School of Energy Resources Update
January 25, 2023

1. The SER Academics program continues to focus on recruiting, evaluating its offerings and supporting student success. Select updates include:
    a. SER's proposed undergraduate certificates (carbon capture, utilization and storage and land administration) were approved by the BOT (thank you!). We are now marketing these certificates for a FA23 launch.
    b. November-December SER and CEPS were able to offer a donor-supported energy experiential competition. By engaging students in hands-on experiences and reflection, they are better able to connect theory and knowledge from the classroom to real-world situations. Students were able to tour energy facilities in Wyoming and write papers about the economic impact of Wyoming's energy sector.

2. SER Outreach is gearing up for a successful 2023, planning for:
    a. Major events to connect Wyoming stakeholders, members of the community and UW faculty, staff, and students including the following:
        i. Spring 2023 Distinguished Speaker Series – six/seven presentations bringing different energy exerts to campus through the fall semester
        ii. Conferences:
            1. RENEW (Research Explorations for Nuclear Energy in Wyoming) Colloquia – April 14, 2023
            2. Rocky Mountain Professional Landman Conference – May 5, 2023
        iii. Webinar Series to support topics of interest to Wyoming as well as grant outreach milestones.
    b. Work to produce informational resources for stakeholders, legislators, community and UW faculty, staff, and students.
    c. Initial plans to arrange in-community event roadshow during the summer of 2023 to connect with Wyoming communities on energy topics.

3. The SER research program was busy over the last quarter responding to funding calls and executing on our current projects.
    a. Proposal Development: The Department of Energy has begun to issue Funding Opportunity Announcements (FOA) supported by Infrastructure Investment and Jobs Act (IIJA). SER has been busy responding to these FOAs. We are excited to report that SER led the development of over $90M worth of proposals over the last quarter of 2022.
    b. Exception funding: As a friendly reminder SER requested $14.5M in exception funding to further the research and demonstration of two of our flagship research programs:
        i. $12.25M Carbon Engineering Research and Demonstration: To operate the pyrolysis unit field demonstration (construction was previously appropriated) near Gillette and demonstrate the major pyrolysis products at an increased scale in real-world conditions.

ii. $2.5M for Phase II of the Mowry Shale Research Program: The Mowry Shale Research Program currently in Phase I aims to bring together a multidisciplinary UW team to focus on unlocking Wyoming's largest untapped unconventional oil and gas resource – with massive economic upside for Wyoming. Phase I of the project began on September 1, 2022 and is funded by the Wyoming Energy Authority. The initial $500k in seed funding is supporting ten (10) students- (undergraduate, graduate, and post-docs), and ten (10) faculty members from five (5) different departments across six (6) projects. In a few short months, we have been able to pull together an impressive multidisciplinary team to address the exploration and production challenges that exist with the Mowry Shale. Shall funding be received, Phase II seeks to move these projects from conceptual design to prefeasibility and feasibility. The funding will also allow for the expansion of the number of supported projects.

c. CEGR was awarded a grant to help develop a machine learning screening tool for rare earth elements (REE) and critical minerals (CM) at a mine-scale. The award is being led by Los Alamos National Laboratory and is partnered with Black Hills Energy (BHE). The team will complete the project at BHE's Wyodak coal mine in the Powder River Basin. The project's mine-scale approach complements CEGR's basin-wide assessment of REE-CM in the basin, enabling a telescoping approach to REE-CM assessment. The data will form a new high-resolution dataset in 3D that will then be integrated into a ML training dataset to better characterize the mine-scale distribution of REE-CM for determining mining and economic viability.

4. SER's Center for Economic Geology Research (CEGR) continues its research on CO_2 storage, hydrogen and critical minerals research. Select highlights include:
    a. Under SER's flagship CO_2 storage project, Wyoming CarbonSAFE, a commercial-scale storage hub is being developed that could provide carbon management solutions for the northern Powder River Basin. Over the holiday season, the project team performed and completed in-situ well tests. These well tests were the first-of-their kind performed exclusively for CO_2 injection in Wyoming. In addition, the team compiled 10 draft Class VI permit-to-construct applications.
    b. The CORE-CM projects, which are focused on building new industries in carbon ore, rare earths and critical minerals in the Powder River Basin and the Greater Green River Basin, have complete d Wyoming-focused outreach and educational materials. These materials will be presented this spring and summer to communities of interest.
    c. CEGR continues to expand its research focus to support Wyoming industries, and recently worked with colleagues within the Geology and Geophysics Department to complete a characterization assessment of the geology at TerraPower's proposed nuclear Natrium plant site that will be used to evaluate construction risks.

5. SER's Center of Excellence for Carbon Capture and Conversion (CCCC) continues to make progress on research and technology development associated with the future of Wyoming coal.
    a. Wood Engineering has completed the move of the Manti, UT site equipment to be used for coal drying at the field demonstration site. The concrete pad for the field demonstration plant coal drying equipment in Gillette has been poured and the tie-in work will start next week. Wood has provided a detailed engineering proposal for the pyrolysis unit is complete and will commence when the contract is signed (pending BOT approval).

b. The students working on the UW solvent extraction pilot plant on campus have implemented the vacuum tower to the system and are shaking down issues that have arisen. This project is in the process of upscaling the reactor so they can provide better parametric data for the field demonstration pilot plant that will be built in Gillette. Due to power limitations at the Hazardous Gas lab location, the pilot plant will be moved to a location at the WRI north site.
c. Initial evaluations of a coal refinery commercialization effort are underway with input from several different industry sector and energy experts in Wyoming. There is growing interest in the technology that is coming from the Carbon Engineering effort.

6. The Center for Energy Regulation and Policy Analysis (CERPA) is focused on supporting other SER centers, state elected and appointed officials and leading its own research programs. Kara Fornstrom, former PSC Chairman and experienced natural resources attorney (and UW alum!), took over the director role of CERPA in December and is developing her strategy for the center. SER is humbled and thrilled to have Kara as part of our team.

7. SER's Hydrogen Energy Research Center (H_2ERC) select updates include:
    a. The Western Interstate Hydrogen Hub (WISHH) concept paper (WY-CO-UT-NM collaboration) was recommended by DOE for the full proposal submission. SER supported the Wyoming Energy Authority in the concept paper preparation and will do so in the proposal as needed.
    b. Research projects are underway with Tallgrass MLP and Williams to focus on hydrogen produced from natural gas (blue) and water electrolysis (green).