



# **Wyoming Coal's Role in the World- Recent Past, Present and Future**

**Morgantown, WV**

**2015 Gasification Systems and  
Coal-Biomass to Liquids Workshop**

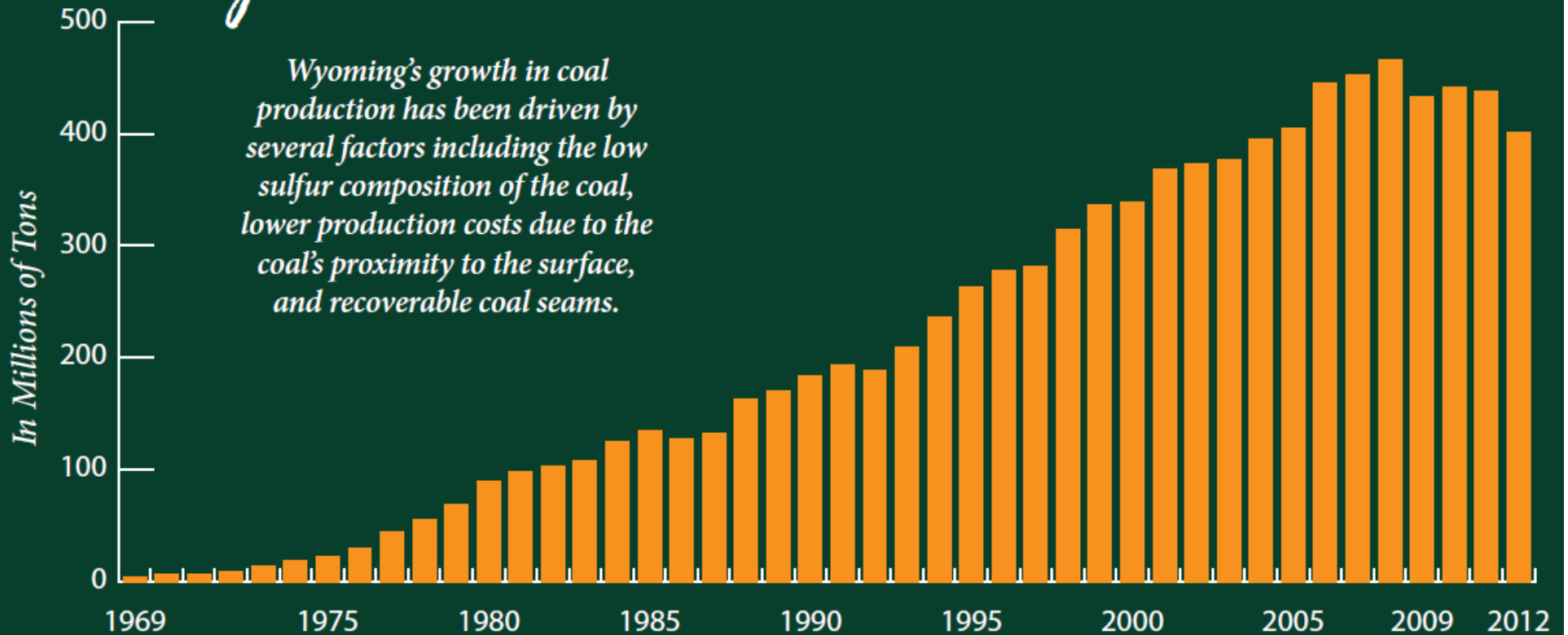
**August 10, 2015**

- **WY produced the most coal on federal and Indian lands in FY2013 accounting for 80% of the total**
- **Two mines in WY accounted for 20% of U.S. coal production by tons in 2012**
- **~720 gallons of water are transported per 1000 tons of WY coal**

- **Development of Wyoming Coal Economy**
- Present Day Challenges
- Tomorrow's Opportunities
- Wrap Up

# Wyoming Coal History

## Wyoming Coal Production, 1969-2012



*Reclamation goes beyond just restoring contours and reseeding native plant species. Reclamation specialists strive to build sustainable natural ecosystems using innovative methods and new techniques to further enhance reclaimed areas.*

