



WEST VIRGINIA'S APPROACH TO ATTRACTING ETHANE CRACKER INVESTMENTS

G. Kurt Dettinger, Esquire
General Counsel
Governor Earl Ray Tomblin
State of West Virginia

OVERVIEW

- ▶ Anticipating volumes of downstream markets for ethane;
- ▶ Identifying end uses for ethane close to the Marcellus play in the near future
- ▶ Examining opportunity for establishing an ethane market; and
- ▶ West Virginia's Competitive Advantage.

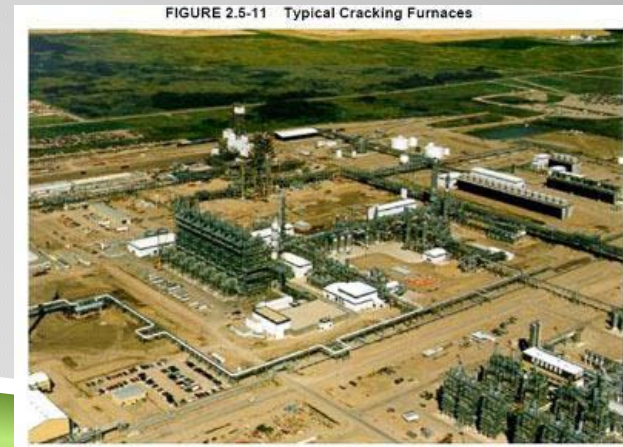
WEST VIRGINIA MARCELLUS TO MANUFACTURING TASK FORCE



- ▶ Created by Executive Order No. 1-11 by Governor Tomblin
- ▶ Comprised of executives with expertise in production activities, midstream activities, chemical manufacturing, transportation issues, economic development, environmental matters and labor issues

GOALS OF TASK FORCE

- ▶ Analyze the feasibility of converting ethane to ethylene in West Virginia
 - ▶ Quantify projected volumes of ethane production
 - ▶ Identify available sites in West Virginia conducive to location and operation of ethane crackers
- ▶ Locate and analyze existing infrastructure within West Virginia, including pipelines and storage facilities



GOALS OF TASK FORCE (CONTRD.)

- ▶ Identify potential companies that specialize in constructing and operating ethane crackers
- ▶ Identify companies willing to invest capital and other resources into the natural gas industry, ethane conversion facilities and revitalization of West Virginia's chemical and manufacturing industries
- ▶ Formulate a comprehensive Marcellus To Manufacturing Action Plan



FOUNDATIONS OF ETHANE MARKET

- ▶ Thriving Natural Gas Industry
- ▶ Robust Marcellus Production
- ▶ Public policies that require responsible development
 - ▶ Environmental regulations that strike an appropriate balance between protecting the environment and allowing responsible production and transportation of natural gas
 - ▶ Executive Order No. 4-11 & DEP Emergency Regulations
 - ▶ Legislative Regulatory Bill



