



(Source: MPLX)

Midstream 101

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Exterran Corporation

October 3, 2019

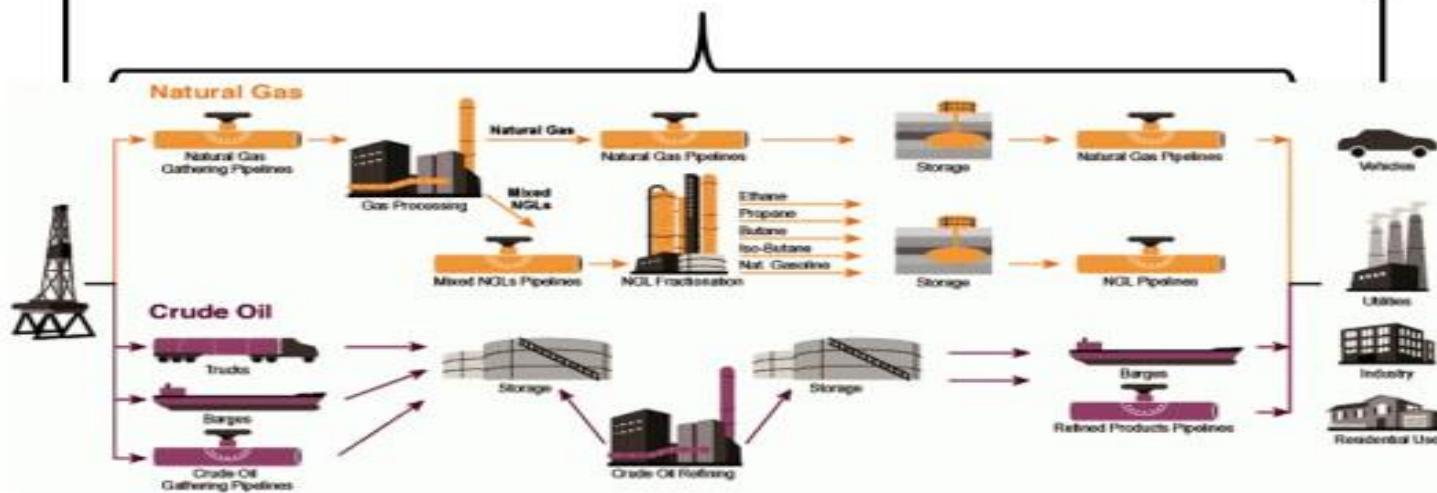
Midstream – 1 of 3 major stages of Oil & Gas industry operations. *Activities include treating, processing, storing, transporting and marketing of oil, natural gas, natural gas liquids (NGLs) and their contaminants or byproducts.*

Other major O&G segments include:

Upstream - raw crude oil and natural gas exploration & production (E&P)

Downstream - refining of crude oil into gasoline, diesel, jet and other fuels or for natural gas, the petrochemical industry that converts NGLs into building blocks for a myriad of everyday products. - *Investopedia*

- **Upstream**
 - Drilling
 - Production
- **Midstream**
 - Transportation
 - Treatment
- **Downstream**
 - Industrial
 - Residential
 - Commercial



Where / Why is Midstream?

Who is Midstream?

What is Midstream?

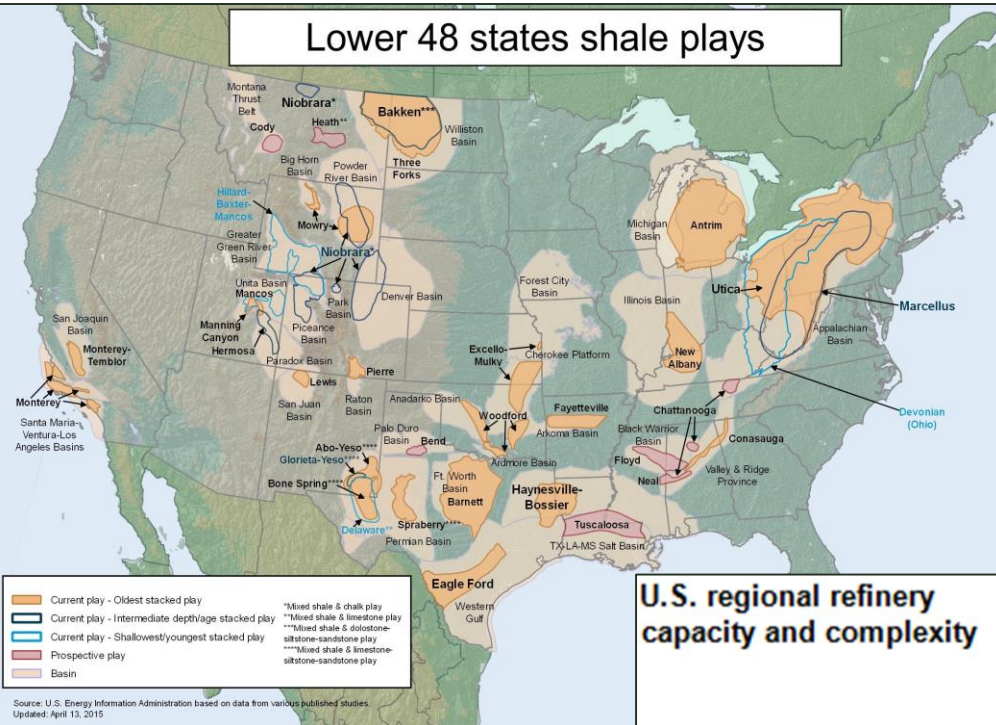
- Water
- Oil
- Gas

Questions?