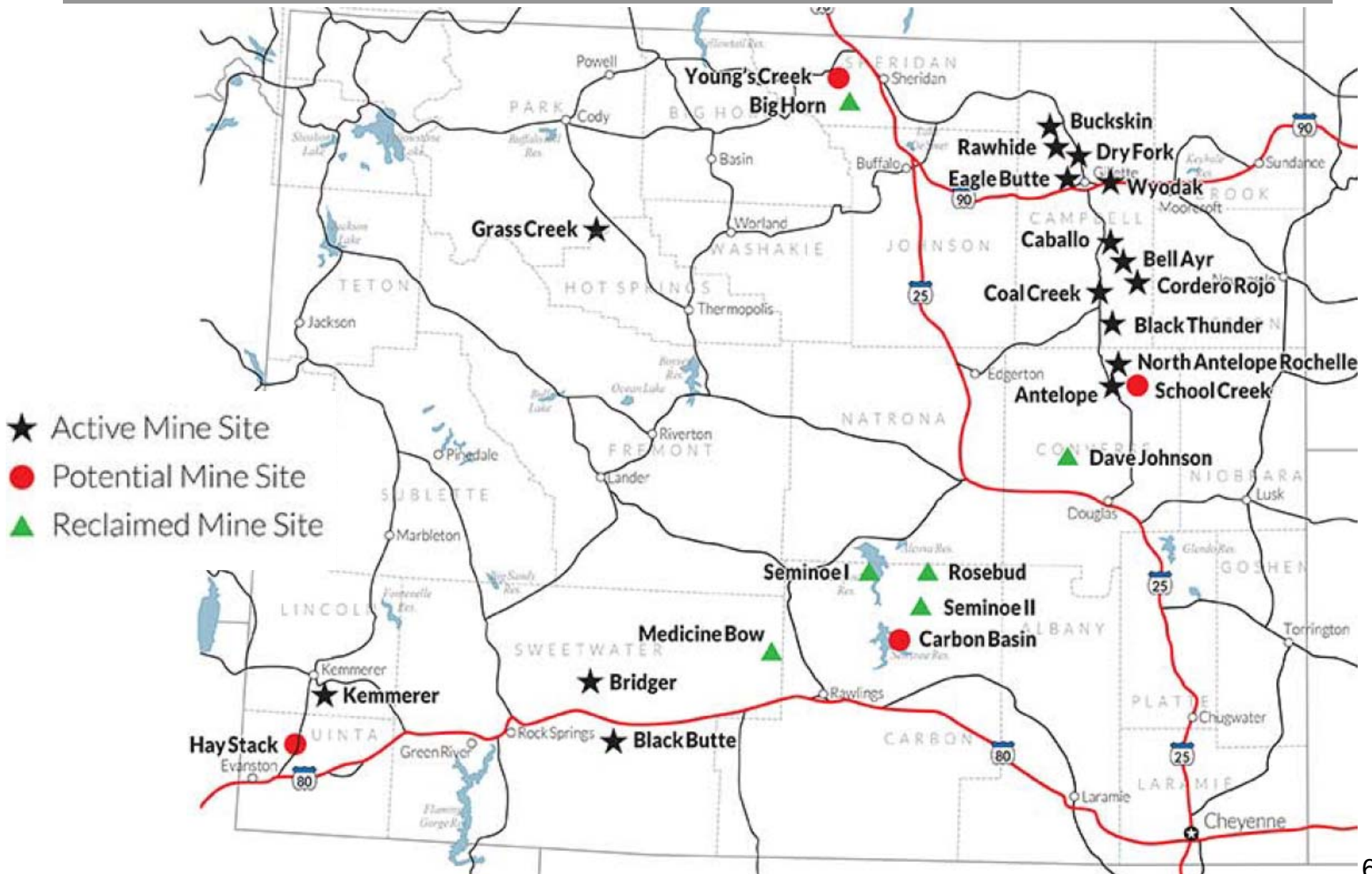


**Mine reclamation aligns with Wyoming heritage of ranching and love for wildlife and outdoor recreation**

Source: Wyoming Mining Association