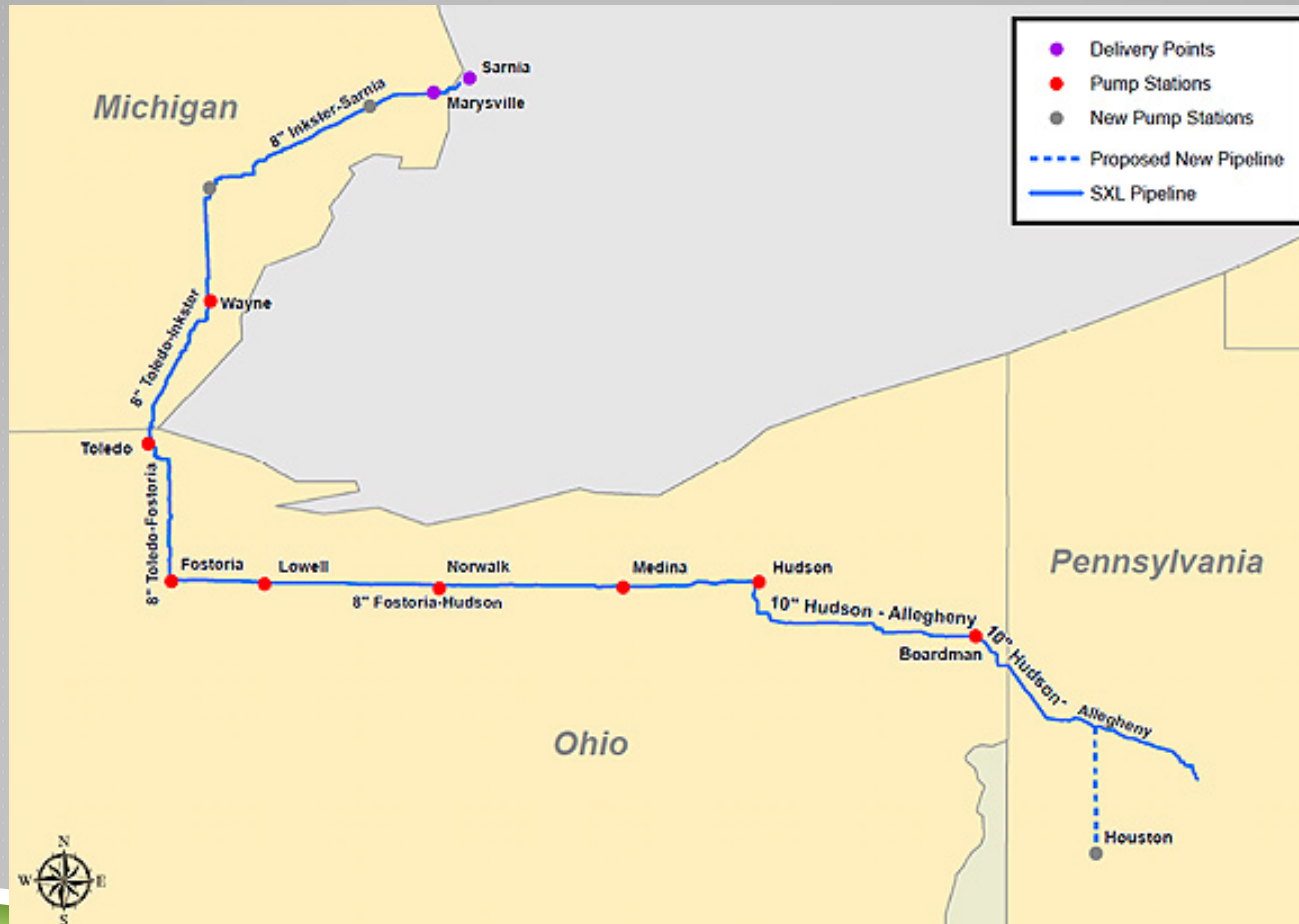
Anticipating volumes of downstream markets for ethane

DOWNSTREAM MARKETS OUTSIDE OF MARCELLUS PLAY

- ▶ Sarnia, Ontario, Canada
 - ▶ Mariner West Project
- ▶ Gulf Coast, United States
 - ▶ Enterprise
 - ▶ Mariner East Project
- ▶ European Destinations
 - ▶ Mariner East Project



