

How do we practice equity, diversity and inclusion in sustainable energy research? Advice for modern researchers

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Perspective

How do we practice equity, diversity and inclusion in sustainable energy research? Advice for modern researchers



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ABSTRACT

Climate change is one of society's biggest and most existential challenges in scale and scope. The energy sector is the largest contributor to climate disruption, and low-carbon energy solutions are needed for mitigation. However, the energy sector, and sustainable energy research, are not representative of society at large. Equity, diversity, and inclusion (EDI) activities focus on the removal of barriers, representation and valuing the contributions of individuals of a wide range of backgrounds, experiences, abilities and identities. Within this context, do equity, diversity and inclusion matter in sustainable energy research, and if so, as scholars, how do we improve in these areas? In providing advice, mainly to early career researchers, but to the established researchers too, I offer advice on creating and finding the culture and governance of EDI as meaningful practice in three steps: 1) find your people; 2) find or create spaces; 3) lean out and start again.

1. Introduction

We are experiencing the impacts of climate disruption—the heat waves, droughts, floods, and sea level rise that are predicted to continue, increase, and amplify if greenhouse gas emissions are not mitigated [1,2]. For example, the 2022 AR6 report from Working Group II (adaptation) includes expanded attention on cascading and interconnected risks and to inequity and vulnerability and responses [2]. The global energy system contributes upwards of 80 % of greenhouse gases that are driving climate disruption. How to address this existential threat and mitigate the energy system's contribution to climate disruption is one of the biggest problems society faces in scale and scope.

However, inequality, and the lack of inclusion in decisions around energy systems, is now understood as a critical barrier to addressing energy systems and climate change. Lieu et al. [3] argue that low-carbon futures are deeply social and gendered, and that women's perspectives are largely absent when exploring energy transition pathways. According to Stephens [4], the climate crisis will not be solved with technocratic solutions, instead, we need to change who has power and how it's used. This indicates the need for feminist, anti-racist leadership on climate and energy, and commitment to racial, social and economic justice in leadership [4]. MacArthur et al. [5] and Stephens and Pearl-Martinez [6] have argued that to successfully and rapidly transition our energy systems to mitigate climate disruption, we need to access a wider deeper talent pool, that includes gender and other forms of

diversity.

In settler colonial contexts like Canada, Australia, New Zealand, the United States, Indigenous communities are participating in their own forms of “community energy”, seeking to implement the United Nations Declaration on the Rights of Indigenous People's (UNDRIP) and local economic development opportunities in selling renewable energy [7–11] in an energy transition that could spur \$124 trillion in global investment [12]. Municipalities and a wide range of community actors are becoming involved in renewable energy production [13–16]; a shift to renewable energy is associated with decentralization and new actors involved in the energy sector [17], leading to conflicts and challenges between energy sector elites and incumbents, and new community entrants [18–20]. Bednar, Reames and Keoleian have shown that racialized communities in the United States are more at risk for energy poverty, living in housing that has lower energy performance [21].

Clearly, there is demand and interest from many parts of society and historically marginalized people to become involved in a low-carbon energy transition. Within this context, do equity, diversity and inclusion matter in sustainable energy research, and if so, as scholars, how do we improve in these areas? According to Coutinho et al., Equity refers to a process of removal of systemic barriers and biases that hinder the access to equal opportunities and benefits; Diversity refers to the composition of teams and a workplace that is representative of a wide range of races, ethnicities, genders, disabilities, sexual orientations, religions, age, socioeconomic backgrounds, and other identity factors;

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Inclusion refers to the practice of ensuring all individuals are valued and respected for their respective contributions and skills set, and integrated in a meaningful way throughout decision-making and design processes [22,23]. EDI matters when we are addressing a problem of the scale and scope of attempting to mitigate climate change disruption. EDI in sustainable energy research is important because sustainable energy scholars, as educators and researchers, are in a unique position to provide knowledge, learning, and research to address this societal challenge.

1.1. EDI in sustainable energy research

There is little evidence of diversity and inclusion in the energy sector, academia, or in sustainable energy research. The most recent global study of diversity in energy was conducted by Diversio in 2021 [24] for the Equal by 30 Campaign, “a public commitment by public and private sector organizations to work towards equal pay, equal leadership and equal opportunities for women in the clean energy sector by 2030” [25]. According to Diversio, advancing gender in the energy sector also requires advancing racial and ethnic minorities, LGBTQ2+, persons with disabilities, and other underrepresented groups. Diversio reported that women account for 32 % of the energy sector. These numbers are a slight improvement on what was previously reported in 2019, according to IRENA [26], that reported women made up 32 % of the renewable energy workforce and 22 % of the oil and gas workforce. Research into community energy also shows that women are underrepresented [27,28].

