



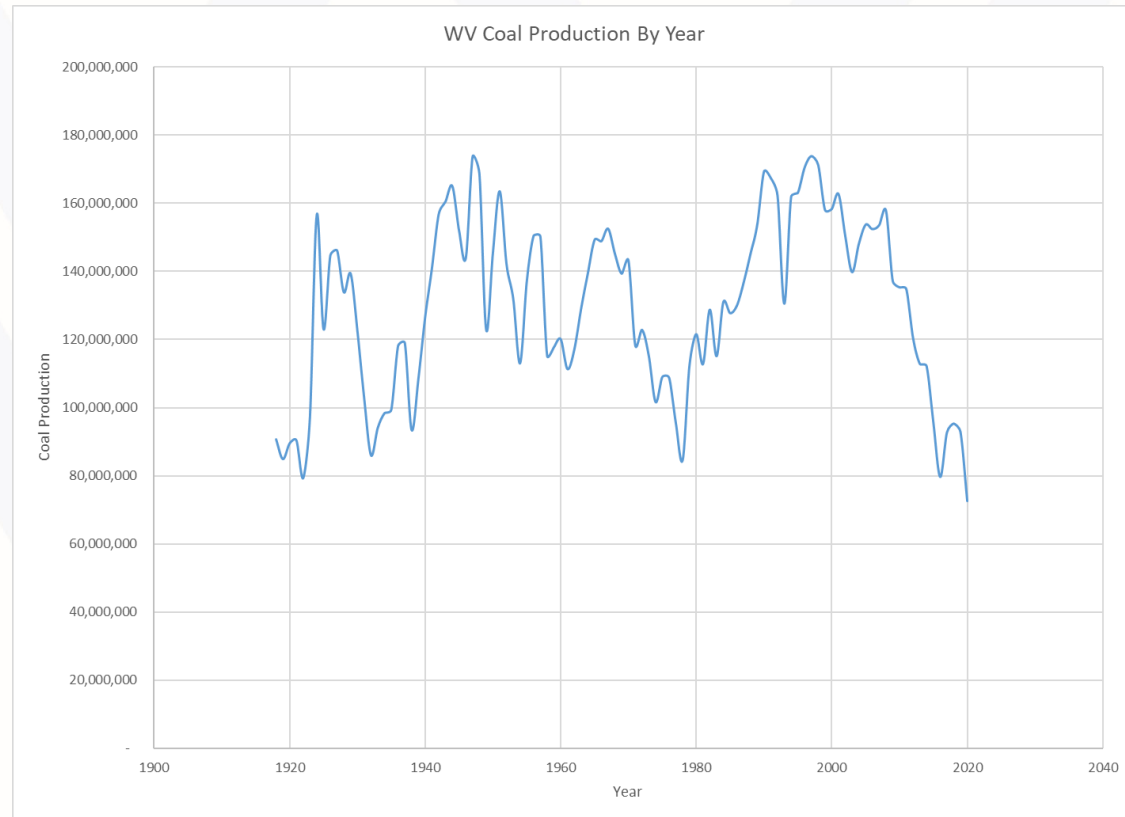
Mid-APPalachian Carbon Ore, Rare Earth and Critical Minerals (MAPP-CORE) Initiative DE-FE032054



