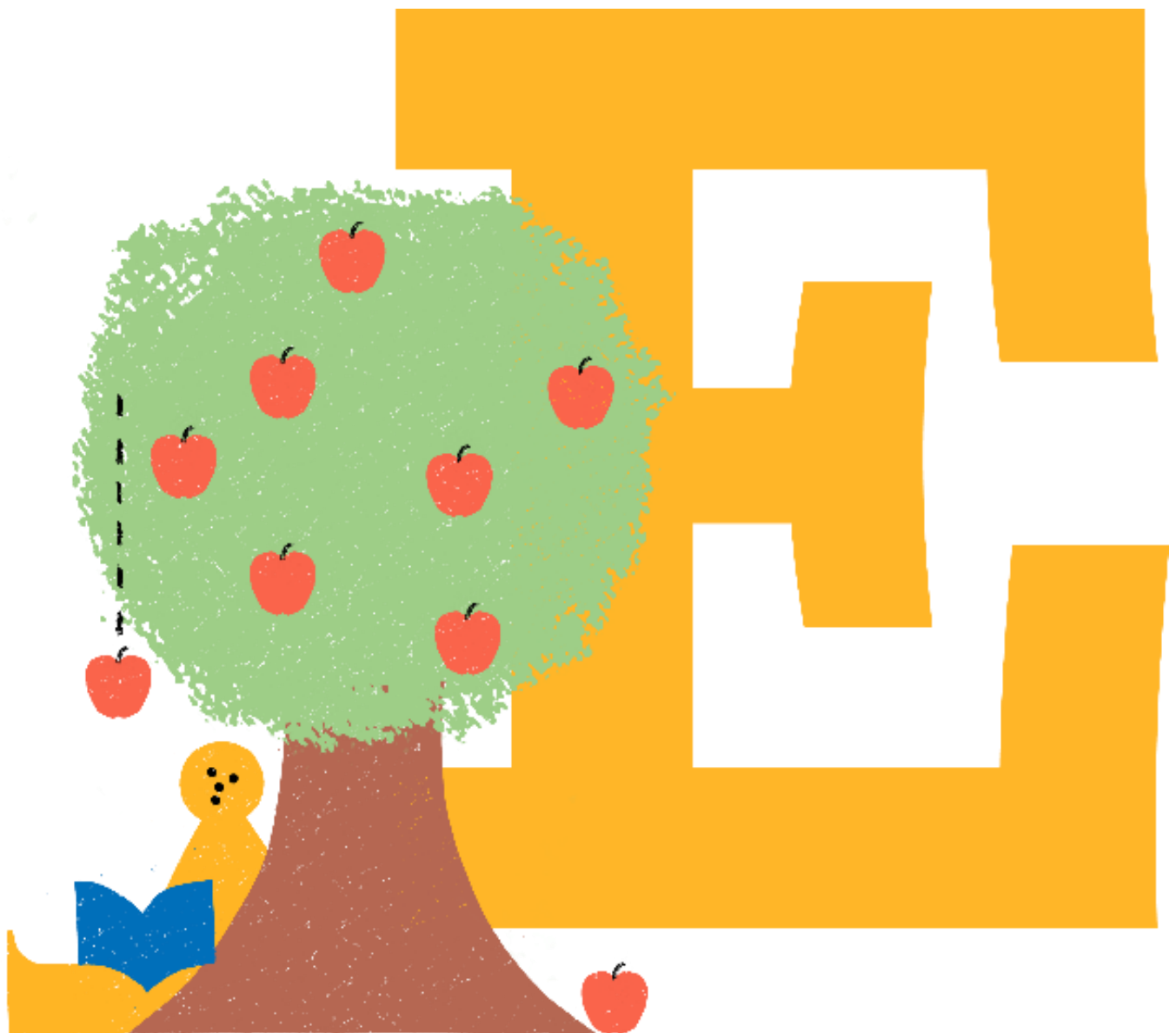


# Science Literacy Week 2023

## Quiz Bowl

## Study Guide



### **Multiple Choice Questions**

1. How many power-producing wind energy projects are there across Canada as of Jan. 2023?  
**318**
2. Which country is the largest exporter of electrical energy?  
**Germany**
3. A device used to store electrical charge is referred to as?  
**Capacitor**
4. Which of the following uses an electrical to heat energy conversion?  
**Clothing Iron**
5. A device used to store electrical energy is referred to as?  
**Battery**
6. Coal is mainly used for two purposes: steel making and power generation? True or False?  
**True**
7. Canada is the largest generator of hydroelectricity globally. True or False?  
**False, Canada is ranked 3<sup>rd</sup> largest hydroelectricity producer.**
8. How many different types of natural gas resources exist?  
**There are two (2) types: Conventional and Unconventional**
9. Which province currently has three active coal mines?  
**Nova Scotia**
10. Buildings use energy for lighting and heating, which of the following reduces energy loss?  
**Insulation**
11. Which renewable energy source had a generation station first opened in 1891?  
**Chaudière Falls in Ottawa for Hydropower**
12. Which crop is most commonly used to produce biomass in the United States?  
**Corn**
13. Which Sustainable Development Goal connects directly with renewable energy consumption?  
**SDG sustainable development goal 7: Affordable and Clean Energy**
14. What is Canada's current installed capacity for hydroelectric power in Megawatts?  
**82,307 MW as of 2021?**
15. Which government program offsets carbon credits and provides a rebate to residents due to the federal pollution pricing?  
**Climate Action Incentive Program**
16. Which NS organization is responsible for solar rebates?  
**Efficiency Nova Scotia**
17. According to Natural Resources Canada, the highest geothermal resources can be found in British Columbia, Northwest Territories, Yukon, and Alberta. True or False?  
**True**
18. Which of the following is not a fossil fuel: Coal, natural gas, petrol, or uranium?  
**Uranium**
19. 5.5% of electricity generated in Canada in 2020 came from which renewable energy source?  
**Wind**