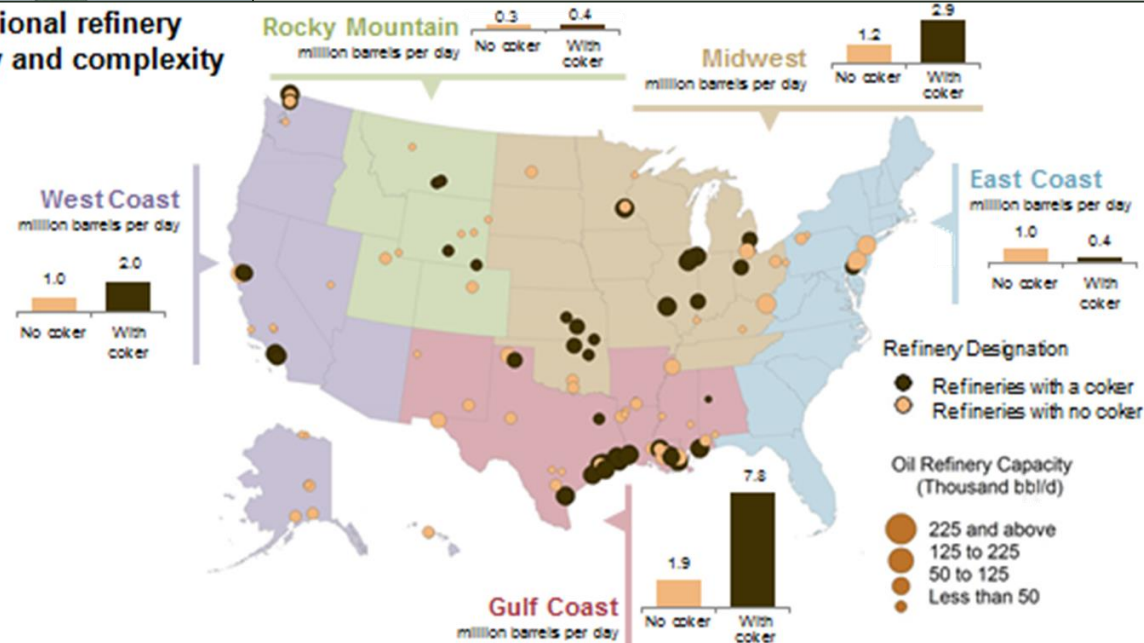
The Midstream: Where / Why?

Lower 48 states shale plays



(Source: Energy Information Association – EIA January 2015)

U.S. regional refinery capacity and complexity



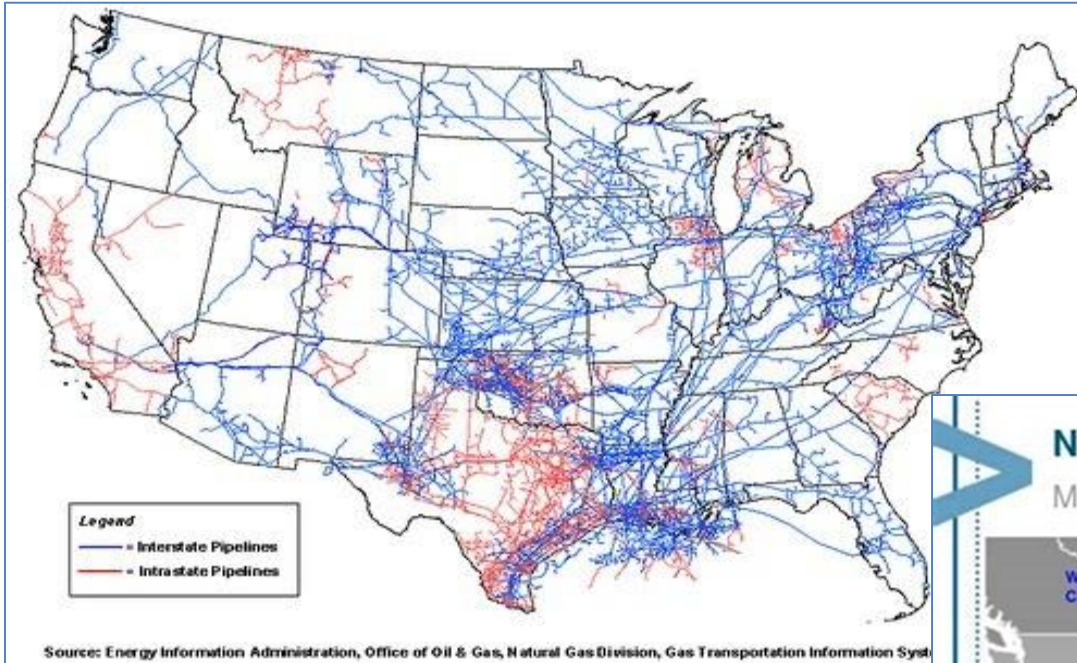
(Source: Energy Information Association - EIA)

The Midstream: Transportation

“Upstream”



“Downstream”

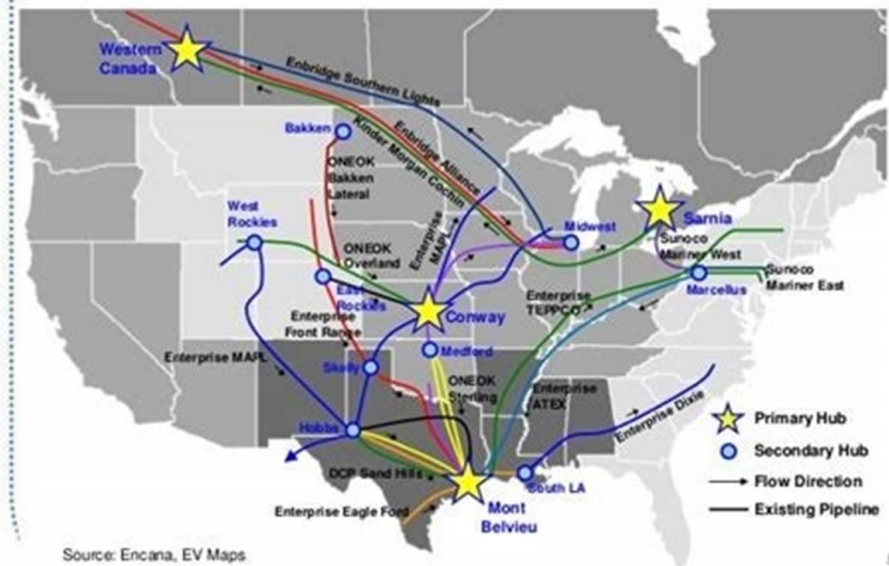


Legend
— Interstate Pipelines
— Intrastate Pipelines

Source: Energy Information Administration, Office of Oil & Gas, Natural Gas Division, Gas Transportation Information System