MARINER WEST PROJECT



Source: <http://www.sunocologistics.com/marinerwest/>, August 11, 2011

MARINER WEST PROJECT



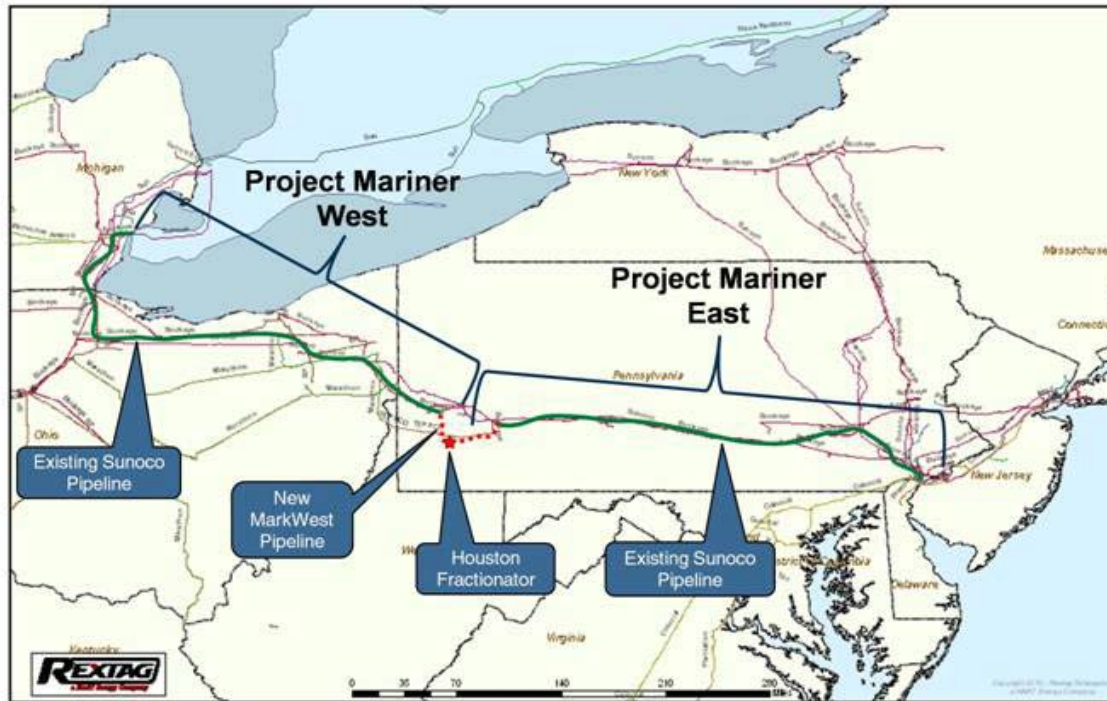
- ▶ Ethane Pipeline to Sarnia, Ontario, Canada
 - ▶ Range Resources and Caiman Energy have agreed to long-term ethane supply agreements with Nova Chemicals. Other regional producers may also have committed capacity to this project
 - ▶ Transport Marcellus ethane from MarkWest's Houston, PA fractionator to Sarnia, Ontario predominately using Sunoco Logistics pipelines
 - ▶ Mariner West is expected to transport 50,000 Bbl/day

ENTERPRISE PIPELINE

- ▶ Ethane Pipeline to Gulf Coast Region, USA
 - ▶ Approximately 1,230 mile pipeline
 - ▶ Transport Marcellus and Utica Shale ethane from Appalachian Basin to the Gulf Coast
 - ▶ The Enterprise project is anticipated to have an initial capacity to transport up to 125,000 Bbl/day, which could be expanded
 - ▶ Chesapeake recently reserved 75,000 Bbl/day of transportation capacity on this project

MARINER EAST PROJECT

Project Mariner East and West



Source: MarkWest Energy Partners, L.P. Form 8-K, Exhibit 99.1, filed July 20, 2011, U.S. Securities and Exchange Commission

MARINER EAST PROJECT

Project Mariner: A Comprehensive Ethane Solution

- MarkWest Liberty and Sunoco Logistics have created effective solutions for ethane that would provide access to attractive NGL markets in North America and Europe
- Timely start up in second half of 2012 for transportation to Sarnia with future incremental ethane deliveries bound for favorable European and Gulf Coast Markets
- Project Mariner requires minimal pipeline construction – a combined total of 75 miles of new pipe is required to deliver ethane to Sarnia, Gulf Coast and European markets
- Project Mariner would have access to ethane storage at Marysville and Philadelphia
- Project Mariner is scalable and can be staged to meet producer's "must recover" and "optional" supplies of ethane



SUMMARY OF NON-MARCELLUS REGION DOWNSTREAM MARKETS

- ▶ Sarnia, Ontario, Canada
 - ▶ 50,000 Bbl/day via Mariner West
 - ▶ Projected to be operational in late 2013 / early 2014
- ▶ Gulf Coast, USA
 - ▶ Up to 125,000 Bbl/day initially via Enterprise
 - ▶ Projected to be operational 1st quarter 2014
 - ▶ Incremental volumes via expanded Enterprise or Mariner East
- ▶ Total non-Marcellus demand – up to 175,000 Bbl/day of Appalachian Basin ethane