In the case of academia, the numbers on gender diversity are fairly stark, where they exist. In 2019 Smith et al. [29] published a study showing that in the United Kingdom that there is a very large drop off of women (they use the term ‘female’) between the stage of students (ranging between about 25 % and 40 % of students from 2011 to 2019) and scholars (‘funded researchers’, ranging between 10 and 20 % from 2011 to 2019), and several times fewer women than men principal investigators (PI)’s or co-investigators (co-I)’s on research applications; the highest reported percentage was 17.5 %. Smith et al. report that the share of women in energy research is consistently lower than that of academia overall.

What about other forms of diversity? Diversio reported that globally, racial and ethnic minorities account for 22 %, with Black and Latinx individuals underrepresented compared to population. Although there is little data overall, my own research reported that less than 25 % of organizations working in the low-carbon energy transitions in Canada are led by equity seeking groups [30]. It’s not clear whether such analyses exist in other contexts.

When implemented, EDI initiatives often focused on outcomes—the results of surveying as to which diversity categories people fall into. In macro data, that might be helpful and ethical; in your research team, this is limited by the ethical need for anonymity, and may not work for you as an individual scholar. Improved statistics also may not address existing power imbalances.

Process, and our day to day interactions are also important indicators of EDI activities. Diversio’s findings point to the need for “*Inclusive Culture* An environment where everyone feels heard and valued by their team; *Fair Management* An environment where everyone feels heard and valued by their team; *Career Development* Providing all employees with opportunities to grow and advance internally; *Workplace Flexibility* Enabling all individuals to establish a healthy work-life balance; *Workplace Safety* Ensuring all employees are not experiencing sexual, psychological or physical harassment” [24].

In my practice as a researcher, I have been concerned about the process and practice of EDI in sustainable energy research and how it changes outcomes. Herein, I provide my own learning and experience that may potentially serve as a guide to both to more established scholars to consider their own practice, and to early career researchers from equity deserving groups looking for the right fit for them. This

paper is the result of a talk I was honoured to give to early career researchers at the Energy Research & Social Science conference held in Manchester in June 2022. Although I was asked to provide EDI advice to early career researchers, this advice is aimed at all career stages, as those of us who are more established need to play our roles and responsibilities to support.

2. Advice to sustainable energy researchers

As I sought to devise a talk, I realized that there are three key ways in which I associate improving diversity and inclusion in sustainable energy research, and these are potentially instructive to researchers of all experiences and career levels. These are: find your people, find and create spaces, and when necessary, lean out and start again (Fig. 1).

2.1. Find your people

If you think about the numbers provided, there is such a lack of diversity in sustainable energy research that finding traditional mentorship in this area might be quite difficult, as potential mentors might be over committed to a range of activities for EDI, or not exist. Finding your people is critical to moving forward in your career. In academia, we operate in networks. We need supervisors, mentors, graduate students, researchers, journal editors, funders, reviewers, and references.

2.1.1. Address your own implicit bias

We have also all grown up in our own contexts and experiences, which includes implicit bias, the assumptions we carry about people based on gender, race, ability that we are not aware of [31] that can keep us from connecting. One example? My first year as an assistant professor, I handed someone my business card, and without looking at it, the receiver said “oh, you must be [insert older man colleague’s name] graduate student!” We have all overlooked someone who could provide valuable experience. Sometimes the consequences of our implicit bias can limit our opportunities—we miss out on learning about important research, citing, hiring the best researcher, or inviting the best expert to our proposal or event.

Whether you are an early career or more established researcher, it’s important to unlearn your own implicit bias. Are there no women, Indigenous or people of colour researchers because they don’t exist or because you haven’t looked hard enough, or you haven’t dropped your assumptions about who a researcher is? Do the work of unpacking and unlearning your own biases. Harvard University’s Implicit Association Test is one place to start [31]. Professional research news sources such as The Conversation, Times Higher Education and University Affairs offer regular posts on issues of implicit bias (e.g., [32–35]).

