

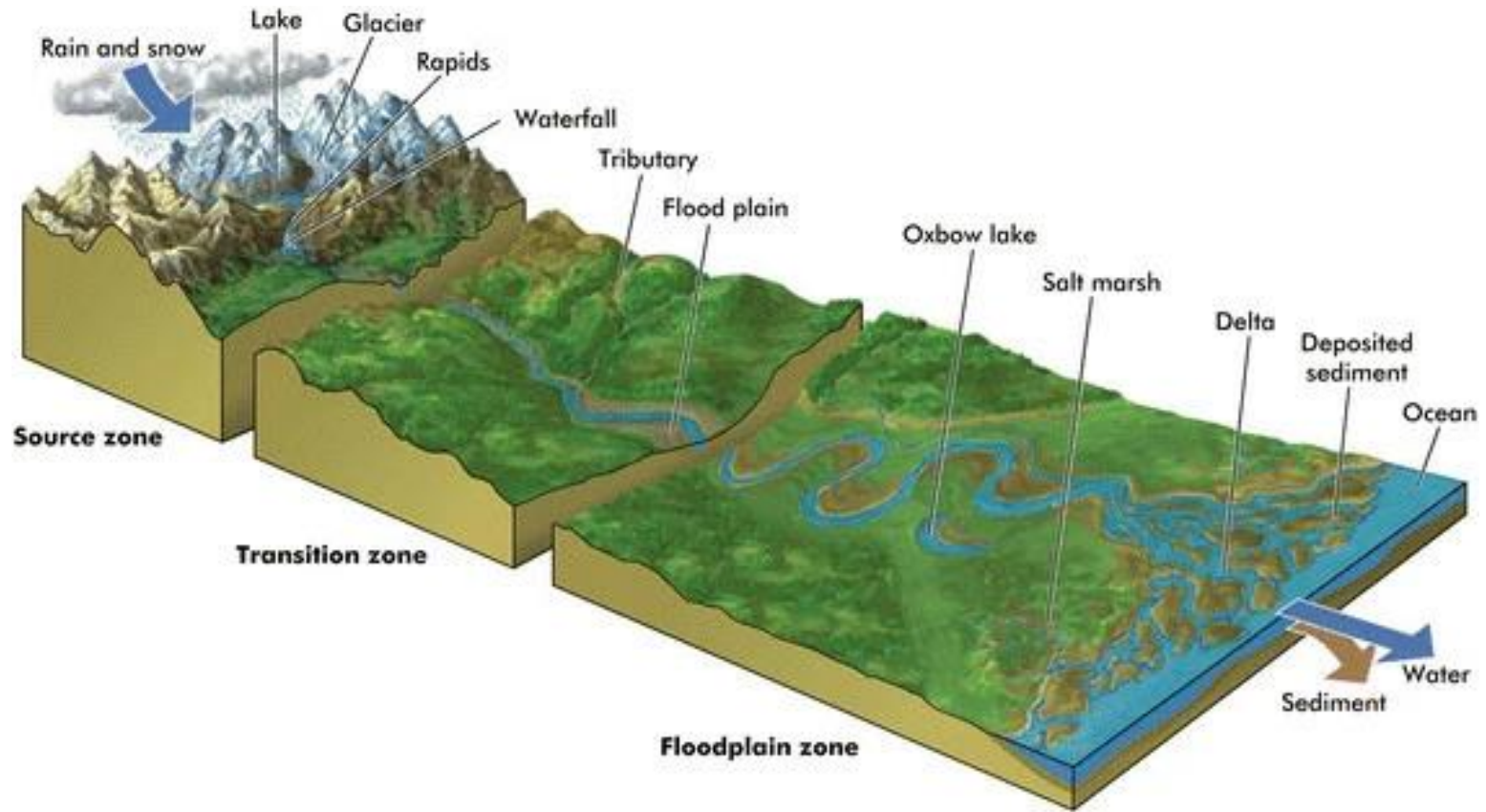


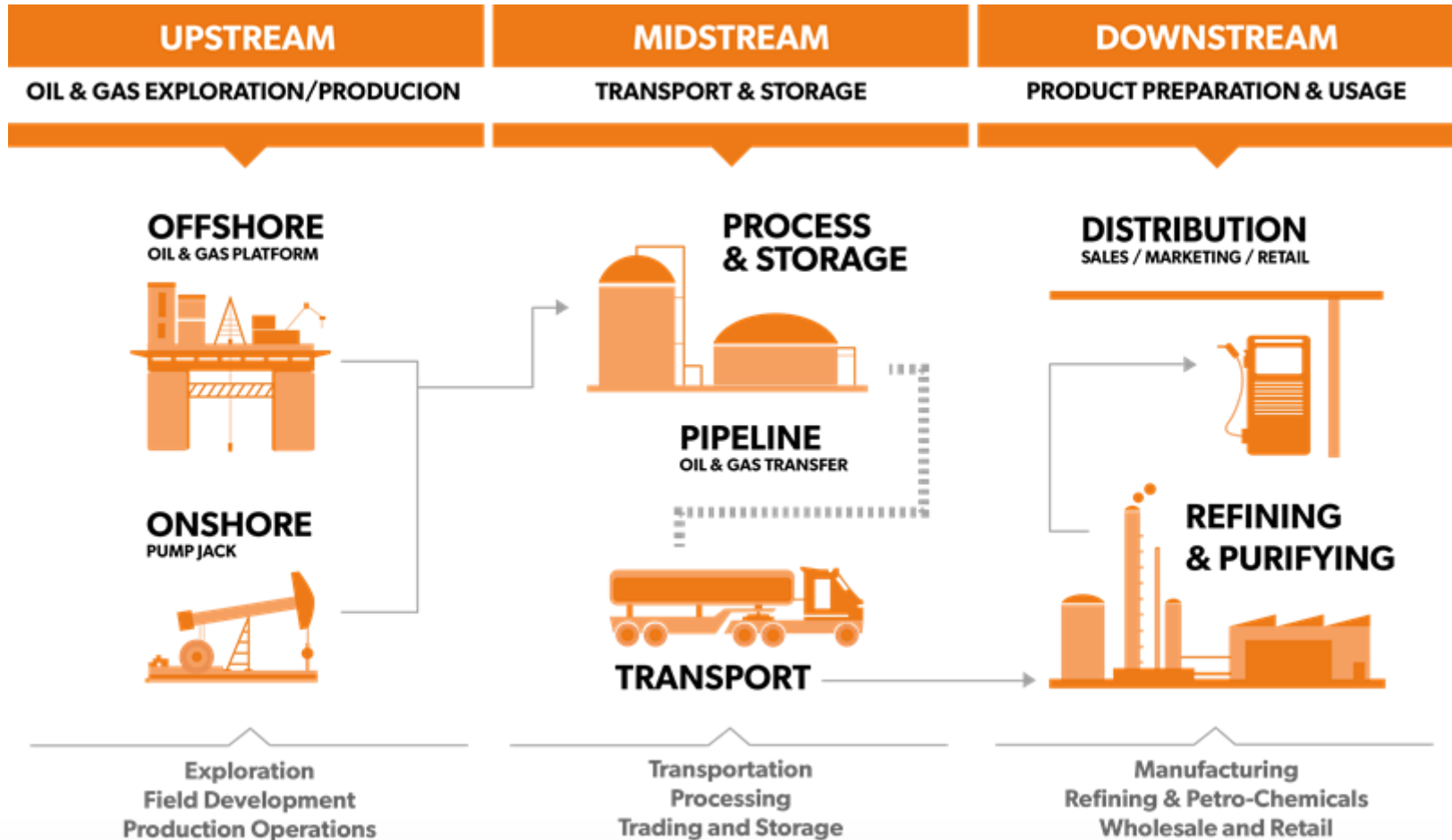
(Source: MPLX)

Midstream 101
Brian Leedy
Exterran Energy Solutions, L.P.

October 6, 2022

Midstream 101: Midstream?





Where is Midstream?

Why is Midstream?

Who is Midstream?

What is Midstream?

