WesternResearch
INSTITUTE

2024

ANNUAL REPORT

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Vision

Reimagining
tomorrow's energy and materials
for a lower carbon intensity and sustainable future.

For Wyoming, the United States and the World.

Mission

Partnering
to innovate, develop, and commercialize technologies
using advanced sustainable chemistry, analysis, and innovative engineering,
for carbon, natural resources, and wastes.

Board of Directors

DR. MYRON B. ALLEN
CHAIR
Professor Emeritus of Mathematics
University of Wyoming

DR. ANNE ALEXANDER
Assistant Dean
College of Business
University of Wyoming

DR. OPINDER BHAN
Former Senior Science Advisor
Royal Dutch Shell

MR. ROB HURLESS
Former Deputy Director
Enhanced Oil Recovery Institute
University of Wyoming

DR. HOLLY KRUTKA
Executive Director
School of Energy Resources
University of Wyoming

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VICE-CHAIR
President
Ralph Shirts Conslting LLC

MR. RICHARD C. WILSON, J.D.
Managing Director
Technology Licensing Company LLC

Board Chair Statement

Two milestones made 2024 a truly exceptional year for Western Research Institute (WRI)!

First, 2024 marked the institute's 100th anniversary. WRI began in 1924 as a **Petroleum Research Laboratory** under the US Department of Interior's Bureau of Mines. Many thanks to scholars at the University of Wyoming's American Heritage Center (AHC), we now have a detailed history of this center, later known as the Laramie Energy Technology Center. In 1983, the federal government transferred the center to the University of Wyoming, which renamed it as **Western Research Institute**. In 2020, WRI reincorporated as a non-profit research and development institute independent of UW. The AHC's **John Waggener** and **Erin Shadrick** are completing a booklet to document this history and this past year's celebration.

A second, even more important event in 2024 was the recruitment of a new CEO. After 14 years spent at WRI, the last 5 as CEO, **Dr. Jean-Pascal Planche** retired. We all have to thank him for outstanding scientific and executive leadership. After an international search, WRI's Board of Director hired **Dr. Didier Lesueur**, a materials scientist. Dr. Lesueur combines over three decades of world-class expertise in asphalt and building materials with business acumen in the international arena. We are delighted to have a scientist and business leader of Dr. Lesueur's stature join the WRI team. He will now build on the solid foundation laid by Dr. Planche and the team, leading WRI into its second century.

I know I speak for the entire Board of Directors in anticipating a bright future for the WRI team. This annual report clearly shows that the institute is poised for another 100 years of world-class chemistry research on carbon materials, natural resources, and waste recycling.

CEO Statement

As our Chairman Dr. Myron Allen just wrote, 2024 has been an intense year for Western Research Institute (WRI)! We have indeed been extremely active on different fronts. Many important achievements could have been selected for inclusion in this Annual Report. Still, for the sake of brevity, we decided to focus on a few chosen ones that illustrate what WRI does today.

In 2024, the **RenuMAT team** has been busy on many projects, and three of them are highlighted in this report: our patented biosolvent-upcycling technology, our work on mesophase pitch and the organization of the 61st edition of the Petersen Asphalt Research Conference. The first two illustrate what WRI is doing to develop non-energetic applications for hydrocarbons like Wyoming coal or heavy oil bottoms. Those are important projects helping the industry transition to a greener future!

In parallel, the **SET team** has been similarly active, as exemplified by the work with the Solvent-DeAsphalting (SDA) unit, in particular what we did in collaboration with the KBR group. We also describe the beginning of a promising new project with American Rare Earth Elements. We then explain what WRI started in 2024 for hosting start-ups, in collaboration with UW's incubator, Impact 307.

All of these activities will remain in force throughout 2025 and the years to come. The Institute will thus remain highly engaged, making sure the projects reach their yearly objectives. In addition to issuing the technical and scientific deliverables on quality and on time, our daily operations will be guided by 3 main concerns:

- **Consolidate our cash reserves** at the highest possible level. This is critical so that we have enough resources to maintain and update our advanced equipment and develop new emerging applications,
- **Diversify our activities**. We need to serve more end markets and be less dependent on the cyclical reality of the main fields we currently operate in, ie the asphalt and oil industries,
- **Communicate**. WRI's expertise in not so well known and we need to do it for all stakeholders, especially to attract new partners and increase in turn our global activity.

DR. DIDIER LESUEUR
CHIEF EXECUTIVE OFFICER

Regarding this last point, the Centennial event that we organized in 2024, showed that many people know about WRI, but without understanding what we exactly do! So, this report and all the on-going communication efforts are intended to bridge this gap.

We are proud to provide Wyoming with a World-class non-profit research institute, where talented young and not-so-young chemists, technicians and engineers, can find a great work place to grow professionally while helping to build a better future.

WRI Today

WRI is currently organized in two business units

DR. JERAMIE ADAMS
VICE PRESIDENT

The first one, **RenuMAT** for Renewable Upcycling Materials and Asphalt Technologies, is led by Dr. Jeramie Adams. It specializes in lab-scale chemistry:

- Hydrocarbons beyond combustion (products: asphalt binders, additives, mesophase pitch, carbon fibers… / feedstocks: coal, oil refining by-products, wastes…),
- waste upcycling & circular economy (asphalt, plastics, composites, biomass,…),
- formulation, analytical chemistry & rheology.

MR. JUSTIN MARTIN
VICE PRESIDENT

The second one, **SET** for Sustainable Emerging Technologies, is led by Justin Martin. It specializes in pilot-scale units:

- Hydrocarbon beyond combustion and waste upcycling,
- Refining/distillation, oil partial upgrading & Solvent DeAsphalting (SDA),
- Catalyst development/testing,
- And any tailor-made pilot/demonstration-scale plant

Both groups work together in a complementary way on many projects. This is for example the case with the biosolvent-based technologies (including coal-to-asphalt) and the mesophase pitch examples described in this report.