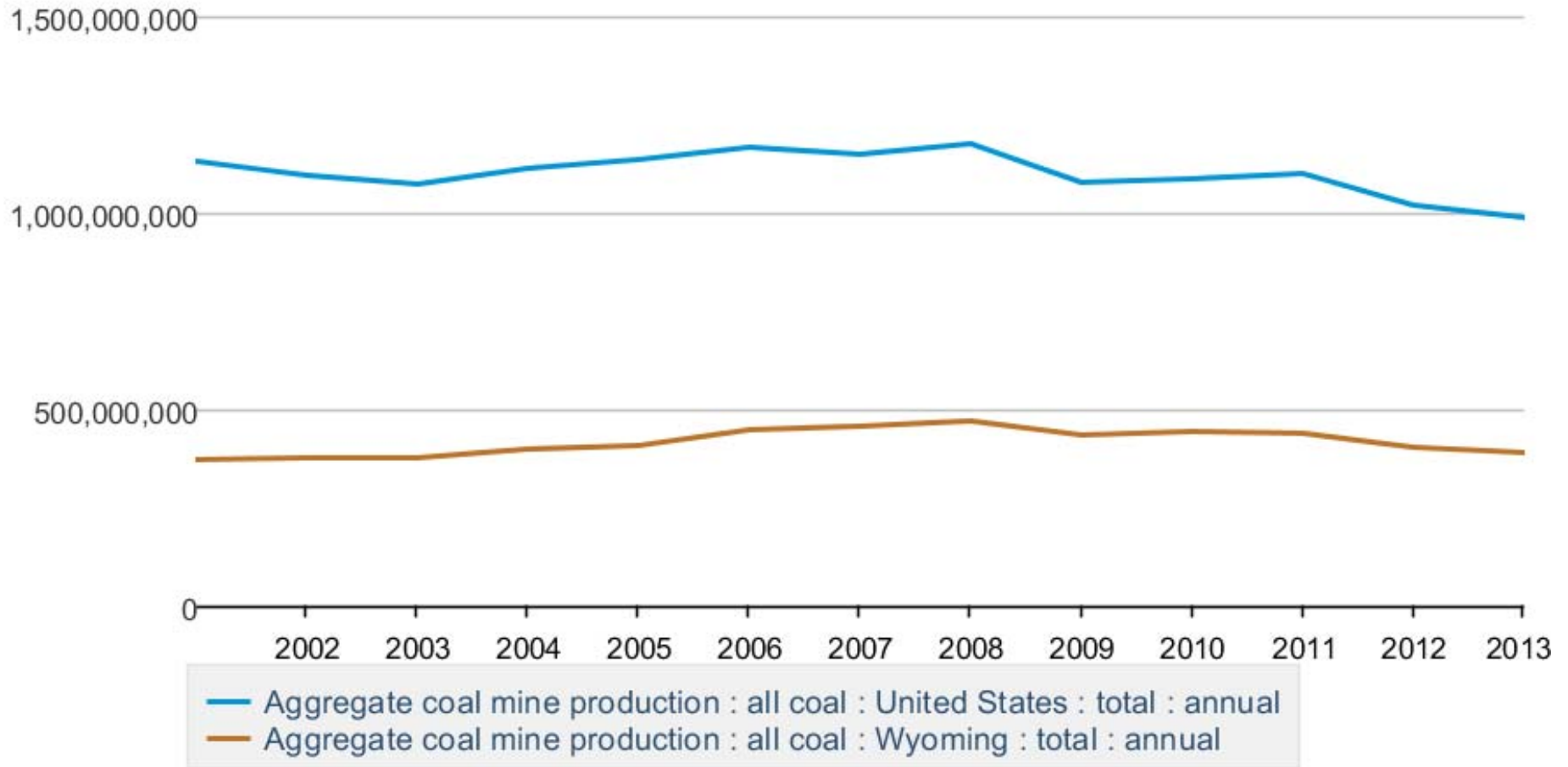
# Wyoming Coal Mines



- **Development of Wyoming Coal Economy**
- **Present Day Challenges**
- **Tomorrow's Opportunities**
- **Wrap Up**