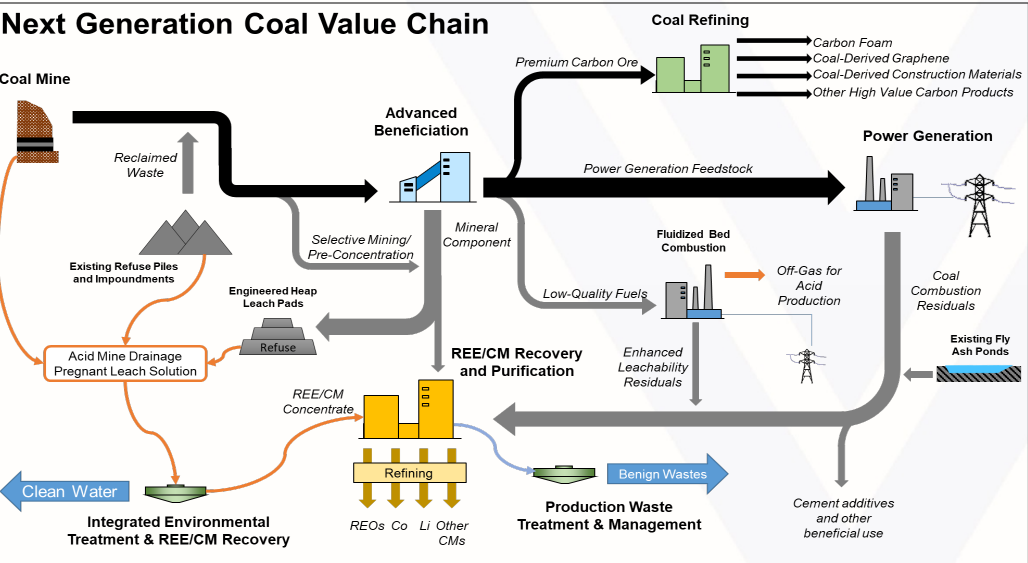
December 2, 2021

WV Coal Production

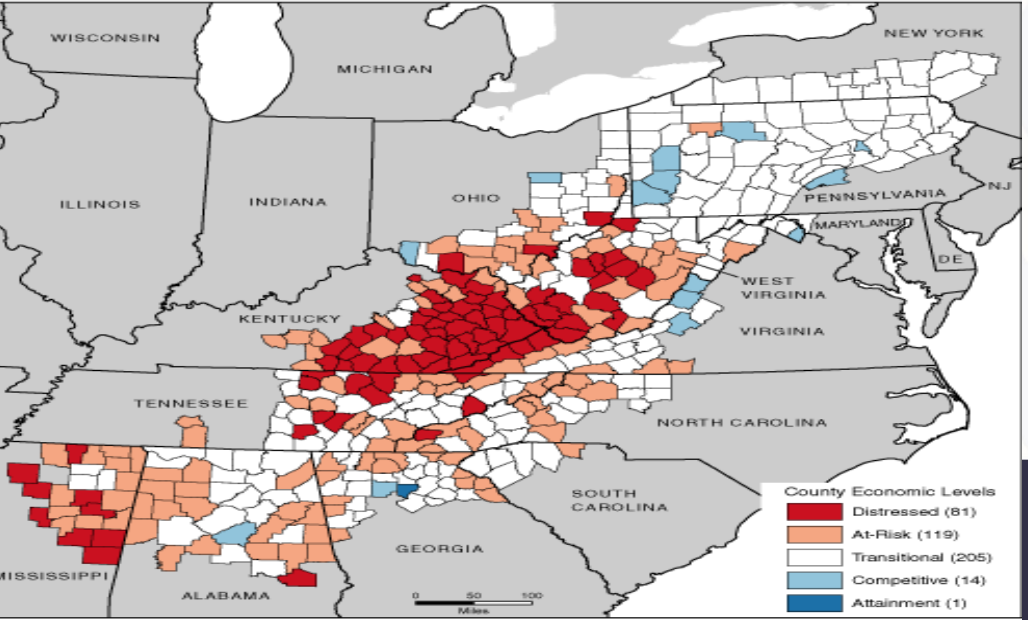
- Because of the confluence of these effects
 - Lower costs in other basins
 - Reduced competitiveness in underground mining vs surface
 - Low natural gas prices
 - Switching in power generation to natural gas and renewables
 - COVID-19 (2020)
- WV Coal production in 2020 at lowest level since ~1920.
- Lowest 5-year period since ~1918-1922 (oldest data I can find)