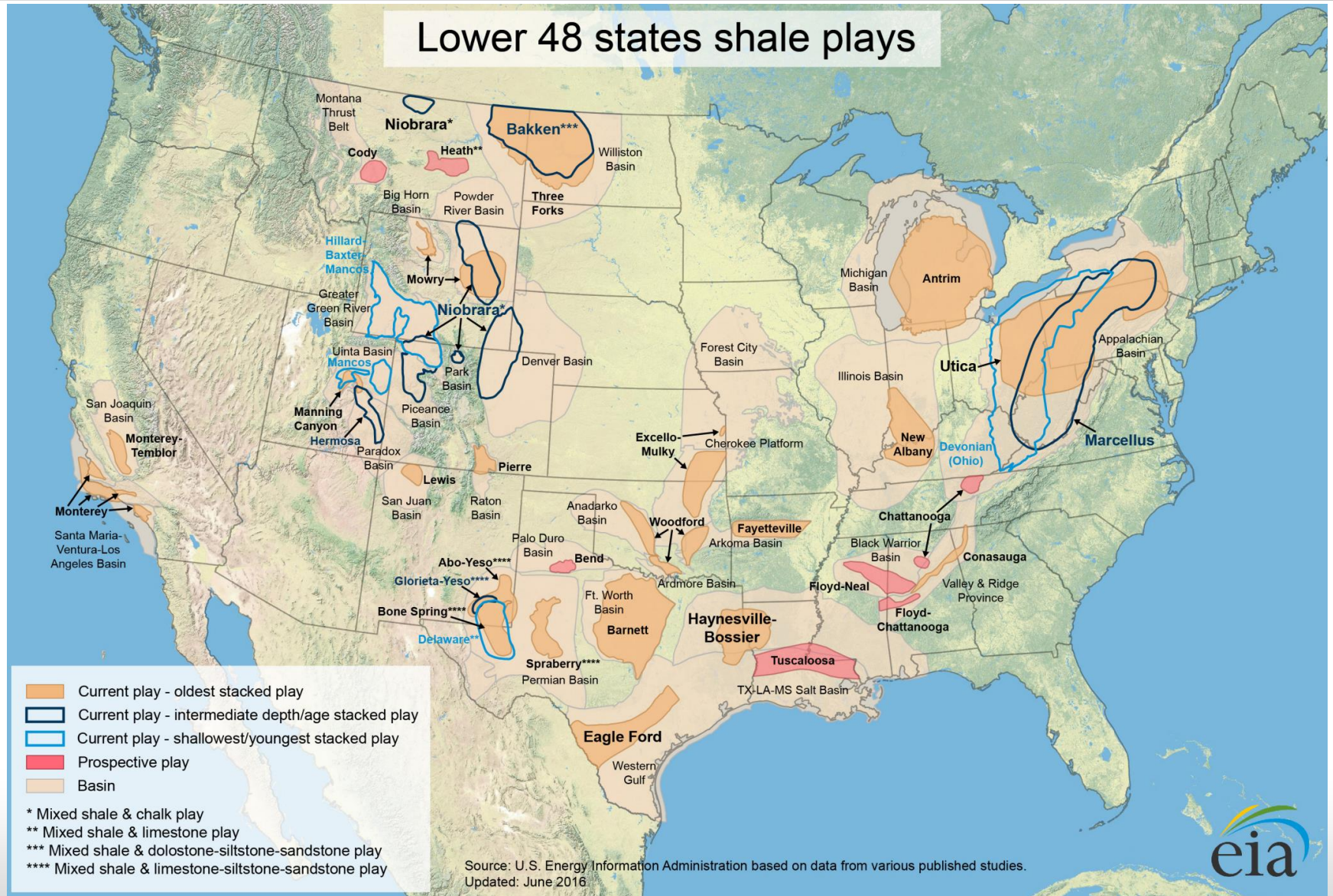
-Gas

-Oil

-Water

Questions?





(Source: Energy Information Association - EIA)

The Midstream: Gathering

“Upstream”



“Downstream”



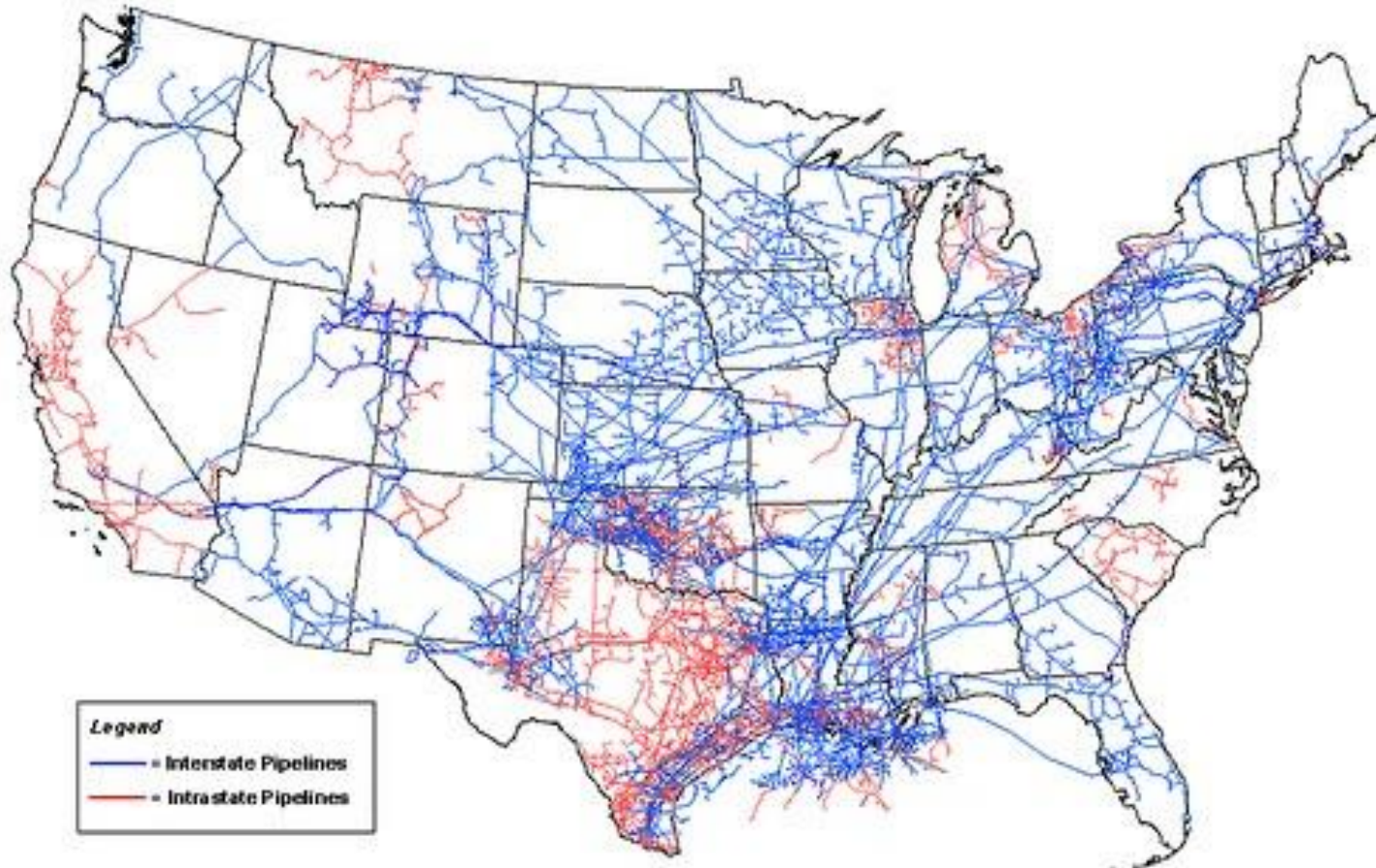
”

Where/Why Midstream?

“Upstream”

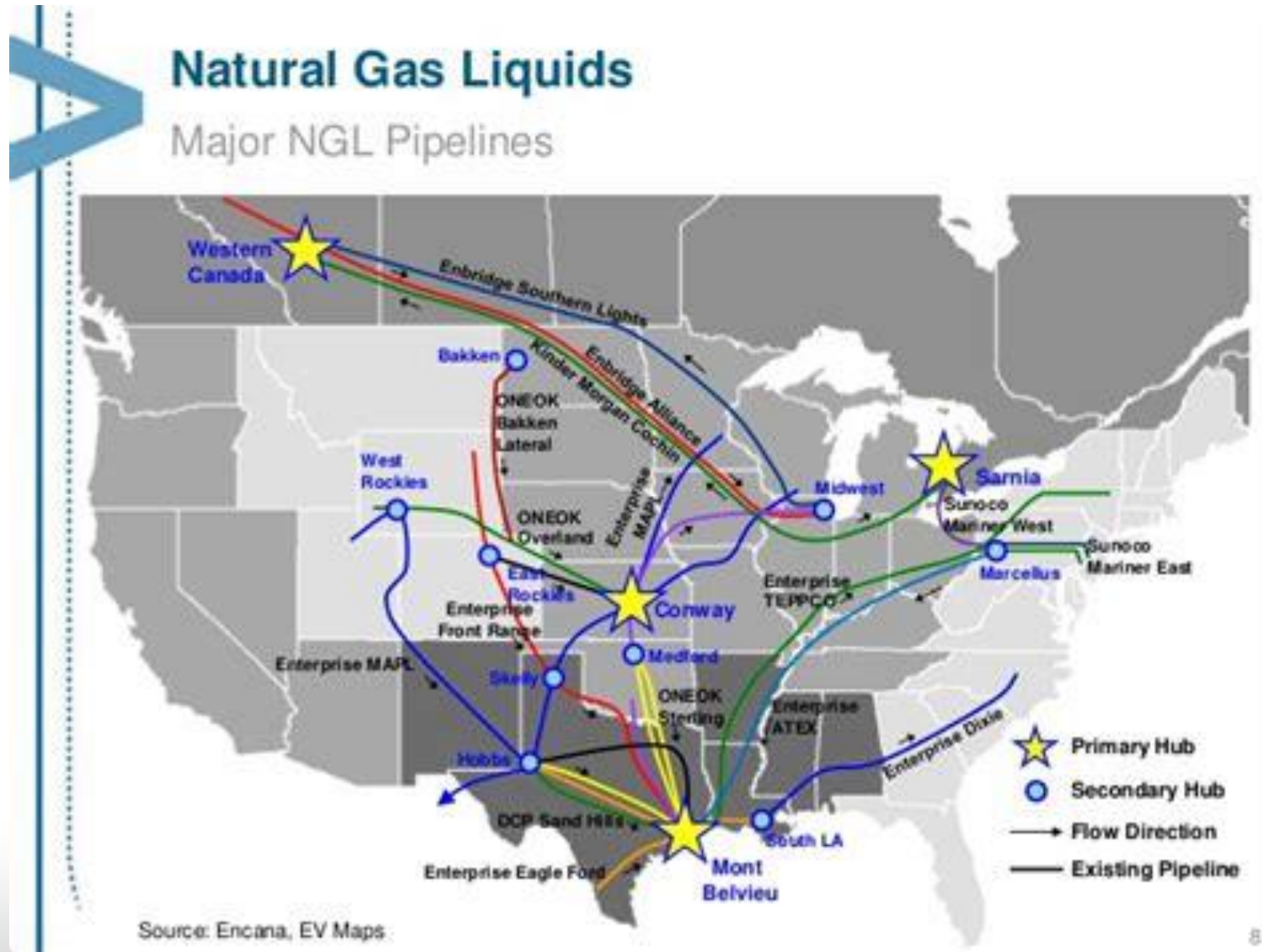


“Downstream”



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

(Source: Energy Information Association - EIA)



(Source: Encana)

Midstream 101: Who?