20. Which of the waterways have been used for hydroelectricity? Fall River, River Hebert, LaHave River, Barrington River, St. Mary's River  
**Fall River**
21. Which province has the highest number of coal mines?  
**British Columbia – 10 coal mines**
22. Which of the following was energy efficiency day in 2022 in Canada?  
**October 5, 2022**
23. What is the name given to energy derived from the heat found within the Earth?  
**Geothermal**
24. What is the name of the basin in Western Canada (British Columbia, Alberta and Saskatchewan) that conventional natural gas can be found in?  
**Western Canada Sedimentary Basin**
25. Which Canadian province used to house one of three tidal power plants in the world?  
**Nova Scotia at Annapolis Generating station.**
26. What is Canada's global rank for installed solar energy?  
**22<sup>nd</sup>**
27. How is energy efficiency measured?  
**Energy output/energy input x 100 = % efficiency**
28. Canada is the \_\_\_ largest producer of natural gas in the world.  
**6<sup>th</sup>**
29. Which car manufacturer has the largest number of electric vehicles?  
**BYD, Tesla is 2<sup>nd</sup> BYD means Build Your Dreams (we are looking at full battery and hybrid)**
30. Solar energy that is used by direct sunlight and heating existing spaces is referred to as?  
**Passive Solar Energy**
31. What is geothermal energy?  
**Geothermal energy is heat generated from the Earth's crust, stored in the rock and fluids that fill the fractures and pores within the Earth's subsurface. (cer-rec.gc.ca)**
32. What are the two main types of energy?  
**Renewable and Non-Renewable**
33. How many active coal mines are there in Canada as of 2023 June?  
**19 - There are 24 mines, 19 are in operation.**
34. How many power-producing solar energy projects are there across Canada as of Jan. 2023?  
**196**
35. What year did Nova Scotia stop producing natural gas?  
**2018**
36. What is energy that is sourced from a consistent source known as?  
**Renewable**
37. What is the name of the global governing body on energy?  
**International Energy Agency (IEA)**
38. Which of these uses less energy? Incandescent or Fluorescent  
**Fluorescent**
39. How many nuclear reactors are in operation in 2023 globally?  
**445**

40. What was the first source of energy in Nova Scotia?  
**Hydropower**
41. Which sector uses the most energy? Residential, industrial commercial or transportation  
**Industrial**
42. How long will a kWh keep a 100-watt bulb on for?  
**10 hours Kilo = 1000, so 1 kWh means 1000-Watt hours or 100 watts for 10 hours**
43. Energy can be created and destroyed. True or False?  
**False**
44. Which of the following produces no greenhouse gas emissions?  
**Hydropower**
45. The Sable Offshore Energy Project was a Nova Scotian natural gas production site that began decommissioning in 2018, what is the name of the other site that also closed in 2018?  
**Deep Panuke**
46. State the law of conservation of energy.  
**Energy can neither be created nor destroyed only converted from one form of energy to another.**
47. What is Canada's global rank in hydroelectric energy generation?  
**4<sup>th</sup>**
48. What percent of Canada's total electricity is generated from nuclear energy?  
**Approximately 15%**
49. Which province produces the greatest amount of solar energy?  
**Ontario**
50. Which country in the G20 has the cleanest electricity grid?  
**Canada**
51. What percentage of Canada's total electricity is supplied by hydroelectricity?  
**60%**
52. What is the SI unit for energy?  
**Joules**
53. In what year did Ottawa become the first city to light all of its streets with electricity?  
**1885**
54. How many solar energy installations are currently set up across Canada?  
**More than 43,000 Solar PV installations**
55. Which province has 59 MW of Solar energy capacity and 616.3 MW of wind energy capacity?  
**Nova Scotia**
56. How many nuclear power plants can be found in Canada?  
**There are five (5) plants and 22 reactors.**
57. Which of the following uses chemical to thermal energy conversion?  
**Coal**
58. What are the four main biomass sources in Canada?  
**Firewood, Pulping liquor, solid wood residues and wood pellets**
59. What is Canada's rank for installed wind energy capacity as of 2021?  
**2021 was 8<sup>th</sup>.**

60. Which province lists hydropower being 94% of its electricity generated?

Quebec

### **Lilian Judy**

Lilian Judy is an accomplished professional with a strong background in engineering and a passion for driving positive change. Holding a Degree in Plastics Engineering from the University of Massachusetts, Lowell, as well as a degree in Engineering Science, she has cultivated a wealth of knowledge and expertise in her field. Currently, Lilian serves as a Life Science Applications Engineer where she embarks on exciting projects focused on delivering clean and reliable polymer solutions for bioprocesses. Her work reflects her dedication to advancing sustainable technologies and making a positive impact on the life sciences industry.

Beyond her engineering pursuits, Lilian is an influential voice in the world of podcasts. She hosts her own podcast called "Dear Women in STEM," where she utilizes her experiences, knowledge, and voice to contribute to a variety of conversations. This platform allows her to address topics relevant to women in STEM, amplifying their voices and fostering a supportive community.

Lilian's commitment to utilizing her voice, experiences, and knowledge to contribute to a variety of conversations serves as an inspiration to others, while driving positive change makes her a catalyst for progress in the realms of diversity, plastics engineering, STEM outreach, and empowering the next generation.

### **Edward Jones-Imhotep**

Edward Jones-Imhotep is the Director of the Institute for the History & Philosophy of Science & Technology at the University of Toronto, where he also serves as an associate professor. He received his PhD from Harvard University in history of science and technology. As an award-winning historian of science and technology, his research focuses on the intersections of science, technology and modern culture, specifically what technological failures reveal about the historical place of machines and machine behaviours in modern societies.-

Jones-Imhotep's first book, *The Unreliable Nation: Hostile Nature and Technological Failure in the Cold War*, won the 2018 Sidney Edelstein Prize in the best scholarly work in the history of technology. In 2021, he launched the Black Androids project. Working with a group of advanced undergraduate students, the project explores the black technological experience in 19th and early 20th century America through a history of the "black androids" — automata in the form of black humans. In 2022, Jones-Imhotep received the Black Research Network's IGNITE grant for his new research, *Black Steam, Blacktop and Black Light*.

