

**Biological and Environmental Research Advisory Committee
(BERAC) Meeting Minutes
April 11-12, 2024
Remote Access Meeting**

BERAC Members Present

Bruce Hungate, Chair	Kerstin Kleese van Dam	Matthew Shupe
Caroline Ajo-Franklin	Sonia Kreidenweis	
Cris Argueso	Xiaohong Liu	Guest Speakers
Ana Barros	Maureen McCann	Wayne Parrott
Bruno Basso	Gloria Muday	Paul Ullrich
Sen Chiao	Dev Niyogi	Pamela Weisenhorn
Leo Donner	Himadri Pakrasi	
Matthew Fields	Kristala Jones Prather	Designated Federal Officer
Robert Fischetti	Patrick Reed	Tristram West
Ann Fridlind	Gemma Reguera	
Jorge Gonzalez-Cruz	Jeremy Schmutz	
Randi Johnson	Karen Seto	

Approximately 239 additional people were in attendance virtually during the course of the meeting.

All presentations are posted to the BERAC website: <https://science.osti.gov/ber/berac/Meetings>

Thursday, April 11, 2024

Welcome

BERAC Chair, Bruce Hungate, called the meeting to order at 11:30 a.m. Eastern Time and welcomed attendees. Visual interpretations of how devastating climate change might be in Arizona were shared. Artistic interpretations of our future are powerful and can give us the perspective needed to take action.

BERAC Member Updates

Hungate invited all BERAC members to share Biological and Environmental Research (BER)-relevant thoughts. Discussion topics varied and included new initiatives, capabilities, and discoveries while emphasizing the urgent need to leverage interdisciplinary and inclusive science in the face of climate change and decreasing U.S. competitiveness. BERAC members also stressed the importance of storytelling and awe, especially in light of the total solar eclipse on April 8, 2024.

New centers, initiatives, upgrades, and related efforts:

- The Advanced Photon Source (APS) at Argonne National Laboratory (ANL) began a yearlong comprehensive upgrade in April 2023, to increase the brightness of x-rays by up to 500 times. Following a recent successful Accelerator Readiness Review (ARR) and subsequent approval from the U.S. Department of Energy (DOE) Argonne Site Office,

the commissioning of the new storage ring has commenced. This will occur over several months and individual beam lines will come online one-by-one.

- The APS Structural Biology Center at ANL has been replaced with long beam lines for ultra-high resolution x-ray imaging through the BER-funded eBERlight program. eBERlight is working with the Facilities Integrating Collaborations for User Science (FICUS) program to provide researchers with access to world-class resources at Environmental Molecular Sciences Laboratory (EMSL), Joint Genome Institute (JGI), the National Ecological Observatory Network (NEON), the Biological Small-Angle Neutron Scattering Instrument (Bio-SANS) beamline at the High Flux Isotope Reactor (HFIR) through the Center for Structural Molecular Biology (CSMB), and the APS.
- Planning for the National Aeronautics and Space Administration (NASA) Atmosphere Observing System (AOS) mission has been budget challenged, resulting in the loss of High Spectral Resolution Lidar (HSRL) under NASA support. However the Italian Space Agency (ASI) will now be supporting those capabilities. The success and value of the mission relies heavily on the data coming from the combination of different instruments.
- Researchers from Wake Forest University are part of the Climate-Responsive Opportunities in Plant Science (CROPS) project, funded by a National Science Foundation (NSF) Regional Innovation Engines grant. The team will be bringing their expertise in plant reproduction and the associated negative effects of temperature stressors to a larger partnership that aims to help North Carolina farmers mitigate climate impacts.
- Hurricane Maria and its impacts on Puerto Rico have resulted in a new vision and perception on how to build resiliency. A collaborative project between researchers from the University of Albany, New York University and the University of Puerto Rico at Mayagüez will use Puerto Rico as a testbed to develop new solutions to improve the security and resiliency of coastal power grids around severe weather events.
- The University of Texas (UT) City + Climate Co-Lab is a federally funded research project between the University of Texas at Austin and the City of Austin to better understand the impact of extreme climate shifts on Texas communities and their infrastructure.
- The Intergovernmental Panel on Climate Change (IPCC) will be creating a Special Report on Climate Change and Cities as part of the Seventh Assessment Report (AR7) cycle. This is a significant change for the IPCC to specifically focus on urban areas.