Do you know that *66%* of WRI's employees were born and raised in Wyoming? Many of them got their highest degree from UW!

In parallel to helping retain local talent, WRI also attracts some of the best specialists in the World, on very specific areas. **5 nationalities** outside of the USA, from Europe, Asia and Africa, are present at WRI.

These facts about WRI are not so well-known, even in Laramie, Wyoming where WRI has been active for a century now!

In addition, many visitors from the oil and asphalt industries, that WRI has been serving for decades, are amazed to discover the **breadth of technical and scientific capabilities** that we offer. Clearly, there are many things that WRI does or could do that are not known to potential partners!

This is why we started in 2024 a steady communication plan, encompassing:

- Regular news and updates on our **website**, where our skills and current projects are described,
- Heavier presence on **social networks**, especially LinkedIn, where more and more professionals are now actively following their industry trends,
- Presentation documents, like a **leaflet** or an **Annual Report**, for anyone to see what we do.

Make sure you follow us on linkedin and visit our website often to stay informed about what we are doing!

100th Birthday

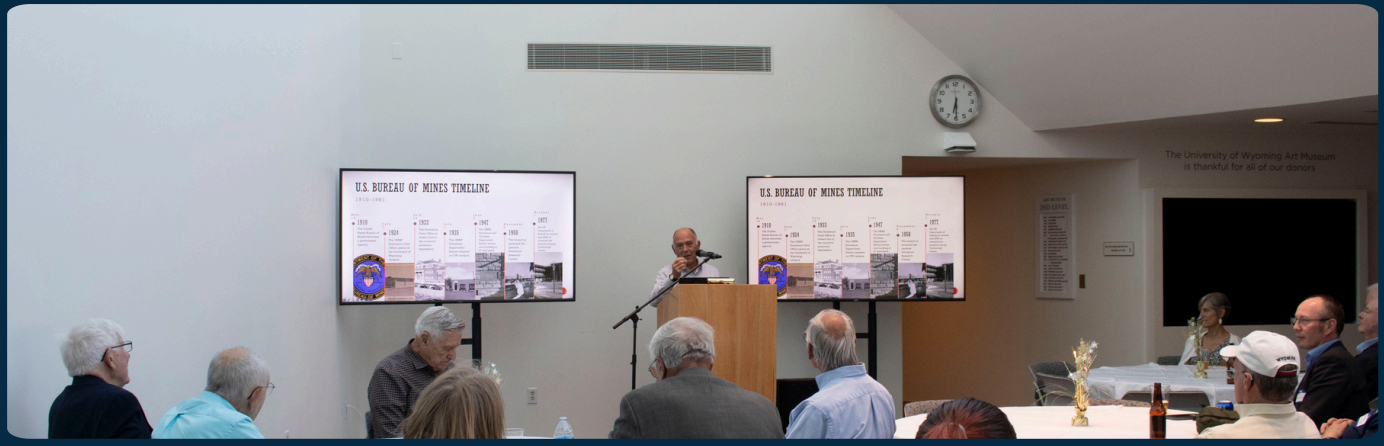
Inviting our main stakeholders and **partners** from **state/gouvernemental agencies**, from **academia** (special thanks to our friends and partners from UW and in particular the **University of Wyoming's School of Energy Resources**) and, of course, from **industry**, we organized a seminar at the WYOMING TECHNOLOGY BUSINESS CENTER where **Erin Shadrick** presented the history of WRI and how it originated in Laramie, Wyoming, as a Petroleum Experiment Station for the Bureau of Mines in 1924.

This outstanding historical work was prepared with the **American Heritage Center** at the University of Wyoming (UW) under the supervision of **John Waggener**. A booklet is being prepared to summarize this great information.

Also, CEO Dr. Lesueur, VP RenuMAT Dr. Adams and VP SET J. Martin presented what is **WRI Today**. Then, options for the **future of WRI** were discussed with the participants. These ideas and recommendations were extremely useful in feeding WRI's upcoming Strategic Plan for 2030.

We couldn't finish the day without a 100th birthday cake and an evening dinner with Board members, current and former employees with their families at UW Museum of Art. A good opportunity to further discuss past successes and recognize key actors!!!

We are now ready for a new century of groundbreaking cooperative research!!!
Thanks to all the participants and the organizing team.

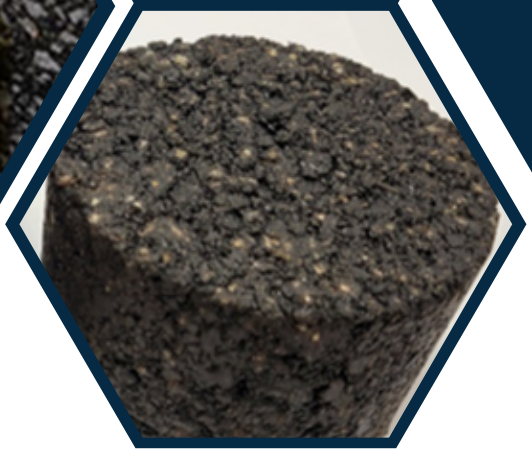


Coal-to-Asphalt & Amine Patents

Over the past decade, WRI has developed a set of patented, and patent pending, innovative technologies that transform organic matter into new valuable products for the road industry. Most of them rely on the same principle: reacting a biosolvent with an organic feed like coal, lignin, biomass, recliamed asphalt shingles, or even waste from plastics or composite material such as wind turbine blades.

The most advanced of this series of projects is being developed in a collaborative project with the **University of Wyoming's School of Energy Resources** (SER) under the Center for Carbon Capture and Conversion (CCCC). This is within the CCCC carbon engineering initiative's mission to find new alternative uses for Wyoming coal. By using a patent pending solvent extraction technology, a coal-based asphalt binder is obtained. It has shown promising results in performance and reducing the carbon footprint over petroleum asphalt.