### **Mireille Norris**

Mireille Norris is an assistant professor at the Temerty Faculty of Medicine at the University of Toronto and a geriatrician at Sunnybrook Hospital. Her expertise is in the determinants of health in seniors with dementia and fall prevention for seniors who live in long-term and community care.

Along with her colleagues at Sunnybrook, Norris co-led the establishment of the Sunnybrook Program to Access Research Knowledge for Black and Indigenous Medical Students (SPARK). The program supports Black and Indigenous medical students by providing opportunities for meaningful, paid research externships at the hospital. A recipient of the Black Research Network's IGNITE grant, Norris will conduct new research to understand how health literacy and dietary choices are key in improving hypertension outcomes in Scarborough's Black community. In March 2022, Norris was a recipient of the Miriam Rossi Award for Health Equity in Undergraduate Medical Education. The award recognizes University of Toronto MD Program faculty members for their commitment to diversity and health equity in undergraduate medical education.

### **Lisa P. Jackson**

Lisa Jackson is Apple's vice president of Environment, Policy and Social Initiatives, reporting to CEO Tim Cook.

Lisa oversees Apple's efforts to minimize its impact on the environment by addressing climate change through renewable energy and energy efficiency, using greener materials, and inventing new ways to conserve precious resources. She also leads Apple's \$100 million Racial Equity and Justice Initiative, focused on education, economic opportunity, and criminal justice reform — and is responsible for Apple's education policy programs, its product accessibility work, and its worldwide government affairs function.

From 2009 to 2013, Lisa served as Administrator of the US Environmental Protection Agency. Appointed by President Barack Obama, she focused on reducing greenhouse gases, protecting air and water quality, preventing exposure to toxic contamination, and expanding outreach to communities on environmental issues.

She has also served as chief of staff to New Jersey Governor Jon S. Corzine and as commissioner of New Jersey's Department of Environmental Protection.

Lisa holds a master's degree in Chemical Engineering from Princeton University and a bachelor's degree in Chemical Engineering from Tulane University. She serves on the boards of Tulane, SF Film, Conservation International, and the American Film Institute.

### **Dr. Rita Orji**

Dr. Rita Orji is a Canada Research Chair in Persuasive Technology and holds the position of Associate Professor at the Faculty of Computer Science, Dalhousie University, where she directs the Persuasive Computing Lab. Her research areas encompass Human-Computer Interaction, Persuasive Technology, Games for Change, and Digital Health. Dr. Orji's research group is particularly focused on investigating user-centered approaches for designing interactive systems that motivate individuals to take actions and support causes beneficial for both them and their communities. They also explore how interactive systems can be tailored to meet the needs of under-served populations, a field known as HCI for Development (HCI4D). Their research is applied to address real-life challenges across various domains, including the enhancement of health and wellness behaviors such as sexual and other health risk behaviors, healthy eating, physical activity, mental health, and smoking cessation.

Dr. Orji is an integral part of the Human-Computer Interaction (HCI), Visualization, and Graphics community. Her work is financially supported by the NSERC Discovery Grant. In the past, she held a Banting postdoctoral fellowship at the University of Waterloo and earned her Ph.D. in Computer Science from the University of Saskatchewan as a Vanier Scholar. Her list of publications and a brief profile can be found on the Dalhousie University News website.

### **Dara Miles Wilson**

Dara has an affinity for watching organisms interact with their environment and is currently researching meaningful ways to connect historically excluded populations to natural and cultural resources through funded placemaking projects. She has had the pleasure of interpreting wildlife at the Smithsonian National Zoo, conducting microsurgery on passerine birds in tropical primary and secondary rainforests, walking rehabilitated mountain lions in Bolivia's Amazonian jungle, and fighting invasive/non-native plant species in Florida's panhandle. Driven by the desire to deepen her awareness of the world, yet cognizant of the role systemic racism plays in ownership, access, and the perceived threat of violence in outdoor spaces, Dara's latent introduction into meaningful scientific inquiry as it relates to coexisting organisms resulted in a fascination with the natural world that transcended into deep questioning concerning issues of access, opportunity, visibility, and narratives.



## **Jessica Matthews**

(thegreenprogram.com)

Uncharted Power is a *power access* company, paving the way for smart and sustainable infrastructure development. The Uncharted System specializes in creating a resilient, upgradable, and cost-effective “Internet for Decentralized Energy” by connecting energy sources and applications like sensors, edge devices, and ICT hardware right under our feet. Uncharted Power has raised \$7 million, the largest Series A ever raised by a black female founder.

Jessica is not only founder and CEO but CTO, too, as well as a multiple patent holder for the software stack, hardware elements, mesh design, and AI-based protocols inside the MORE (Motion-based, Off-grid, Renewable Energy) technology.

(Smithsonian Institute)

Jessica Matthews is the Founder and CEO of Uncharted Power, a renewable power startup company that harnesses energy from motion to create sustainable power systems for communities around the world. Jessica grew up in New York City as the child of Nigerian immigrants. During a visit to Nigeria when she was 17, she noticed the use of generators and kerosene lamps to provide electricity and lighting at night. She then looked for quieter and less polluting solutions, and invented “Soccket,” a soccer ball that captures and stores energy. From there, she created other energy-generating toys and devices before turning to invent new ways to create and store power on a larger, community or city-wide scale. Jessica is the named inventor on more than 10 patents and has been listed in Fortune magazine’s “Most Promising Women Entrepreneurs” and Inc. magazine’s “Top 30 under 30.”

## **Dr. Korie Grayson**

As a first-generation college student, Dr. Korie Grayson received a full-ride scholarship into the Dozoretz National Institute for Mathematics and Applied Science (DNIMAS) program at Norfolk State University, a historically black college or university (HBCU). In 2012, she graduated from NSU with a Bachelor’s in Chemistry: Pre-Med and eventually landed a job at a biomedical device company called CryoLife, Inc. She worked as a Medical Device Associate assembling the HeRO® Graft (Hemodialysis Reliable Outflow), the only fully subcutaneous AV access solution clinically proven to maintain long-term access for hemodialysis patients with central venous stenosis. While there, she decided to pursue graduate studies and was accepted into Cornell University’s Biomedical Engineering PhD program.