# U.S. & Wyoming Coal Production on a Declining Trend

short tons



Data source: U.S. Energy Information Administration



## **Greenhouse Gas Life Cycle Analysis for WY Coal Exports**

- **The state of Washington has required:**
  - a global greenhouse (GHG) climate change environmental impact assessment
  - under State Environmental Protection Act (SEPA)
  - review of permit applications for coal export terminals in Washington
- **U.S. Army Corps of Engineers determined that a GHG LCA is beyond scope of the National Environmental Protection Act (NEPA)**

**Read more at: Huffington Post, “Pacific Northwest Coal Exports: Washington And Oregon Governors Call For Greenhouse Gas Study,”** **Phuong Le, March 25, 2013;**  
[http://www.huffingtonpost.com/2013/03/26/pacific-northwest-coal-exports\\_n\\_2952245.html](http://www.huffingtonpost.com/2013/03/26/pacific-northwest-coal-exports_n_2952245.html)

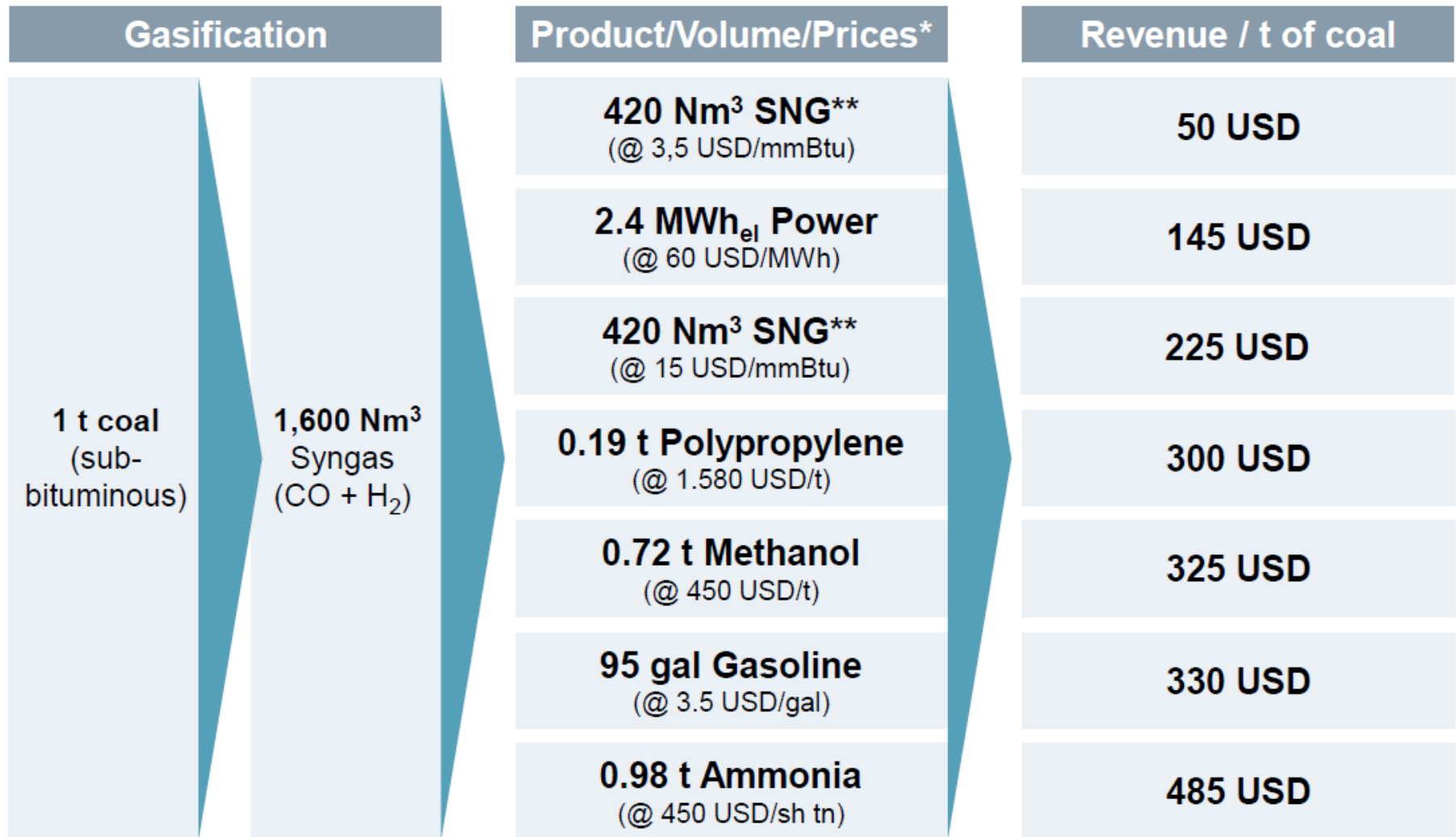
- Mining Operations to End-Use Consumption