Natural Gas Liquids

Major NGL Pipelines



Source: Encana, EV Maps

(Source: Energy Information Association - EIA)

Top 15 O&G Storage & Transport Cos. – Platts (assets, revenue, profit, ROIC)

Platts Rank	Company Name	Region	Industry
30	OJSC Transneft	EMEA	Oil and Gas Storage and Transportation
61	The Williams Companies, Inc	Americas	Oil and Gas Storage and Transportation
63	Enbridge Inc	Americas	Oil and Gas Storage and Transportation
66	TransCanada Corp	Americas	Oil and Gas Storage and Transportation
98	Kunlun Energy Co Ltd	Asia/Pacific Rim	Oil and Gas Storage and Transportation
124	Snam S.p.A.	EMEA	Oil and Gas Storage and Transportation
127	Ultrapar Participações SA	Americas	Oil and Gas Storage and Transportation
151	Pembina Pipeline Corp	Americas	Oil and Gas Storage and Transportation
155	ONEOK, Inc	Americas	Oil and Gas Storage and Transportation
172	Kinder Morgan, Inc	Americas	Oil and Gas Storage and Transportation
182	Enagás, SA	EMEA	Oil and Gas Storage and Transportation
193	Inter Pipeline Ltd	Americas	Oil and Gas Storage and Transportation
223	EnLink Midstream, LLC	Americas	Oil and Gas Storage and Transportation
242	Cheniere Energy, Inc	Americas	Oil and Gas Storage and Transportation
246	Targa Resources Corp	Americas	Oil and Gas Storage and Transportation

Private Equity Midstream Companies (US)

Sponsors: Blackrock, Apollo, ArcLight, Riverstone, EnCap, Morgan Stanley, ECP, etc.

- Tall Oak
- Lucid Energy Group
- Oryx Midstream
- Brazos Midstream
- Eagle Claw Midstream
- Caiman Energy
- Intensity Midstream
- Velocity Midstream
- Valiant Midstream
- Outrigger Energy
- Fullstream Energy
- Howard Energy Partners
- Sendero Midstream
- Navitas Midstream



... plus the Majors

- Shell
- Chevron
- Oxy
- BP
- XOM / XTO
- ...

- Gather
- Dispose / Re-use
- Compress
- Treat / Process
- Store
- Transport
- Market



The Midstream: Gathering

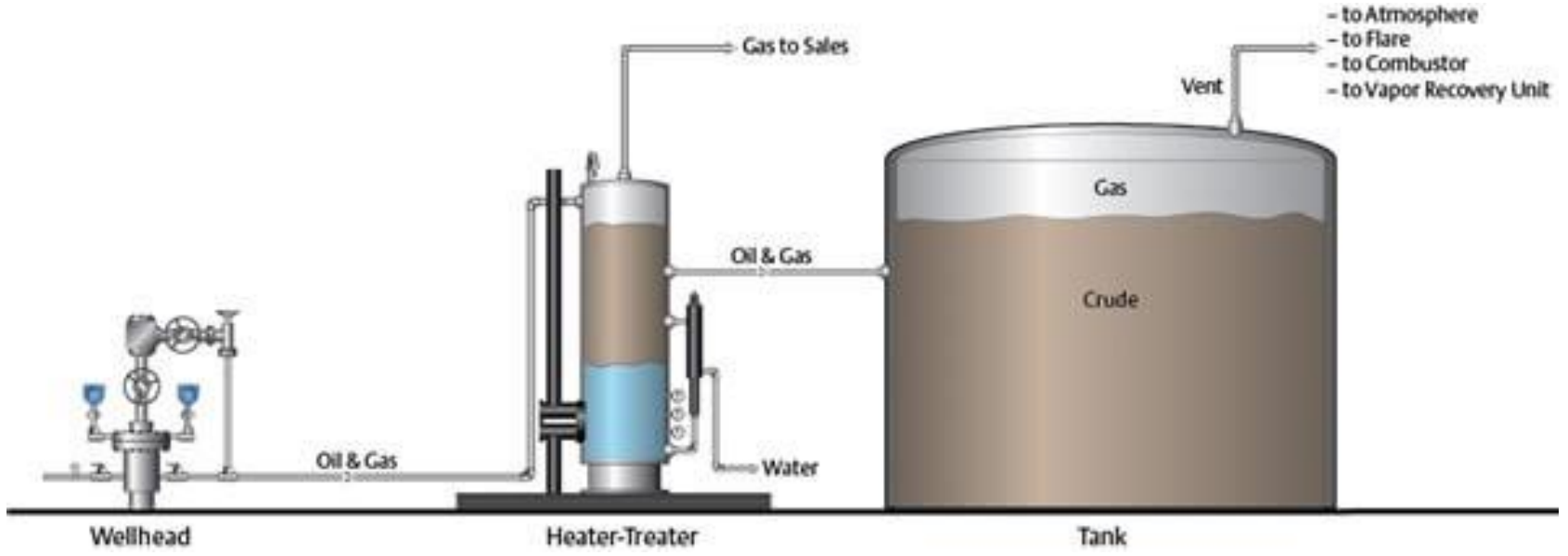
“Upstream”