While at Cornell, Dr. Korie Grayson became the Louis Stokes Alliance for Minority Participation (LSAMP) Graduate Coordinator in the DPE Department at Cornell, a position designed to support the recruitment

and retention of underrepresented students in engineering. She was also a Graduate Resident Fellow who lived among and worked directly with Cornell undergraduates in the West Campus Housing System to foster a diverse community through workshops, forums, activities, and socials.

She did a Postdoctoral Research Fellow at the University of Michigan in the Department of Chemical Engineering in Dr. Lola Eniola-Adefeso's lab. Her research focused on the evaluation of novel nano- and microparticles for therapy in neutrophilic, acute inflammatory disease and cancer. She was also the Chair of the UMich Black Postdoc Circle. Currently, she is an American Association for the Advancement of Science (AAAS) Science & Technology Policy Fellow working at the intersection of science and policy in emerging technology fields.

But the work does not stop there! Dr. Korie Grayson is super passionate about increasing the number of underrepresented minorities in STEM by illustrating that representation matters. She is the Diversity Chair for Women Doing Science, an international movement to increase the visibility of women in science. She is also on the planning council for STEMNoire, a holistic wellness and research retreat for Black women in STEM that just had its first inaugural conference of over 500+ attendees! She is the Director of Finances for BlackInCancer, an organization that aims to strengthen networks and highlight Black excellence in cancer research and medicine. She is also a part of the STEM Avengers that successfully planned the STEM Success Summit, a virtual conference designed to equip and empower over 2000 young adults, who are traditionally underrepresented in STEM, to launch and build a successful STEM career with purpose.

Throughout the years, Dr. Korie Grayson has been honored and awarded: List of Influential African American Women to Follow on LinkedIn (2020), Cell Press 1000 Inspiring Black Scientist in America (2020), Edward A. Bouchet Graduate Honor Society (2020), Cornell Diversity Programs in Engineering (DPE) Graduate Student of the Year (2017), Cornell DPE Robert Mozia Graduate Distinguished Service Award (2016), National Science Foundation Graduate Research Fellowship Program (2014), and Alfred P. Sloan Fellowship (2014).

She is a proud and active member of the Biomedical Engineering Society, National Society of Black Engineers, Society of Women Engineers, and Delta Sigma Theta Sorority, Inc. She hopes she can continue to inspire and fight for the next generation of scientists and beyond.

## Hazel O'Leary

Former U.S. Secretary of Energy

The first African American Secretary of Energy, O'Leary advanced America's energy policy toward valuing renewables and linking energy with health and environmental quality. She emphasized the importance of renewable energy and energy efficiency, increased funding for renewable energy fields, and established a quantifiable way to measure successes. She went on to lead the Ambassadors for the Minorities in Energy Initiative, part of the Department of Energy's Office of Economic Impact and Diversity.

([thehistorymakers.org](http://thehistorymakers.org))

Cabinet appointee and president of Fisk University, Hazel Rollins O'Leary was born Hazel Reid on May 17, 1937, in Newport News, Virginia to Dr. Russell Edward Reid and Hazel Palleman. Raised by her stepmother Mattie Ross Reid, O'Leary attended the Urban League's camp in Atwater, Massachusetts every summer where she met Alma Brown and the Delany sisters. O'Leary attended Aberdeen Gardens School in Hampton, Virginia, Booker T. Washington School, John Marshall School and Huntington High School in Newport News, Virginia. O'Leary graduated from the High School of Fine and Performing Arts in Newark, New Jersey in 1955. She then graduated Phi Beta Kappa from Fisk University in 1959, at the cusp of the Civil Rights Movement. Among her teachers were Vivian Henderson, Robert Hayden, and T.S. Courier. O'Leary went on to obtain her J.D. degree from Rutgers University Law School in 1966.

From 1967 to 1969, O'Leary handled organized crime cases while serving as assistant county prosecutor in Essex County, New Jersey. Later, she joined the accounting firm of Coopers & Lybrand. During the administration of President Jimmy Carter, O'Leary acted as assistant administrator of the Federal Energy Commission, general counsel of the Community Services Administration, and an administrator for the Economic Regulatory Commission of the newly created Department of Energy. In 1981, O'Leary and her husband formed O'Leary and Associates, 1989 to 1993, where she served as executive vice president of Northern States Power in Minnesota.

Nominated by President Bill Clinton in 1993, O'Leary became the seventh United States Secretary of Energy and the first African American woman to serve in that office. As Secretary, O'Leary changed the department's Office of Classification to the Office of Declassification, initiated an aggressive clean-up of surplus plutonium, created an Openness Advisory Panel, and encouraged the Clinton administration to end nuclear testing in the United States. O'Leary established the Samuel P. Massie Chair of Excellence Professorship in Environmental Disciplines which benefited nine historically black colleges and universities. In 1996, O'Leary resigned and joined Blaylock and Partners, becoming CEO in 2002. In 2004, O'Leary was named President of Fisk University in Nashville, Tennessee.

O'Leary served on the boards of Africare, UAL Inc. (parent company of United Airlines), Morehouse College; Alchemix Corporation; AES Corporation; The Center for Democracy; ICF Kaiser; Scottish Re, Ltd.; Nashville Chamber Orchestra; the World Wildlife Fund; Nashville Alliance for Public Education; ITC Holdings, Inc.; and Nashville Business Community for the Arts. O'Leary also received numerous honors for her work. O'Leary was widowed in 1987 and she also has one son, attorney Carl G. Rollins III.