- Development of Wyoming Coal Economy
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- **Environmental Regulations**
  - Mercury Air Toxic Standards (MATS)
  - Regional Haze
  - CO<sub>2</sub>
  - Greenhouse Gas (GHG) Life Cycle Analysis
  - Ozone
- **States, Business and Investment Community out ahead of Federal Gov't**
- **Sustainability Movement Progressing**
- **Maximize Flexibility and Optionality**

# Coal / Natural Gas Value-Added Products



\* Applied end-product market prices may differ to actual prices\*\* SNG...Substitute Natural Gas

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Source: Siemens



# Wyoming Coal Spot Price Advantage

## Average weekly coal commodity spot prices

dollars per short ton

Coal commodity regions	Week ended				Wyoming PRB Low-Sulfur Coal Price Advantage % \$/Btu basis
	7/10/2015	7/17/2015	7/24/2015	7/31/2015	
Central Appalachia 12,500 Btu, 1.2 SO <sub>2</sub>	\$54.90	\$54.90	\$49.95	\$49.95	<b>67.2%</b>
Northern Appalachia 13,000 Btu, <3.0 SO <sub>2</sub>	\$53.20	\$53.20	\$52.25	\$52.25	<b>67.3%</b>
Illinois Basin 11,800 Btu, 5.0 SO <sub>2</sub>	\$34.35	\$34.35	\$34.35	\$34.35	<b>54.9%</b>
<b>Powder River Basin 8,800 Btu, 0.8 SO<sub>2</sub></b>	<b>\$11.55</b>	<b>\$11.55</b>	<b>\$11.55</b>	<b>\$11.55</b>	<b>Wyoming</b>
Uinta Basin 11,700 Btu, 0.8 SO <sub>2</sub>	\$39.35	\$39.35	\$39.55	\$39.55	<b>61.2%</b>

Source: U.S. Energy Information Administration, [Coal News & Markets](#)