Name	Price (Intraday)	Change	% Change	Volume	Avg Vol (3 month)	Market Cap ▼	P
Enbridge Inc.	43.57	-0.81	-1.83%	2.478M	3.326M	88.22B	
Enterprise Products Partners L.P.	26.88	-0.35	-1.29%	4.806M	6.205M	58.578B	
TC Energy Corporation	50.42	-0.58	-1.14%	975,550	1.827M	51.022B	
Kinder Morgan, Inc.	18.99	-0.27	-1.40%	13.527M	15.382M	42.985B	
The Williams Companies, Inc.	35.03	-0.57	-1.60%	4.034M	8.182M	42.685B	
Energy Transfer LP	12.14	-0.22	-1.78%	15.277M	20.129M	37.476B	
MPLX LP	33.25	-0.34	-1.01%	1.169M	1.764M	33.656B	
ONEOK, Inc.	64.84	-1.81	-2.72%	1.375M	2.73M	28.975B	
Pembina Pipeline Corporation	37.02	-0.96	-2.53%	741,854	946,967	20.545B	
Targa Resources Corp.	70.21	-1.99	-2.76%	853,110	2.076M	15.907B	
Magellan Midstream Partners, L.P.	52.58	-0.41	-0.77%	502,700	1.027M	10.92B	
Western Midstream Partners, LP	28.25	-0.33	-1.15%	776,446	1.117M	10.917B	
Plains All American Pipeline, L.P.	12.26	-0.09	-0.73%	4.954M	4.983M	8.557B	
DCP Midstream, LP	38.13	-0.65	-1.68%	1.258M	696,711	7.946B	

Private Equity Backed Midstream Companies

- Tall Oak
- Lucid
- Momentum
- Brazos
- Eagle Claw
- Aspen Midstream
- Intensity Midstream
- Rangeland Energy
- StakeHolder Midstream
- Evolution Midstream

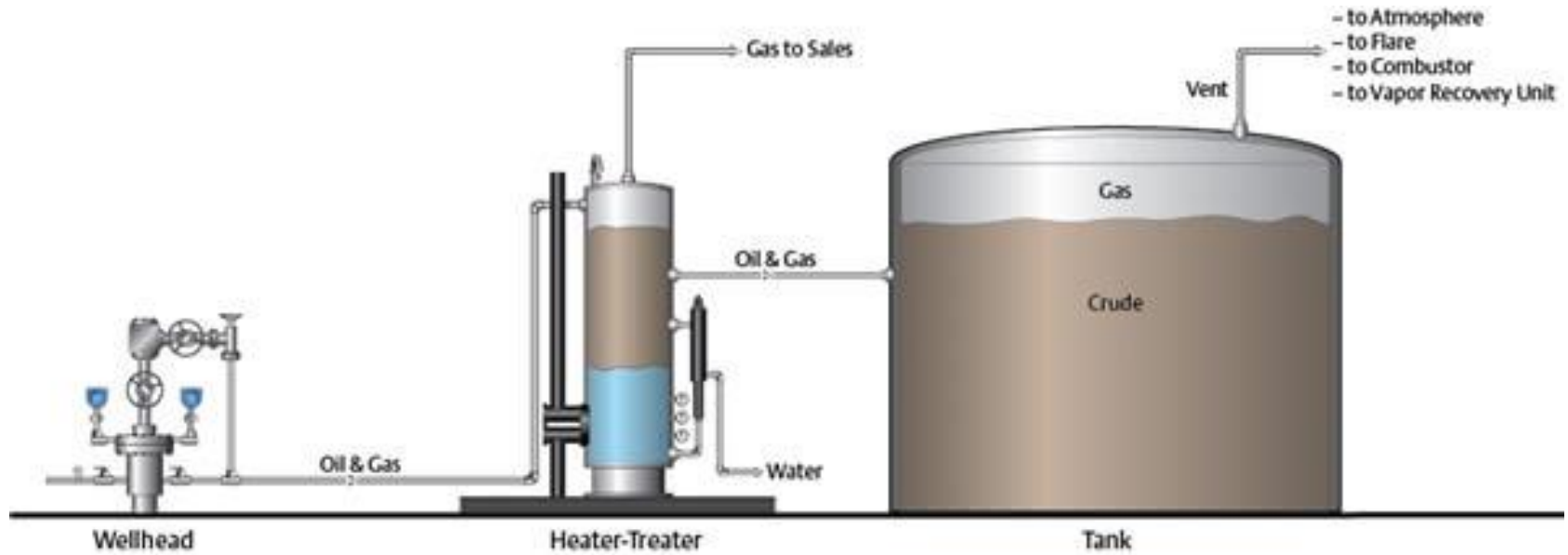


- Gathering
- Processing
- Storing
- Transporting
- Marketing

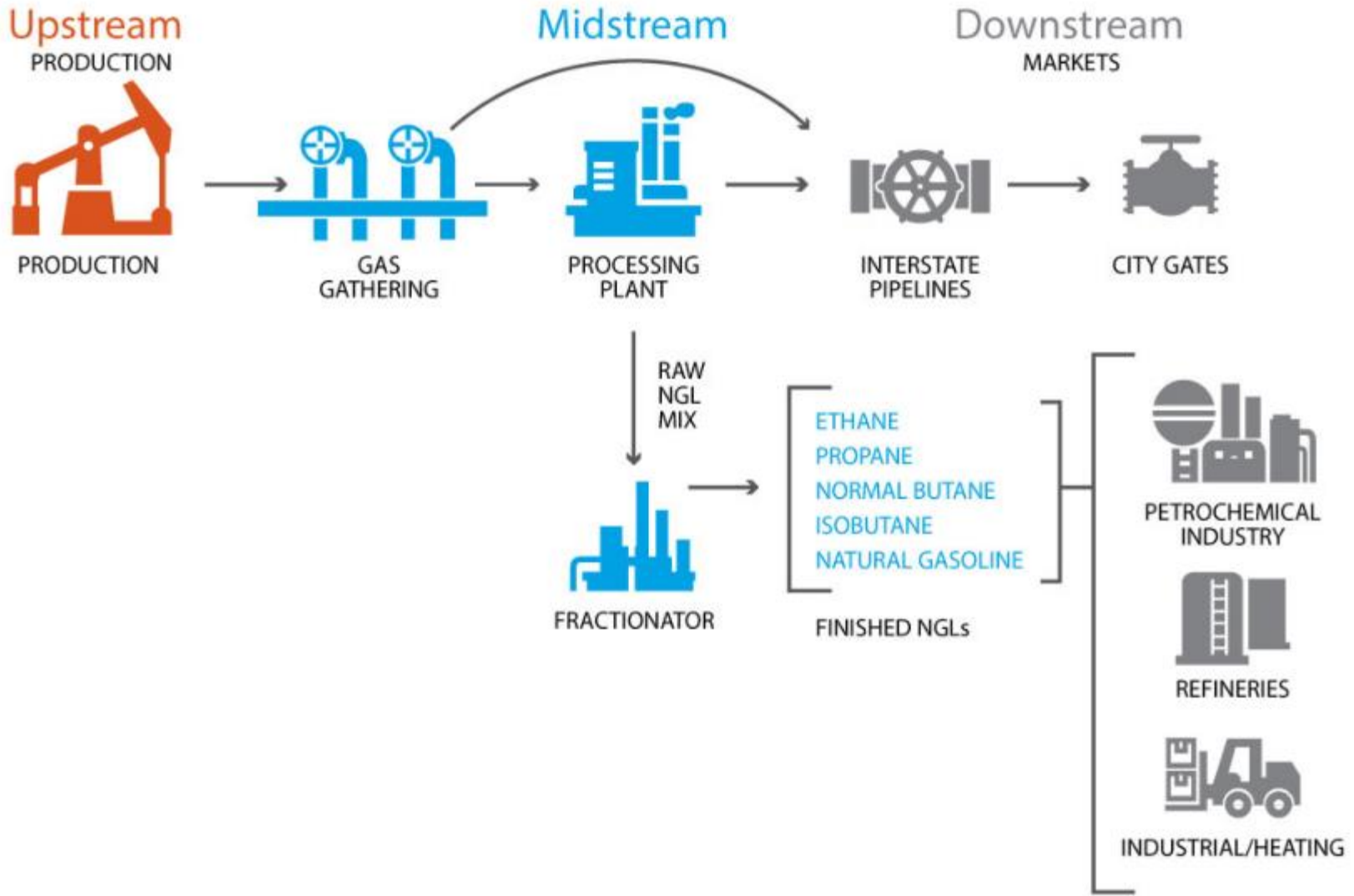


(Source: Tall Oak Midstream)











(Source: Phillips 66 Partners)