### **Dr. Sophia Stone**

Dr. Sophia Stone has always surrounded herself with strong female role models. While growing up in Jamaica and then Ontario, Dr. Stone attended Catholic school and looked up to the nuns. During her graduate and post-doctoral studies, Dr. Stone's supervisors were both champions for women in science. But perhaps the strongest female influence of all was her mother, who encouraged Dr. Stone to follow a path of excellence while supporting her the whole way through.

Strong mentorship and unwavering commitment throughout her life led Dr. Stone to the career she has today as a professor and molecular biologist in the Department of Biology. Her research explores the fundamental principles that explain how plants respond to their environments and cope with changes. It is an area of research that's especially important today, as challenges with global food security become increasingly urgent in the face of both climate change and a growing population.

### **Dr. OmiSoore Dryden**

Dr. OmiSoore H. Dryden (she/her/hers), a Black queer femme and associate professor, is the James R Johnston Endowed Chair in Black Canadian Studies, Faculty of Medicine, Interim Director of the newly established Black Studies in STEMM Research Institute at Dalhousie University, and the co-lead of the new national organization – The Black Health Education Collaborative. Dryden is a content expert and Associate Scientist with the Maritime Strategy for Patient-Oriented Research (SPOR) SUPPORT Unit (MSSU). In that capacity, she provides guidance on Canadian Black Health metrics needed to inform the development of health policies and improve the health care system, this specifically focuses on survey data and demographic information, determinants of trust, sexual health and qualitative data collection and analysis. Dryden is a member of the CIHR Anti-Racism External Advisory Committee, a member of the Black Feminist Health Science Studies International Collective, a board member of the Health Association of African Canadians; and the past co-president of the Black Canadian Studies Association.

OmiSoore Dryden has published in peer-reviewed journals and book collections and has an edited collection (with Dr. Suzanne Lenon): *Disrupting Queer Inclusion: Canadian Homonationalisms and the Politics of Belonging* (UBC Press, 2015); and the co-authored Commentary (with Dr. Onye Nnorom), *Time to Dismantle Systemic anti-Black Racism in Medicine in Canada* (2021) in the *CMAJ (Canadian Medical Association Journal)*, and the article titled, *Who Gets To Do Medicine: Black Canadian Studies and Medical Education in the "Special Forum on Black Studies in Canada"* in the academic journal, *Topia: Canadian Journal of Cultural Studies* (2022).

### **Research interests**

Dr. Dryden engages in interdisciplinary scholarship and research that focuses on Black LGBTQI communities, blood donation systems in Canada, anti-Black racism in health care, medical education, and Black health curricular content development. Dr. Dryden is the Principal Investigator of **#GotBlood2Give / #DuSangÀDonner** a research project that seeks to identify the barriers Black gay, bisexual, and trans men encounter with donating blood and also analyzes how anti-Black homophobia/transphobia shapes blood system protocols in Canada; the Principal Investigator on the project **Don't Count Us Out!** – a community-informed, culturally sensitive approach to health promotion for African Nova Scotian communities with an initial focus on COVID-19 pandemic; and the Nominating Principal Investigator (with co-principal investigators Dr. Barbara Hamilton-Hinch and Dr. Gaynor Watson-Creed) **Breast Cancer and Communities of African Descent in the Atlantic (BC-CAD-A)**. this project, focuses on identifying prevalence of breast cancer among Black women and Black populations in the Atlantic using an intersectional lens; the social and structural determinants of health that impact Breast cancer screening and treatment in the Atlantic, and testing the efficacy of the “Afrocentric screening protocols” for Black women and populations in the Atlantic.

### **André Taylor**

(LinkedIn)

As a Professor in the Department of Chemical and Biomolecular Engineering at NYU, Prof. Taylor serves as Director of the Transformative Materials and Devices (TMD) Laboratory. The TMD lab leverages their multidisciplinary expertise in engineering and materials chemistry to synthesize novel materials and use these to develop innovative architectures for energy applications. Interested in topics ranging from electrocatalyst synthesis, fuel cells, batteries, organic solar cells, amorphous metals, and 2D materials. Previous successes from the group include the first inkjet printed fuel cell catalyst layers. We also developed a spin spray layer-by-layer assembly system that dramatically increased the throughput of layer-by-layer assembled thin films. True to our name, we design and study transformative technologies that have the ability to change the status quo and promote the adoption of sustainable energy generation and use.

### **Janelle Joseph**

Janelle Joseph is an assistant professor of critical studies of race and indigeneity in the Faculty of Kinesiology & Physical Education at the University of Toronto. Joseph's research interests include anti-racism policy, physical activity access, decoloniality, and ethics.

An elected member of the Royal Society of Canada College of New Scholars, Artists, & Scientists, Joseph's book, *Black Atlantic: Cricket, Canada and the Caribbean Diaspora*, traces how sports create transnational social fields that connect migrants in North America, England and the Caribbean.

Joseph is the founder and director of Indigeneity, Diaspora, Equity and Anti-Racism in Sport (IDEAS) Research Lab, the first research lab in Canada dedicated to issues of race and movement cultures. IDEAS Research Lab promotes knowledge, leverages political work and develops community partnerships to create anti-racism programming in sports, dance and leadership. In 2021, IDEAS Research Lab partnered with Ontario University Athletics to conduct a study that traces experiences of racism among student athletes, coaches and administrators.

### **Dr. Pemberton Cyrus**

Dr. Pemberton Cyrus is a Professional Engineer and Fellow of Engineers Canada, Associate Professor and Head of the Department of Industrial Engineering at Dalhousie University. He has more than 36 years' experience teaching industrial engineering, and has held administrative positions at Dalhousie University, including Associate Dean of Engineering and acting Associate Vice President Academic. He volunteers in several organizations, including the Board of Examiners of Engineers Nova Scotia, the Canadian Engineering Accreditation Board, Vice Chair of the Maritime Provinces Higher Education Commission, and President of Imhotep's Legacy Academy.

One of his research interests is optimization of operational processes, including those in academic environments. His expertise includes scheduling, routing, networks, information systems, seaport operations and manufacturing operations.