Dr. Jeramie Adams, vice president of the RenuMAT group, is the lead scientist developing the coal-based asphalt. "We have taken Wyoming coal, as a large feedstock, and tried to turn it into a viscoelastic material by chemically reacting it with different bio oils," Adams says. "Coal, or carbon ore, can be mined and used like any other raw material so it is not being consumed as a fuel. This allows us to engineer a product for a wide range of markets so it is always consistent and performs well."



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Team members:
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Seth Bassham
RenuMAT team

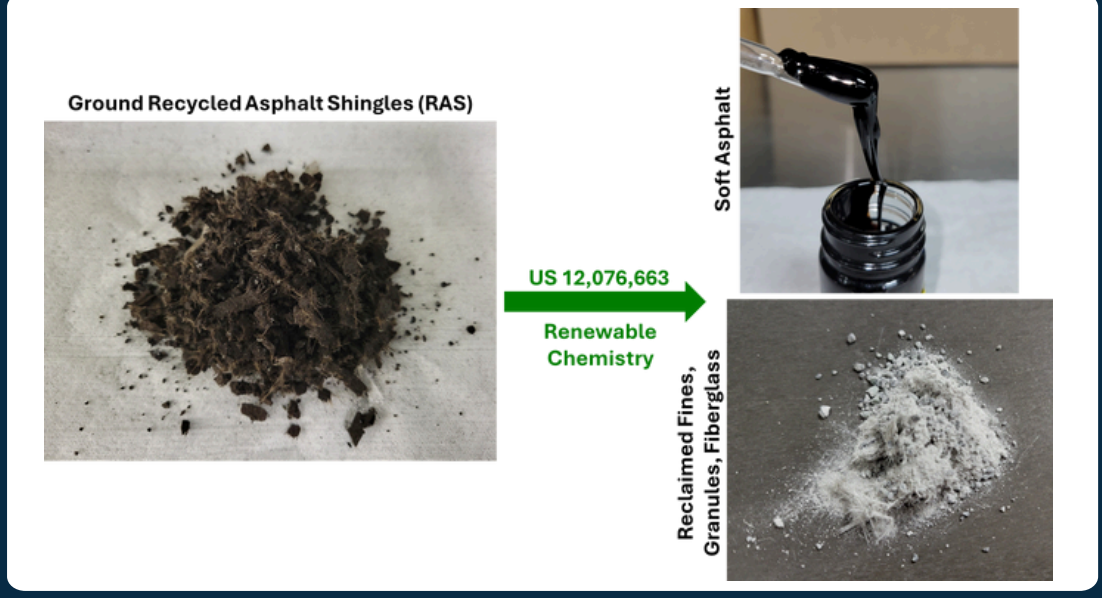
“The benefit here is that we are actually engineering asphalt binders, whereas petroleum asphalt is a byproduct from the oil refining process,” Adams explains, “That product is different depending on the crude oil source, blending, and the way that refinery operates. The coal-based binder could be helpful in supplementing petroleum-based asphalt for consistency and lower emissions, or work as a stand-alone product.”

Recently, there has been pressure in the asphalt industry to move toward greener alternatives with bio binders, Adams says. UW and WRI’s project with coal-based asphalt is quickly gaining momentum, with **early interest from industry partners** to collaborate. “If we can use coal, which is really ancient biomass, and react it with another bio oil (biomass), thereby creating a new binder, we have a low-carbon footprint at industrial volumes from an easily accessible and abundant domestic feedstock that is not posssible with biomass alone,” Adams says. “It is a very green product because there is no need for combustion in any of its outlets and PRB coal has about 5 times less CO_2 emissions than petroelum for extraction and transporation.” This is because it occurs in thick seams near the surface and it contains very low levels of coal-bed methane. “Furthermore, combining coal with biogenic CO_2 allows the new asphalt products to store CO_2 from the atmosphere in the pavement. Coal-based asphalt has the potential to help petroleum asphalt meet some of the current challenges posed by new regulations and to supplament potential future supply shortfalls that are being projected.”

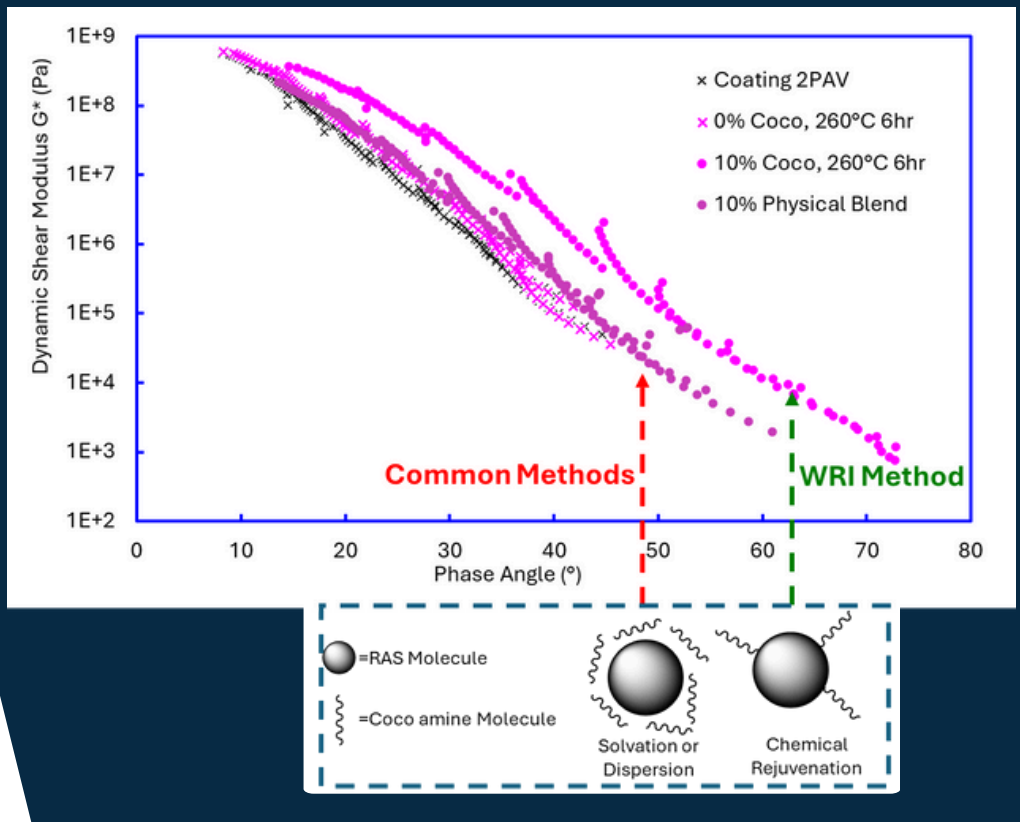
The project is now moving **out of the lab into field tests**. A demonstration-plant is being built in Northern Wyoming to process enough PRB coal for producing large-scale batches of asphalt needed for paving a test section. The Wyoming Department of Transportation is also supporting the project to futher development and identifying and paving the test section.

