

# SynCoal Overview



- **SynCoal Solution Converts Your Coal To The Fuel You Prefer**
  - ✓ Recovers heat from your plant efficiently with a non-fluidized tower, converting 2" x 0" coal into consistent bituminous fuel
  - ✓ Removes natural mineral matter that can be safely landfilled, reducing emissions
  - ✓ Provides continual coal market advantage
- **SynCoal Reduces Emissions**
  - ✓ Improves combustion, reducing NO<sub>x</sub> and CO formation
  - ✓ Reduces sulfur, mercury and particulate emissions with precombustion removal
- **SynCoal Increases Production**
  - ✓ Reduces slagging, increases boiler capacity & availability
  - ✓ Reduces auxiliary power for mills & fans
  - ✓ Increases efficiency, reducing CO<sub>2</sub> emissions
- Applications include: coal-fired power generation, coal gasification, cement and steel production facilities

# SynCoal Development



Successor to Northern States, Montana Power, DOE Partnership that invested \$105 million



Gen1

27 years development  
9+ years operations  
~2 million tons sold



8 previous commercial customers  
2 years supplemental firing



Gen2

Efficiency Improvements  
Significant Cost Reductions

# Example SynCoal Upgrade Colstrip, Montana

	MT-PRB	SynCoal	% Change
% Moisture	25%	2%	-94%
Btu / lb	8,700	11,800	+36%
Mass yield	100%	74%	-26%
Energy yield	100%	98%	-2%
# Ash / MBtu	10.3	7.8	-25%
# SO2 / MBtu	1.7	1.0	-40%
# Hg / TBtu	4.6	2.7	-41%

# Example of Economics

## CAPP Coal to Midwest

	<u>\$ / ton</u>
CAPP Coal	68.20
Transportation 478mi	13.38
SO <sub>2</sub> Credits @ \$100	0.50

Delivered Cost **\$82.53**

@ 12,500 Btu, 1.2 # SO<sub>2</sub>

**\$/MBtu \$3.30**

## Engineered Fuel From PRB

	<u>\$ / ton</u>
PRB Coal	13.00
Transportation 1,094 mi	25.15
Conversion	11.71
Processing	<u>5.00</u>
Cash Cost	54.86
Benefit Share	<u>13.69</u>

Effective Price **\$68.55**

@ 11,500 Btu, 0.8 # SO<sub>2</sub>

**\$/MBtu \$2.98**

# PRB Coal Conversions

## Since 1990, PRB Use Grew By 300 Million Tons

- Only 2.4 GW designed for PRB were added
- About 80 GW switched to PRB coals
- Conservatively 224 M tons (60 GW) converted from bituminous coals to PRB coals

## Enhanced Coal Testing At PRB Designed Plant

- Enhanced PRB coal testing improved efficiency - 8.8%, output - 29%, SO<sub>2</sub> - 49% and mercury – 41% on a Btu for Btu basis
- Applying these results to the PRB conversions could reduce **SO<sub>2</sub> by 477,000 tons, NO<sub>x</sub> by 56,000 tons, mercury by 8,900 lbs and CO<sub>2</sub> by 40 million tons each year !**

Based upon SynCoal test results