

Clean Coal Technologies, Inc. The Pristine[™] Suite of Technologies

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Clean Coal Technologies has the potential to revolutionize the global coal industry.



Clean Coal Technologies, Inc. is an emerging growth coal technology company developing what we believe is the world's first commercially viable and scalable coal dehydration and stabilization technology.

CCTI's proven technology can eliminate moisture, reduce transportation costs, and minimize carbon footprint, allowing for the upgrade of billions of tons of coal around the world.

All of CCTI's technologies are patented globally.

CCTI's suite of patented technologies enables the dehydration and gasification of coal.

Pristine-M[™] technology developed by CCTI has been successfully tested in partnership with the University of Wyoming and Kiewit Engineering and is ready for commercialization.

Pristine-M[™] technology offers compelling arbitrage economics for upgrading low-rank coal (LRC). Global demand for coal continues to rise.

South & Central America

96

Europe & Eurasia

In 2016, coal accounted for 45.1% of global non-renewable energy reserves:

Asia Pacific

3732 million tons

of coal were consumed

50.6% by China

11.0% by India

9.6% by the United States

Source: BP Statistical Review of World Energy 2018

91

North America

Middle East

Africa

06

16

1000



81% of world coal reserves are low-rank coals (LRC) which is the target coal for Pristine M

High moisture content & low heating value





Lignites 5.5-14.3 MJ/kg 1300-3400 kcal/kg



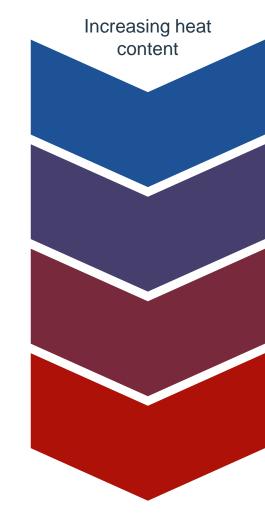
Sub Bituminous 5.5-14.3 MJ/kg 2000-4000 kcal/kg



Bituminous 18.8-29.3 MJ/kg 4450-7000 kcal/kg



Anthracite 30+ MJ/kg +7100 kcal/kg





CCTI's proprietary technologies address commercial needs across industries.



- Coal mining companies needing to upgrade LRC
- Power companies needing to meet air quality standards
- Steel companies needing low-cost materials
- Transportation companies needing to eliminate coal dust in transit
- Chemical companies needing to harvest hydrocarbons from low-cost coal vs high-cost oil
- Valuable by-products including rare earth mineral extraction from coal



Pristine[™]

Upgrade low-rank high-moisture coal and extract valuable byproducts

Pristine-SA[™]

Reduce coal to fixed carbon and co-fire with biomass

CCTI's Proprietary Technologies



Pristine-M[™]

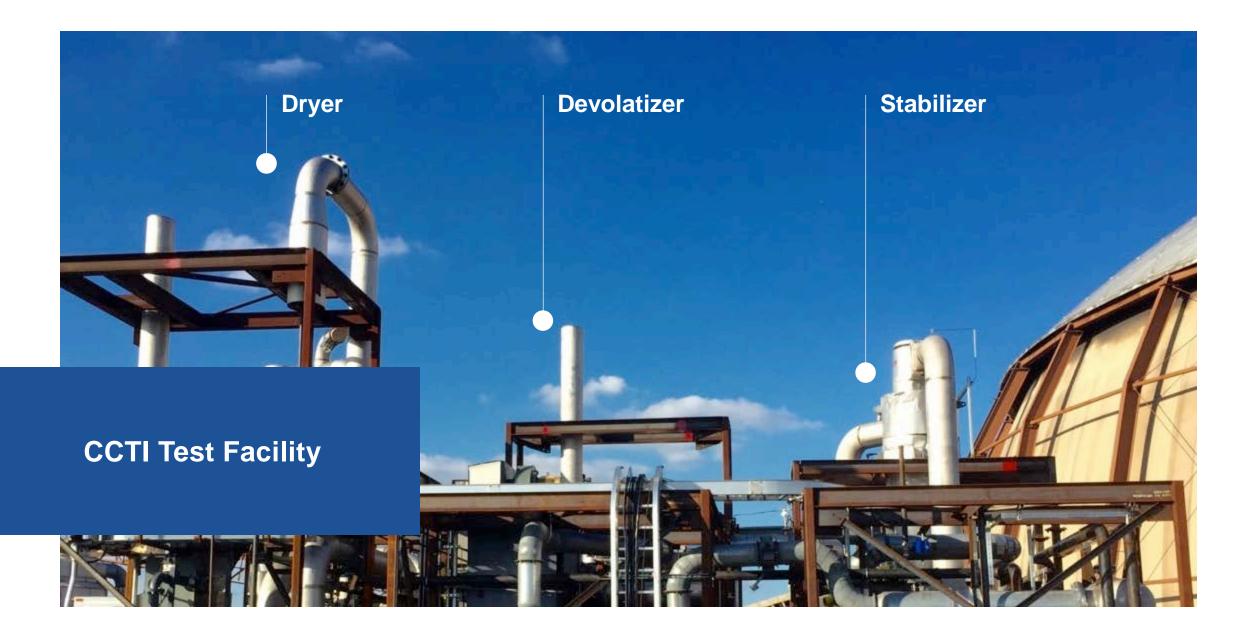
Upgrade high-moisture high-volatile coal and reduce moisture, transportation costs, coal dust, and carbon footprint

