MARCH 2021

IN THIS ISSUE:

Occidental Chair in Energy and Environmental Technologies

Student Project Turns into Legislative Bill

CERPA Enters Contest for "Reimagining Energy"

SER Adds Center for Wind Energy Research

CEGR Research Scientist Profile: Erin Phillips & Davin Bagdonas

CEGR New Hires

Webinar Presentations for Wyoming

CCCC Plans to Build a House from Coal-Derived Building Products

UNIVERSITY of WYOMING

School of Energy Resources

QUARTERLY NEWSLETTER

Vol. 2, Issue 1

ACADEMICS

RESEARCH

OUTREACH



MESSAGE FROM THE EXECUTIVE DIRECTOR

To the SER community,

As the Wyoming and the School of Energy Resources emerges from winter, we pack up our skis and rediscover our camping gear. Warmer weather will also bring opportunities to demonstrate advancements in our research program. For example, in the coming months, the Center for Carbon Capture and Conversion will move toward launching construction of a building structure made from coal-derived carbon materials as well as testing of our coalderived soil amendment.

On the academic side of SER's house, the two endowed chairs SER administers are now filled and these chairs are facilitating collaborative research with exceptional energy-focused UW faculty as well as the industry players that created those chairs. I once again extend my gratitude to the Wold Foundation and Occidental for creating these chairs and working with us to administer them. SER's energy minor is also progressing through the various approval steps and is now nearing final approval. We have already begun to consider how to market this new energy-focused academic offering to reach more students.

SER's outreach effort has been extensive despite the pandemic, blizzards and other obstacles. Perhaps most promising, we are observing increasing industry interest and activity in carbon capture, use and storage. The principle investigators of the Wyoming CarbonSAFE project, Scott Quillinan, Fred McLaughlin and Kipp Coddington recently spoke on a webinar regarding Class VI permitting - the type of permit required for CO₂ injection into saline aquifers - after their presentation they fielded a barrage of questions for more than half an hour. It certainly feels as though the work the state of Wyoming has made toward creating a commercial industry for carbon capture, use and storage is on the cusp of becoming a reality. For our part, SER will keep our foot on the gas and continue to drive toward energy-driven economic development for the state. Stay tuned.

Sincerely,

Holly Kritka Holly Kritka, Ph.D.

CONTACT US

University of Wyoming School of Energy Resources 1000 E. University Ave. Dept. 3012 Laramie, Wyoming 82071

Energy Innovation Center 11th and Willet Laramie, Wyoming

(307) 766-6897 serforum@uwyo.edu uwyo.edu/SER

School of **Energy Resources**

FOLLOW US



ACADEMICS

ACADEMICS

SER Student Initiated Project Becomes a Bill in the Legislature

Work initiated by **Professor Kris Koski** and students in the Land Management Concentration to remove racist covenants in Wyoming is now in a bill (HB0091) before the Wyoming Legislature.

While the restrictive covenants are no longer enforceable, they do violate the law. However, the restrictive language still remains in the covenants and is difficult for property owners to remove. Legislative action provides a means for removing the exclusionary language from the covenants permanently. The bill underwent multiple readings in the WY House of Representatives and on March 26th it passed unanimously.

The bill will be codified in the Wyoming Statutes §34-1-154 through 34-1-156 and address the removal of the restrictive covenants that violate law, the process for removing the covenants, and a civil appeal process for any property owners that wish to challenge the removal of enforceable covenants. The act will go into effect beginning July 1, 2021.

Student Highlights

Student Profile: Meet Paige Trent

One of the most visible and prominent advocates for the Energy Resources Development and Management (ERDM) degree at the School of Energy Resources (SER) is **Paige Trent**. A long-time resident of Laramie, Trent had no idea that the degree program even existed when she enrolled at the University of Wyoming. But, somewhere in the middle of her freshman year at the Haub School for Environment and Natural Resources (ENR), she crossed paths with SER and promptly signed up as a double-major.

Four years later, Trent has emerged as a leader among the campus community, a highly skilled energy scholar, and is on a trajectory to attend law school following graduation.

While the Haub School opened the door for Trent to the world of energy and natural resource management, SER is where she has found an academic home.

A student in the Professional Land Management (PLM) concentration of the degree, Trent discovered her proclivity and passion for energy policy and regulation.

READ MORE >

SER Faculty Highlights

- Professor Moahang Fan's research turning coal powder into graphite in a microwave was highlighted in an article by UW media. Read Here >
- **Professor Dario Grana** started an initiative to help first generation students in Geology, Geophysics and Energy Resources connect.
- **Professor Moahang Fan** was once again recognized as a "Highly Cited Researcher" by the Web of Science Group.
- Professor Tara Righetti was selected to Vice-Chair the diversity and inclusion task force for the Rocky Mountain Mineral Law Foundation (RMMLF).
- Ms Sophia Stuart will join the Research Group under the direction of Professor John Kazsuba this summer as an MS student. She will work on a Rare Earth Elements joint project with Erin Phillips in the Center for Economic Geology Research.