Discoveries and opportunities in modeling, plants, microbes, genomics, and urbanization:

- The fourth generation of climate model development is ongoing at the National Oceanic and Atmospheric Administration (NOAA) Geophysical Fluid Dynamics Laboratory (GFDL). Predicting the time of day when maximum precipitation occurs over land areas has been a longstanding problem within climate modeling. Introducing nonequilibrium convection into the prototype next generation model has shown to substantially reduce the error in this area, while also correcting the error in the distribution of tropical cyclones.
- The NASA Plankton, Aerosol, Cloud, ocean Ecosystem (PACE) mission was successfully launched in February 2024, however the first quality-controlled data has not yet been released. The centerpiece of the mission are polarimeters sensitive to randomly polarized radiation reflected from the atmosphere, which is expected to provide the first data about the dispersion of cloud droplet sizes.

- Geoengineering is receiving significant attention due to the accelerating effects of climate change, with solar radiation management and marine-cloud brightening as the most prominent forms. However there might be unexpected consequences; changing the amount of solar radiation reaching the Earth's surface might affect the precipitation and cloud circulation.
- U.S. leadership in urban weather and climate models is slowly declining; Europe and others are increasing their investment in this area. However, the BER Urban Integrated Field Laboratories (IFLs) are making significant progress in taking back global leadership.
- Cuttings from poplar trees have been transported from Purdue University to Oak Ridge National Laboratory (ORNL) for amplification and propagation by the Center for Bioenergy Innovation (CBI). There is an urgency to get these bioenergy crops propagated into the agricultural landscape and to spur the bioeconomy; because the innovation cycle for plant development is years long and commercial pathways are few, scientists need to brainstorm ways to get these plants to growers in a timeframe that reflects the gravity of climate change.
- A paper was recently published on the genome of sugarcane through the Community Science Program at the Joint Genome Institute (JGI), a DOE Office of Science (SC) user facility at the Lawrence Berkeley National Laboratory (LBNL). This is one of the last genomes to have a reference sequence created, due to being a cross between an octaploid and decaploid, resulting in a highly complex fourteen-copy genome. This is a great demonstration that almost anything can be done in plant genomics.

Past and upcoming events:

- The NASA Goddard Space Flight Center (GSFC) Earth Sciences Division (ESD) is hosting a Workshop on the Use of Climate Models in Satellite Mission Design from June 10-12, 2024.
- The University of Texas Extreme weather and Urban Sustainability (TEXUS) Lab participated in the World Meteorological Organization (WMO) World Weather Research Programme (WWRP) Paris Summer Olympics and Paralympics research demonstration project meeting. Discussions centered around the progress made in urban weather and climate model development and how that might be useful for cities.
- The Climate Security Roundtable, convened by the National Academies of Sciences, Engineering, and Medicine (NASEM), is working to understand how climate change might affect national security. This includes climate impacts on migration, the livability of cities, and food security. This roundtable has produced a series of workshops, with recent and upcoming topics including urban systems, agriculture, and food systems.
- The Joint Meeting of Beta Kappa Chi (BKX) and the Nation Institute of Science (NIS) occurred in Montgomery, Alabama at the end of March 2024. The need to engage with students at events like this was emphasized.

Department of Energy (DOE) Introductory Remarks – Dr. Geri Richmond, Under Secretary for Science and Innovation

Richmond shared pre-recorded remarks. BERAC members were thanked for taking on three charges; the service of outgoing SC Director Dr. Asmeret Asefaw Berhe was acknowledged.

BER-funded science was highlighted, including the Energy Exascale Earth System Model (E3SM), along with the integral role of modeling in European Union (EU) collaborations on carbon neutral pathways and the Energy Earthshots Initiative. While some areas like the Energy Earthshot Research Centers (EERCs) saw a reduction in funding from FY24 appropriations, SC remains committed to advancing BER work. The FY25 request recently released to Congress includes an increase in funding for BER.