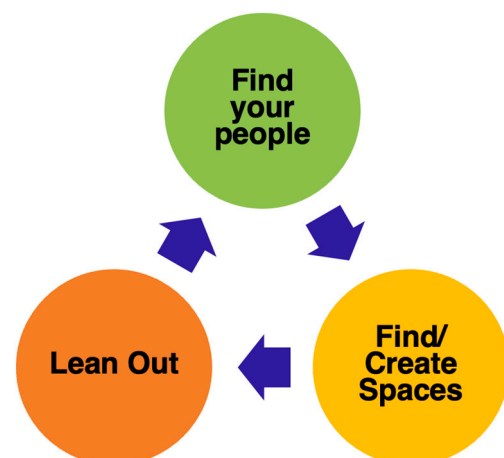


Fig. 1. Three Steps to Meaningful EDI in Practice.

You can find other creative ways to challenge your bias—what if you only paid attention to researchers from equity deserving and historically excluded groups on social media or ResearchGate for the next month or the next year? What would you learn? You can also look at scholarly networks that are seeking to diversify research in sustainable energy. Some notable diverse networks in sustainability research include Donors of Colour BIPOC scholars with PhDs list [36], Climate Social Science Network (CSSN) [37], and Women & Inclusivity in Sustainable Energy Research (WISER) Network [38].

2.1.2. Find your supports and networks

We all need support in our careers as scholars. Finding your people includes finding the right mentor or research supervisor who will support you and your vision of sustainable energy research. Some ways to find your people are to join a network and get to know other scholars that way. As mentioned, Donors of Colour BIPOC scholars with PhDs list, Climate Social Science Network, and WISER Network are all possible networks you can join. You can also join ResearchGate, academia.edu, and other social media to follow researchers you know, and to find new and emerging researchers, or researchers from other areas.

If you can't find a network you feel like you can fit into, keep in mind that you can start your own! For example, if you are part of a specific discipline or approach, and you are unable to find your people in a program or in books, you can call your people in. Nearly all fields and disciplinary associations have email lists you can post to. You can do this by organizing your own conference panel, special issue, edited volume, and use these professional endeavors as a way to bring people together and build from there. If you are feeling nervous or unsure of whether or not to post to meet new people: one important learning I've had in finding my people: you don't need to convince anyone—you will find your people when you speak up.

2.1.3. Find your journals and publishers

Publishing in a peer-reviewed journal or a book with an established publisher is critical to the career advancement of all scholars. The editorial team of the journal or book series is ultimately the group that makes the decisions as to whether your article or book are sent for review, to which reviewers, rejected, invited to revise, or accepted.

When you select a journal to submit to, read the aims and scope, the audience, but also review the editorial board page carefully when making your selection. Some publishers are starting to create transparent diversity reports on the journal editorial team and staff. For example, Elsevier journals have the opportunity to publish which countries, what genders represent the editorial team. Journals can choose whether or not to report this. Some journals choose to not report this. Other journals choose to report on diversity, or report partial results, even if the results do not look particularly encouraging. If a journal reports on diversity, even if the results are not encouraging, I encourage you to engage, as they are at least taking a look. Some journals, particularly some of the newer ones, have structured their editorial team around diversity. Some that stand out to me include Renewable and Sustainable Energy Transition, that reports 50 % men and women of 80 % of editors responding, 27 editors and editorial board members across 27 countries [39]. Another one is Energy Sources, Part B: Economics, Planning, and Policy (full disclosure, I am on the editorial board) with members of the editorial board spanning a wide range of countries [40]. There is also disciplinary and methodological diversity, for which Energy Research & Social Science has played a critically important role in the area of interdisciplinary sustainable energy research.

2.2. Find and create spaces

Power and decisions are not diversified [4], and the culture of inclusion in the energy sector and energy research needs to improve [24,29]. EDI challenges the status quo of current power structures, muting some of the power some people hold, or feel they deserve.

Improving EDI means changing who is invited to the table, changing who dominates and who contributes to the conversation, who receives funds, tenure track jobs, and studentships. Oftentimes, people from equity seeking groups join an academic organization or team, and immediately do not feel comfortable due to the daily experience of discrimination and micro-aggressions [41].