Aryana Named UW's Occidental Chair in Energy and Environmental Technologies

Saman Aryana is the first Occidental Chair in Energy and Environmental Technologies in the University of Wyoming's School of Energy Resources (SER).

A UW chemical engineering associate professor, Aryana's research has primarily focused on the fundamental physics of flow instabilities and the dynamics of subsurface displacement processes.

Inspired by Occidental's pursuit of enhanced oil recovery technologies and leading-edge carbon capture, use and storage (CCUS) projects, the chair was created to champion a distinguished UW faculty member whose research expertise lies in improving enhanced oil recovery techniques, as well as long-term CO2 storage solutions. Occidental is one of the largest oil producers in the U.S., including a leading producer in the Permian and DJ basins, and offshore Gulf of Mexico.

"I am honored and humbled to have been awarded the Occidental Chair in Energy and Environmental Technologies, and I am grateful to Occidental for their generosity and vision," Aryana says. "I look forward to the opportunities made possible through this endowed chair position to address timely and impactful questions related to CCUS and CO2-enhanced oil recovery and help establish the University of Wyoming and the state of Wyoming as leaders in CCUS."



READ MORE >

"SER is incredibly grateful to Occidental for working with us to create this chaired position. We hope that this chair will further grow UW's already strong expertise in CCUS and increase collaboration with Occidental as a global leader in the technology. In addition, this chair is a wonderful tool to help us advance SER's energy-focused economic development mission for the state and support talented faculty like Dr. Aryana."

-SER Executive Director, Holly Krutka

UW Seeks Occidental Chair of Energy and Environmental Policy

The University of Wyoming is seeking a faculty member to serve as the Occidental Chair of Energy and Environmental Policy. The successful candidate will hold an appointment in the Helga Otto Haub School of Environment and Natural Resources (Haub School) with an affiliation to the School of Energy Resources (SER).

This fundamentally interdisciplinary position is envisioned to engage in research and outreach efforts with multiple units on campus. UW is especially interested in applicants who can advance an understanding and application of policy concepts in support of sound decision-making in Wyoming, the Rocky Mountain region, and at the national level.

UW welcomes applicants with demonstrated commitment toward and experience in research, teaching, and outreach at the nexus of energy and the environment policy. Applicants are welcome from a variety of disciplines including public policy, environmental and energy policy, political science, economics, and law.

For more details on the position and how to apply, please view the position profile.

RESEARCH

RESEARCH

School of Energy Resources Adds Center of Excellence for Wind Energy Research

A foundational pillar of the School of Energy Resources (SER) at the University of Wyoming (UW) is its dedication to innovative research to find solutions to energy development challenges in Wyoming. In order to accomplish this mission, SER supports research through its Centers of Excellence (COE), which facilitate the investigation of energy issues in an assortment of disciplines.

In order to efficiently utilize the talents and expertise across UW, SER brings together faculty and graduate students from multiple disciplines by funding COE's throughout campus. This approach allows SER to support faculty that develop important energy research programs to benefit the state.

SER aims to serve as a research incubator, helping to get the COE's up and running, and highlighting the outcomes that offer solutions to industry. As the needs of the state evolve, new centers may form to work on emerging challenges, while others may disband as their programs are completed while others become independent and self-sufficient.

When a center becomes independent or is sunset, it also opens the door for SER to reallocate resources and address new emerging issues. Most recently, SER has directed support to the Wind Energy Research Center (WERC). **READ MORE >**

The Shell 3D Visualization Center Invites UW Faculty and Staff to Collaborate and Actively Seeks Departmental 3D Viz Champions

The Shell 3D Visualization Center (Viz Center) in the Energy Innovation Center, has launched a new 2.0 format and is actively seeking project development partners, both old and new, to support dynamic and innovative teaching and research activity. The 3D Viz Center 2.0 welcomes UW faculty and staff interested in utilizing visualization, data capture, 3D asset creation, and software-development as part of research or teaching grant application to raise their interest and join in collaboration. **READ MORE >**





Centers of Excellence Highlights

- The Center of Innovation for Flow Through Porous Media (COIFPM) is officially an independent campus unit and is no longer housed under the SER umbrella. More details coming soon!
- The Center for Produced Water Management (CEPWM) has developed a flow-through device for altering the physical and chemical properties of inorganic nanoparticles and organic macromolecules using magnetic fields. This device will be used for enhancing the effectiveness of nanosilver based disinfection processes and removing organic additives from produced waters without chemical additives or external energy inputs.
- Work in the Center for Air Quality (CAQ) was prominently mentioned in a news segment from PBS Newshour. The segment mentions an Environmental Defense Fund (EDF) project mapping methane emissions across the Permian Basin. Researchers from UW deploy a vehiclebased, downwind approach to quantify site-level methane emissions from oil and gas sites.