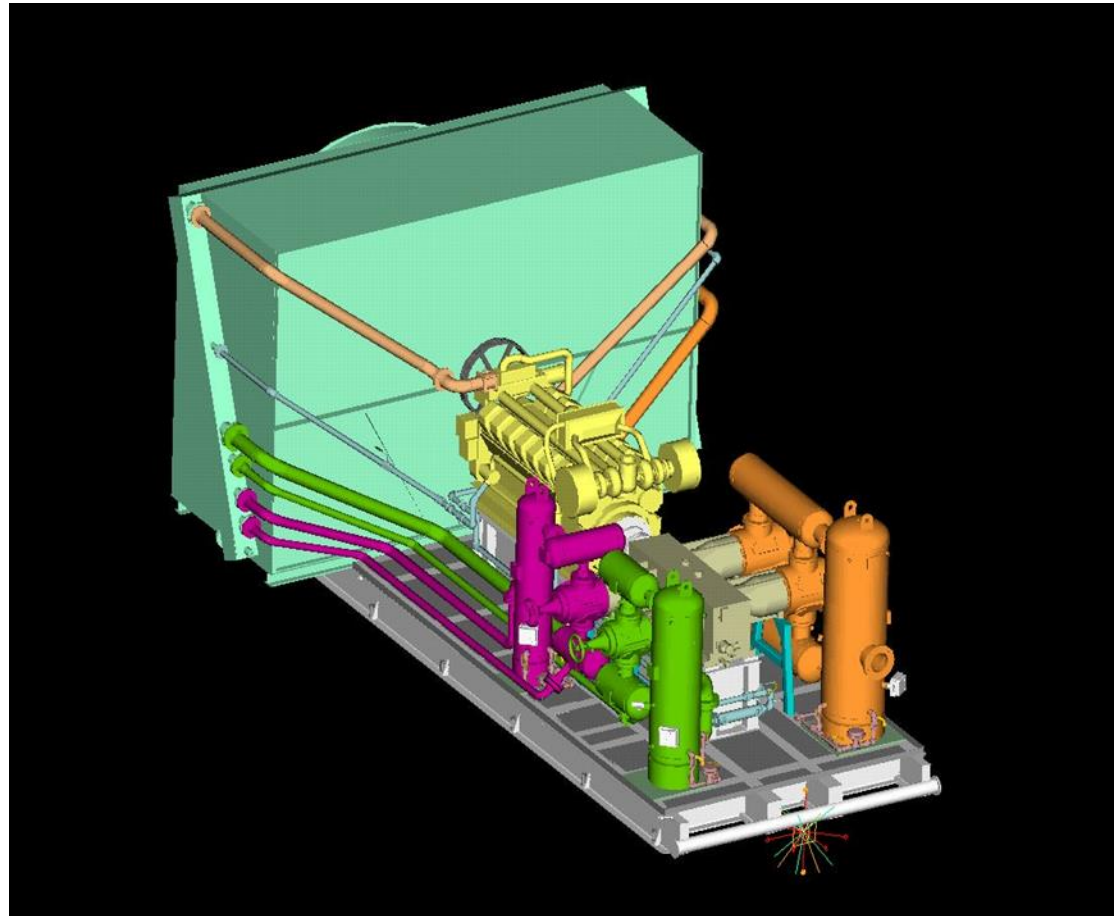
“Upstream”



“Downstream”



- Cooler
- Driver - (engine)
- Compressor
- Process piping and vessels
- Controls
- Skid





(Source: SNC Lavalin)

“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

Contaminates

“Natural Gas”

Natural Gas Liquids
or NGLs

Natural Gasoline
or Condensate

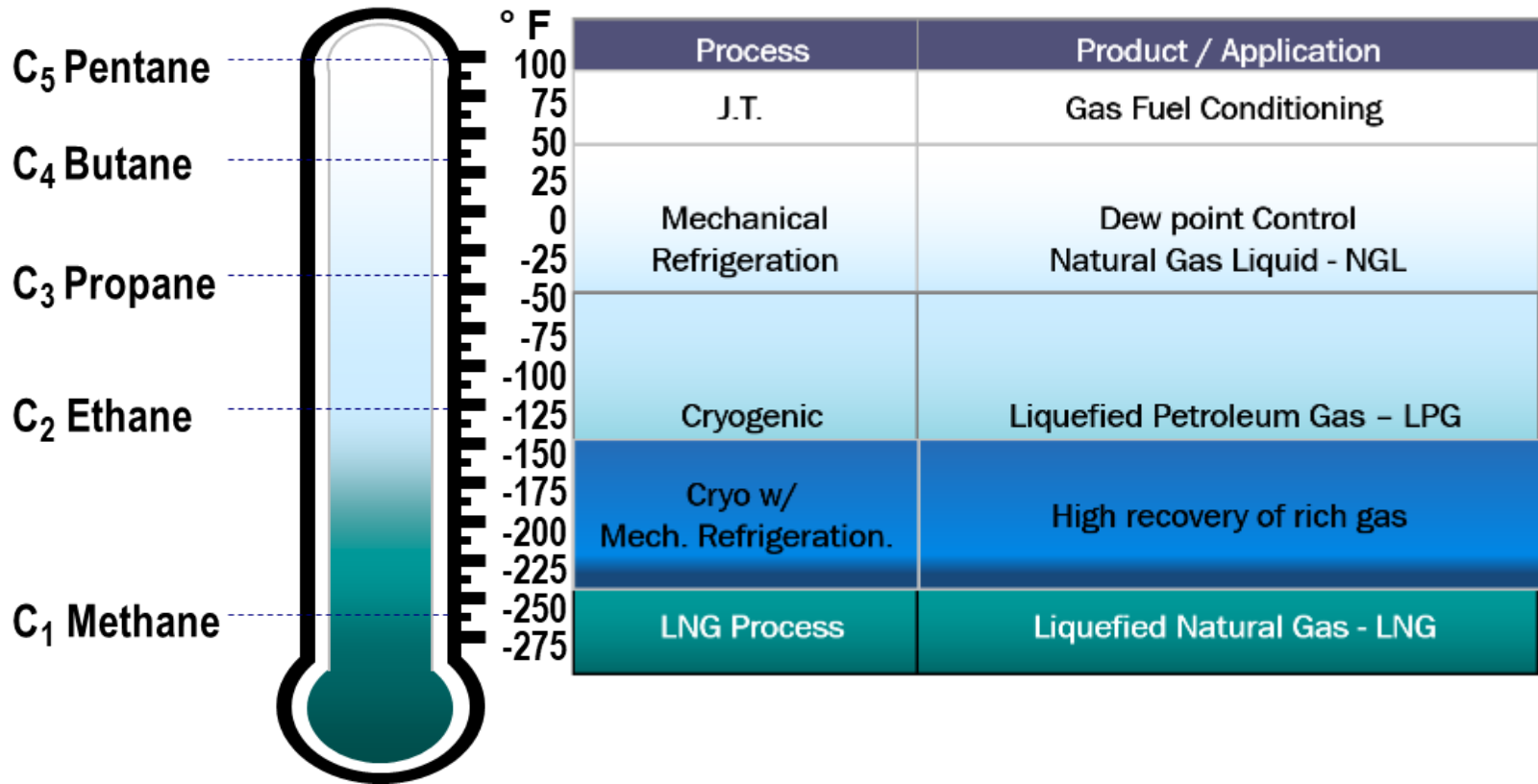
Contaminates

C2+ Content	=	6.30 GPM
Water Content	=	15 lb H ₂ O/MMscf
Mercury (Hg) Content	=	Nil
Heating Value	=	1297 Btu/SCF