## *Wyoming Coal – a Water-Rich Resource, too!*

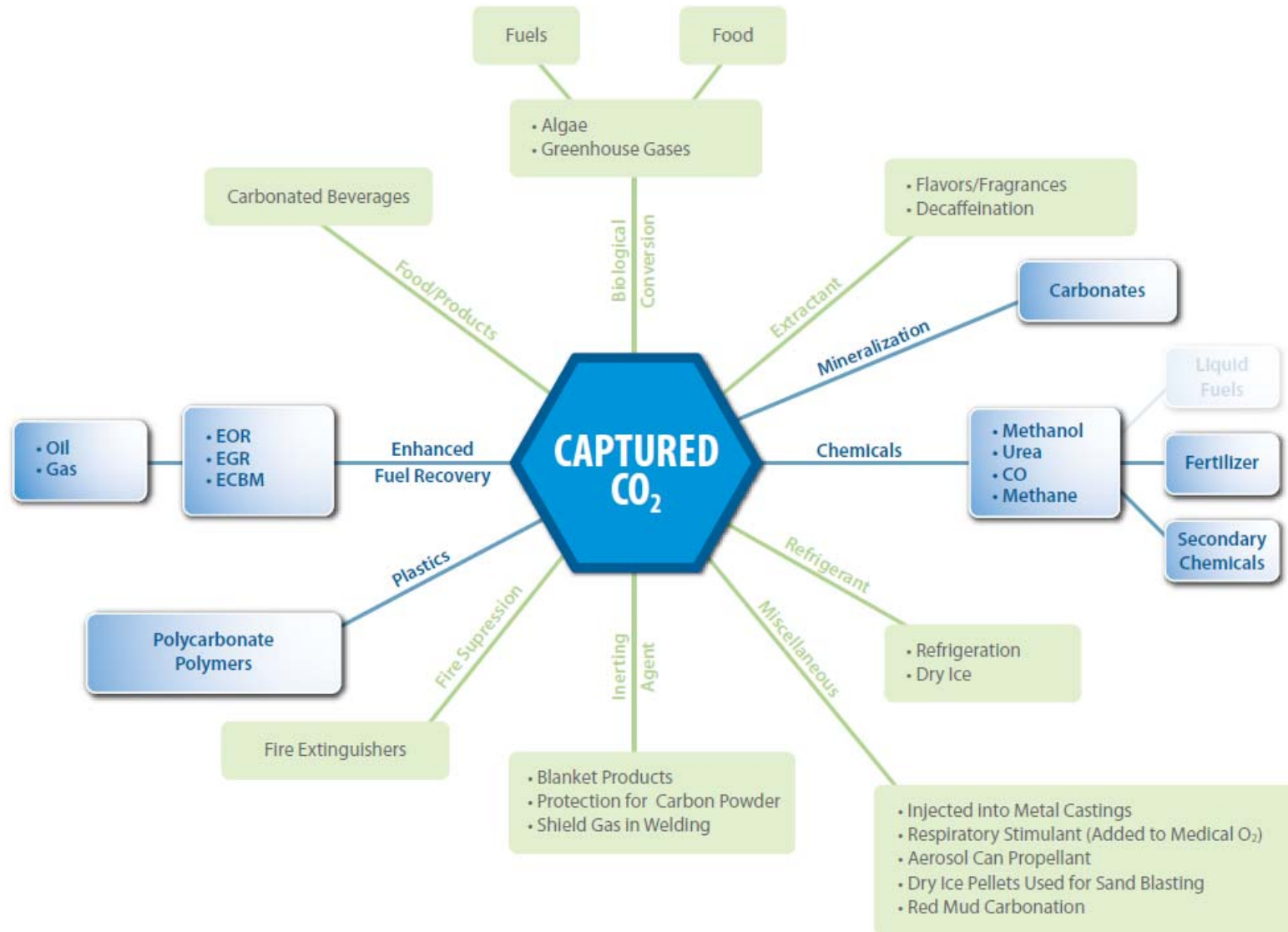
### **WYOMING SUBBITUMINOUS COAL**



**AN UNTAPPED  
WATER, OXYGEN  
& HYDROGEN  
RICH  
NATURAL  
RESOURCE**

~720 GALLONS in 1,000 TONS of PRB COAL  
~300 MILLION GALLONS per YEAR from WYOMING

# CO<sub>2</sub> Use and Reuse Opportunities



**Source: National Energy Technology Laboratory, “Carbon Storage Technology Program Plan,” December 2014**

- **Aim for long-term environmental regulation targets versus present day interim targets**
  - Target Ultimate Goal – Sustainable Energy Systems and Industries
  - Recycle CO<sub>2</sub> for products needed for sustainable societies
- **Energy-Water Efficiency, Conservation-Recycle Strategies**
  - Utilize water in low rank coals
  - Devise integrated multi-plant schemes that avoid/minimize plant temperature ramping damage/degradation costs and inefficiencies
  - Maximize operating at peak efficiency/peak profitability
- **Maximize product value-density vs. shipping impacts**
  - Achieves lowest energy, water, emission LCA level per unit of economic good (GDP)





