FEASIBILITY STUDIES FOR PROCESSING RARE EARTH ELEMENTS FROM COAL BYPRODUCTS COMPLETED

DOE's Critical Minerals and Materials Program has demonstrated the technical feasibility of extracting rare earth elements from coal-based resources.

EIGHT DOWN-SELECTED PROJECTS COMPLETED PRE-FRONT-END ENGINEERING DESIGN (PRE-FEED) FEASIBILITY STUDIES

Initiated in FY21 as a group of 13 concept studies, **eight down-selected projects completed pre-FEED feasibility studies** in support of a 1-3-tonne per day mixed rare earth oxide/mixed rare earth salt (MREO/MRES) engineering-scale rare earth element (REE) processing facility.

REEs are used in many advanced energy, defense, and high-tech applications and industries.

R&D HAS PROGRESSED FROM BENCH/PILOT-SCALE TO ENGINEERING-SCALE PROTOTYPES

Research has **progressed from bench/pilot-scale to engineering-scale prototype materials processing** to address scale-up challenges for future opportunities.

The eight feasibility studies were required to use coal or coal byproduct feedstocks for a minimum operating life of five years.

The projects considered the processing of the REEs or critical minerals from intermediate products (MREO/MRES) through to commercial rare earth metals, alloys, or other products.

Projects also considered other byproducts that would improve the economics of each facility.

Processing coal byproducts to extract MREO/MRES.

SEVERAL FACILITIES PROPOSED PRODUCTION BEYOND MREO OR MRES

Notably, some of the eight completed pre-feed studies **elected to extend their proposed facilities further** to refined metals, alloys, or other products, which further accelerates technology development.

The feasibility studies help to de-risk a potential future engineering-scale REE facility by using Association of Cost Engineering Class 4 estimates on the conceptual facilities.

Rare earth elements and critical minerals needed for clean energy, economic security, defense, and national security.

NATIONAL ENERGY TECHNOLOGY LABORATORY AWARDED MORE THAN $19 MILLION ($19,138,598)

Cumulatively, more than **$19 million in federal funding was awarded** for the eight feasibility studies, which were managed by DOE's National Energy Technology Laboratory.

PARTNERS

EF ENERGY FUELS
MP MATERIALS
MATERIA
TETRA TECH
EERC Energy & Environmental Research Center®
TMR TEXAS MINERAL RESOURCES CORP.
West Virginia University RESEARCH OFFICE
WinnerWater SERVICES

AWARD NUMBERS
Multiple

PROJECT BUDGET

$19.1M

DOE $19,138,598

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PRINCIPAL INVESTIGATOR
Multiple

FECM RDD&D PRIORITY

DOMESTIC CRITICAL MINERALS PRODUCTION