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	

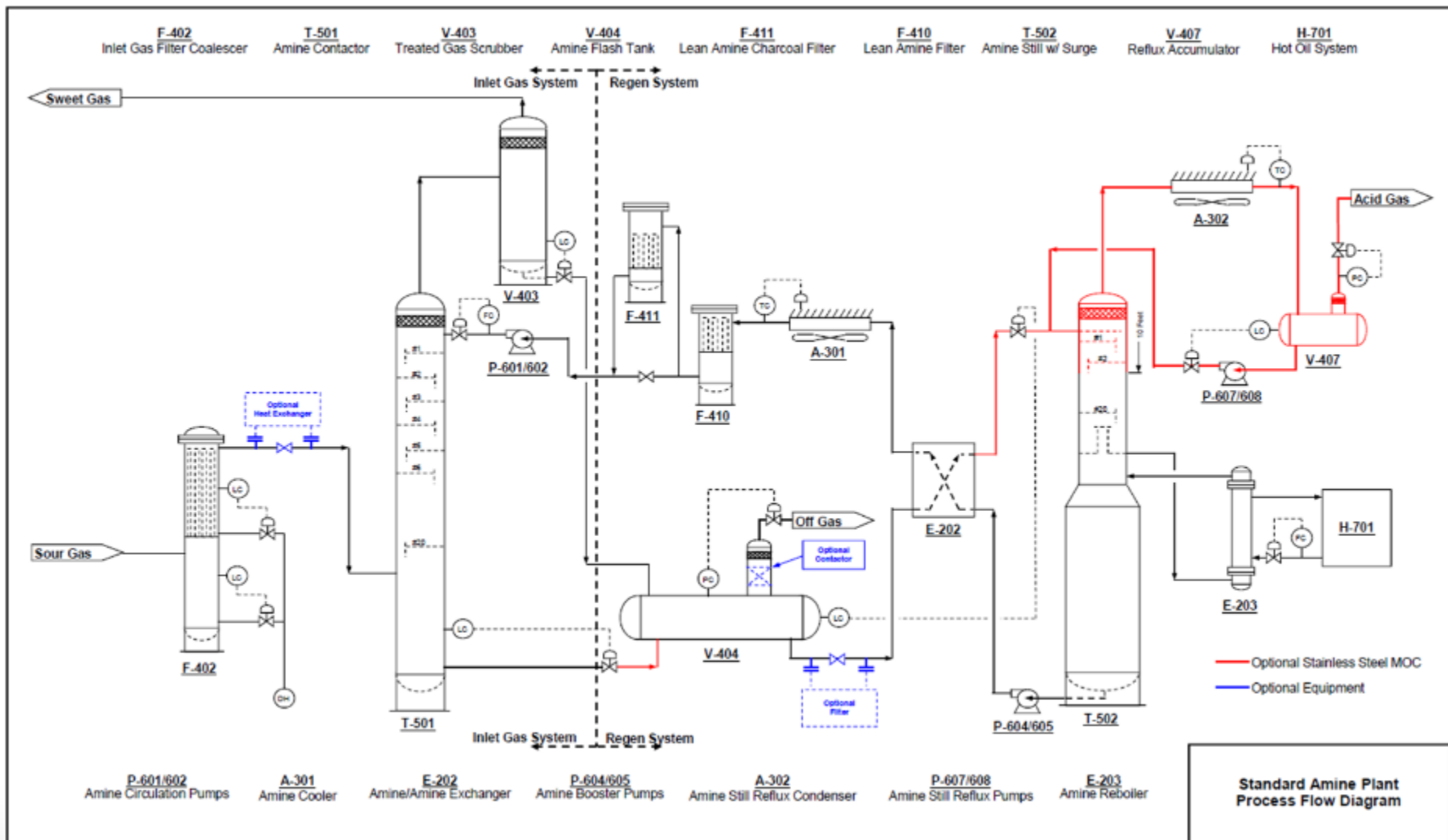




Amine Plant

Removes CO₂ or
H₂S compounds

Midstream 101: Treating PFD

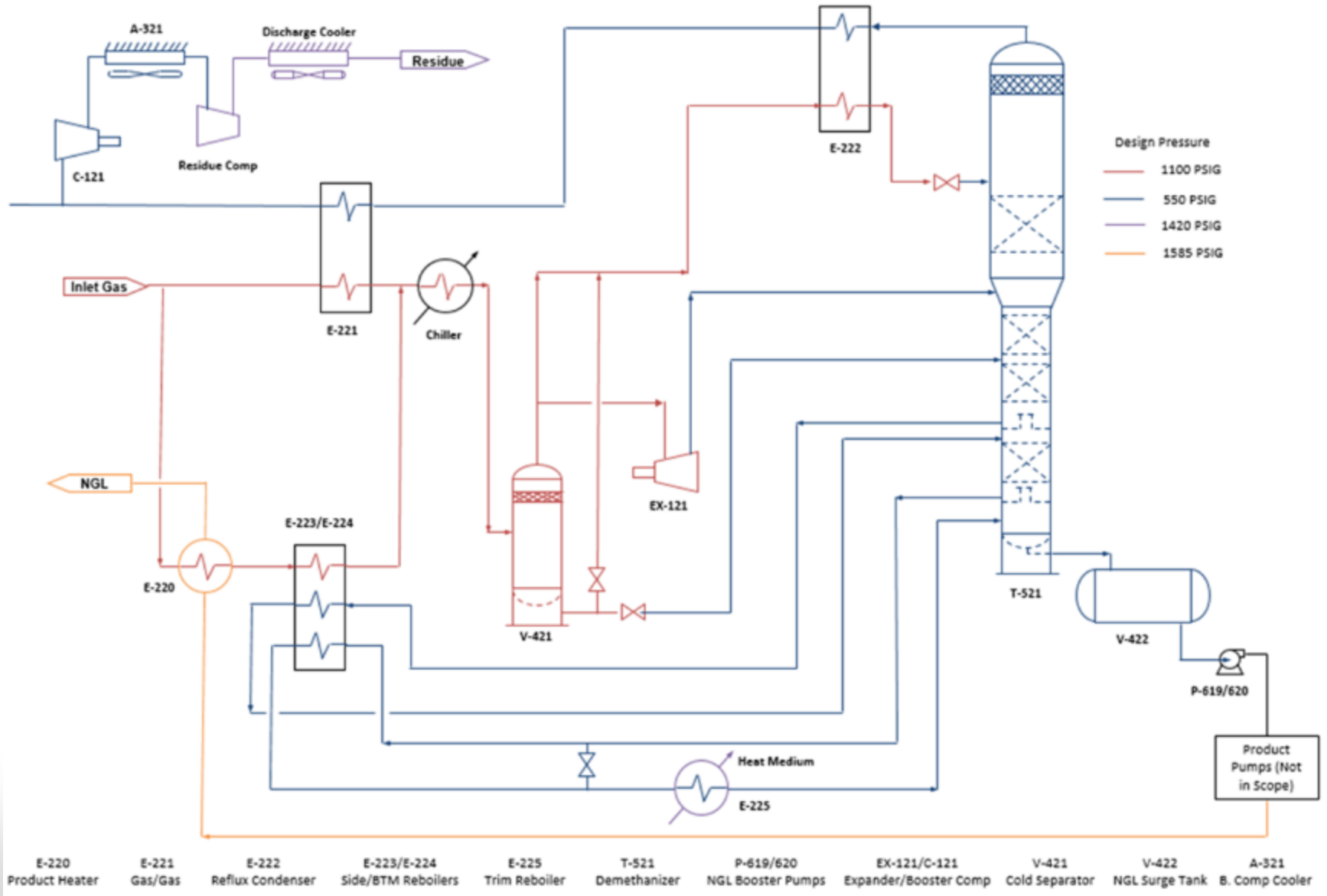




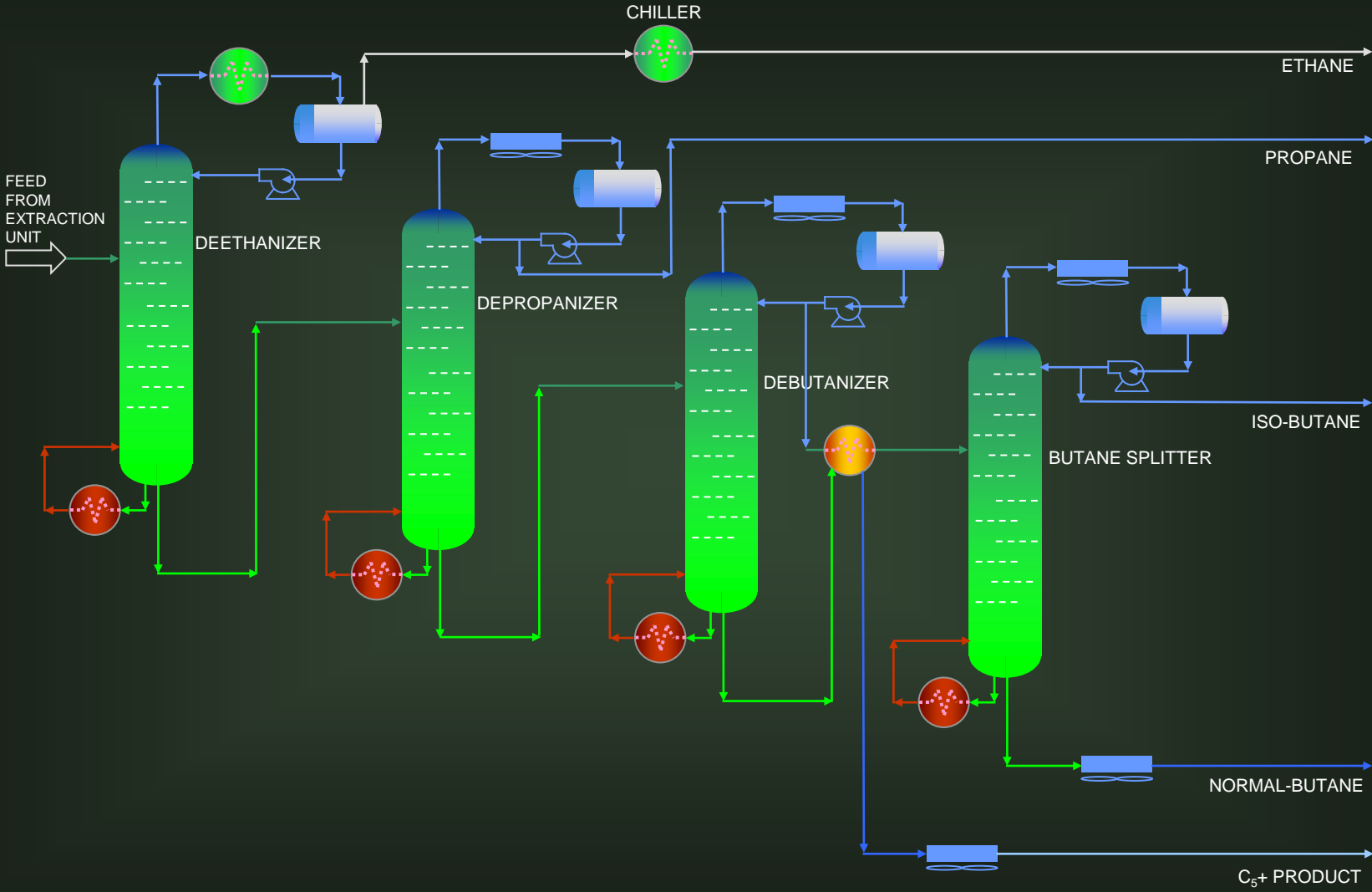
Cryogenic,
Natural Gas
Processing
Plant

Separates
NGLs from
Methane
and/or Ethane
to form
Pipeline
Quality Gas
and a Y-Grade
liquid product

Midstream 101: Gas Processing PFD



Midstream Value Chain: Fractionation





(Source: MPLX)

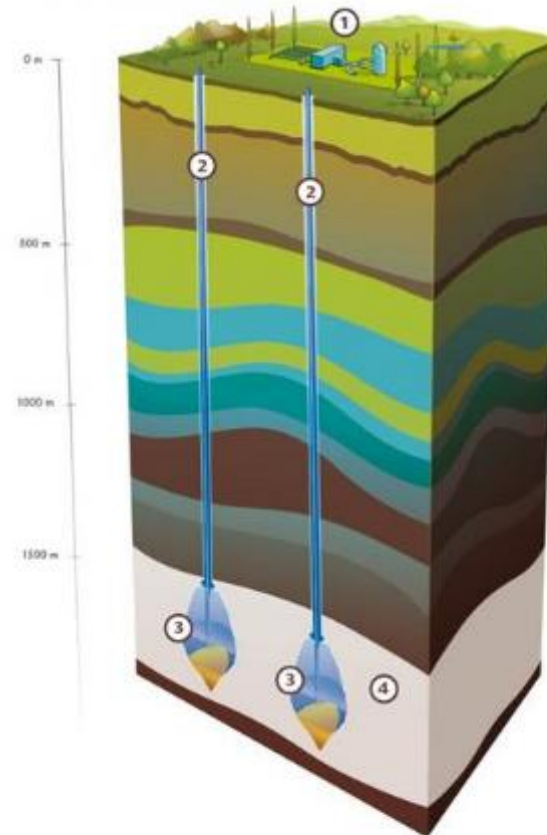
Storage in Salt Caverns

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



Cross section of a salt dome storage facility

(Source: Storengy)





CURIOSITY

We are inquisitive
because we want to
learn and grow.