DOE is the first federal agency to aggressively embrace artificial intelligence (AI) as a tool across climate and energy system research. Technologies in computational structural biology like AlphaFold and RoseTTAFold; genome editing through clustered regularly interspaced short palindromic repeats (CRISPR); and laboratory automation are providing fertile ground for new breakthroughs in BER.

Strengthening links between basic and applied research is a priority at the DOE. This is being done via Secretarial crosscuts, Energy Earthshots, and the newly stood up Office of the Under Secretary for Infrastructure (S3) pillar. BER has supported multiple Energy Earthshots through the Biological Systems Science Division (BSSD) and Earth and Environmental Systems Sciences Division (EESDD). In March 2024, the White House launched the National Bioeconomy Board and BER will be consulted as needed for this exercise.

Discussion

None.

DOE Office of Science (SC) Update – Dr. Harriet Kung, Acting Director [Presentation posted]

Discussion

An individual asked whether dual-anonymous peer review might be considered at DOE. **Kung** mentioned a small-scale pilot that took place within DOE and is being assessed internally to determine whether it should be pursued further.

A BERAC member inquired about the balance between maintaining current facilities and building new facilities, especially in light of increased support for operations. Will funding ever reach 100% so facilities can be fully utilized? **Kung** said reaching 88% in the FY25 request will require ~\$200M increase in funding; unless there is a significant increase in overall funding, it will be difficult to approach 100%. There must be a determination how to balance the current suite of operations and building new facilities, along with having a trained workforce to support any increase. On a positive note, the transition during COVID to hybrid operations added additional resource requirements to all facilities, which led to elevating the funding for all facilities after a re-baselining exercise in 2023.

Comment was sought on the progress around investments in workforce development and student training at minority serving institutions (MSIs). **Kung** called for better data; more voluntary demographic information needs to be inputted into the SC Portfolio Analysis and Management System (PAMS). However, investments in MSIs are growing by least 20% year-over-year. Similarly, a longitudinal analysis tracking the impact of the Reaching a New Energy Sciences Workforce (RENEW) and Funding for Accelerated, Inclusive Research (FAIR) initiatives is being set up. The SC's long-term commitment was reiterated.

An attendee wondered how to ensure DOE funding does not become a zero-sum game, where other programs end up losing out. **Kung** mentioned the Creating Helpful Incentives to

Produce Semiconductors (CHIPS) and Science Act and the bar of authorization it sets for the SC. There is an emphasis around U.S. competitiveness and maximizing the impact and outcome of resources.

Fields within the SC are rapidly changing; in order to not fall behind, has there been a push for unsolicited proposals on a rolling basis? **Kung** stated many SC programs are using a year-round open call on a number of different topics. There has been significant discussion on how this might work best within the SC.

News from the Office of Biological and Environmental Research (BER) – Dr. Dorothy Koch, Associate Director

[Presentation posted]

Discussion

A BERAC member voiced support for the extension of the Urban IFL concept to rural and exurban areas; this expansion can highlight the urban-rural divide on mitigating and adapting to climate change. **Koch** agreed with this sentiment and mentioned the opportunities it presents for crossover between BSSD and EESSD.

An attendee asked about opportunities for forming interagency partnerships on topics like climate and energy. **Koch** did see some opportunities beyond what is already occurring, but emphasized the amount of energy these partnerships take; further interagency collaborations should be chosen strategically.

The United States Department of Agriculture (USDA) has been in rural and semi-rural areas for a long time; it was suggested that they be included in any conversations. **Koch** agreed with this suggestion.

Update on the Earth and Environmental Systems Science Division (EESSD) – Dr. Gary Geernaert, Division Director

[Presentation posted]

Discussion

An inquirer asked whether there are plans to do intentional research on the human dimension of tipping points. **Geernaert** mentioned tipping points as one of the topics addressed in the upcoming BSSD Strategic Plan, so further discussion will occur when that is released.