How do we create spaces that are equitable, then? At one of the conference panels WISER members held in 2019, Fig. 2 from “Three sides to every story: Gender perspectives in energy transition pathways in Canada, Kenya and Spain” [3] was presented. The image presents “mainstream” energy pathways as simultaneously fossil fuel and male dominated leading to incremental change, juxtaposed alongside, but not overlapping, was the “offstream” pathway that provides niches for low-carbon innovations and allows for different gender roles and needs across policies. In the image, the “offstream” pathway led to the “transformative” pathway that incorporates gender concerns fully.

The lesson I took from this is that the spaces you create don't need to be in the mainstream, if they will face too many challenges to survive. They can be created outside of the mainstream, in an “off-stream” pathway, or something small and barely detectable to challenge in the mainstream (in early stages!). Fig. 2 was my “aha!” moment: the off-stream to transformative pathway made complete sense to me. I realized that WISER, that at the time started as a professor and a few PhD students working together now has over 200 members globally and is growing could be characterized as an “offstream” network. Since 2019, many of the people who founded the network have jumped over the deep drop off, moving from PhD to post-doctoral researcher, to professor and lecturer positions, and the network has allowed them to form deep connections, collaborations, and grant applications as PI's to further their careers.

The types of spaces we can create depend on our rights, roles, responsibilities and capacities. These will vary depending on our career stage and the structures we inhabit. For those with more power, such as principal investigators and co-investigators, supervisors and professors with tenure, we will have different options to create spaces for those who we work with and who work for us. If you are looking to diversify your department or research group, you should ask yourself, have you created an environment that would encourage someone from an equity deserving group to join your organization? For those who are in an earlier career stage, there are some indicators of spaces that you can start to look for to see if it might be a supportive environment for you.

Structures in the “mainstream” are daunting and not easy to solve overnight or individually, but there are some practices that can help as practical navigating tools. What follows are the practices I've learned over time in conducting research that addresses equity and justice in sustainable energy transitions and working with a diverse group of scholars at a range of career stages. It is not meant to be all encompassing, but potentially an appetizer or starting point for those starting out, and those hoping to change their practice and structures in a meaningful way.

2.2.1. Spaces of accountability, reciprocity, and transparency

In a time where work life balance and mental health are acknowledged as important to achieve, everyone's time is valuable and deserves to be respected. The number one thing I look for in spaces where I research and collaborate is accountability, reciprocity, and transparency.

To find spaces of accountability, reciprocity, and transparency, you can ask these questions:

- Are roles, responsibilities and timelines clearly and transparently defined in research groups, co-authorships, projects, etc.?
- Is there reciprocity in relationships?
- Are decisions made transparently?
- Are you given reasonable time, feedback, and support to carry out your tasks or requests of your time?