“Our lab is working in tandem with WRI on scaling up the solvent extraction processing technology to the field demonstration level in the Powder River Basin,” says **Dr. Trina Igelsrud Pfeiffer**, the CCCC director. “We have a lot of great industry partners in the basin, as well as a host site adjacent to the mines for easy access to coal. The demonstration-plant will demonstrate our ability to produce performance-grade asphalt. It will also feed a techno-economic analysis to bring production costs down and try to make it cost-competitive with petroleum-based asphalt.”

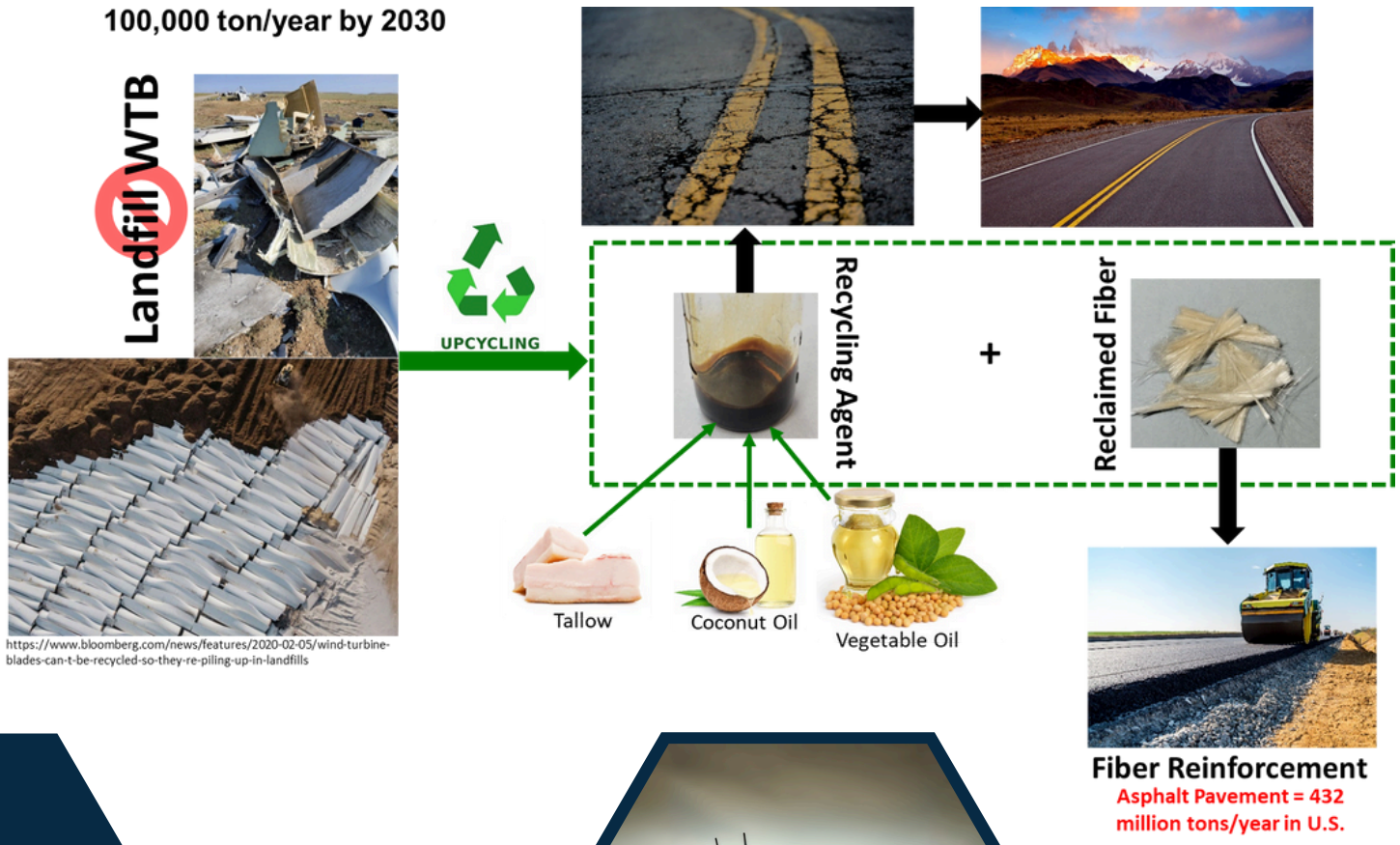
The focus in 2025 will be to fine-tune the chemical process and help with the construction of the demonstration-plant to be commissioned in 2026.