A BERAC member asked about linking Urban IFLs to laboratory-based research such as wind tunnel testing. **Geernaert** had not considered this possibility, but welcomed ideas like this.

In terms of the IFL concept moving to suburban and rural areas, will the approach have a winner-take-all framework or will it be more distributed? **Geernaert** said there are no plans to add additional IFLs, but urban areas will be a component of more BSSD funding opportunities, with the intention of elevating its role in the portfolio.

An attendee suggested working with economists to quantify the societal value of BER research. **Geernaert** mentioned funding work in socioeconomic models that are integrated into E3SM. However, steps need to be taken to sufficiently explain and market the societal value of the science. Communications need to emphasize visualizations instead of PowerPoint presentations. **Koch** pointed to the difficulties of economics used around biology, but emphasized that metrics showing successful science are needed.

Where can BERAC provide strategic direction and leadership within the U.S. Global Change Research Program (USGCRP), especially on urban topics? **Geernaert** mentioned USGCRP having its own strategic plan, but urban has not been incorporated until recently. BER is trying to capitalize on the momentum of the Urban IFLs and that integrated approach in order to showcase how similar success can be achieved elsewhere.

Hungate dismissed the meeting for a break at 2:40 p.m. and reconvened at 2:50 p.m.

Update on the Biological Systems Science Division (BSSD) – Dr. Todd Anderson, Division Director

[Presentation posted]

Discussion

A BERAC member sought more information about the National Bioeconomy Board and how DOE will be engaged with it. **Anderson** explained the Executive Order on Advancing Biotechnology and Biomanufacturing Innovation for a Sustainable, Safe, and Secure American Bioeconomy calls for a bioeconomy implementation plan; this board facilitates that implementation across different agencies.

An attendee wondered how the discussions during the September 2023 BER workshop on Overcoming Barriers in Plant Transformation might affect BSSD plans moving forward. **Anderson** mentioned plans to build out that area. Addressing plant biomass research is important in positioning BSSD's portfolio around the bioeconomy.

BERAC Science Talk: Basic Science and Actionable Science in Earth Systems Models: Current Challenges, Dr. Leo Donner, National Oceanic and Atmospheric Administration

[Presentation posted]

Discussion

A BERAC member sought thoughts on using machine learning (ML) to explore the multiparameter complexity of conventional models using emulators. Similarly, opinions on the role of uncertainty in training data set were solicited. **Donner** saw the use of emulators in classical models as an important approach, especially in exploring out-of-sample problems and formalizing the tuning process. In respect to uncertainty, the industrial scale use of process surrogates necessitates knowing any of the associated consequences. Observations in process models and process surrogates can propagate through uncertainties in the training data with careful attention. The integration of laboratory, field, and global model data is necessary in these cases.

An attendee remarked on the modelled sea-surface temperature (SST) patterns being much lower than the observed trends; what is causing that? **Donner** said this is unknown and a better understanding how the oceans are responding is necessary to answer this question. One issue is that atmospheric models are not delivering to the ocean realistic estimates of surface fluxes. Many models have biases in the marine stratocumulus clouds and around aerosol-cloud interactions; getting better global constraints on clouds will be a significant first step.

BERAC Discussion – Dr. Bruce Hungate, BERAC Chair

Hungate said the Overcoming Barriers in Plant Transformation report is now available online.

An article in Physics Today was mentioned; it explained that the majority of the general public would prefer NASA to focus on Earth observing measurements over manned spaceflight, despite the funding not reflecting that. To stay internationally competitive requires funding and Congressional support, so research should tell stories better quantitatively and qualitatively. Another BERAC member seconded the importance of staying competitively globally; one suggestion might be sharing BER research summaries in lay terms in order to reach audiences like Congress. Similarly, it was suggested that projects might be asked to report on its effects on communities and stakeholders. In response, a member asked who would present this information to congressional staff. Would it be possible to create an interface between them and BER? A different attendee added that science communications professionals are needed to effectively share BER research. This was seconded; there needs to be a shift from exclusively writing papers to engaging with the community more effectively.