Watch Segment Here



Center for Economic Geology Research

Characterizing the Subsurface: The People Behind the Projects

The School of Energy Resources is engaged in many innovative energy solutions for the state of Wyoming. While the projects themselves are large-scale with the potential to be ground-breaking for the state and the economy, it is important to recognize the researchers that are actually on the ground doing the detailed and demanding work.

Two such researchers are scientists in the School of Energy Resources Center for Economic Geology Research (CEGR), **Davin Bagdonas** and **Erin Phillips**. With backgrounds in geochemistry and subsurface characterization, both Bagdonas and Phillips have been integral parts of multiple, high-profile research projects housed in SER.

Phillips and Bagdonas have most recently emerged as leaders on rare earth element and critical mineral ventures for SER. Their backgrounds have been instrumental in their success and transition to REE-CM characterization.

READ MORE >

Center for Economic Geology Research Welcomes New Research Scientist

The School of Energy Resources (SER) is pleased to welcome a new research scientist among its ranks in the Center for Economic Geology Research (CEGR). **Dr. Ying Yu** of Xi'an, China joined the department in February 2021.

A specialist in CO_2 foam characterization and flow behavior in porous media, Yu brings a wealth of knowledge to CEGR where she will primarily work on the Wyoming CarbonSAFE project, which has recently entered Phase III.

READ MORE >

US-China Clean Energy Research Center Nears Completion



As part of the U.S. China Clean Energy Research Center (CERC), CEGR scientists **John Jiao** and **Heng Wang** are finalizing the field development plans for the Baibo enhanced oil recovery field pilot in the Ordos Basin of China.

The program has been a successful 10-year-long endeavor that has advanced carbon management technologies across the two nations. Stay tuned for more details of the project conclusion.

above John Jiao; below Heng Wang

CEGR Highlights

- CEGR has published and made public seismic data from the Rock Springs Uplift. The data can be found in the **UW Libraries Mountain Scholar Database**.
- CEGR scientists Selena Gerace and Erin Phillips are developing a roadmap to provide guidance on CO₂ injection well permitting (Class VI). The work is funded under the Plains CO₂ Reduction Initiative (PCOR) along with help from CERPA.
- Update on CarbonSAFE: CEGR is making preparations to oversee the drilling of a second deep test well at the CarbonSAFE test site in early summer. Led by Fred McLaughlin, CEGR staff are working to develop the field testing coring, and logging plan for the field activities.
- Led by Davin Bagdonas, CEGR is conducting a Rare Earth Element Coal Ash Pilot. The project is a 3-yr collaboration with NETL to develop economic REE extraction methodologies for PRB Coal Ash.







RESEARCH

Center for Energy Regulation and Policy Analysis

Reimagining Energy Initiative

CERPA recently competed for funding from the United States Air Force's "Reimagining Energy" initiative. For part of the effort, CERPA created a proposal that touted Wyoming's low carbon efforts that was part of the Department of Defense's showcase event in the topic area of Energy, Culture, Policy and Education. As part of the pitch, CERPA Director Kipp Coddington was invited to participate on a panel discussion during the main event, which featured speakers and experts from all over the world that are leaders in low carbon initiatives.

CERPA created a virtual showcase to highlight its energy solution, as well as to provide information about the carbon management solutions ongoing at SER. VIRTUAL SHOWCASE >

International and Interdisciplinary Team

CERPA has convened an international and interdisciplinary team of engineering, legal, and policy experts to examine issues that surround retrofitting CCS/CCUS technology on Wyoming's fleet of coal-fired power plants and related topics.

Through these collaborative partnerships, CERPA seeks to integrate valuable information and expertise from other CCS/CCUS efforts around the world. The team will conduct both unit- and system-level analyses, then run different outcomes based on various policy inputs. Initial results are expected in the

fall of 2021.

Research Affiliates to join the team include Niall Mac Dowell of the Institute for Molecular Science and Engineering at Imperial College London, and Professor of Public Policy and Director of the Payne Institute, Morgan Bazilian at Colorado School of Mines.