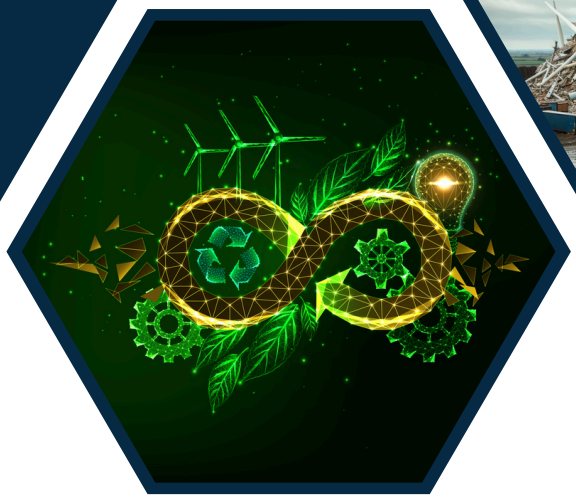
In addition to coal-based asphalt, WRI was awarded patent US 12,076,663 which converts a wide range of **petroleum based hydrocarbons into liquids or asphalt product** using renewable fatty amines. This technology is the basis of the Asphalt Institute Foundation award to transform recycled asphalt shingle binder (RAS) into new asphalt product through a chemical rejuvenation process using renewable chemistry. The process does not simply soften the oxidized asphalt but truly transforms embrittling and viscosity building asphaltenes into maltenes to soften and improve the relaxation properties of asphalt materials.



A derivative of this technology has also been applied to upcycling the epoxy in end-of-life **wind turbine blades into recycling agents** to allow for stable and efficient recycling of higher amount of reclaimed asphalt pavement (RAP) into new pavement construction, thus eliminated landfilling of old blades.



https://www.bloomberg.com/news/features/2020-02-05/wind-turbine-blades-can-t-be-recycled-so-they-re-piling-up-in-landfills



PARC 2024

The **Petersen Asphalt Research Conference** (PARC) began 61 years ago in 1963. It is heavily attended by the asphalt paving and roofing industry, with a unique focus on asphalt binder chemistry related to performance, that cannot be experienced anywhere else.

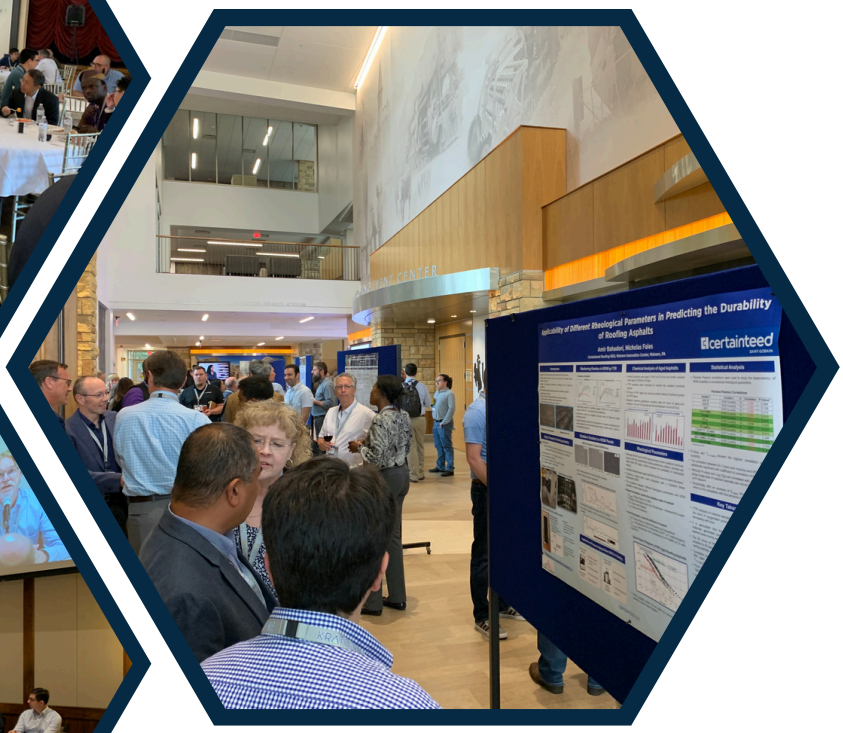
This year, PARC attracted **180 attendees** with a global participation encompassing 16 countries across the world. This edition was made possible thanks to the support of 16 sponsors and 8 exhibitors along with the first Stein Sponsor, which will be an annual tradition moving forward!

In technical terms, PARC 2024 consisted of 48 presentations spanning across 2.5 days, covering a range of important topics such as asphalt chemistry, rheology, asphalt roofing, aging (and antioxidants), recycling and rejuvenators, alternative binders, sustainability, innovative additives, new tests and specifications, case studies, field performance, artificial intelligence, etc.

Dr. Yogesh Kumbargeri, newly appointed as the Conference Director in 2024, stresses that “In addition to the abstracts received, the proceedings included special invited presentations specifically focusing on new frontiers in asphalt, with issues affecting and opportunities available for the industry globally”. He further explains that “As always, PARC also provides great networking and business development opportunities with evening cocktail receptions and a banquet dinner”.

Furthermore, we continue PARC's "love for nature" legacy by ending the conference with an outdoor hike exploring the beautiful landscape of Laramie and its surroundings, with the much appreciated help of Visit Laramie!, the Albany County Tourism Board.

Over the years, PARC has matured into a forum showcasing disruptive technologies that address the future of environmentally friendly alternative materials, methods, and characterization for binders, mixtures, and flexible pavements—while not losing its dedication to binder chemistry.