Members wondered how connecting art and science might be included in the scope of BER science. **Koch** mentioned investments in visualization, which is a step in that direction. **Geernaert** remarked on the elements of storytelling included in the BER-funded work led by Paul Ullrich at Lawrence Livermore National Laboratory (LLNL). **Anderson** saw NASA as a leader in this area. **Hungate** recommended The Story Collider, a podcast about scientific storytelling.

Dismay was shown around the lack of growth of BER funding, especially in light of the vital work being done to mitigate climate change. Another BERAC member hoped that funding might be tied to a fraction of gross domestic product (GDP) and be at least held constant at that level.

Cities are decarbonizing faster than we might have previously expected; BERAC has an opportunity to support research to influence policy in this area.

Hungate dismissed the meeting for the day at 4:35 p.m.

Friday, April 12, 2024

West convened the meeting at 12:30 p.m. and acknowledged the hard work of the members of the three charge subcommittees.

Workshop Briefing: Artificial Intelligence for the Methane Cycle (AI4CH4) – Dr. Pamela Weisenhorn, Argonne National Laboratory
[Presentation posted]

Discussion

An inquirer was curious about the mismatch between top-down and bottom-up; in terms of heterogeneity, how can you get enough sampling for them to match? Are there other factors beyond that? **Weisenhorn** said high heterogeneity is part of the problem, but the bottom-up models are missing key mechanisms; the way plants and microbes are included is not sufficient, especially given that methanogens and methanotrophs are important players. The importance of individual taxa was emphasized.

A BERAC member wondered whether there have been discussions around using AI and ML to predict where more spatial sampling might occur. **Weisenhorn** point to this as a key finding action item. If data assimilation can be proven at the edge, there can be indications of where to sample based on a certain set of conditions.

Workshop Briefing: Overcoming Barriers in Plant Transformation – Dr. Wayne Parrott, University of Georgia
[Presentation posted]

Discussion

An attendee was curious about the idea of a single research facility with a network of service facilities; why isn't the more specialized fundamental research into regeneration, transformation, and gene stacking incorporated into the service facilities? **Parrott** explained the division of research into two types: long-term, complicated research best suited for a dedicated facility and smaller, more targeted defined research to be done at various universities. Similarly, the regionality of these bioenergy crops means research needs to be done where they can grow.

Reflecting on the previous question, it was asked if both types of work could potentially be done at both research and service facilities? **Parrott** said service and research work are not mutually exclusive, but are different functions. Depending on the facility and personnel, both might be possible at a location.

Workshop Briefing: Understanding Decision-Relevant Regional Climate Projections – Dr. Paul Ullrich, Lawrence Livermore National Laboratory

Discussion

A BERAC member noted the lack of international participation; what is the rest of the world doing in this area? **Ullrich** said Europe is the only region that produces ensembles of high-resolution climate data products; they are focusing on dynamical downscaling. Most of the major countries in Europe have their own regional climate modeling system in order to generate high-resolution regional data. It is expected that their work can be leveraged to build up data sets globally.

Another attendee commented on extending these efforts beyond the Continental United States (CONUS), where there is significant interest; in these areas, there is debate on whether it should be done through statistical downscaling or dynamical downscaling. Are the downscaling efforts from high resolution general circulation model (GCM) physics or are they coupling between regional models with local physics? **Ullrich** mentioned the lack of CONUS coverage as something highlighted in the workshop. There must be a mechanism to encourage running dynamically downscaled models over less covered regions in order to build up data sets with broader coverage.

Cities are not well-represented in coarse-scale models and downscaling will only add some refinement; what is suggested in using this data in cities? **Ullrich** shared the strategies of running very high-resolution dynamically downscaled simulations or regional climate simulations over urban areas. A team is modeling Los Angeles to evaluate urban effects associated with

heat extremes using very high-resolution simulations. With the appropriate investments and computational resources, we can run these simulations over many urban areas to get a better picture of how climate might be influencing impacts on local scales.

More information was sought on participating in the community of practice. **Ullrich** said the framework and vision for the community of practice is being created. Those who are interested were encouraged to join the mailing list to be kept up to date on next steps.