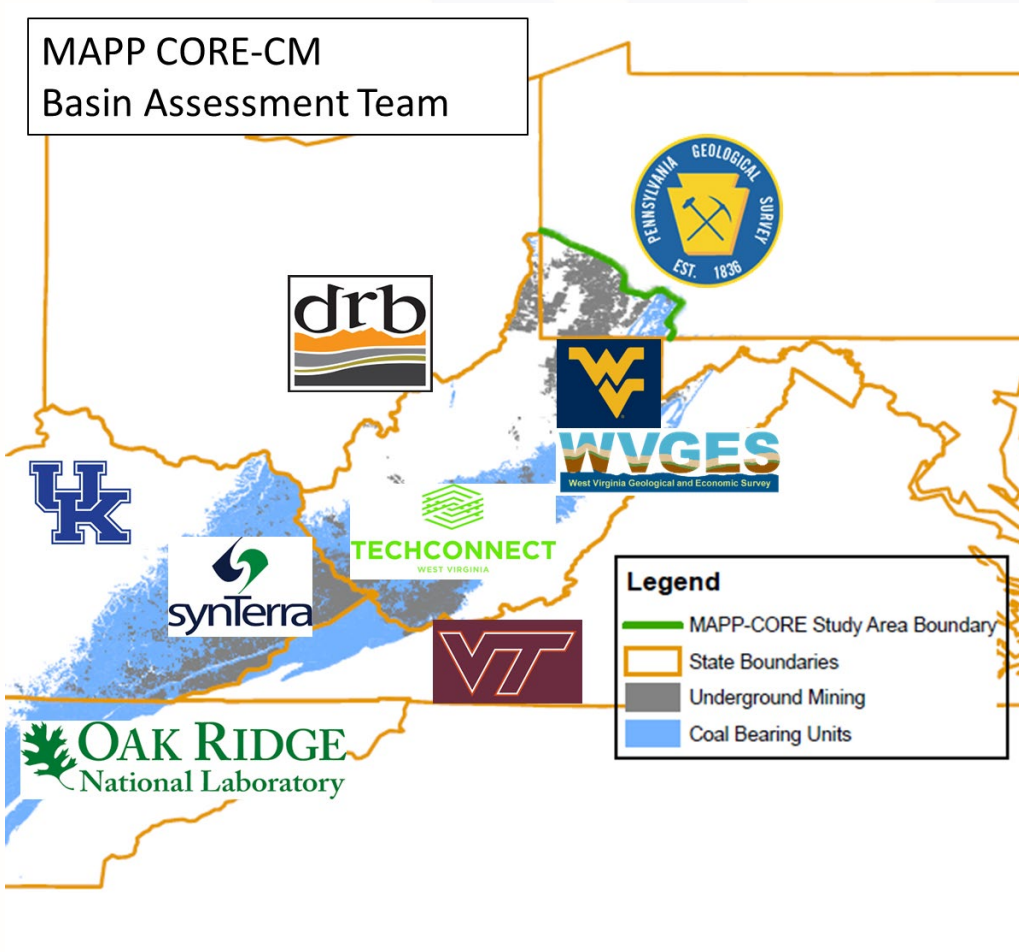
MAPP-CORE Vision



- MAPP-CORE plans to address
 - upstream production
 - midstream refining and processing
 - downstream manufacturing of high value products
- MAPP-CORE will identify
 - key barriers and opportunities in connecting raw materials and resources to end users and manufacturers
 - technical, workforce and economic considerations.
 - Directly addresses social justice through economic development
 - Directly addresses environmental justice concerns through focus on mine waste cleanup and site reclamation opportunities.
 - Specific projects will require additional analysis (outside the scope of this project)



Region



- Mid-Appalachia
- No “new” specific targeted reserve locations
- Technology Innovation Center is expected to be a “virtual” center, connecting multiple regional incubators and innovation centers.
 - TIC is still intentionally undefined.
 - Expect outcomes of commercial outreach and research outcomes to better focus TIC definition and location (virtual vs. brick-and-mortar)

Potential Significance of the Work

Near-Term (Tactical)