Join us for PARC 2025!!

petersenasphaltconference.org

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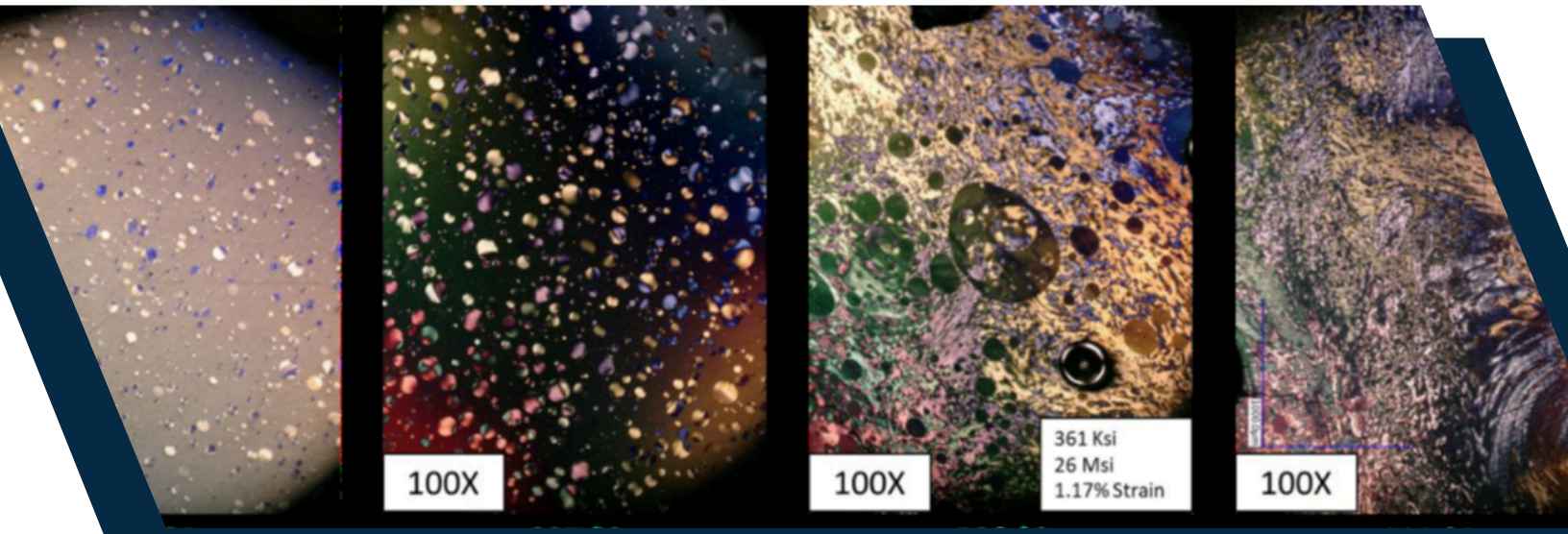
Mesophase Pitch

Carbon fibers (CFs) are beneficial in a range of industries such as aerospace, automobile, and sports equipment, because of their low weight but high modulus, strength, and chemical resilience. Yet, because of high cost compared with alternative materials such as glass and plastic fibers, the widespread deployment of CFs has been limited to niche applications, such as in aerospace applications that use the CFs' superior mechanical properties and heat resistance.



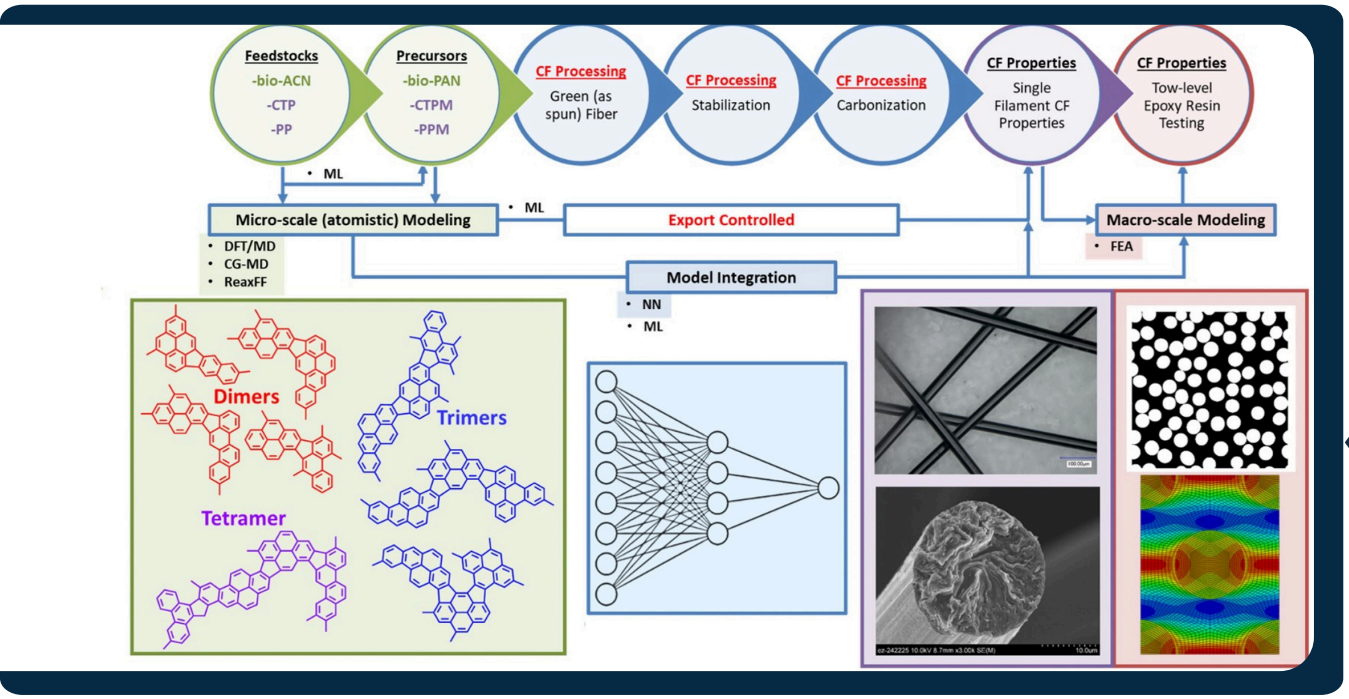
A substantial reduction in cost may be possible by adopting **cheaper initial feedstocks** and low-temperature processing methods. Now, more than 96% of CFs use polyacrylonitrile (PAN) as precursor, which is made from polymeric fibers of a petrochemical product called acrylonitrile, while the remaining use pitch, which is a viscoelastic material derived from fossil fuels.