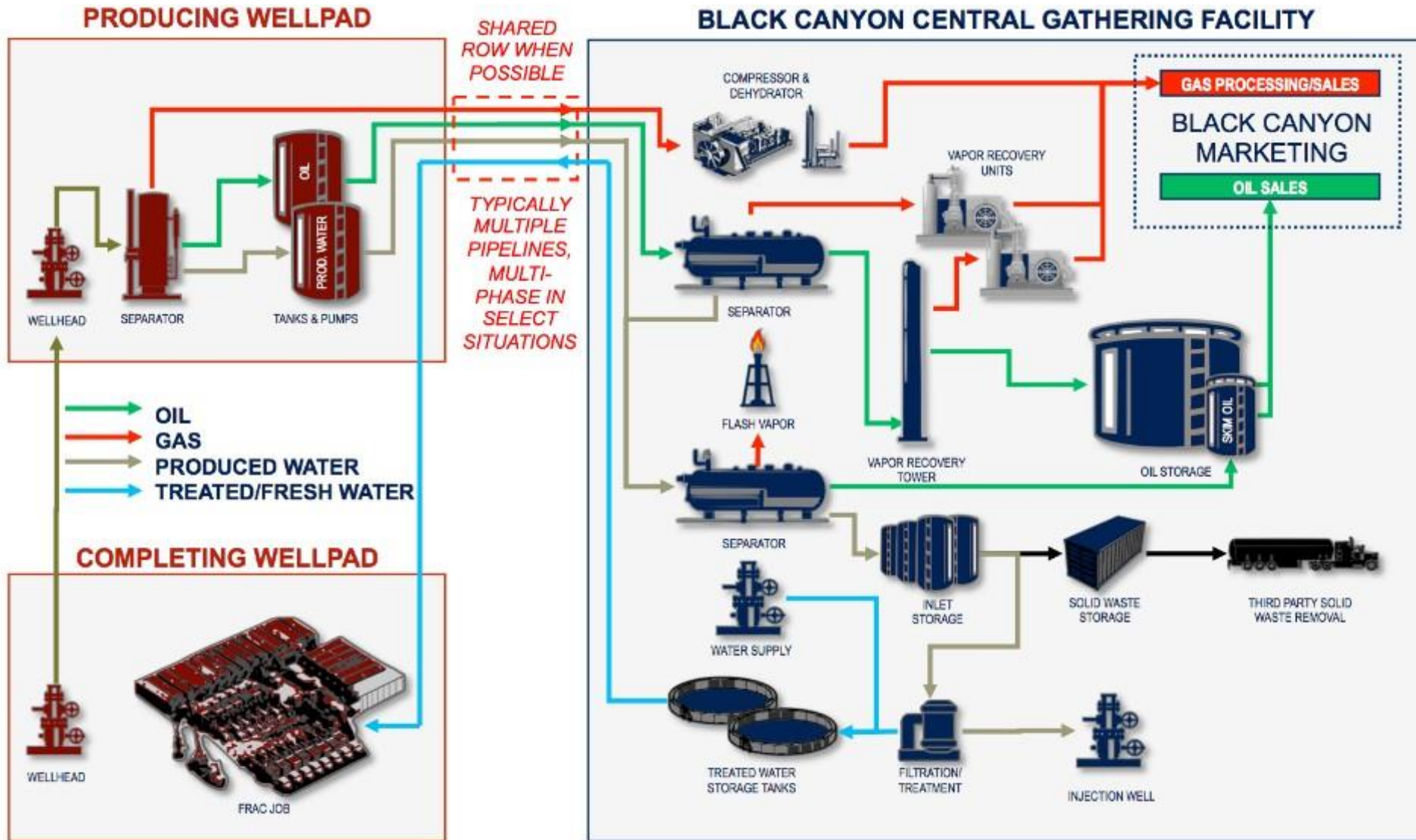


“Downstream”

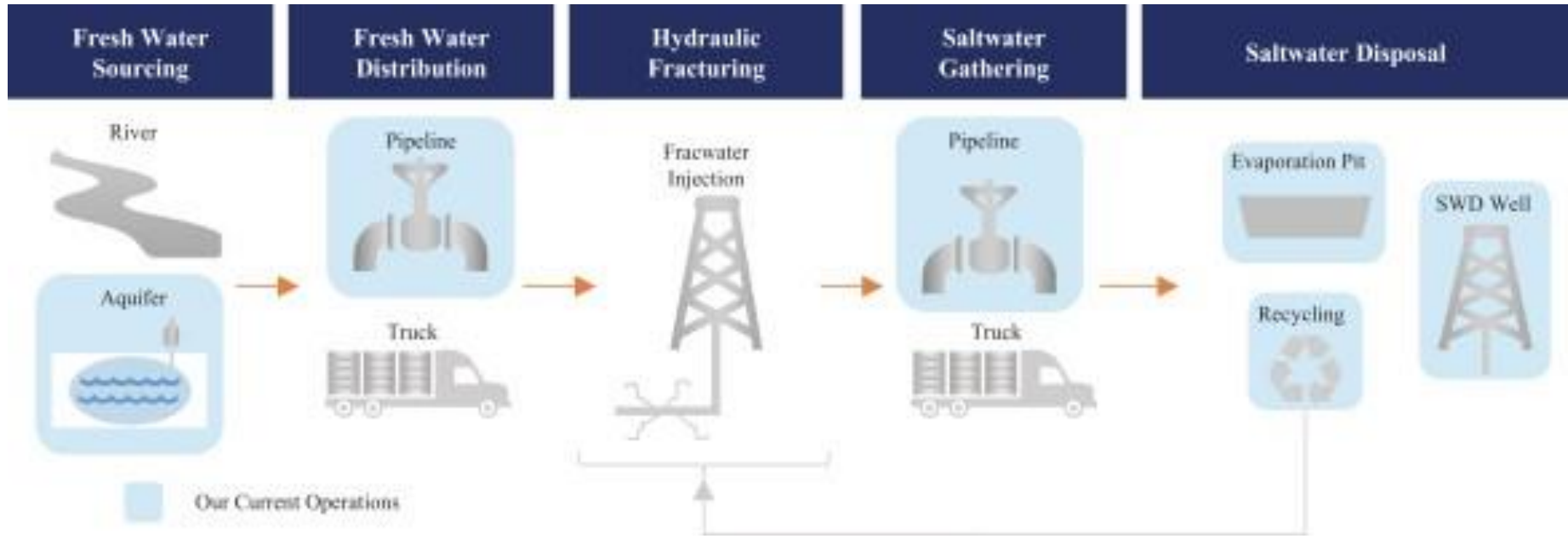


“Upstream”