Identifying end uses for ethane close to
the Marcellus play in the near future

WEST VIRGINIA AND THE CHEMICAL INDUSTRY – A BRIEF HISTORY

- ▶ From 1972 to 1992, West Virginia lost thousands of jobs in the chemical industry due to industry decline and corporate restructuring
- ▶ Today, West Virginia remains the home to significant chemical operations – operations that are well positioned to be expanded and reinvigorated with a stable, cost-effective ethane supply



MARCELLUS ETHANE'S POTENTIAL TO REVITALIZE CHEMICAL INDUSTRY

- ▶ West Virginia has numerous chemical sites with room to expand
- ▶ Local conversion of Marcellus ethane into ethylene has the opportunity to create new market efficiencies and generate a groundswell of new petrochemical activity in West Virginia involving ethylene and polyethylene
- ▶ West Virginia stands ready to work with those companies seeking to invest in ethane to ethylene conversion facilities in our state

Examining opportunity to establish an ethane market

KEYS TO ESTABLISHING MARKETS FOR ETHANE

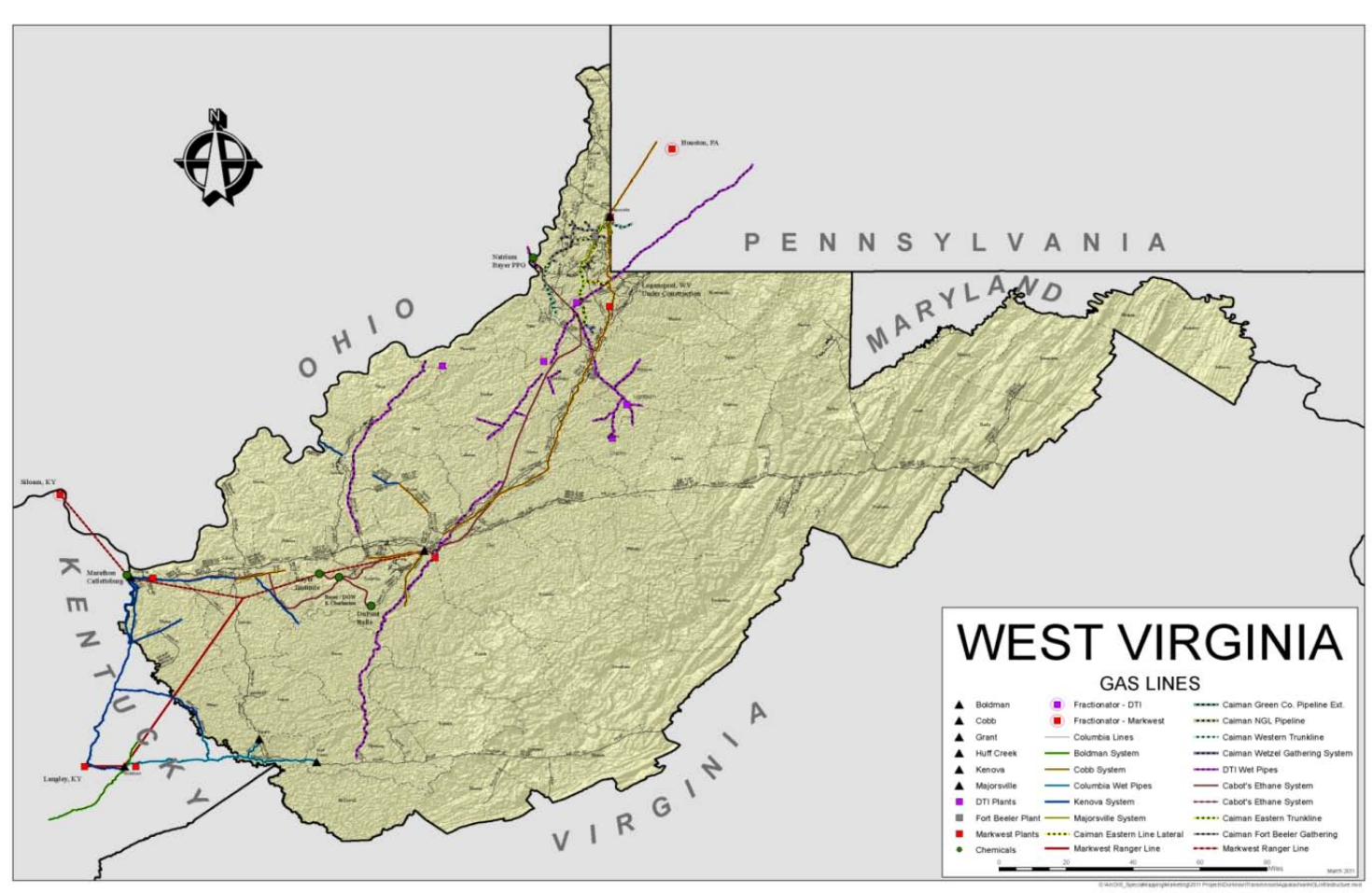
- ▶ Demonstrate to petrochemical companies that West Virginia is a willing, capable partner for ethane cracker investments
 - ▶ Adequate, Stable Supply of Ethane
 - ▶ World-Class Midstream Infrastructure and Facilities
 - ▶ Feasible Ethane Storage Capabilities
 - ▶ Suitable, Advantaged, Developable Sites