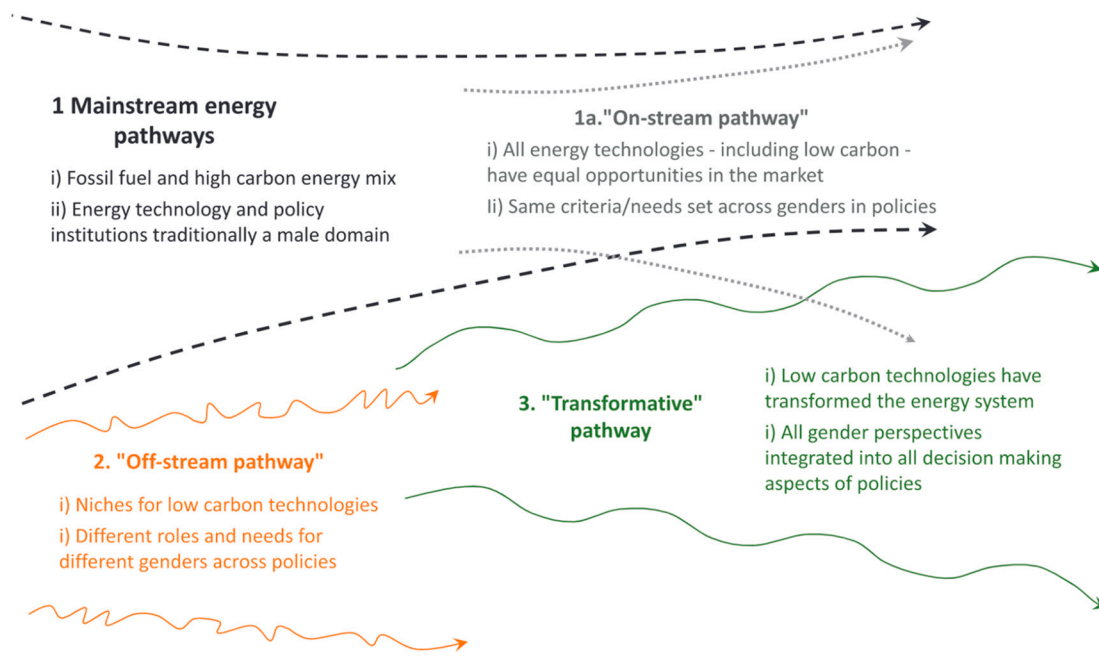


Fig. 2. Alternative Pathways Framework to Analyze Gender Perspectives on Energy Transition [3].

In my lab, for example, the weekly lab meeting is a required commitment to joining the lab. In our lab meetings, we are bringing together accountability, reciprocity and transparency by contributing to the shared lab agenda, showing up, bringing in what we are working on, providing and receiving constructive feedback and mentorship, and then following up with an email of action items from the supervisor (me) and the student/researcher. As a supervisor, I am accountable to the group and the institution, and as a PI, to other researchers, funders and research collaborators and participants, so I request that the group be accountable to each other in their accountability to my responsibilities.

Being accountable to others means that when you are unpacking your implicit bias, be aware of others' time and energy. Rather than asking someone to explain the implicit bias, discrimination or micro-aggressions they experience to you, start with reading the many blogs, articles, and social media threads on the topics. Over time, as you gain more understanding, move on to reciprocal conversations with the goal of providing support, rather than trying to understand.

Being reciprocal and accountable also means following through on opportunities offered to you from your communities, networks, mentors, collaborators, supervisors, supervisees, co-authors, funders, editors, reviewers, authors, and subjects of the papers you review/submit.

Are you contributing back to the community, community based organization, or peer-reviewed process, research group that is supporting your research? Reciprocity is critical to impactful, meaningful research, and long-lasting relationships. For example, are you following through on an opportunity that was offered to you? Someone worked hard to provide resources or arrange an opportunity for you—it's important that you are accountable to them in following through, which may affect the outcome they are working towards and the broader structure. If you don't feel able to follow through on an opportunity, then be accountable by flagging this, and proposing a different route to the outcome.

2.3. Find and create spaces: Reading, teaching, sponsoring

One question I'd like to ask you, particularly if you are an established researcher, is, *what are you doing to promote the research of a diverse group of researchers?* I recently saw a tweet that got a lot of attention and praise, asking which women are "out there" doing sustainable energy research. I was surprised since WISER and CSSN networks were out there

for several years, sharing the work of many women scholars, and there were so many women scholars on that social media network sharing their work. The tweet was additionally indirectly asking women scholars to do the work of promoting themselves to that tweet, even though there were already resources out there (see accountability, reciprocity, above).

It's not enough to ask "who's out there?". If you are an established researcher, I'd like you to consider your sphere of influence, and how are you using it to promote a just transition? I have some suggestions in terms of reading, teaching, and sponsoring.

First, in teaching, I am sure that you are teaching a diverse group of students (this is what the statistics say). It's important that they see themselves in the readings. Are the articles and readings you are assigning in your course syllabi/outlines by women, non-binary, Indigenous, and people of colour, diverse abilities and sexual orientations? You may say to yourself, I just read articles, how would I know all of that from an author's name? (I know, because I asked myself that when I started to do this). This means, you'll need to go back to the "find your people" stage (above) and start by author or network, rather than strictly by topic, to find a diverse group of scholars, and this is where networks like Donors of Colour, WISER, CSSN, the social media research you've done into implicit bias, and other sources can help. This also relates to your research. Are you reading, citing and publicly recommending articles and research on energy transitions by a diverse group of scholars? You might find that diverse group of scholars, and then decide that they aren't studying what you are interested in, so it's not "worth your time" (this is something I've heard before). I want to challenge you to think about if someone is not trying to solve the same problem you are trying to solve, what is their point of view? Could you try to understand it and start to see what's valuable about it, and why it got published?

Sponsoring is another tool in reach of those of us who are networked. This is about supporting the career development of a more junior, or under heard scholar. This can take the form of putting forward their name for opportunities, such as keynotes, events, and jobs. It might also take the form of providing letters in support of tenure, or for other important career stages.