(Source: Black Canyon Midstream)

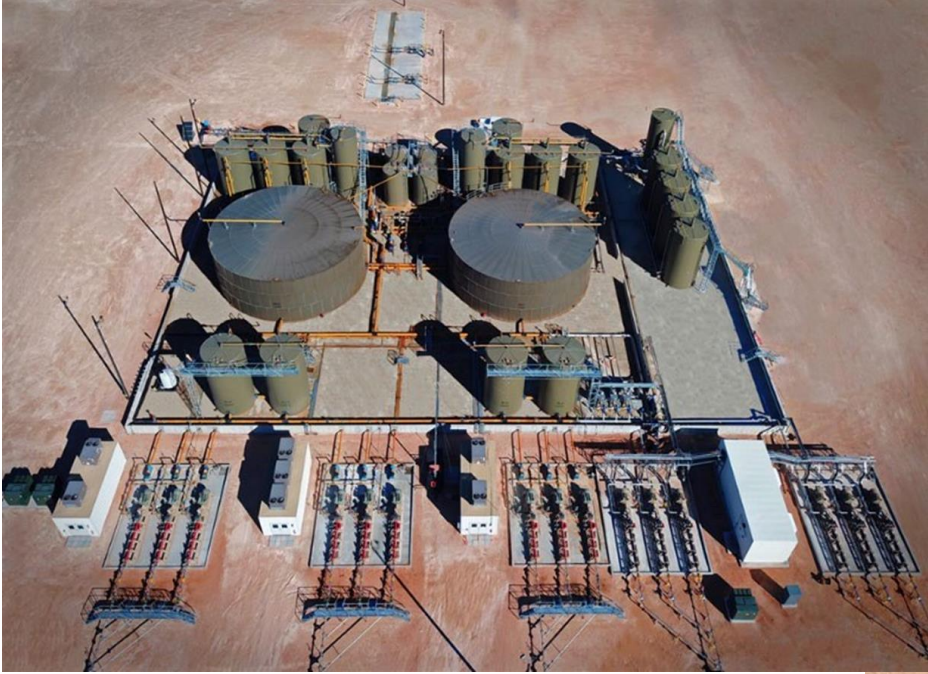




(©Hart Energy, source: Gravity Oilfield Services)

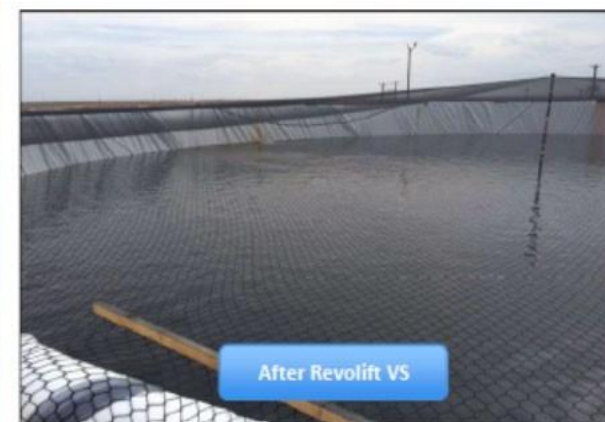
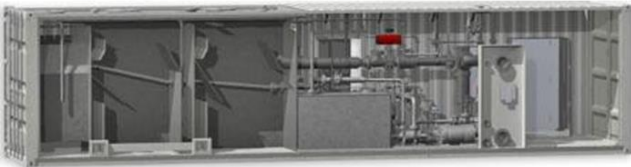


(Source: <http://www.chriswellconsulting.com/water-management.html>)