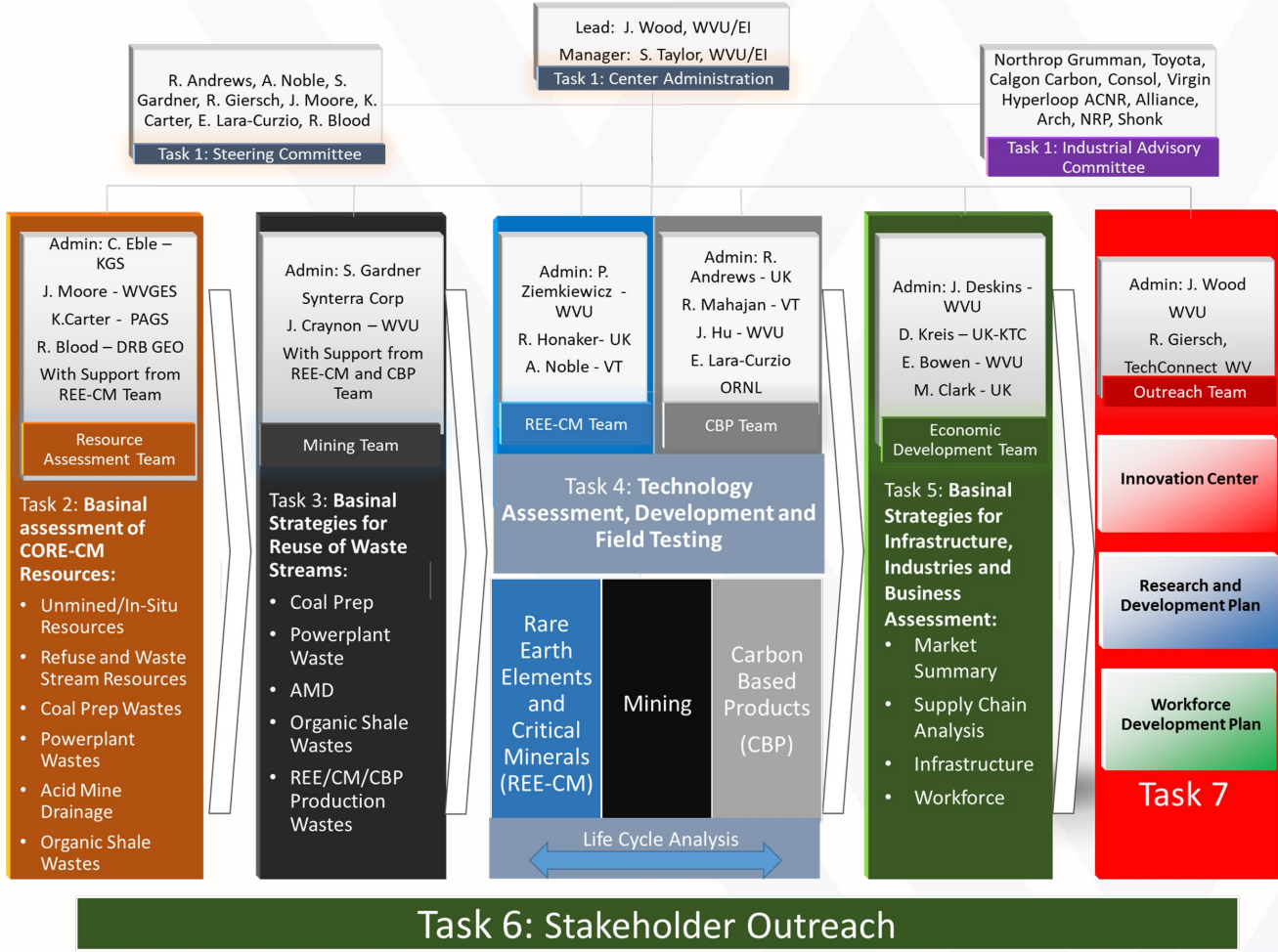
- Develop resource assessments for CORE-CM feedstocks in basin
- Identify resource production technologies, including novel or low TRL approaches that may have unique application in basin
- Identify key infrastructure resources and infrastructure gaps within the study area
- Engage in-basin industrial/commercial partners to understand materials sourcing requirements and limitations