Dr. Cyrus is also President of Logix Consultants Limited, an industrial engineering consulting firm specializing in seaport information systems, manufacturing operations management, and information engineering.

### **Ade Ben Salahuddin**

Starting at Yale University as an Ecology and Evolutionary Biology major, he is currently pursuing a B.S. degree in Biology Secondary Education with 7-12 Teaching Certification at Southern Connecticut State University. Adé's interests include evolution, paleontology, and science communication and outreach. He has worked at the Yale Peabody Museum as both a collections assistant and tour guide, observed the feeding habits of common terns in Maine with Project Puffin, excavated fossils in Arizona's Painted



Desert, and currently runs the YouTube channel Adasaur, focusing on prehistoric life and highlighting the diversity of the ancient past and the people who research it.

## **Dr. Tony G Reames**

(Energy.gov)

Dr. Tony G. Reames is the Principal Deputy Director for the Office of State and Community Energy Programs. He was most recently the Department of Energy's Deputy Director for Energy Justice, where he stood up the Department's new Office of Energy Justice Policy and Analysis in the Office of Economic Impact and Diversity. Reames also served as a Senior Advisor on Energy Justice.

Prior to the Department of Energy, Reames was an associate professor of environment and sustainability at the University of Michigan. There he established the Urban Energy Justice Lab and the Energy Equity Project, focusing on research and solutions to the production and persistence of racial, income, and geographic energy-related disparities.

Reames also served as a commissioned officer in the U.S. Army Corps of Engineers and worked in both the private and public sectors as a licensed professional engineer. He earned a B.S. in Civil Engineering from North Carolina Agricultural & Technical State University, a Master of Engineering Management from Kansas State University, and a Ph.D. in Public Administration from the University of Kansas.

## **Biography**

(Thegreenscholar.com)

Dr. Tony G. Reames is an energy and environmental justice scholar and advisor.

Reames is currently a Presidential appointee in the Biden-Harris Administration serving as the Principal Deputy Director for the Office of State and Community Energy Programs. He was also the first-ever Deputy Director for Energy Justice Policy and Analysis and in 2022 established the Department of Energy's new Office of Energy Justice Policy and Analysis.

Reames is on a professional leave of absence for public service from the University of Michigan School for Environment and Sustainability where he is an associate professor and founder of the Urban Energy Justice Lab and the Energy Equity Project.

In addition to his federal service, Dr. Reames has advised state and local governments. He was appointed by Governor Gretchen Whitmer to the first-ever Michigan Advisory Council on Environmental Justice and the Governor's Climate Justice Braintrust. He was also a member of the Michigan Department of Health and Human Services' Weatherization Policy Advisory Council. He has worked with the cities, like Detroit and Ann Arbor, on implementing equitable climate action plans, and affordable,



energy efficient housing. Reames has also consulted with corporations on increasing program access and participation for diverse customers and businesses.

Reames holds a Doctor of Philosophy in Public Administration from University of Kansas, a Master of Engineering Management from Kansas State University, and a Bachelor of Science in Civil Engineering from North Carolina Agricultural & Technical State University.

Reames' research investigates the fair and equitable access to affordable, reliable, clean energy, and explores the production and persistence of energy disparities across race, class, and place.

Reames was a JPB Environmental Health Fellow at Harvard University (2018-2021), and a visiting scholar at the Kleinman Center for Energy Policy at University of Pennsylvania (2020-2021).

Reames is a licensed professional engineer and has worked in both the public and private sectors. He is an US Army veteran, reaching the rank of Captain. His numerous recognitions include being named to the Grist 50 Fixers list, Midwest Energy News 40 Under 40, and Oakland County (Michigan) Elite 40. Reames is a member of Kappa Alpha Psi Fraternity, Inc. and Sigma Xi Scientific Research Honor Society. Reames has served as a director on several nonprofit boards, including Ecology Center, Institute for Energy Innovation, and GreenHome Institute.

### **Urban Energy Justice Lab – Dr. Tony G Reames**

(urbanenergyjusticelab)

The Urban Energy Justice (UEJ) Lab at the University of Michigan School for Environment and Sustainability (UM SEAS) was established in 2015 to study energy-related topics through a justice lens, primarily in an urban context. Our research focuses on the production and persistence of spatial, racial, and socioeconomic disparities in accessibility and affordability of energy services, technology, and programs. The UEJ Lab is led by Dr. Tony G. Reames, an assistant professor at UM SEAS.

UEJ Lab research has been funded by US Department of Energy, Alfred P. Sloan Foundation, UM Poverty Solutions, National Institutes of Health, and JPB Foundation/Harvard T.H. Chan School of Public Health. Our work is published in top journals like Nature Energy, Applied Energy and Energy Policy, and featured in popular media outlets like Greentech Media, Grist, and Midwest Energy News.



## **Dr. Rashid Sumaili**

### **Research Unit**

Fisheries Economics Research Unit

*OceanCanada* Partnership

Rashid Sumaila is a Professor and Canada Research Chair (Tier 1) in Interdisciplinary Ocean and Fisheries Economics at the Institute for the Oceans and Fisheries, and the School of Public Policy and Global Affairs, University of British Columbia. His research focuses on bioeconomics, marine ecosystem valuation and the analysis of global issues such as fisheries subsidies, marine protected areas, illegal fishing, climate change, marine plastic pollution, and oil spills. Sumaila has experience working in fisheries and natural resource projects in Norway, Canada and the North Atlantic region, Namibia and the Southern African region, Ghana and the West African region and Hong Kong and the South China Sea. Dr. Sumaila received his Ph.D. (Economics) from the University of Bergen and his B.Sc. (Quantity Surveying) from the Ahmadu Bello University. Sumaila is widely published and cited. He won the 2017 Volvo Environment Prize and was named a Fellow of the Royal Society of Canada in 2019. His interest in the environment started early in life when his grandfather used to say people should “walk as if the ground feels pain” – this is sophisticated environmentalism! His specific interest in ocean and fisheries was picked in Norway. Sumaila enjoys exploring novel ideas and mentoring future thinkers. He loves waking up each day thinking of how best to contribute to ensuring that we bequeath a healthy ocean to our children and grandchildren so they too can have the option to do the same.