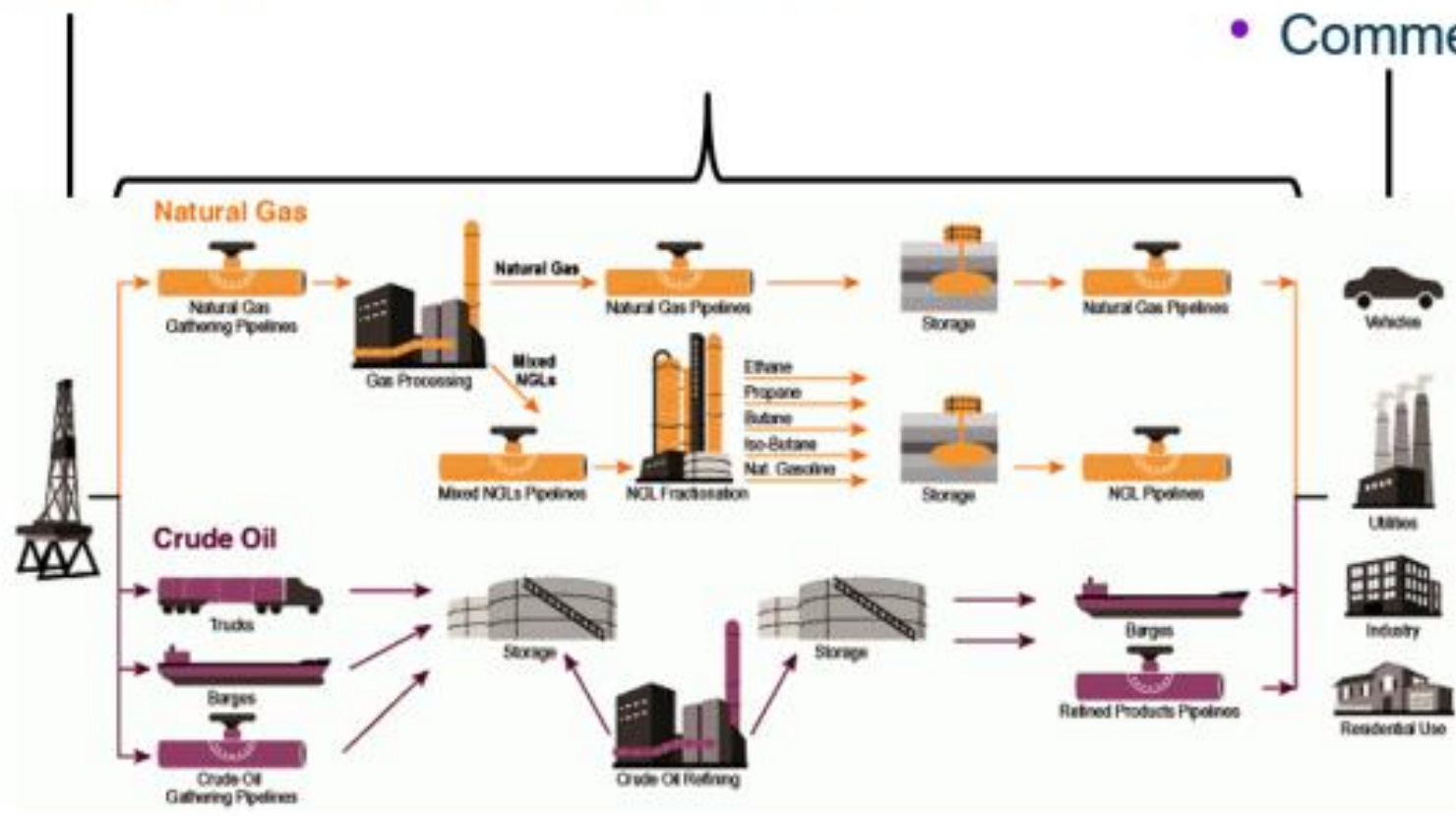
Your Questions

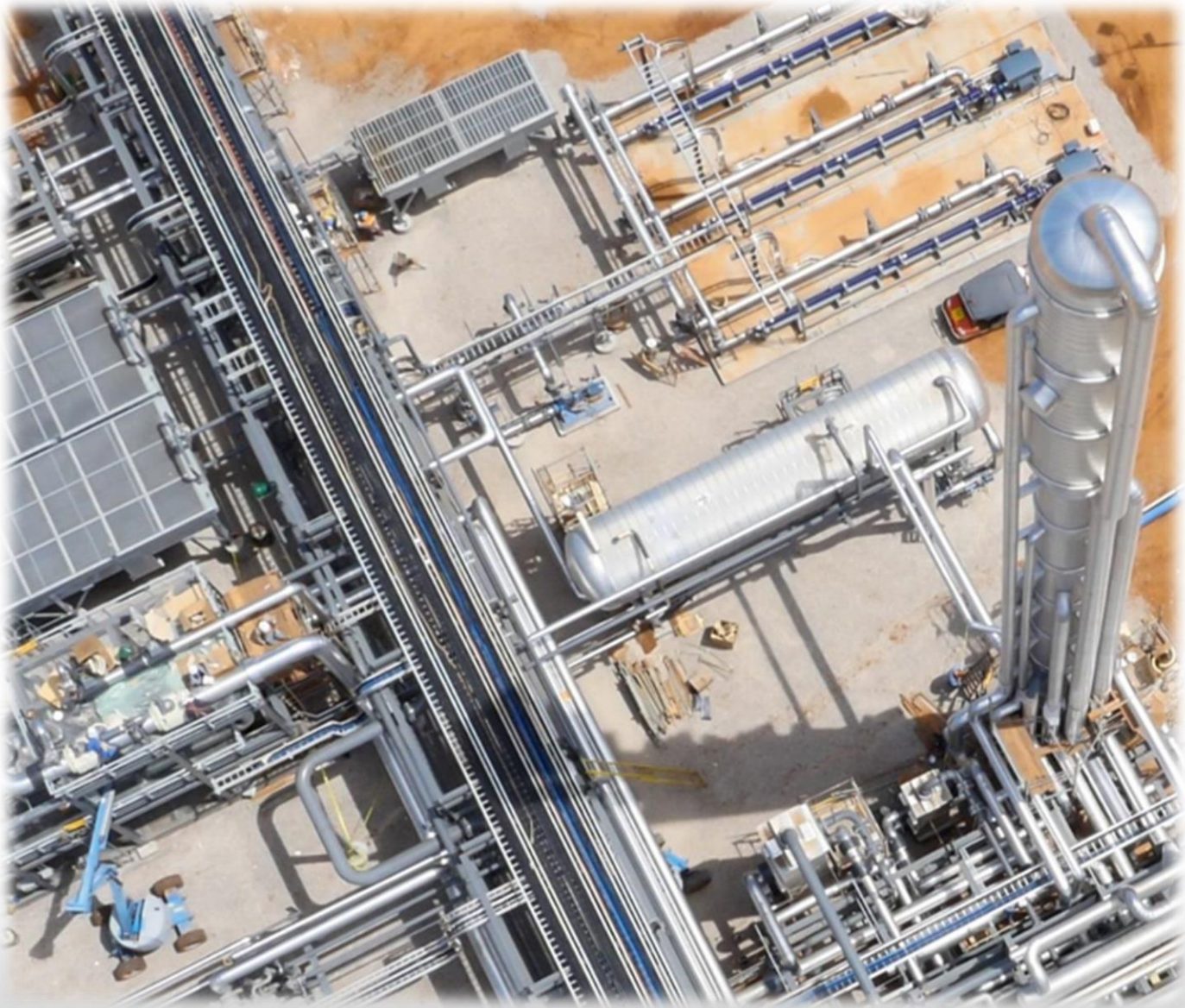


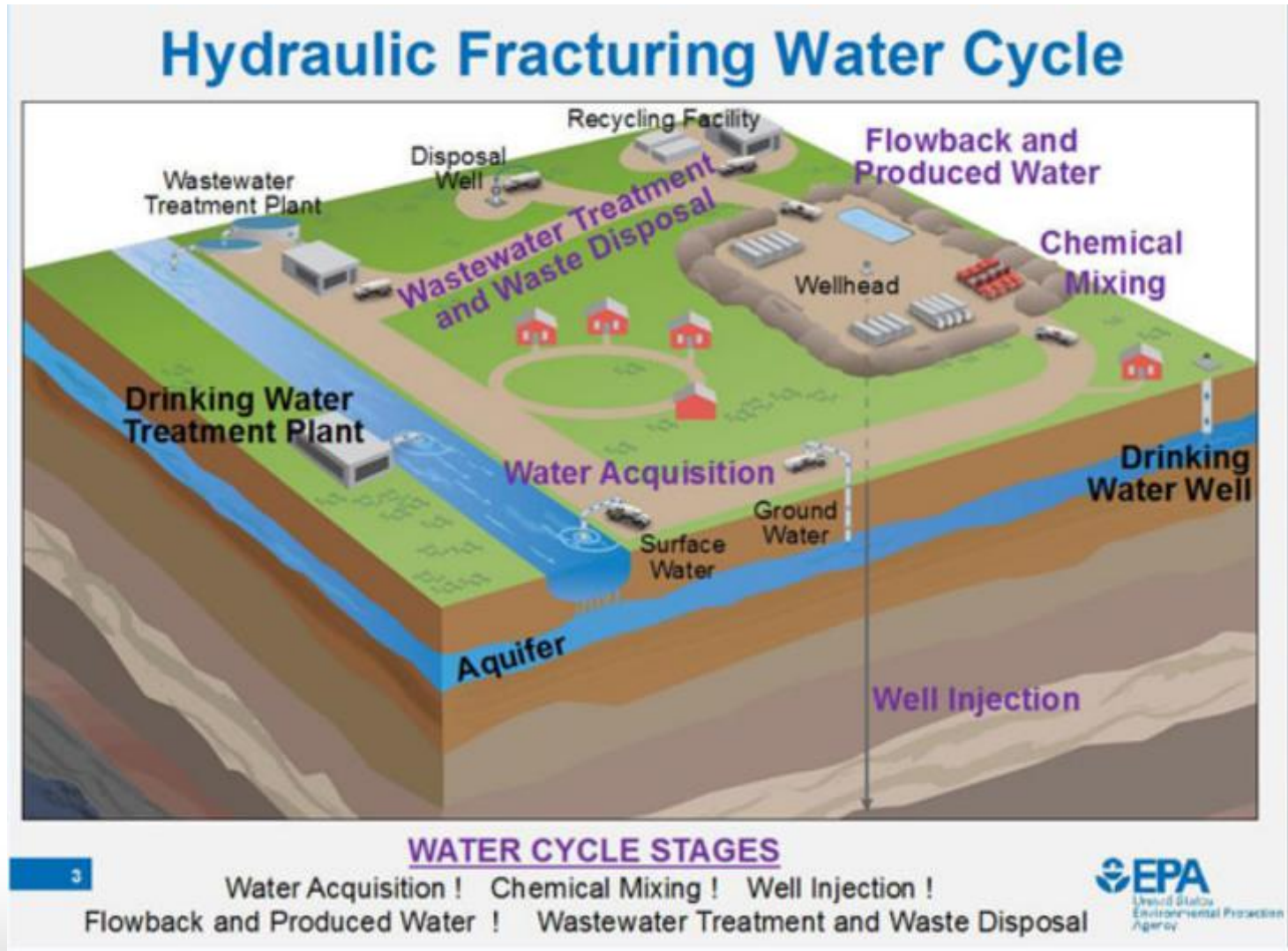
- **Upstream**
 - Drilling
 - Production

- **Midstream**
 - Transportation