> Pictured left Niall Mac Dowell; right Morgan Bazilian

CERPA Highlights

- Download the most recent CERPA guarterly newsletter covering energy regulation and policy analysis for the state of Wyoming. **SUBSCRIBE >**
- REGIONAL CARBON CAPTURE DEPLOYMENT

CERPA Director Kipp Coddington and Professor Tara Righetti gave a webinar about pore space legal liability issues and CO₂ Transport Infrastructure as part of the **Regional Carbon Capture Deployment** Initiative, hosted by the Great Plains Institute. WATCH WEBINAR >

- CERPA Researchers Jada Garofalo, Selena Gerace, Haibo Zhai, Niall Mac Dowell, and Kipp Coddington, along with SER Executive Director Holly Krutka presented to the Wyoming Public Service Commission about HB200 and CCUS in Wyoming.
- CERPA sponsored a survey conducted by Dr. Rob Godby and Dr. Mark Peterson of the College of Business. The survey examined how Wyoming citizens feel about budget options facing the state legislature and provided a useful interactive tool. See Survey & Interactive Tool >



FOR THE DOD

Creating the future of resilient energy production, transmission, use and storage







Center for Carbon Capture and Conversion

CCCC Develops Eco-Friendly, High-Performance Building Materials from Coal

The Center for Carbon Capture and Conversion (CCCC) is developing coalderived carbon building materials from Powder River Basin coal pyrolysis products. Two proposed building products – coal char bricks (CCB's) and as a bi-product, structural support units (CSU's), are being developed, each containing at least 70% carbon derived from coal. These products have the potential to be transformational, providing superior physical and mechanical properties than conventional materials, while being manufactured at low cost with minimal carbon footprint, in accord with industry standards.

The center plans to then build two reduced-scale demonstration buildings in the summer of 2021 – one from the coal-derived building materials, and the other from conventional building materials. The model buildings will allow researchers to assess the performance (mechanical properties, thermal insulation, installation properties) of the developed building products in real weather conditions.

Soil Amendment Field Demonstration

Researchers in the CCCC have developed a soil amendment product manufactured from Powder River Basin coal-char carbon and augmented it with nutrients from Wyoming sourced algae. The product has undergone extensive greenhouse testing and field crop demonstrations over the last 3 years. Application strategies and impacts on various crop types are the subjects of current studies at the pre-commerical scale.

CCCC is currently making preparations for the field demonstration of coal derived soil amendments at the Lingle and Powell agricultural research stations. The demonstrations, which will include sugar beets and sweet corn, will start at the end of March 2021.



CCCC Highlights

- The USA Soy Bean Board has approved an outline for a research proposal in the **CCCC** to use high oleic acid soybean oil (HOSO) for the manufacture of coal derived asphalt.
- **CCCC** has completed an outline design of a field demonstration of the pyrolysis step of the coal refinery in collaboration with Atlas Carbon. An engineering cost estimate will now be produced.
- **CCCC** is currently in the process of hiring two additional positions in the center to help aid and facilitate critical research.



OUTREACH

OUTREACH

Professor Tim Considine Releases Economic Review of Restrictive Federal Land Policies

Professor Tim Considine published a report for the Wyoming Energy Authority that explored the potential impacts of a federal leasing and drilling ban on the Wyoming economy.

The study, funded from the Wyoming legislature, explores two potential scenarios under the new presidential administration – a possible moratorium on new federal leases for oil and gas companies or a full drilling ban on onshore federal lands.

The study concludes that either of these scenarios would pose severe difficulties for Wyoming, with potential losses in employment, reduced investment in new oil and gas wells, and losses in energy production. The full report can be found on the **WEA's website**.

Webinars

The School of Energy Resources and **CERPA** led a webinar round table discussion with legal and economic experts in the state to examine the recent executive orders released from the White House suspending energy leases on federal lands.

The panel featured SER Professor **Kris Koski**, **Eric Waeckerlin** from the law firm Brownstein Hyatt Farber Schreck, LLP, and SER Professor **Tim Considine** from the UW College of Business. A special introduction was offered by SER Executive Director, **Holly Krutka**, and the panel was moderated by CERPA Director, **Kipp Coddington**.

The full webinar as well as the presentation slides can be found Here >

Hosted by the Enhanced Oil Recovery Institute (EORI), speakers from SER discussed class VI permitting and what it may look like for Wyoming. The panel, which included SER Executive Director Holly Krutka, CEGR Director Scott Quillinan, CEGR Research Scientist Fred McLaughlin, and CERPA Director Kipp Coddington, answered questions from members industry and the public regarding the class VI permitting process and expected requirements.

The full webinar as well as the presentation slides can be found Here >

Outreach Highlights

- SER provided seed-funding to encourage Wyoming-focused research across UW. Support for small projects to be completed in the spring of 2021 included CCUS, rare earth elements, hydrogen, wind, and energy economics. Read More >
- The Enhanced Oil Recovery Institute will be leading the Wyoming Oil and Gas Fair henceforth. This year's event will likely be held virtually. Read More >
- WEA, SER and EORI released a report detailing the environmental and economic impacts of proposed policy initiatives that suspend or restrict new leasing and drilling for fossil fuels on federal lands. Read More >
- SER was a lead sponsor of the **AAPG Carbon Capture, Utilization and Storage** annual conference that was help March 23-25, 2021.