An individual asked whether air quality data was considered as part of these models. **Ullrich** mentioned the workshop contributions of Tanya Spero from the U.S. Environmental Protection Agency (EPA), who has significant interest in the role of air quality data.

In regard to multi-state extremes, it would be valuable to extend this work to the large ensemble climate modeling space. There is interesting work in this area on the internal variability and interplay of extremes, but virtually no downscaled access for applications. **Ullrich** agreed and shared that without subdaily datasets, many of these extremes cannot be addressed.

Hungate dismissed the meeting for a break at 1:45 p.m. and reconvened at 1:55 p.m.

Data Unification Subcommittee Update – Ms. Kerstin Kleese van Dam, Brookhaven National Laboratory (BNL)

[Presentation posted]

Discussion and Vote

An attendee highlighted DOE's track record in developing the Earth System Grid Federation (ESGF) and the Climate and Forecast (CF) Metadata Conventions; a similar approach is needed for interoperability. AmeriFlux was also spotlighted as part of BER leadership in data crowdsourcing. An opinion was sought about the difference of bringing together all BER data and crowdsourcing data. **Kleese van Dam** said a focus on the data needed in high-impact science areas will eventually lead to outside of DOE. Overall, it is highly targeted to address a particular science challenge.

A BERAC member asked about different data types and tension between the retention period and volume. **Kleese van Dam** stated this was not specifically addressed; on the climate science systems side, there are existing retention conventions. Anything that cannot be observed must be kept. The capturing and storage of data should sit with the BER facilities, as they have a sense in those communities how long it should be retained.

Curiosity was expressed around the High Performance Data Facility (HPDF) hub; there was a sense that the BER effort is separate, but are there possible synergies between the two given the current ambiguities of the HPDF? **Kleese van Dam** explained there is not enough funding allocated to realize what has been proposed, so more information on the HPDF timescale and roadmap is needed. However, this report gives BER something to coordinate with the Advanced Scientific Computing Research (ASCR) program around what is needed.

An inquirer mentioned the dramatic changes in the rate, variability, and content of data; how can the problem of designing something that will be dated by the time it is realized be addressed? **Kleese van Dam** emphasized that solutions must be lightweight and cannot take years to build. Leveraging work from other agencies and constantly engaging the interested communities can help make this happen.

An individual raised the point of workforce development and asked whether broadening fellowship eligibility beyond U.S. citizens has been retained as a recommendation in the report. **Kleese van Dam** said it was retained but is not a high-level recommendation.

BERAC voted unanimously to approve the Unified Data Infrastructure for Biological and Environmental Research report. No one present abstained or voted against the report.

Low Dose Radiation Subcommittee Update – Dr. Gemma Reguera, Michigan State University
[Presentation posted]

Discussion and Vote

In the last 15 years, there have been major efforts within BER to identify grand challenges and low dose radiation has not been identify amongst those; is there a reason to use the term “grand challenge” in this context? **Reguera** explained the use of the term as representative of the many challenges of low dose radiation research that still remain. There are significant limitations that BER needs to consider in order to move forward.

BERAC voted unanimously to approve the Assessment of BER Research in Low-Dose Radiation report. No one present abstained or voted against the report.

Project Prioritization Subcommittee Update – Dr. Himadri Pakrasi, Washington University in St. Louis
[Presentation posted]

Discussion

A BERAC member was curious about the lack of proposals on urban areas. **Fridlind** mentioned the short turnaround of this charge, so urban was outside of the remit of the subcommittee. **Gonzalez-Cruz** brought up the discussion around urban processes and the need for cloud chambers capable of stratification within the boundary layer. **Donner** shared there were not any specific facilities proposed related to the urban theme and clarified that the charge only specified new projects over \$100M.

Fridlind expressed concern about the Drizzle, Aerosol, and Cloud Observation (DRACO) chamber project development and referenced Steven Allison’s 2021 Committee of Visitors (COV) report for the review of BSSD. This COV was troubled by the facilities development process and recommended greater transparency*. Other recommendations from that report included strategizing on how to invite proposals for new facilities; developing metrics of success for large, complex facilities; and more structured processes for community input and peer review.