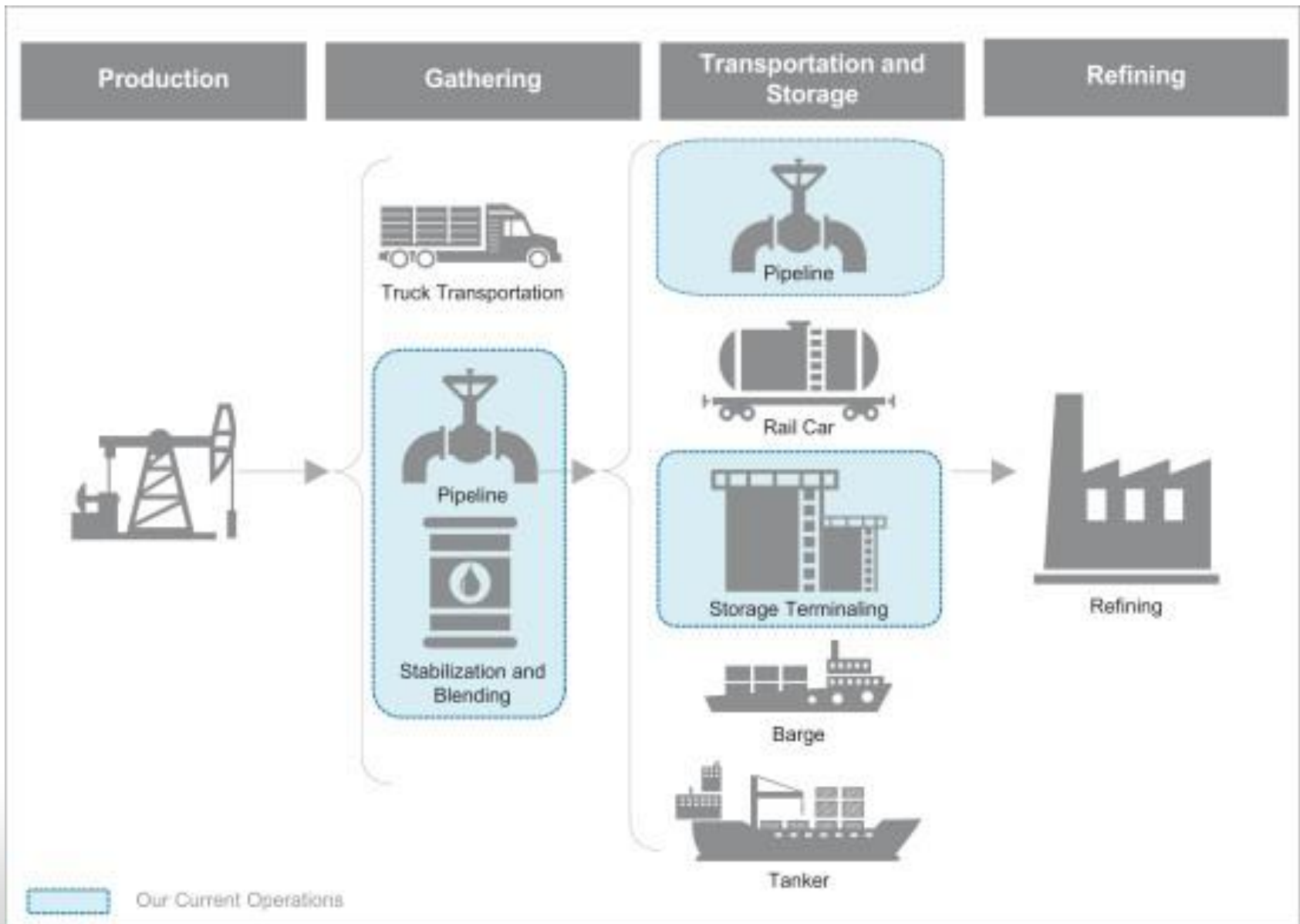


Key Benefits:

- 0 – 30,000 BPD
- Fully enclosed
- Multi-chambered
- Full PLC & ESD
- Portable
- NACE (sour service)
- Blanketed system
- Class 1 Div 2
- Upset tolerant
- Low install cost
- Lower chemical cost



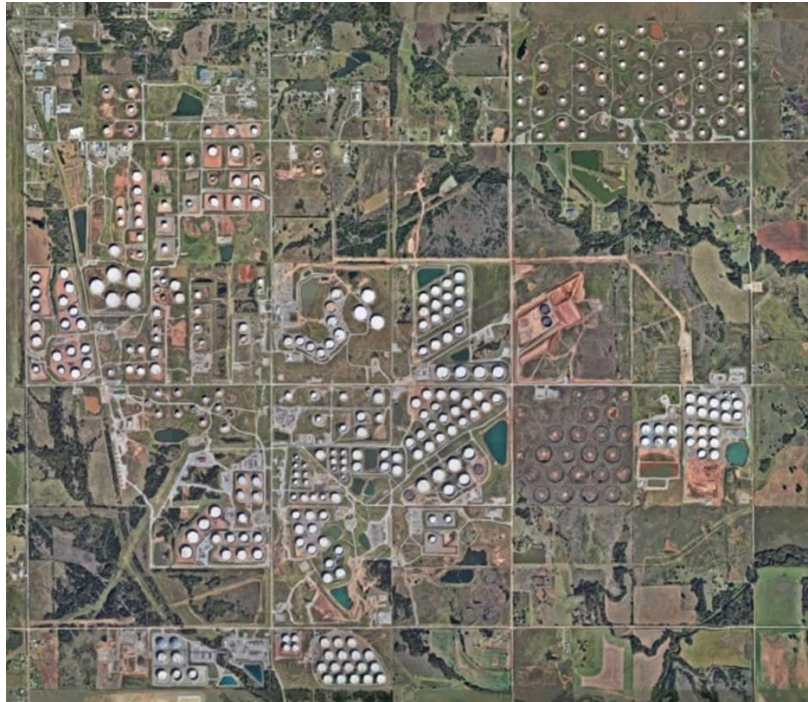






(Source: Velocity Midstream)

Midstream 101: Oil Storage





(Source: Enbridge)