 - Treatment

- **Downstream**
 - Industrial
 - Residential
 - Commercial

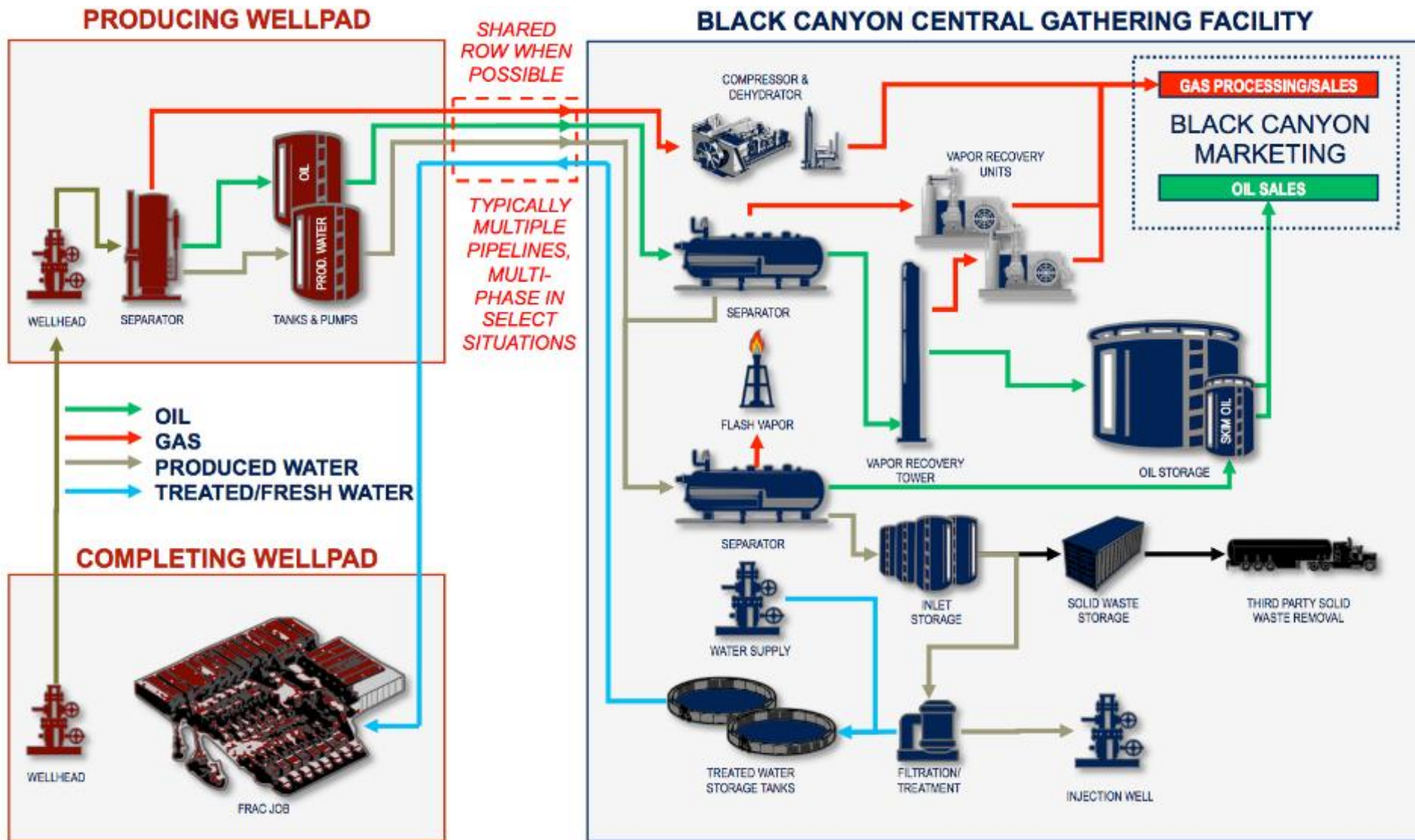




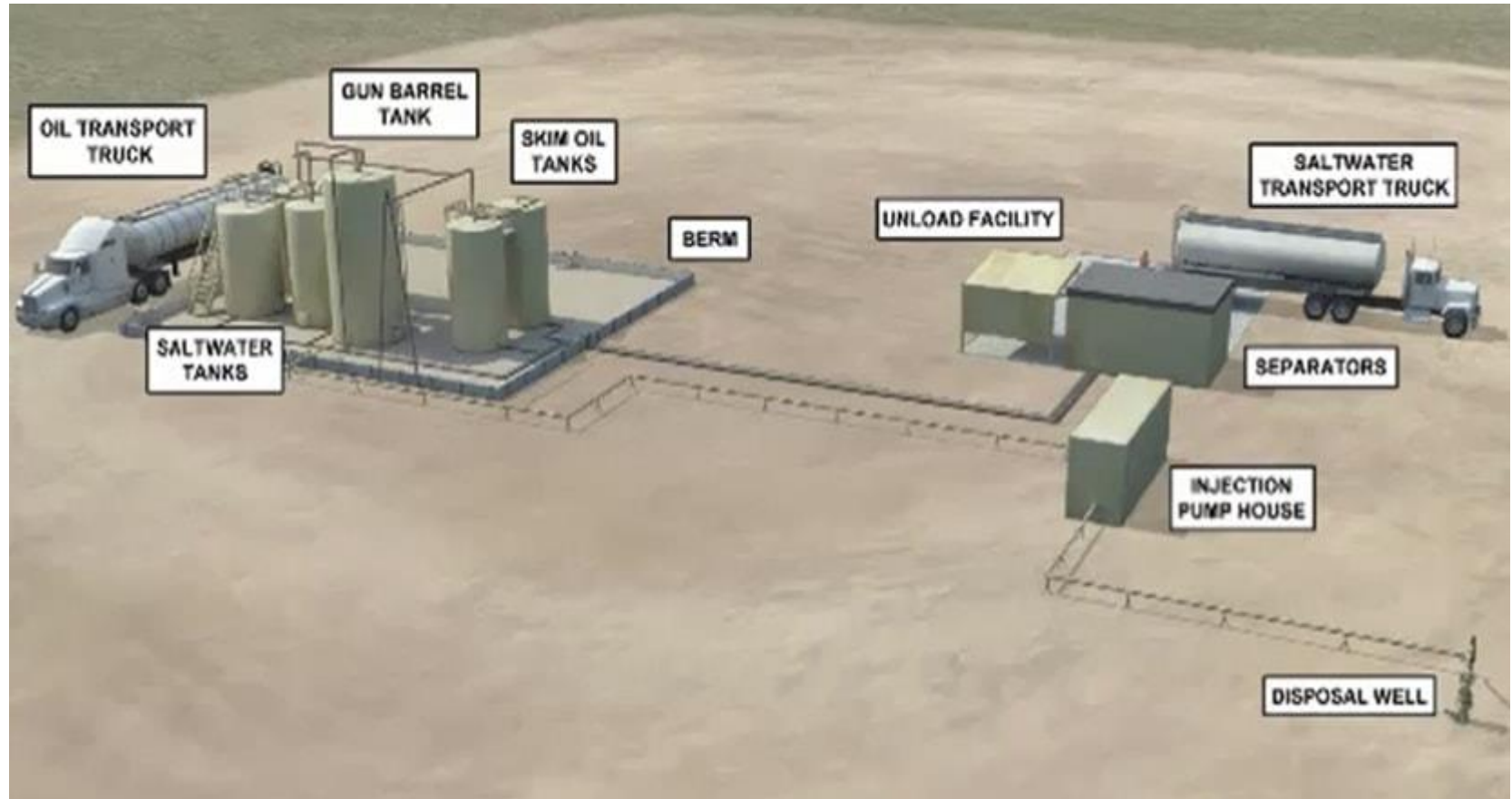




(©Hart Energy, source: Gravity Oilfield Services)