An attendee remarked about the process of these projects moving forward and getting manifested; BERAC must be injected into these processes for maximal impact.

Excitement was expressed for the recommendation of a plant transformation facility.

Similar excitement was voiced around the Earth System Modeling and Analysis Center (ESMAC); there has been long standing calls for a modeling unification facility. There was also curiosity about its readiness statement. **Donner** saw ESMAC as an essential facility and readiness was called out due to lack of clarity on whether it will include dedicated computing. This is evolving based on ASCR’s strong interest in integration across the sciences. Similarly, there is a

community facility at NSF and the possibility of interacting with that must be resolved before moving forward. **Pakrasi** reiterated the positive interactions the subcommittee had with ASCR.

Schmutz remarked on the feedback received around the Bioeconomy Accelerator Facility (BAF) and whether BER is best suited to be leading in this area. **Jones Prather** added to this discussion and emphasized data sharing as an important issue. BER might be able to step in to address the lack of data transparency around the bioeconomy. There were also questions about where to draw the line between basic and applied research.

Gonzalez-Cruz proposed soliciting feedback from the community before a final vote on the report takes place. It was also suggested that the subcommittee might make recommendations for new facilities. **Pakrasi** said the charge letter allowed for the opportunity to make those recommendations, but that was declined given the time constraints.

A BERAC member wondered if a chapter on emerging trends and facilities might be added. **Pakrasi** appreciated the suggestion and expressed concern about completing this within the time remaining. **Fridlind** mentioned an alternative facility vision was presented to the committee. Will those slides be shared with others? **Donner** said that the report does not include everything that was in the slides; the alternative vision is captured but not the specific details.

West suggested, based on the timing, putting the report up for a vote with caveats to make minor edits afterwards. **Pakrasi** agreed with this suggestion. **Hungate** saw further edits as an opportunity to contextualize Steven Allison's concerns around transparency with the challenge of producing this report in a brief timespan. **Gonzalez-Cruz** recommended including how the facilities will encourage diversity, equity, and inclusion (DEI).

An attendee expressed a desire that to ensure the report reflects all the voices of the subcommittee. Another attendee asked if a more detailed report could accompany the official report. **West** was open to taking suggestions from BERAC along these lines.

BERAC voted unanimously to approve the BER Project Assessment report with minor forthcoming edits.

Public Comment

Dr. Julie Mitchell (ORNL) offered comments on the Overcoming Barriers in Plant Transformation workshop report. ORNL is excited to see growing interest in a network of plant transformation facilities and has compiled a list of fourteen ORNL publications, eight review articles, and six patents/ disclosures from the past five years that have resulted from BER investments. These accomplishments can be viewed at <https://tinyurl.com/ornlplants>. ORNL looks forward to their further contributions in the area.

Hungate adjourned the meeting at 4:09 p.m.

*Additional post-meeting note from BERAC Chair: All projects that were proposed to the Subcommittee were compiled from multiple BERAC reports that were completed over approximately the last ten years. This input was then reviewed by BER to assess what may have the most significant impact. For some proposed projects, workshops have been held with the larger research community to further develop project details. For example, a workshop report relevant to the Plant Transformation project has been published (<https://www.osti.gov/servlets/purl/2335710>). With regard to the proposed DRACO Chamber project, a workshop to discuss science priorities and concepts for a large-scale laboratory facility

was open to the entire research community. The outcomes of the workshop, hosted by the National Center for Atmospheric Research (NCAR) with 60 participants from across the community in attendance, were reported in an article published in the Bulletin of the American Meteorological Society (BAMS), a leading journal in the atmospheric science community (<https://doi.org/10.1175/BAMS-D-20-0009.1>). The subsequent NSF/DOE funded design effort which involved two DOE labs and nine universities has led to 11 publications in peer-reviewed journals and 13 oral presentations at conferences.

Respectfully submitted April 25, 2024,
Drew Nitschke
Science Writer, Oak Ridge Institute for Science and Education (ORISE)