

# **CCUS Roadshow Washington, D.C. Workshop**



*Darrell D. Ricketson*  
*Chief Operating Officer*  
*Kinder Morgan CO<sub>2</sub> Company*

January 28, 2020

- **Overview of Kinder Morgan**
- **CO<sub>2</sub> Source and Transportation**
- **Planning, Specifications, Compliance**
- **KM Outlook and Support for CCUS**

- ❖ Natural Gas Transmission
- ❖ Products Pipelines
- ❖ Terminals
- ❖ CO<sub>2</sub>



## OUR VISION

---

Delivering Energy to  
Improve Lives and  
Create a Better  
World

# Kinder Morgan: Leader in North American Energy Infrastructure



*Unparalleled and irreplaceable asset footprint built over decades*

## Largest natural gas transmission network

- ~70,000 miles of natural gas pipelines
- 657 Bcfd of working storage capacity
- Connected to every important U.S. natural gas resource play and key demand centers
- Move ~40% of natural gas consumed in the U.S.

## Largest independent transporter of refined products

- Transport ~1.7 mmbld of refined products
- ~6,900 miles of refined products pipelines
- ~5,800 miles of other liquids pipelines (crude and natural gas liquids)

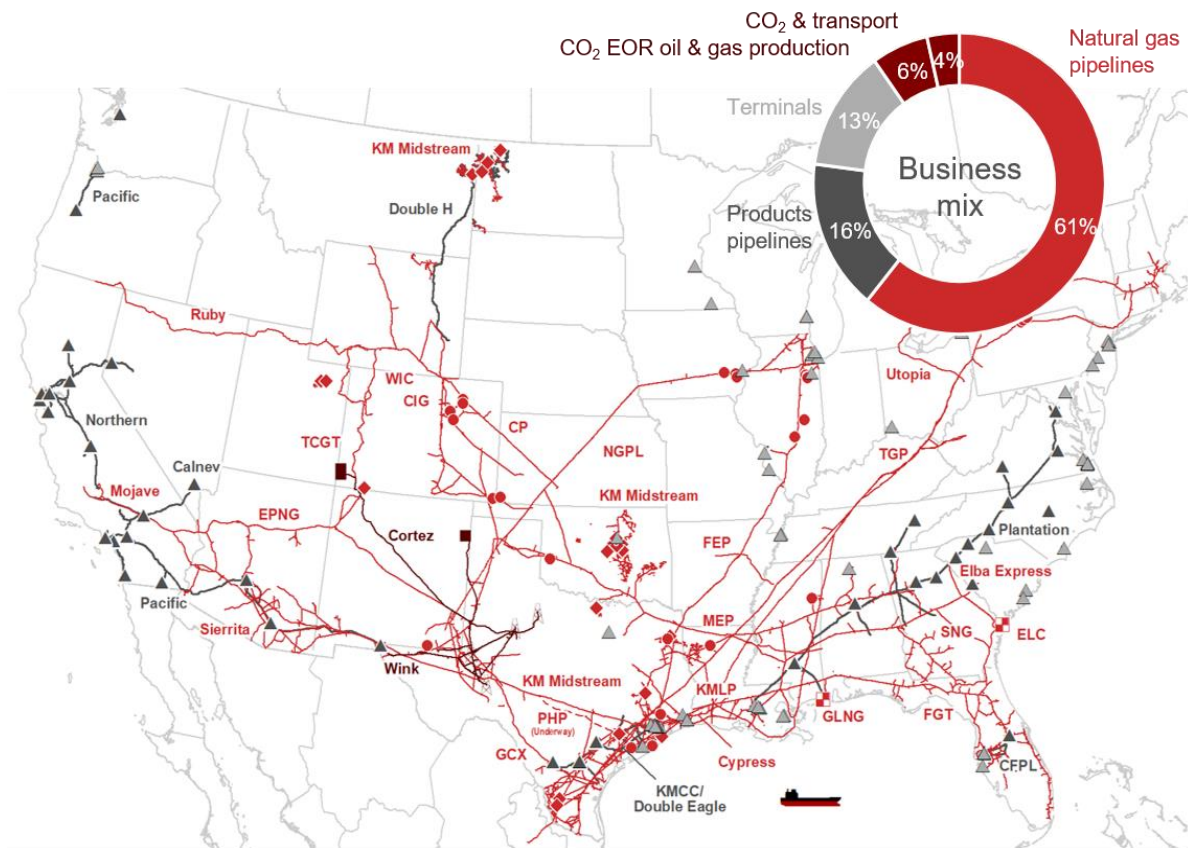
## Largest independent terminal operator

