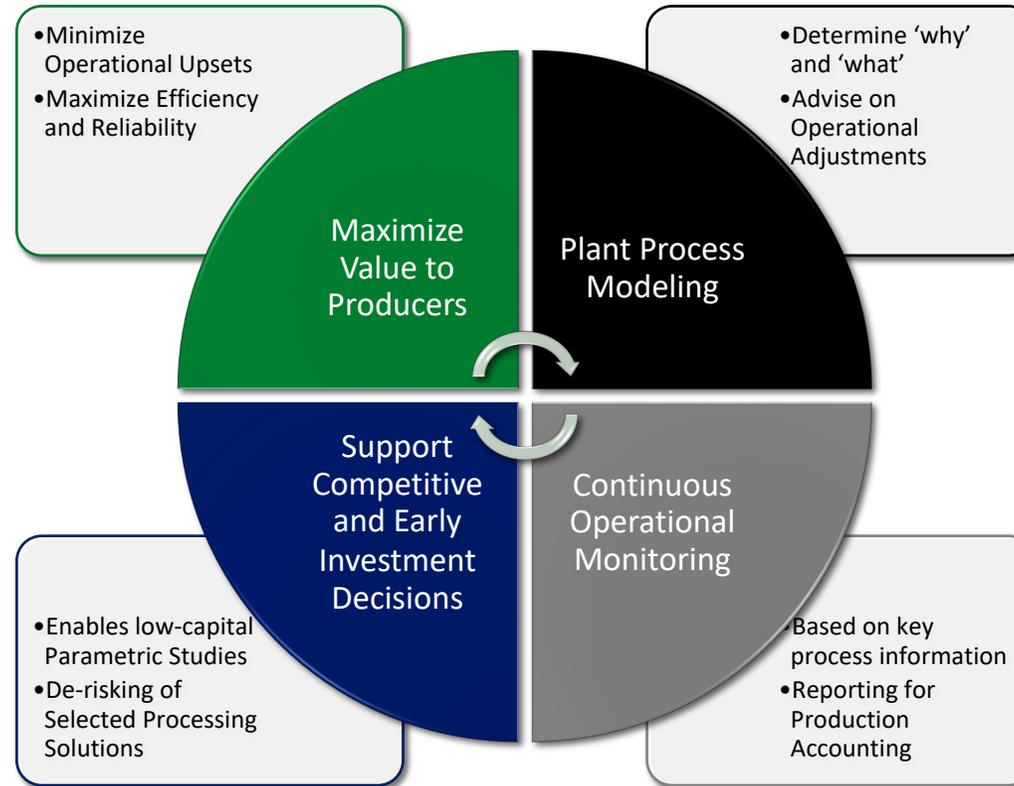
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# Virtual Materials Group (VMG) Product Applications



## Process Simulation is a highly functional tool to support business decisions

- A dedicated process engineering team evaluates and troubleshoots scenarios for the optimization of gas and liquids treatment and processing for the purposes of efficiency, gas and liquids commodity optimization, reliability of production accounting and reporting and production forecasting
- Process simulators provide valuable and effective input for process technology selection and engineering estimates to validate business cases and economics and enable quicker and safer investment decisions