2.4. Find and create spaces: Governance

Equity, diversity and inclusion are achieved through governance. One of my mentors always told me to look at governance. I suggest putting your time into well governed spaces or creating them.

2.4.1. Funder level

Some of these spaces and opportunities are created at the funder level. In Canada, despite the very low wages graduate students and post-doctoral researchers are paid, the main funding agency, Tri-Council, has leaped ahead recently in EDI. Their Canada Research Chairs Program was mandated to reflect diversity at the level of the general population, affecting who gets these prestigious research chairs that last 5 to 14 years. Several granting programs also require EDI statements as part of the application process, and there are set-asides for ECR in a few granting programs. However, some of these statements look for measurable outcomes that conflict with anonymity. I think we can go further, still. We should be looking at the funders process. What is the funder's commitment to EDI in the process of designing and review grant programs? How is the peer-review process managed?

These types of incentives at the funder level will translate to the university level, in the types of hires and eligibility criteria. At the university level, as a sustainable energy researcher, you'll want to look at what kinds of EDI commitments your university has in place. You'll also want to look at whether sustainable energy and climate research are also in your university's strategic research plan. Is there an energy institute or center at the university, and how is it governed, who is leading, and is there meaningful engagement in EDI? Finally, as deemed important to Canadian researchers as part of the Corporate Mapping Project, what kinds of private funds is the university or researchers accepting? [42] When we see that the energy industry is not gender diverse, when they fund research in academic institutions, are they partnering with diverse researchers, or is their implicit bias leading them to who they fund?

2.4.2. Research project level

You are invited onto a proposal for a major research project. Research is not just about the content, though, it's about the culture we create. All major projects have governance structures for accountability, and these structures are critical to work within to create a culture that people want to work within. How is it being organized? What governance structures, conflict mechanisms are being proposed? How is conflict handled? How is gender-based or other discriminatory based conflict handled? Are roles and responsibilities clearly laid out? Who are the leaders? Are decisions made transparently? While your project is running, How are meetings organized and run? Is there an agenda? Are ideas equally heard? Does everyone have a chance to speak and be heard respectfully? Is accountability valued?

2.4.3. Find and create spaces: Unpacking hierarchy

The research group we work within is one of our most day to day interactions in sustainable energy research, particularly for early career researchers, such as in their masters or phd programs. There are many different lab manuals out there who are promoting diversity, inclusion, and feminist, anti-patriarchal, anti-racists or decolonial lab structures (e.g., [43–45]).

My own method to attract people to my lab is through transparency and unpacking hierarchy, and through what I call "anti-patriarchal" communication and governance. In my role as principal investigator on a grant and my other main role as a supervisor to students, I have a lot of power. I obtain funding, I hire, I sign off on payroll. I also have a lot of responsibilities, like being accountable to funders, students, my university, implementing ethics, respecting intellectual property. As such, I can't devolve power, but I can unpack that hierarchy for the members of my research group so that it's more transparent, and they become more aware of the power that they have, or the reasons why I make certain

decisions. My colleague, University Professor Dawn Bazely, would call some of these activities addressing the "hidden curriculum"—being the curriculum mainly known to people whose parents attended university, and hidden to those who are the first in their family to attend. To me, "anti-patriarchal" communication and governance are about not interrupting, speaking over, or finding the "right" answer (meaning all other answers are "wrong"), it's about allowing people to work their way through the problem, with enough support and resources to make their own decisions, and giving them the space to think things through. Where the goal is to empower ECR's, other researchers may use different strategies or call them other things that fit to their own university and funder contexts.

How we interact and relate, and some of the guidelines we follow in the lab are codified in our lab manual. Although work life balance, mental health and health have always been a concern for researchers (and the world at large!), the Covid 19 pandemic highlighted this much more directly. The underlying rationale for many of the decisions in my lab are around maintaining as much work life balance as possible for everyone, including myself.

In my lab's case, we have regular meetings that are focused and democratically organized (i.e., when, how often, how the agenda is organized, who speaks, etc.). The lab manual outlines roles and responsibilities, and expectations around working together, funding, intellectual property, ethics, in research projects and publications. The agreement in my research group is that you attend all lab meetings and participate, which means receiving and providing feedback. The agenda is organized by researchers and planned ahead to make the best use of everyone's time. The agenda allows us to stay focused, cover all items, manage time, and give everyone an opportunity to speak and receive feedback. We had this in place when the pandemic started, and all of my graduate students completed on time for their program. Students are also accountable to their committees, courses, and their own funders, all of which are highlighted in the manual and lab meetings.