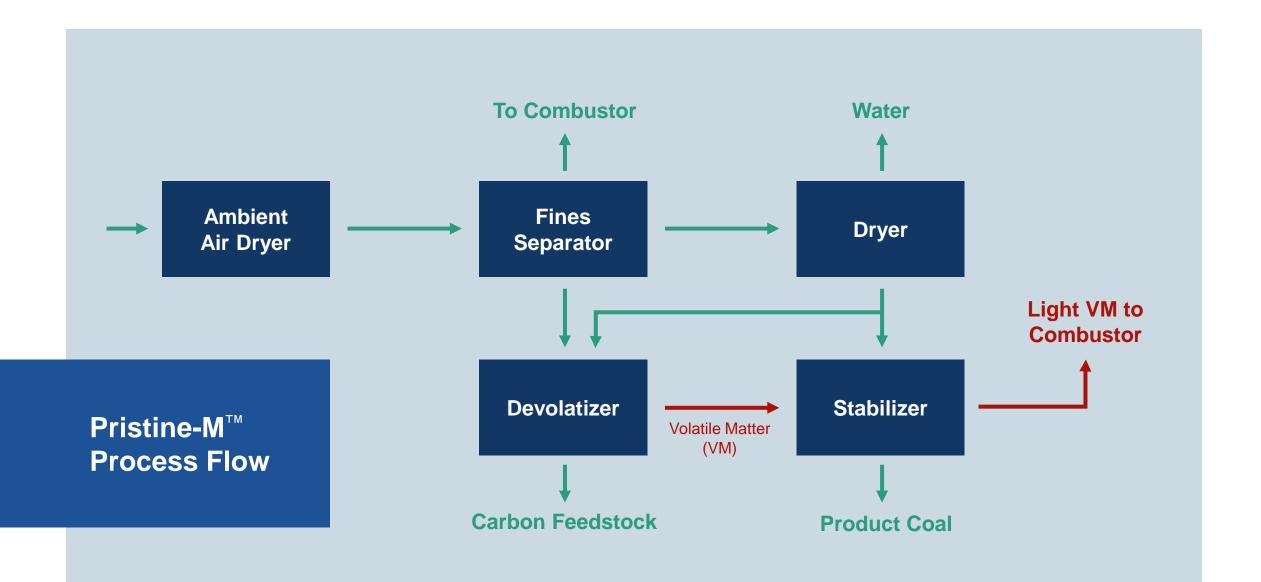
Overview of Pristine-M[™]

Concept

To generate coal-derived volatile gases from a slip stream of coal and use those volatiles in a proprietary stabilization process that renders the dry coal structurally stable and hydrophobic with increased BTU content.