### **Research Interests**

Sumaila's research involve: (i) applying game theory to fisheries, to, for example, identify whether or not developing countries should give access to their fisheries resources to foreign fleets; (ii) rethinking the nature of the discount rates applied to natural resource projects, and formulating a highly original alternative (“intergeneration discount rates”); (iii) understanding the nature, amounts and effects of government subsidies on global fisheries; (iv) documenting the employment in fisheries and competing uses of living marine resources; and, (v) estimating the multiple benefits that would be obtained globally by rebuilding fish stocks and setting up marine reserves, including the concept of the ‘High Seas’ as a large marine reserve or a ‘fish bank’ for the world.

### **Deja Perkins**

Deja Perkins is a Geospatial Analytics Ph.D. student, bird guide, and public STEM figure at NC State University. Her work prioritizes investigating environmental data gaps in low-income and minority neighborhoods and connecting communities with participatory science as a tool for creating community connection, awareness, and advocacy. With a B.Sc. in Natural Resources and an M.Sc. in Fisheries and Wildlife Conservation Biology, she uses her training to connect people across North Carolina with neighborhood nature through a variety of virtual, in-person, visual, and auditory experiences.

### **Dr. Kevin Hewitt**

Dr. Kevin Hewitt is a full Professor in the Department of Physics & Atmospheric Science, and former Chair of Senate (2015-2021) at Dalhousie University. In his Molecular imaging lab, he has developed novel nanoparticle probes for cancer imaging and treatment, new optical imaging approaches and a prototype medical diagnostic tool. He completed his B. Sc., Physics & Biology at the University of Toronto (1992), where he received the UofT Physics prize.

At Dalhousie he unified his deep and abiding interests in science and community engagement by co-founding (in 2003) the award-winning Imhotep's Legacy Academy, a STEM outreach program for Black students from junior high to university. He's featured in Cool Black North, a film which explores the unique and vibrant Canadian Black Community and its role in our country's contemporary identity.

His contributions have been recognized by a Youth Community Service Award (1999), the Harry Jerome Award for Professional Excellence (2014), Nova Scotia Discovery Centre Science Champion (2018), NSERC Award for Science promotion (2021), and the Rosemary Gill award for service to students (2021).

Kevin Hewitt is a professor in the Department of Physics & Atmospheric Science and Chair of Senate at Dalhousie University. He obtained his BSc at the University of Toronto with a Physics Specialist and a Biology Major. After finishing his graduate studies at Simon Fraser University, Hewitt joined Dalhousie University in 2015. His expertise lies in bionanophotonics, holography and molecular imaging. Over the years, his group has developed novel nanoparticle probes for cancer imaging and treatment, new optical imaging approaches and a prototype medical diagnostic tool for liver steatosis. Apart from academic research, Hewitt is a model advocate for promoting diversity in STEM. He laid the foundation of Imhotep's Legacy Academy, an innovative university-community partnership that promotes involvement in science among young African Nova Scotian learners. Over the years, Hewitt has received numerous awards and accolades for his contributions to academia and community engagement alike; in 2018, he was named the Nova Scotia Discovery Centre Science Champion and has been elected to the boards of the Nova Scotia Institute of Science, Canadian Association of Physicists and the American Physical Society – Committee on Minorities in Physics.

### **Nicole Jackson**

Nicole Jackson (she/her) is a native of Cleveland, Ohio, and received her Bachelor of Science degree in Environmental Education from The Ohio State University in 2011. A nature enthusiast, park advocate, and birder, she loves spending time outside and has a passion for getting people from underserved communities connected to the wonders of the natural world. Nicole currently works as a nature coach and environmental education consultant assisting in creating programs that educate youth and families on how to build a healthy relationship with nature. She is also a board member of the Columbus Audubon chapter, the founder of Black in National Parks Week, and a 2023 COSI STEM Star.

### **Beverley Essue**

Beverley Essue is an associate professor at the Institute of Health Policy, Management and Evaluation at the Dalla Lana School of Public Health. As a global health systems researcher and health economist, her work focuses on strengthening financial risk protection and advancing equity and gender equality in global health systems.

As one of nine recipients of the Black Research Network's IGNITE grant, Essue will work alongside the Dr. Borna Meisami Commemorative Foundation to help racialized survivors of intimate partner violence (IPV) regain confidence and economic stability. The project will map the health and non-health outcomes associated with providing culturally appropriate care to IPV survivors, starting with dental care.

Essue holds a Visiting Scientist appointment at the Institute for the Advanced Study of the Americas at the University of Miami. She is also an Honorary Senior Fellow at the George Institute for Global Health (India).

In 2020, Essue was recognized by the Canadian Association of Global Health for her accomplishments in the field.

### **Remigius Agu**

Remi U. Agu, BSc (Pharmacy), MSc (Pharmacology), MSc (Biopharmaceutics), PhD, graduated from the University of Nigeria and Catholic University of Leuven, Belgium. He is an Associate Professor of Pharmaceutical Sciences at the College of Pharmacy, Dalhousie University, Halifax, Nova Scotia. Prior to assuming this position, he was a Postdoctoral Fellow in Dr. Audra Stinchcomb's lab at the Faculty of Pharmaceutical Sciences, University of Kentucky, Lexington, USA. Dr. Agu is on the editorial board of Drug Delivery letters, Journal of developing Drugs and African Journal of Pharmacy and Pharmaceutical Sciences. He is a member of Controlled Release Society, the American Association of Pharmaceutical

Scientists (AAPS), and Canadian Society for Pharmaceutical Sciences. Dr. Agu frequently reviews manuscripts and grants for publishers and funding agencies in Canada, USA and Europe.