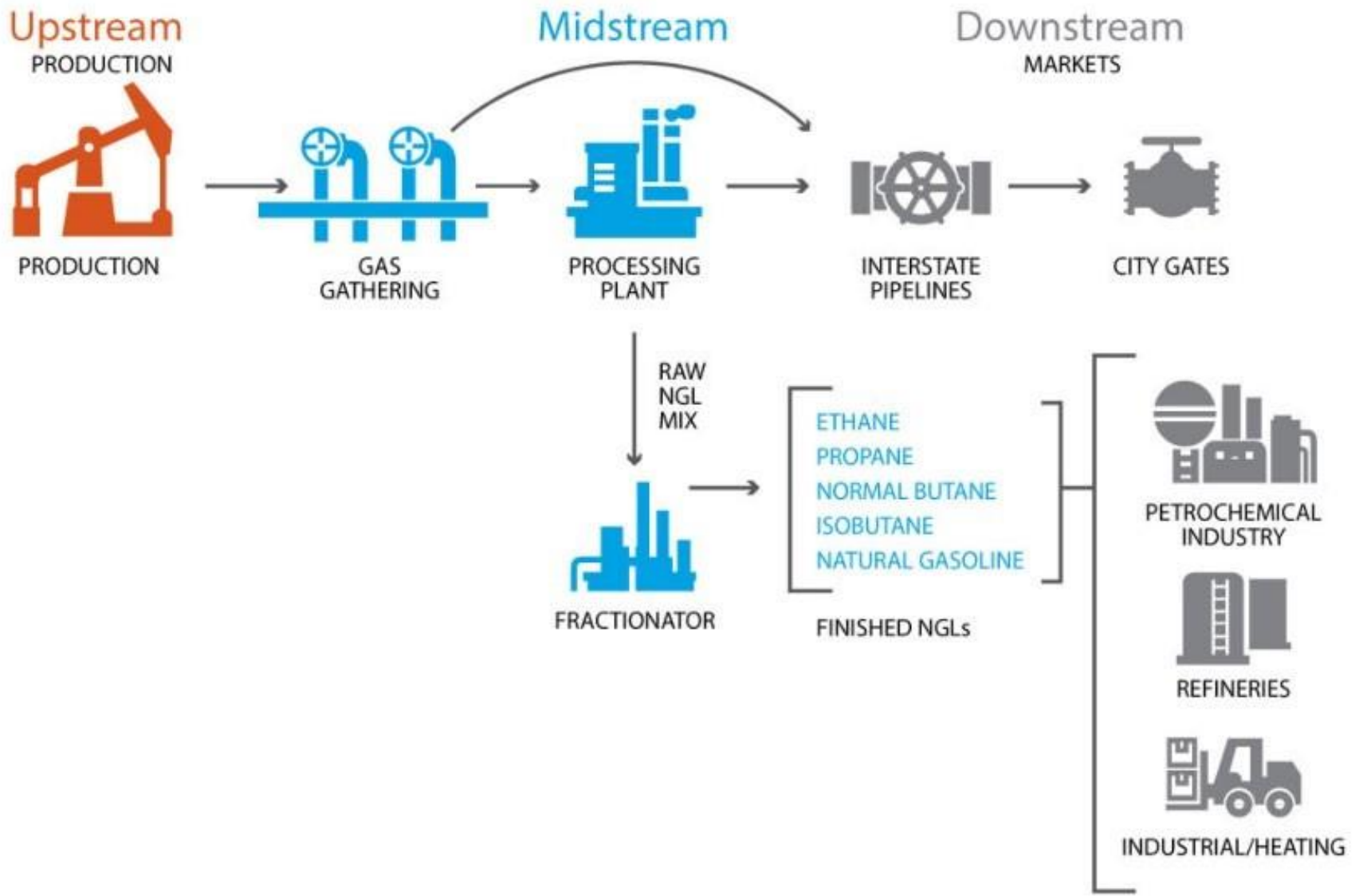


(Source: Forbes)



(Source: Businessinsider.com)







(Source: SNC Lavalin)



(Source: Phillips 66 Partners)



“Upstream”

“Downstream”

A. Inlet Gas Composition

Component	Mole % (Dry Basis)
Nitrogen	0.916
Carbon Dioxide	0.530
Methane	76.421
Ethane	11.282
Propane	6.280
i-Butane	0.729
n-Butane	2.216
i-Pentane	0.442
n-Pentane	0.590
n-Hexane	0.346
n-Heptane	0.196
n-Octane	0.052
Total	100.00

Contaminants

“Natural Gas”

Natural Gas
Liquids or NGLs

Natural
Gasoline or
Condensate

Contaminants

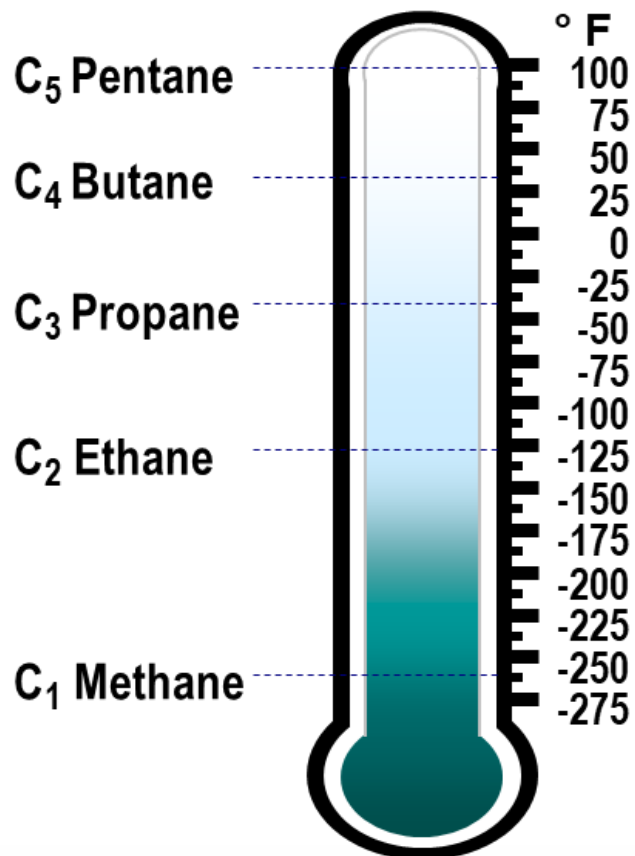
C2+ Content	=	6.30 GPM
Water Content	=	15 lb H ₂ O/MMscf
Mercury (Hg) Content	=	Nil

Heating Value	=	1297 Btu/SCF
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Heat content

One Example Specifications for Pipeline Quality Gas

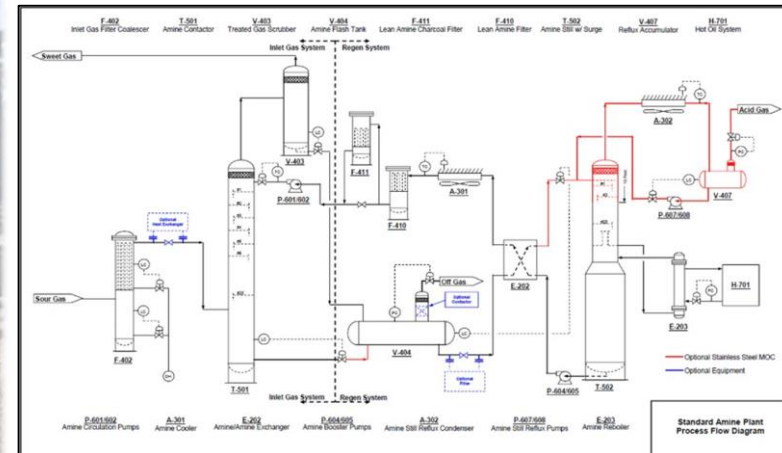
Major Components	Minimum Mol%	Maximum Mol%
Methane	75	None
Ethane	None	10
Propane	None	5
Butanes	None	2
Pentanes and heavier	None	0.5
Nitrogen and other inerts	None	3
Carbon dioxide	None	2-3
Total diluent gases	None	4-5
Trace components		
Hydrogen sulfide	0.25-0.3 g/100 scf (6-7 mg/m ³)	
Total sulfur	5-20 g/100 scf (115-460 mg/m ³)	
Water vapor	4.0-7.0 lb/MM scf (60-110 mg/m ³)	
Oxygen	1.0%	
Other characteristics		
Heating value (gross, saturated)	950-1,150 Btu/scf (35,400-42,800 kJ/m ³)	
Liquids	Free of liquid water and hydrocarbons at delivery temperature and pressure	
Solids	Free of particulates in amounts deleterious	