(Source: Black Canyon Midstream)



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



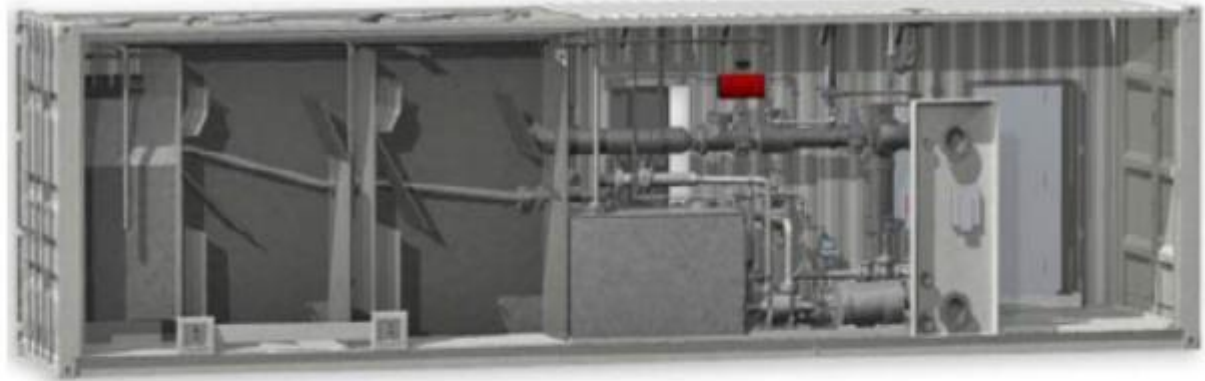
(©Hart Energy, source: Basic Energy Services)




REVOLIFT® VS Flotation



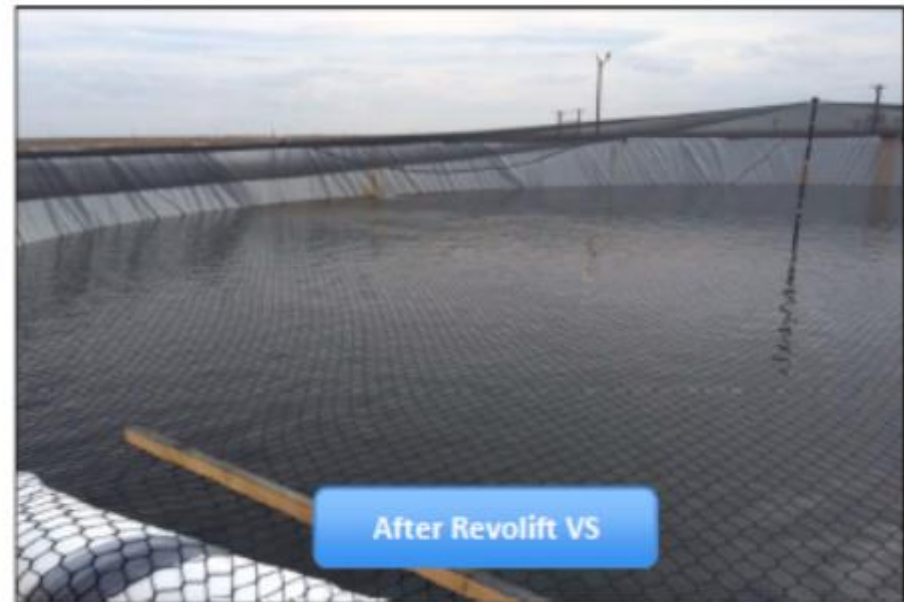
- Fully Enclosed, Multi-Chambered
- Full PLC and ESD
- Portable
- NACE (Sour Service)
- Blanketed System
- Class 1 Div 2
- 0 – 30,000 BWPD
- Upset tolerant
- Low install costs
- Lower chemical costs



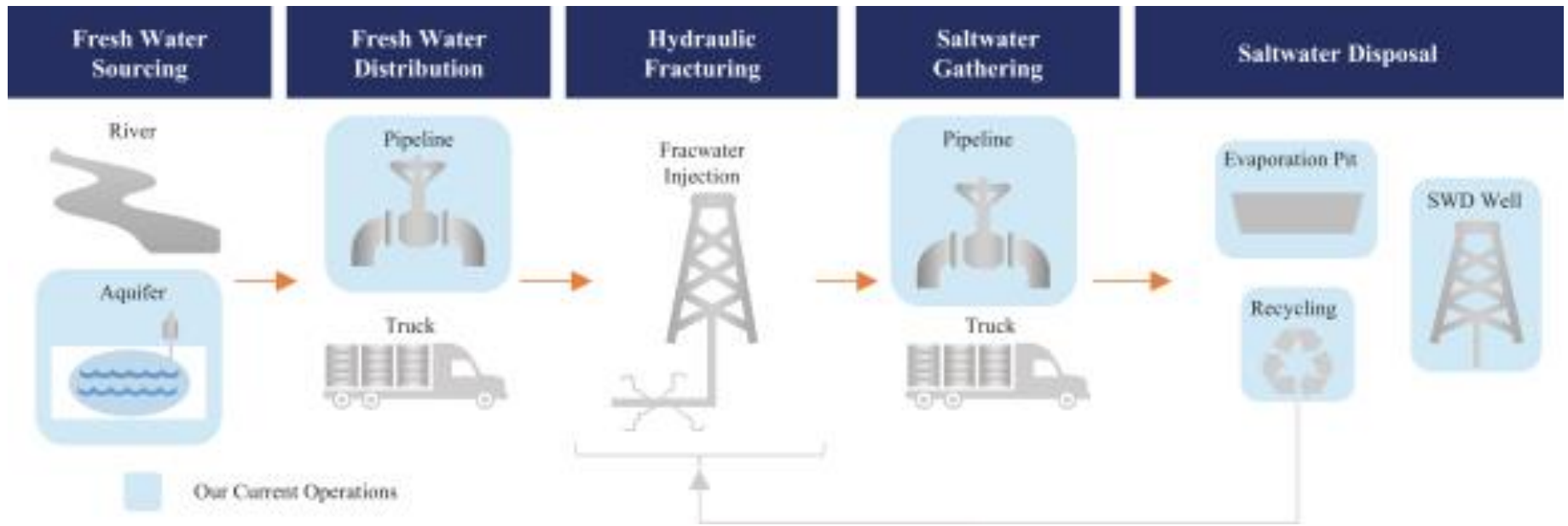
Midstream 101: Exterran REVOLIFT Results



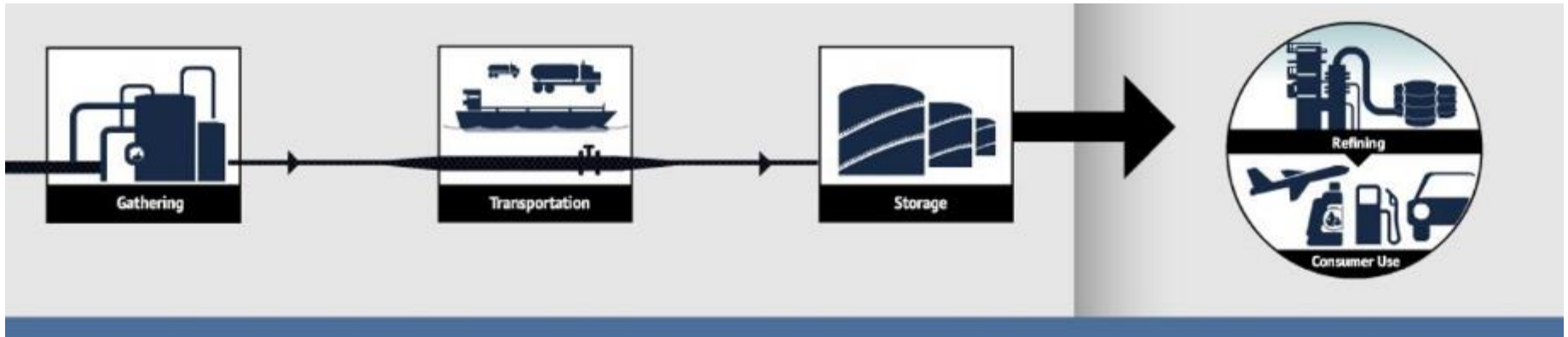
Inlet Oil PPM	Outlet Oil PPM
493	24
520	21
511	25
596	33
522	12
498	29
529	10
335	10
609	14













(Source: Velocity Midstream)





(Source: Enbridge)



(Source: Forbes)



(Source: Businessinsider.com)