# **WIA Energy Conference Invitation**

**October 8<sup>th</sup> 8:30am - 9<sup>th</sup> 12:00pm Jackson Hole, Wyoming**

**There is no fee to attend thanks to our sponsors.**

**Venue: Snow King Resort, Jackson Wyoming**

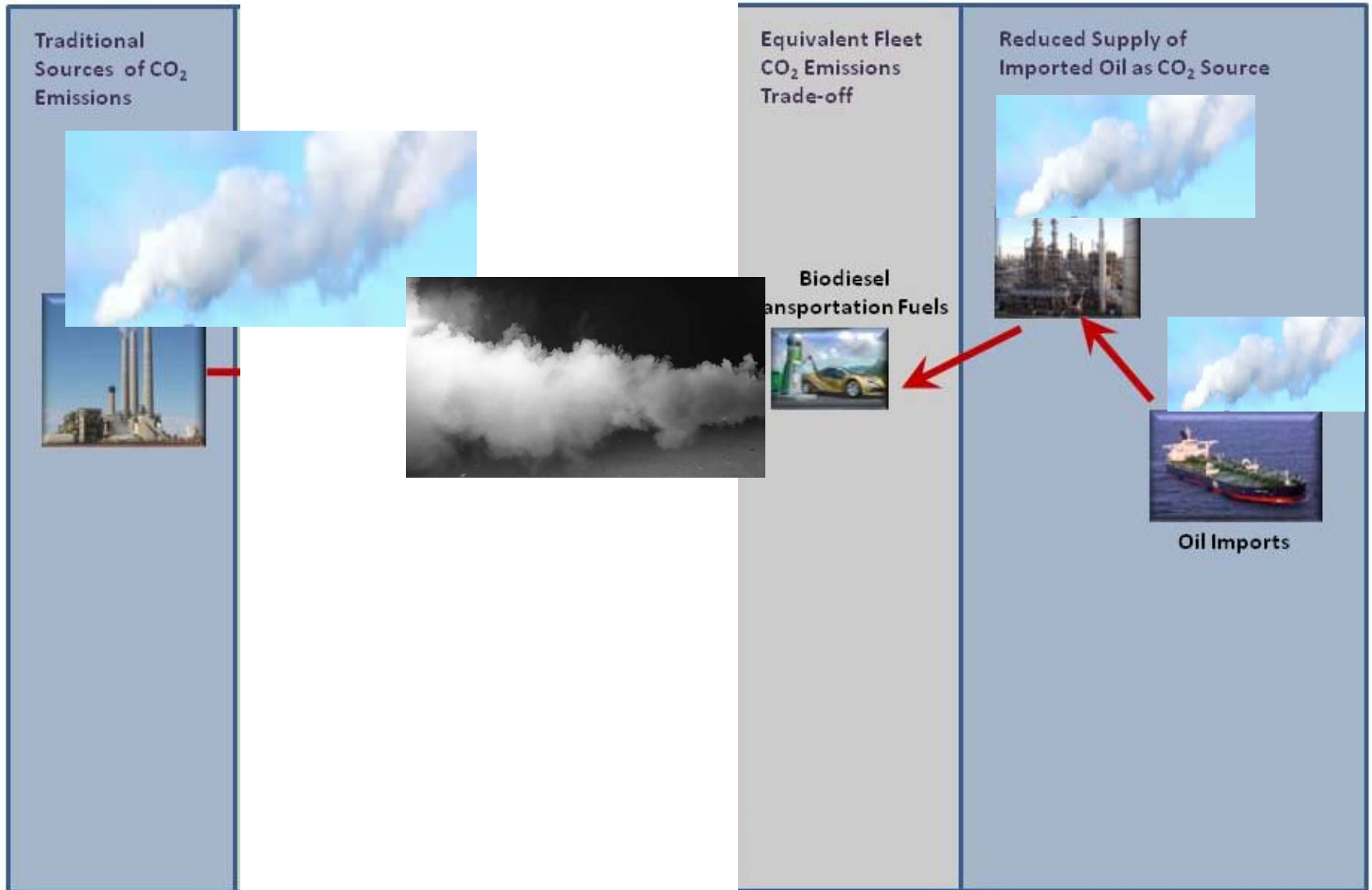
**Registration: RSVP to [Holly.Martinez@wyo.gov](mailto:Holly.Martinez@wyo.gov)**

**Snow King Resort: 800.522.5464 ask for WY Infrastructure Authority rate.**

**<http://wyia.org/events/board-meetings/>**



# Power and Transportation CO<sub>2</sub> Emissions Today





# CO<sub>2</sub> to Transportation Fuel LCA CO<sub>2</sub> drops 40-50%