Pitch can be 3 to 5 times cheaper than PAN as a precursor material. In addition, conventional PAN precursor fiber processing requires a series of unit operations involving organic solution of PAN polymer and subsequent solvent recovery. In contrast, pitch feedstocks can be melt processed to make fibers, and such precursor processing routes require less capital investment.

However, the heterogeneous nature of pitch and the variability in which such heterogeneity is expressed among the used pitch feedstocks often lead to inconsistent mechanical performance, requiring ad hoc, customized fabrication parameters highly dependent on the pitch itself. A major factor contributing to the difficulty and cost of the procedure is the often required conversion of pitch from isotropic to mesophase, because **CFs derived from isotropic pitch usually have poorer mechanical properties.**

Isotropic pitch refers to a state where the molecular constituents are randomly oriented in the bulk, while mesophase pitch consists of molecules aligned in a preferred orientation, which leads those to behave like liquid crystals in molten state.

WRI started its work on mesophase pitch in 2017 under a DOE grant with partners such as Oak Ridge National Laboratory and Massachusetts Institute of Technology (MIT).



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SET team

With several international industrial partners, the work is now being focused on finding the successful conditions to make mesophase pitch out of diverse raw materials like coal tar pitch or petroleum pitch.

Solvent Deasphalting Partnership

KBR delivers science, technology and engineering solutions to governments and companies around the world. KBR employs approximately 38,000 people worldwide with customers in more than 80 countries and operations in over 29 countries, across various global businesses, one of them being Hydrocarbons Services, including oil refining, petrochemicals and chemicals.

KBR markets the leading Supercritical Solvent Deasphalting (SDA) technology **ROSE®**. “This highly efficient technology requires up to 60% less energy than other technologies,” explains **Brian Heasley**, Refining and Clean Fuels Technologies, Sr. Director. “It is designed for ease of operation, safety and high reliability.” Leading KBR's line of environmentally friendly technologies, ROSE® is setting the industry standard for assisting refiners in complying with the new International Marine Organization (IMO) fuel regulations in effect since 2020 (IMO2020).

As the market leader in SDA technology, **Raichman** explains that “KBR has licensed over 90% of the world's installed SDA capacity. We continue to see a strong demand for the ROSE® technology globally.”

KBR has entered into a research agreement with WRI, through which WRI operates its legacy SDA pilot unit which has been modified to KBR’s advanced ROSE® technology. The unit also retains the flexibility to revert to its original configuration if necessary. For client-specific pilot testing, KBR provides the relevant client feedstock. Then, WRI processes the feedstock continuously over the course of one to two weeks. This approach enables the optimization of process parameters to ensure extraction efficiency in the deasphalting operation. As noted by **Justin Martin**, Vice President of the Sustainable Emerging Technologies (SET) team, the refined operating conditions identified during pilot testing are directly applied to the client’s full-scale commercial applications. This process allows for improvement of the ROSE® Technology operational efficiency at a smaller scale.
This ultimately delivers substantial cost savings and improved refinery performance to KBR’s clients.

In 2025, KBR and WRI plan to have several such trials for end-clients from all over the World.

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SET team

Startup Hosting

Early in 2024, WRI signed a partnership with UW, which includes a participation to development of startups. **Impact 307**, the incubator of UW, already provides office space to emerging businesses. Yet, some of them need lab or warehouse space. This is where WRI can help. Installed on our 22-acre campus North of Laramie, we have just that: **free space for wet labs or warehouses**.

UplinkRobotics is a Wyoming based inspection robotics company that creates high-quality and purpose built inspection tools for various industries, such as home inspection, construction, firefighters, law enforcement and more. They are one of the many successful startups hosted by Impact 307.

Thanks to this agreement between WRI and UW, Uplink Robotics is now leasing a full building on our campus since April 2024. **Christian Bitzas**, CEO and cofounder, says it all: “We were looking for a small warehouse to install our paint shop. We wanted it to be close to our main facility in the Wyoming Technology Business Center”. UplinkRobotics contacted with local stakeholders and rapidly found out that there are not so many such options in Laramie! “We were happy to find what we need at WRI. We now have an operational paintshop only 5-min away from the office”.

Since then, regular contacts have been organized with other startups from Impact 307. Developing businesses, that have an interest in settling in the Laramie area, are also considering working at WRI.

So, 2025 will probably see many more examples and we will be happy to see WRI also develop has a Business Park that fosters innovation in many different areas!

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Rare Earth Elements

2024 finished on a great news: **American Rare Earths Limited** (ARE) just started a new project with Western Research Institute.

WRI will host a pilot plant to help move ARE's starting line forward in what has become an extremely high-stakes race not just for Wyoming, but the nation and the World. The plant will show the potential of **Halleck Creek's mine**, which will be operated by **Wyoming Rare (USA)**, the local subsidiary of ARE.

The partnership with Western Research Institute will also help Wyoming Rare to centralize its operations. The facility is going to house all its drill core and assay samples to date. "There will be other synergies as well, given the institute's expertise", Wyoming Rare (USA) President **Joe Evers** said. "The not-for-profit center is renowned for its work on advanced energy systems, environmental technologies, and materials research and technologies."

"They've been able to take the natural resources in the state of Wyoming and find new, interesting, novel ways to either produce them or provide different market avenues for them," Evers said. "And they have a staff of very high-quality engineers, chemical engineers that can help companies like ours go from drawing board into like actually piloting and testing out ideas in their facilities."
"They are an outstanding resource in Wyoming", Evers added, "one that is perhaps not as well-known as it could be."