Remigius U. Agu was a practicing pharmacist before joining the academia. He has a masters degree in Pharmacology (University of Nigeria) and Biopharmaceutics (University of Leuven, Belgium), respectively. He also has a PhD in Pharmaceutics and Biopharmaceutics from the University of Leuven, Belgium. As a scientist, Dr. Agu worked in Africa, Europe and USA before joining Dalhousie University in 2004. Currently, he is an Associate Professor of Pharmaceutics and Biopharmaceutics at the College of Pharmacy. Dr. Agu is also cross-appointed to the Department of Surgery, Dalhousie University, Halifax, Nova Scotia. He is involved in many basic science and clinical research in the areas of nasal/pulmonary drug delivery and pain management. Dr. Agu's core research involves the development of novel respiratory drug delivery systems and testing methods. Dr. Agu is currently an editorial board member of two international journals and frequently reviews articles for more than twenty-top ranking pharmaceutical journals.

#### **Research Interest**

He is involved in many basic science and clinical research in the areas of nasal/pulmonary drug delivery and pain management. Dr. Agu's core research involves the development of novel respiratory drug delivery systems and testing methods.

### **Julius Nyerere Hydropower Plant And Dam – Tanzania**

**Employer:** Tanzanian Ministry of Energy

**Contractors:** JV Arab Contractors Company and Elsewedy Electric

**Project location:** Stigler's Gorge Area, the dam is located in the Morogoro area on Rufiji River - Tanzania

**Completion Period:** 42 months including 6 months mobilization

#### **Project Objectives:**

Generating electricity with capacity of 2115MW to satisfy energy needs in Tanzania Control water flow in the period of flooding and thus providing the necessary water requirement

#### **Main items:**

- Total excavation is about 4 million m<sup>3</sup>
- Total aggregate backfilling is about 7.5 million m<sup>3</sup>
- Total volume of concrete is about 2.6 million m<sup>3</sup>
- Total weight of reinforced steel is about 64000 ton

#### **Scope of Work:**

- Main dam for storage of water to generate hydropower using RCC concrete for main dam with total length 1025m at crest level and 130m dam level
- Construction of 4 saddle dams for reservoir impounding of water with length of 1.4km, 7.9km, 4.6km and 2.6km with a maximum height 21.3m, 14m, 12.4m and 5.5m respectively, with a capacity to impound approximately 33 billion m<sup>3</sup> of water
- Construction of a hydropower plant with a capacity of 2115mw and a substation of 400kv; in addition to 400kv transmission lines to the nearest point of the public network The civil works includes the following:
  - Permanent access roads connecting the site with the existing roads network and length about 21km
  - Temporary access roads that connect all permanent facilities with length of 59km
  - Main dam of RCC on Rufiji River Power plant with administration building, control building, workshops and stores
  - Connecting power station 400kv including transmission lines 4 variable height and length dams for water impounding of reservoir Diversion tunnel 660m length (15\*17m) and 2 cofferdams
  - The main spillway is located on the center of the main dam with 7 radial gates and an emergency spillway is located in the first saddle
  - Permanent concrete bridge on Rufiji River
  - Integrated residential complex on an area of 19000m including housing and playground, permanent furnished offices; in addition to temporary residential complex, utilities, lighting, drinking water and water treatment

**Main electromechanical works for power house:**

- Power plant 2115 -9 vertical Francis turbines, each turbine capacity is 235MW
- 9 butterfly valves for entrance
- 9 vertical axis generators
- Water and sewage cooling systems
- Ventilation, air-conditioning, firefighting and communication systems
- Protection, control and monitoring equipment
- 3 diesel generators for the power plant, dam and spillway
- Other supplementary items

## Glossary

**Efficiency:** Output divided by input

**Ocean Acidification:** a reduction in the pH of the ocean over an extended period of time, caused primarily by uptake of carbon dioxide (CO<sub>2</sub>) from the atmosphere.

**Photovoltaics:** The field concerned with photovoltaic (PV) cells, commonly called solar cells, which are nonmechanical devices that converts sunlight directly into electricity.

**Nova Scotia Climate Targets:** To reduce greenhouse gas emissions by at least 53 per cent below 2005 levels by 2030.

**Indigenous Knowledge:** Information that is known among Indigenous peoples that is used to guide their ways of living and existing.

**Tidal energy:** Power produced by the surge of ocean waters during the rise and fall of tides.

**Fossil Fuel:** These are used for energy and are made from decomposing plants and animals.

**Energy consumption:** How energy is used.

**Energy Independence:** Having enough energy to meet the energy needs of one's country.

**Energy Conservation:** Reducing the amount of energy that is used.

**Joule:** The SI unit of energy. It represents the work done by a force of one newton acting over a distance of one metre.

**Rebate:** A partial refund to someone who has paid too much money for a tax, rent or utility.

**Carbon credits:** A permit which allows a country or organization to produce a certain amount of carbon emissions, and which can be treated as necessary.

**Climate Action Incentive Payment:** This is a tax-free amount paid to help individuals and families offset the cost of the federal pollution pricing.

**Greenhouse Gas Emissions:** Greenhouse gases are gases that absorb and trap heat in the atmosphere. These gases include carbon dioxide, methane and nitrous oxide. Greenhouse Gas Emissions refers to the production and release of these gases.

**Law of Conservation of Energy:** Energy cannot be created or destroyed, only converted from one form of energy to another.

**Incandescent:** Often used to refer to light bulbs, it is the production of light due to being heated. Incandescent bulbs produce light by heating a filament.

**Fluorescent:** Often used to refer to light bulbs, it is the production of light due to absorbing electromagnetic radiation. Fluorescent bulbs produce light when the atoms of gases inside the bulb are excited.

**Hydroelectricity:** The production of electricity using the movement of water.

**International Energy Agency:** An international body that works alongside countries in shaping policies to allow for a sustainable future.

**Geothermal Energy:** Energy generated from the heat found within the Earth.

**Biomass:** Organic material that come from plants and animals. Biomass is used as an energy source in multiple ways.

**MHEEP:** Mi'kmaw Home Energy Efficiency Program, a program run by Efficiency Nova Scotia that offers upgrades to reduce energy waste and improve efficiency and comfort.

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