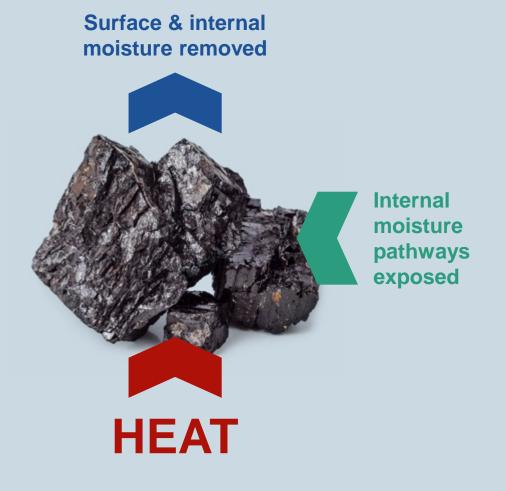
- The technological breakthrough of the Pristine-M's stabilization process is the stabilizer that puts into effect a proprietary technology called "Vapor Phase Deposition," which causes the pores of dry coal to adsorb volatile matter, rendering it hydrophobic while boosting its heat value beyond what would be accomplished by moisture removal alone. The end product is stable and dust-free.
- The Pristine-M pilot plant handles 2-3 tons/hour while the Pristine-M commercial scale module is designed to handle 30 tons/hour.
- Full capacity is achieved by the addition of a suitable number of identical modules up to 1 million tons/year capacity or greater depending on client needs.





Process Overview: **Dryer**

- Low-grade high-moisture coal processed into dryer and demoisturized down to below 5% internal moisture or to client specification
- Dry coal in this state has a tendency to spontaneously combust and must be kept in an inert atmosphere



Process Overview: **Devolatizer**

- Side stream of coal processed into the devolatizer to partially drive off volatile vapor
- Volatiles preserved to coat outer surface of coal later in the process.

Volatile compounds of lower hydrocarbons removed



Process Overview: **Stabilizer**

- Majority of demoisturized coal fed into the stabilizer
- Volatiles condensed from the devolatized coal used to stabilize the demoisturized coal. Called "Vapor Phase Deposition."
- Stabilized demoisturized coal is removed from stabilizer, allowed to cool, and stored for later use in power generation





- No moisture re-absorption
- No spontaneous combustion
- No size degradation
- Ideal gasifier feedstock
- Optimal level of VM to sustain combustion
- Reductions in emissions of CO₂ and carbon footprint
- Dust-free end product

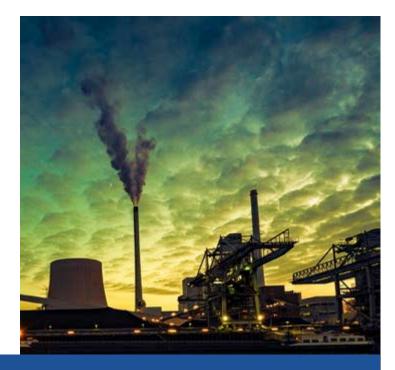


- Processing times are
 5-7 minutes depending on coal
- Adjustable product specifications
- Variety of feed coals—processcontrol and optimization through knowledge-based PLCs
- About 25-45% of the feed coal consumed for the process (subject to the quality of the coal and desired output)

Average Weekly Coal Commodity Spot Prices

(Dollars Per Short Ton)

Region & BTU	Sulpher Content	Ash Range*	Week Ending 07/27/18	Week Ending 08/3/18	Week Ending 08/10/18	Week Ending 08/17/18	
Central Appalachia 12,500 BTU	1.2 SO ₂	6-13% - Average 9%	\$70.55	\$72.70	\$72.70	\$73.20	
Northern Appalachia 13,000 BTU	<3.0 SO ₂	5-20% - Average 10%	\$53.10	\$54.75	\$54.75	\$56.45	
Illinois Basin 11,800 BTU	5.0 SO ₂	8-15% - Average 10%	\$32.95	\$32.95	\$32.95	\$32.70	
Powder River Basin 8,800 BTU	0.8 SO ₂	4-10% - Average 7%	\$13.00	\$12.95	\$12.95	\$12.15	
Uinta Basin 11,700 BTU	0.8 SO ₂	6-18% - Average 12%	\$41.30	\$41.15	\$41.15	\$41.00	