Long-Term (Strategic)

- Enable development of commercial supply chains for regional and national customers.
- Identify “value-added” technologies and technology gaps to enable development and deployment
- Identify domestic supply chain gaps and strategies to fill those gaps for industrial/commercial partners in the region.
- Provide the foundations for technology transfer and commercialization and deployment

Project Structure and Team

MAPP CORE Organizational Chart
 CORE-CM Initiative for U.S. Basins DE-FOA-0002364



Project Partners

- Leading State Universities in the Region
 - West Virginia University (WVU)
 - University of Kentucky (UK)
 - Virginia Tech (VT)
- State Geological Surveys
 - West Virginia Geological and Economic Survey (WVGES)
 - Kentucky Geological Survey (KGS)
 - Pennsylvania Geological Survey (PAGS)
- Private Sector Partners with Key Knowledge and Experience
 - Synterra – Mining Engineering, Site Reclamation
 - DRB Geological Consulting – Shale Waste Characterization
 - WV TechConnect – Advancement of Innovation and Industrial Leveraging

Key Persons

Institutional Lead/Key Person	Institution	Project Role
James Wood	WVU	Project principal investigator.
Rodney Andrews	UK	Provide overall technical management and coordination of carbon materials components of program. Assessment of coals for carbon products. Co-lead Task 4
Aaron Noble	VT	Technical assistance in process development and techno-economic assessment of REE/CM technologies.
Cortland Eble	KGS	Lead Task 2 – Basinal Assessment of CORE-CM Resources. CO-PI for geologic characterization in Kentucky and Southwestern Virginia.
Jessica Moore	WVGES	Serves as the Deputy Director of the WVGES. Primary investigator for WV geologic characterization effort.
Kristin Carter	PAGS	Assistant State Geologist for the PAGS, will serve as Pennsylvania’s Primary Investigator.
Randy Blood	DRB	Co-Lead Basin Shale Analysis Team
Edgar Lara-Curzio	ORNL	Assessment of coal and coal wastes to carbon products. Lead for TEA analysis.
Paul Ziemkiewicz	WVU	Co-Lead Task 4 - REE-CM Technology Assessment, Development and Field Testing.
Steve Gardner	Synterra	Coal waste & recovery, environmental assessments, remediation. Lead Task 3.
John Deskins	WVU	Lead Task 5 – Basinal Strategies for Infrastructure, Industries and Business Assessment.
Rich Giersch	TechConnect	Convening organization for industrial and stakeholder outreach. Lead Task 6.
Sam Taylor	WVU	Lead Task 1 - Project Management and Planning

Outreach Plan

- Develop stakeholder outreach plan
- Outreach to groups to ID stakeholders in:
 - Energy
 - Energy Companies
 - Utilities
 - Automotive and Defense manufacturers
 - Battery manufacturers
 - Small and early-stage companies
 - Relevant large manufacturers
 - Education
 - State boards overseeing higher education
 - Community and Technical Colleges
 - State departments of education
 - NGO's supporting Public Education
 - Relevant local, state, and federal agencies
 - DOE funded R&D projects
- Convene Stakeholder group Quarterly
- Conduct public research seminars per the project plan

Continuous Stakeholder ID throughout project

Technology Innovation Center

Innovation Center Plan Development

- Inventory Region's Resources
 - Existing information resources
 - New information gathered yr I
- Catalog each facilities attributes
 - Survey
 - Site Visits
- Gap assessment
- Implementation and management plan

*Networked existing innovation
Infrastructure – Expanded research
capacity*



Project Initiation/Challenges/Opportunities

Project stand up is taking longer than I'd like

Have initiated contact with commercial partners

Challenges are “philosophical” – what is long term plan for deployment of technologies in the basin? Commercial deployment?

- Need is NOW
- Opportunity is “NOW” (significant infrastructure funding may be available – likely before project results are known)

Opportunities are potentially significant