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SET team

This opens a brand new chapter in WRI's history! Created a century ago to study the local crude oil, WRI has become a world-class organization for oil and asphalt research. Our goal is now to repeat this and become a reference center on Rare Earth Elements.

2024 Scientific Production

Papers in peer-reviewed journals

- Siroma, R. S., M. L. Nguyen, P. Hornych, **J.-P. Planche, J. Adams, J. Rovani, Y. Kumbargeri** et al. "Asphaltene agglomeration through physical-chemical and rheological testing." Road Materials and Pavement Design 25, no. sup1 (2024) 248-261 (https://doi.org/10.1080/14680629.2023.2221744)
- **Kumbargeri, Y., J.-P. Planche, J. Adams, J. Rovani**, and M. Elwardany. "Comprehensive Selection of Base Asphalt Binders for Effective Formulation of Polymer-Modified Asphalts." Transportation Research Record (2024): 03611981231217271 (https://doi.org/10.1126/sciadv.abn1905)
- West, R., F. Yin, M. Mottaghi, C. Chen, R. Moraes, N. Tran, **Y. Kumbargeri, J.-P. Planche, J. Adams, J. Rovani**, C. DuBois and G. King, "Evaluation of Post-Consumer Recycled Plastics in Asphalt Mixtures via the Dry Process", NCHRP Research Report 1143 (2024) (https://nap.nationalacademies.org/catalog/28867/evaluation-of-post-consumer-recycled-plastics-in-asphalt-mixtures-via-the-dry-process)

US Patents

- **J. Adams and J.-P. Planche**, Methods for Modulating Petroleum-Based Hydrocarbons Using Amines, US Patent 12,076,663 (B2)

US Patent Applications

- **J. Adams, J.-P. Planche, S. Bassham and A. Literati**, Asphalt Materials from Wind Turbine Blades and other Composite Materials, US Patent Application 2024,254,397 (A1)

Oral Communications (underlined = invited presentation)

- **Kumbargeri, Y., J.-P. Planche, J. Adams and J. Rovani**, "Lessons Learned at Industry Level from the 60th Petersen Asphalt Research Conference 2023", Transportation Research Board, 103rd Annual Meeting, Washington D.C., January
- **Adams, J., S. Bassham, Y. Kumbargeri, A. Literati and J.-P. Planche**, "Novel Method to Chemically Treat Recycled Tear-off Reclaimed Asphalt Shingles (RAS) for Use as New Asphalt in Roofing Applications", Petersen Asphalt Research Conference, Laramie, WY, July
- Igelsrud Pfeiffer, T., **J. Adams**, LC Muller, **C.-Y. Pan, Y. Kumbargeri, J.-P. Planche, C. Seago, A. Literati, W. Phillips** and P. Behrens, "Update on Coal to Asphalt", Petersen Asphalt Research Conference, Laramie, WY, July
- **Lesueur, D.**, "La cal en las mezclas asfálticas", Asociación Mexicana de Ingeniería de Vías Terrestres (AMIVTAC)/Calidra Simposio-Taller Internacional "Cal en Vías Terrestres", Mexico City, MX, August
- **Kumbargeri, Y., J.-P. Planche, J. Adams, S. Bassham, A. Literati and D. Lesueur**, "A multi-pronged approach for effective performance characterization and evaluation of recycling agents in asphalt pavements", Association of Asphalt Paving Technologists (AAPT) Annual Meeting, Chicago, IL, September
- **Kumbargeri, Y., J. Adams, S. Bassham, A. Literati and D. Lesueur**, "Non-Petroleum Binders for a Sustainable and Net-Zero Asphalt Pavement", Nevada Asphalt Conference, Las Vegas, NV, October
- **Kumbargeri, Y., J. Adams, D. Lesueur, A. Literati and S. Bassham**, "A multi-pronged approach for performance characterization of polymer modified alternative binders", Association of Modified Asphalt Producers (AMAP) Annual Meeting, Salt Lake City, UT, October
- Muller, LC, **C.-Y. Pan**, T.I. Pfeiffer, P. Behrens, **J. Adams, Y. Kumbargeri, J.-P. Planche, J. Martin, L. Hazard, Md I. Haque**, "Novel PRB Coal Based Asphalt", 41st Annual International Pittsburgh Energy and Carbon Management Conference (PECMC), Online, October
- **Adams, J., S. Bassham, Y. Kumbargeri, A. Literati and J.-P. Planche**, "Novel Method to Chemically Treat Recycled Tear-off Reclaimed Asphalt Shingles (RAS) for Use as New Asphalt in Roofing Applications", Annual Meeting of the Asphalt Institute, Orlando FL, December

Credits

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Website
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- The article “Coal to Asphalt” is adapted from UW’s news published in 2023 (https://www.uwyo.edu/news/2023/07/uws-ser-and-wri-collaboration-on-green-coal-based-asphalt-featured-at-conference.html)
- The article “Mesophase pitch” contains extracts from Jana et al., (2022), “Atoms to fibers: Identifying novel processing methods in the synthesis of pitch-based carbon fibers”, Science advances 8(11) (https://doi.org/10.1126/sciadv.abn1905)
- The article “SDA Partnership” contains extracts from KBR’s news published in 2019 (https://www.kbr.com/en/insights-news/press-release/kbrs-market-leading-solvent-deasphalting-technology-roser-selected)
- The article “Rare Earths Elements” contains extracts from Cowboy State Daily’s article by Renee Jean (2024), “Wyoming Project Gets Boost In Race To Be First For U.S. Rare Earths Production” (https://cowboystatedaily.com/2024/12/21/wyoming-project-gets-boost-in-race-to-be-first-for-u-s-rare-earths-production/)
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