- 147 terminals
- 16 Jones Act vessels

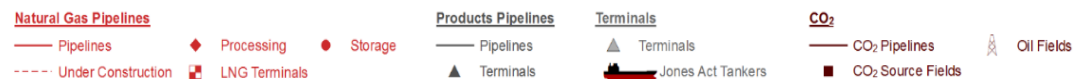
## Largest transporter of CO<sub>2</sub>

- Transport ~1.2 Bcfd of CO<sub>2</sub>

Leading infrastructure provider across multiple critical energy products



Note: Mileage and volumes are company-wide per 2019 budget. Business mix based on 2019 budgeted Adjusted Segment EBDA plus JV DD&A.



# CO<sub>2</sub> Segment Overview



World class, fully-integrated assets | CO<sub>2</sub> source to crude oil production and takeaway in the Permian Basin

## CO<sub>2</sub> & TRANSPORT

CO <sub>2</sub> Reserves	KMI Interest	NRI	Location	Remaining Deliverability	OGIP (tcf)
<b>McElmo Dome</b>	45%	37%	SW Colorado	20+ years	22.0
<b>Doe Canyon</b>	87%	68%	SW Colorado	10+ years	3.0
<b>Bravo Dome<sup>(a)</sup></b>	11%	8%	NE New Mexico	10+ years	12.0

Pipelines	KMI Interest	Location	Capacity (mmcfpd)
<b>Cortez</b>	53%	McElmo Dome to Denver City	1,500
<b>Bravo<sup>(a)</sup></b>	13%	Bravo Dome to Denver City	375
<b>Central Basin (CB)</b>	100%	Denver City to McCamey	700
<b>Canyon Reef</b>	97%	McCamey to Snyder	290
<b>Centerline</b>	100%	Denver City to Snyder	300
<b>Pecos</b>	95%	McCamey to Iraan	125
<b>Eastern Shelf</b>	100%	Snyder to Katz	110
<b>Wink (crude)</b>	100%	McCamey to Snyder to El Paso	145 mbbl/d

## EOR OIL PROD

Crude Reserves <sup>(b)</sup>	KMI Interest	NRI	Location	OOIP (billion bbls)
<b>SACROC</b>	97%	83%	Permian Basin	2.8
<b>Yates</b>	50%	44%	Permian Basin	5.0
<b>Katz</b>	99%	83%	Permian Basin	0.2
<b>Goldsmith</b>	99%	87%	Permian Basin	0.5
<b>Tall Cotton</b>	100%	88%	Permian Basin	0.7



a) Not KM-operated.

b) In addition to KM's interests above, KM has a 22%, 51%, and 100% working interest in the Snyder gas plant, Diamond M gas plant and North Snyder gas plant, respectively.

c) 2019 budgeted Adjusted Segment EBDA plus JV DD&A. See Non-GAAP Financial Measures and Reconciliations.

# Kinder Morgan CO<sub>2</sub> Pipeline Systems



## CO<sub>2</sub> Pipeline System



## Pipeline Details

Name	Length (miles)	Diameter	Year Built
CRC PL	138	16"	1975
Cortez PL	502	30"	1984
Central Basin PL	143	26", 24", 20", & 16"	1985
Pecos PL	25	8"	1985
Centerline PL	112	16"	2002
Cogdell PL	4	10"	2003
Eastern Shelf PL	91	10"	2010
<b>Total</b>	<b>1,298</b>	<b>4" to 30"</b>	

- **Pipeline design and integrity programs critical to safe operations**
- **Operation and maintenance is somewhat unique**
- **Trained personnel**
- **Adherence to product specifications**
- **Reliable delivery and injection for commercial use**
- **CO<sub>2</sub> market and contracts to support take-away**