Plant Economics



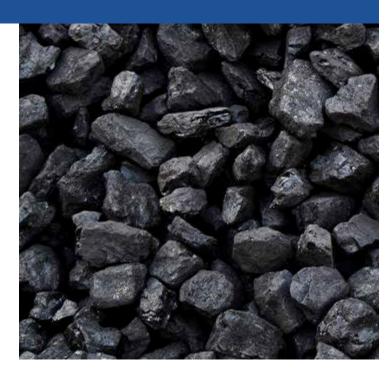
Example using PRB coal and upgrading it to 11,700btu using Pristine M Technology @ 8/17/18

Operating Costs			\$
1mm tons of PRB coal @ 8,800btu			12,150,000
Utilized additional costs (slipstream of coal)	45.00%	450,000	5,467,500
Running costs (based on US labor rates)		1,500,000	
Maintenance (based on US labor rates)	1,500,000		
Total operating costs	20,617,500		
Total capital costs (based on \$35m for 1mm ton facility built in the US)			2,706,066
Total costs			23,323,566
Price per ton to upgrade to 11,700 btu dust free coal		23.32	
Compare to Uinta coal 11,700 btu 1mm ton	41,000,000		
Contribution vs. Uinta coal	17,676,434 / Anum		

Please refer to previous slide 15 for other US coal price comparisons



Current Status



- Test facility fully-tested in Oklahoma
- Successful dehydration of coal
- Successful beneficiation of coal (increase in BTU value)
- Successful stabilization of coal
- Successful production of a dust free, stable end product
- Test facility moved to Fort Union, Wyoming
- New location secured and permits received
- Re-assembly of test facility scheduled

- Simulation models completed by University of Wyoming to facilitate the design and engineering of first commercial unit
- License agreement signed with Jindal Power and Steel (India); deposit paid on a license fee with Wyoming New Power (US)
- Several MOU's outstanding with key clients in India
- Scheduled receipt of 500-ton batches of samples being sent for testing from India and Indonesia and other coal-producing regions



Current Plant Location: Fort Union, WY











Next Steps for CCTI



Milestones Expected to be Completed by Y/E 2018

- Reassemble facility at Fort Union, WY (in-progress)
- Receive 500-ton batches of coal from India and Indonesia for testing
- Client visits to Fort Union
- Completion of DOE technology review
- Complete design of commercial facility
- Execute on outstanding MOU's
- Research by University of Wyoming on coal by-products using test facility

 Research on by-products in Australia in conjunction with Austrade (the commercial division of the Australian Government) and three Australian Universities

Applications of Coal Beyond Energy Feedstock



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What CCTI has done is developed a very intriguing technology.

Richard Horner

Director of Special Projects and Emerging Technology, University of Wyoming. November 2017

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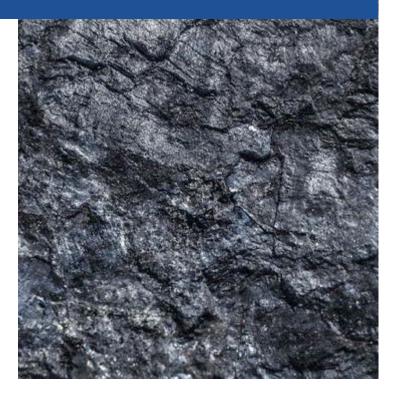
There are proprietary features of the CCTI technology which have scope to be incorporated into our coal refinery concept, what we have been working on now for over two years... The CCTI technology is proven at pre-commercial scale in the field and is an exciting and serious candidate.

Richard Horner

Director of Special Projects and Emerging Technology, University of Wyoming. October 2017



Other Patented Technologies



Pristine-SA[™]

- Convert low-rank coals with high moisture/volatile matter into clean, gasifier feedstocks
- Reduced to fixed carbon and co-fire with biomass
- Reduced VM content to optimum level
- Provides a consistent quality of coal as feed to the gasifier
- No sulfur, tars, and other gases requiring hot or warm gas cleanup

Pristine[™]

- Remove moisture and VM, as per client-specific requirements
- End product is cleanerburning dry coal
- Following launch of Pristine-M tech, CCTI will advance Pristine tech
- By-product extraction in partnership with University of Wyoming

Company Information & Partnerships

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