Process	Product / Application
J.T.	Gas Fuel Conditioning
Mechanical Refrigeration	Dew point Control Natural Gas Liquid - NGL
Cryogenic	Liquefied Petroleum Gas - LPG
Cryo w/ Mech. Refrigeration.	High recovery of rich gas
LNG Process	Liquefied Natural Gas - LNG



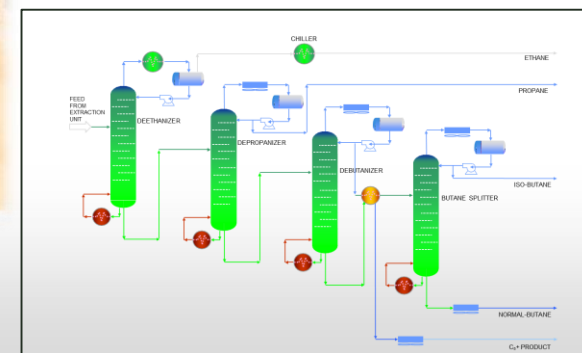
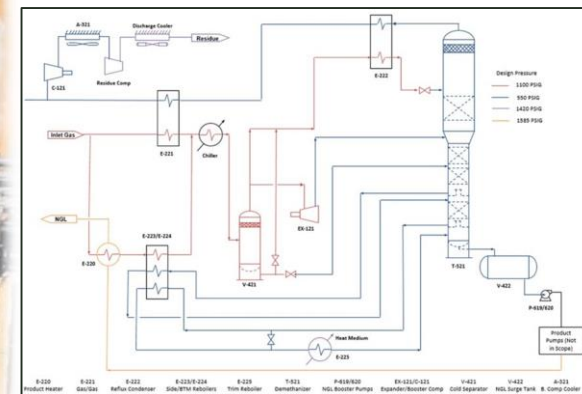
Amine Plant
Removes CO₂ &
H₂S compounds





Cryogenic Natural Gas Processing Plants

Separate NGLs from Methane and/or Ethane to get pipeline quality NG & Y-grade liquids ... or more...





Storage in Salt Caverns

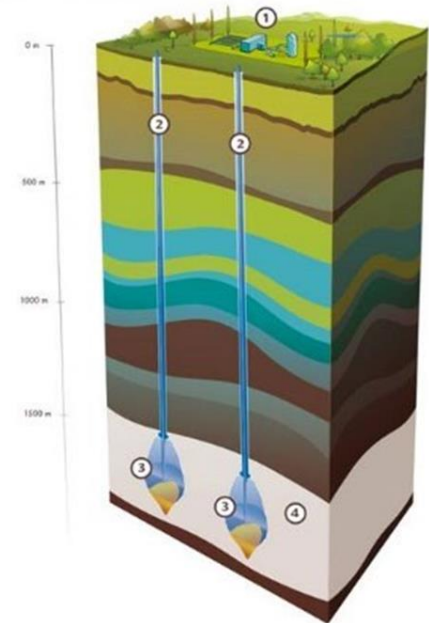
Type of Facility:
Storage in Salt Caverns

Specifications:

- Smaller working gas capacity
- High deliverability

- 1) Gas plant
- 2) Storage well
- 3) Salt cavern
- 4) Salt dome formation

storengy



Cross section of a salt dome storage facility

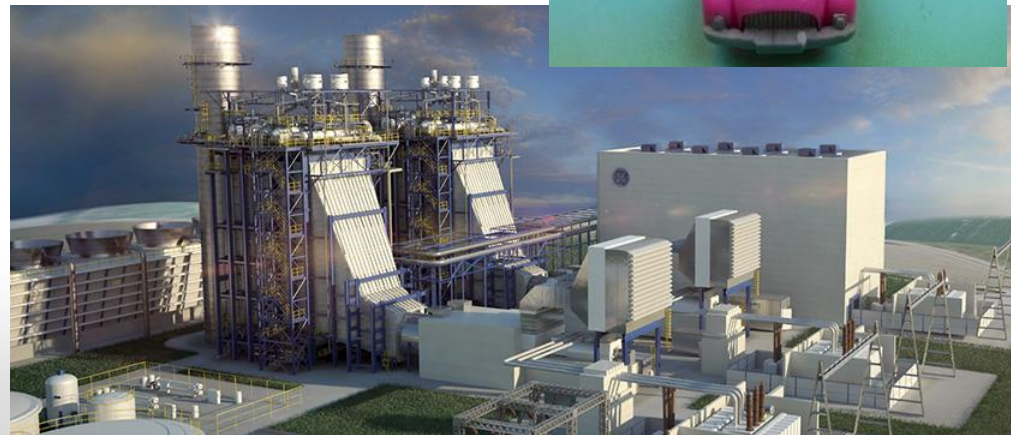
(Source: MPLX)



Adhesives Carpeting Cosmetics Fertilizers



Paints Rubber Fabrics Plastics



Midstream 101: Midstream brings value



CURIOSITY

We are inquisitive
because we want to
learn and grow.

Questions?