- **CO<sub>2</sub> Pipelines have same metallurgy as Natural Gas Pipelines**
- **CO<sub>2</sub> Pipelines have higher operating pressures**
  - Gas – 600 to 1200 psig
  - CO<sub>2</sub> – 2000 to 3000 psig
- **CO<sub>2</sub> - PHMSA regulated under CFR Part 195, “Transportation of Hazardous Liquids by Pipeline”**
- **Natural Gas – PHMSA regulated under CFR Part 192, “Transportation of Natural and Other Gas by Pipeline”**
- **Pipeline Safety Management System – API RP 1173**



- **State and Local agencies may have additional regulations**
- **Regulations are specific, prescriptive and auditable**
- **Regulatory and permitting processes requires significant planning time**
  - 2-4 year permitting process
  - Local, state, federal agencies
  - Tribal relationships are critical
  - Coordinated efforts for proper alignment
  - Time and preparation needed for agency and public meetings
  - Requirements vary by impact area

# CO<sub>2</sub> Pipeline Specifications



## Quality specifications for CO<sub>2</sub> pipelines.

- a) **Product**. Contain at least 95 mole percentage of CO<sub>2</sub>.
- b) **Water**. Contain no free water, and not more than thirty (30) pounds of water per mmcf in the vapor phase.
- c) **Hydrogen Sulfide**. Contain no more than 20 ppm, by volume, of H<sub>2</sub>S.
- d) **Total Sulfur**. Contain no more than 35 ppm, by weight,
- e) **Temperature**. Shall not exceed 120°F.
- f) **Nitrogen**. Contain no more than 4 mole percent.
- g) **Hydrocarbons**. Contain no more than 5% mole percent and Dew point no more than -20°F.
- h) **Oxygen**. Contain no more than 10 ppm, by weight, of oxygen.
- i) **Other**. Contain no liquid glycol or no more than 0.3 gallons of glycol per MMcf.

*Note – see Kinder Morgan CO<sub>2</sub> pipeline specification sheet for full list*

## Why are these specifications important?

- a) **Product**. Maintain dense phase and EOR needs
- b) **Water**. Free water causes corrosion and damages pump seals.
- c) **Hydrogen Sulfide**. Dangerous to health and safety of the public. Special requirements if > 99 ppm in Texas.
- d) **Total Sulfur**. Foul odor in product and causes injection problems
- e) **Temperature**. Protect pipeline external coating
- f) **Nitrogen**. Maintain dense phase of product.
- g) **Hydrocarbons**. Maintain dense phase of product.
- h) **Oxygen**. Catalyst for other internal corrosion components. H<sub>2</sub>S and O<sub>2</sub> form elemental sulfur in EOR piping
- i) **Other**. Glycol damages pump seals.

# CO<sub>2</sub> Pipelines – Operations

SCADA: Operational Control

## Cortez, Colorado Control Center



## System Control

- **Centralized pipeline surveillance**
- **24 hour monitoring and control**
- **Monitor pressures, flows, receives key alarms and calls out response**
- **Provides full remote control to:**
  - Start/stop pump stations
  - Flow control to customers
  - Shut-down and closure of valves
- **Pipeline expansions supporting CCUS easily integrated into control center**

- **Kinder Morgan brings capital discipline**
  - Defined benefit
  - Experience invaluable for execution and de-risking for success
  - Investments supported by long term contracts
  - If marketing CO<sub>2</sub>, important to have reliable deliveries and good relations with customers
  
- **Partner to support incentives like 45Q**
  
- **Helium recovery where viable helps economics**
  
- **Opposition to new pipeline infrastructure is potential barrier to CCUS**

- **Existing CO<sub>2</sub> Pipeline Systems are a natural fit for CCUS**
  - Safe method for transportation and distribution
  - CO<sub>2</sub> transportation and marketing fundamentals are well established
  - Network can expand
  
- **Kinder Morgan has extensive experience and expertise in EOR and CO<sub>2</sub> system design, implementation and operation and is ready to help grow CCUS infrastructure**

**Thank You !**

**Darrell D. Ricketson  
Vice President - Chief Operating Officer  
Kinder Morgan CO<sub>2</sub> Company L.P.**

**darrell\_ricketson@kindermorgan.com  
Houston, Texas  
713-369-8930**

January 28, 2020