ETHANE SUPPLY – MORE THAN ADEQUATE

MarkWest – Southwestern, PA/Northern, WV (Houston, Pa, Majorsville, WV, etc.)	120,000 Bbl/day
MarkWest – Siloam, KY	20,000 Bbl/day
Dominion (Hastings, WV and Natrium, WV)	50,000 Bbl/day
Caiman Energy (Northern WV Fractionator)	80,000 Bbl/day
Total Ethane Production EOY 2015	270,000 Bbl/day
Less: Mariner West Demand	(50,000 Bbl/day)
Less: Enterprise/Mariner East Demand	(125,000 Bbl/day)
Remaining Ethane Volumes	95,000 Bbl/day

PROCESSING PLANTS, FRACTIONATORS & PIPELINES



Supply

Demand

Houston, PA-MarkWest

Mariner West- 50,000 bbl/day

Enterprise/Mariner East - 125,000 bbl/day

63 miles

10"

Hastings, WV-DTI

23 miles

8"

Natrium, WV-DTI

New Martinsville, WV-Bayer/PPG-60,000 bbl/day

Natrium, WV-Caiman

New Martinsville, WV-PPG Cavern Storage

77 miles

10"



Cornwell/Cobb, WV

37 miles

10"



Institute, WV-Bayer-60,000 bbl/day

Depleted Reservoir or Mined Storage-
Kanawha, Putnam, and Jackson Counties

32 miles

8"

Ranger-Hamlin, WV – MarkWest –
Langley, Boldman



Kenova, WV - MarkWest

39 miles

8"



Total Mileage = 271

WV ETHANE PIPELINE ECONOMICS

	\$150,000/inch-mile	\$180,000/inch-mile	Comments
8" Mileage	94	94	Natrium, Ranger Spurs
8" Capex-\$MM	112.8	135.4	
10" Mileage	177	177	
10" Capex-\$MM	265.5	318.6	
Total Capex-\$MM	378.3	454	
Demand Determinants-BBL/Day	160,000	160,000	Postage Stamp
Demand Rate-Cents/Gallon	2.3	2.8	
Term-Years	15	15	
After Tax-IRR-%	12	12	

ETHANE STORAGE SOLUTIONS

- ▶ WV Development Office commissioned storage study from PB Energy, a division of Parsons Brinckerhoff
 - ▶ PBESS identified three opportunities for underground ethane storage in WV
 - ▶ Salt Caverns
 - ▶ Hard Rock Caverns
 - ▶ Porous Material/Depleted Reservoirs
 - ▶ Phase I deliverables have been delivered



WEST VIRGINIA'S COMPETITIVE ADVANTAGE



- ▶ 2-3 cent/gallon Appalachian ethane system provides cracker with significant feedstock value
- ▶ Marcellus producers that supply ethane to Appalachia enjoy an approximate 12 cent/gallon ethane netback advantage based on expected transportation costs to Sarnia, Ontario, Canada and the Gulf Coast
- ▶ These savings should provide producers an alternative market for the ethane produced from the Marcellus Shale



G. Kurt Dettinger

General Counsel

Governor Earl Ray Tomblin

1900 Kanawha Blvd., East

Charleston, WV 25305

304.558.2000

Chairman, West Virginia Marcellus To Manufacturing Task Force