For recruitment, I have a website that details all of my active and past projects, media, and a page dedicated to the researchers in my lab. Everyone writes their own profile and provides their own photo that is posted. When students are thinking of joining the lab, because we're creating a space, I ask past and current students to speak with potential students to let them know what they are getting into!

Sometimes my role as PI and supervisor conflict. A student is not well and needs time off, but the project is moving ahead. How do we resolve these issues when they come up? These are questions to ask and issues to address when we join or create research groups.

2.4.4. Co-authorship

One area that is critical to EDI and to the careers of ECRs is that of authorship. There are many conflicts that can arise—if you check academic social media discussions, you will learn of many unethical methods to gaining authorship.

My suggestion for established and ECR scholars is to use resources that denote authorship, be transparent, and unpack hierarchy. If you are working on a project, you can use the CREDIT author statement [46] as a framework to outline all of the activities you have done for the manuscript. One thing that is helpful about the statement is that it unpacks the range of the roles and responsibilities that lead to a manuscript. This can help you gauge your contribution in discussions with co-authors. Different fields have different traditions. For example, one of my colleagues prefers to be the last author. Some institutions will only pay open access fees if one of the first two authors is lead, second or corresponding author. These types of rules might affect decisions, and it's important to outline these transparently at the outset. One key aspect of co-authorship that is present in many discussions is that of accountability (see, for example, Harvey's discussion of the ethics of Gift, Guest and Honorary authorship in Nature Spinal Cord [47]). If you are unsure about how co-authorship and order of authors works, I recommend that you not be shy, and start that conversation early.

3. “Lean out” and start again

The last part of the EDI cycle I am proposing is “lean out”. Your time, your productivity, your health and your mental health are precious. You can lean out if you need to, and start the cycle again. Why lean out? Sometimes bad things happen. Sometimes, we get sick, or we need to tend to our personal lives. Sometimes there is not sufficient governance or transparency, and you are being tokenized or talked over rather than included meaningfully. Sometimes organizations, research centers, research projects are not ready to change or ready to do research that centers equity and your suggestions are not implemented or valued. Sometimes these things happen simultaneously and cumulatively—health, tokenizing, and organizations not ready to change—is what it takes to lean out. Whatever the reason, leaning out allows you to go back to the beginning—find your people, and create and find constructive spaces for EDI.

3.1. What does “lean out” look like?

“Lean out” can be stepping away from, or limiting or reducing your contribution to a job, an administrative position, a project, a paper, a research group. However, I urge you to not simply lean out, but to lean out with accountability. Make sure to tell people you are unable to continue or to contribute at the same level or altogether. Suggest an alternative option to accomplish a goal. Make sure to tell people your appreciation for them, even if something did not work out. Take time to replenish, focus, and remind yourself of what is important: your important research, publishing, sharing it at conferences, applying to grants, building the network that will support your growth as a researcher and scholar. When you need to lean out, also recognize that others may not want to or need to lean out.

Some times can also be better than others to lean out. For example, during a grant application is a great time to propose governance structures that are EDI-oriented. If those structures are rejected or resisted by a research team, then that’s your answer. That is a good time to step away from a grant—before the proposal has even gone in.

4. Conclusion

If we are to address the climate crisis adequately, we need to alter power structures and who is included, including in sustainable energy research. To support the important research activities of researching, publishing, sharing it at conferences, applying to grants, and building the network that support the growth of ECRs from equity deserving groups as researchers and scholars, I offer three key pieces of advice: 1) find your people; 2) find and create spaces; and 3) lean out and start again. However, EDI in sustainable energy research requires broader change; ECRs cannot do this alone and require supports from those more established across the sustainable energy research sector, from editors, reviewers, professors, supervisors, PIs, and funders. For this reason, I provide a summary of this advice in [Table 1](#), outlined based on the roles and responsibilities across the sustainable energy research sector, where roles can be overlapping.

This advice comes from my own experience of sustainable energy research in the Canadian context, from the mentoring I received from full professors working to make change, from contributing to the incorporation of EDI activities into the federal tri-council funding processes, co-founding a network of women and non-binary scholars, and co-founding a lab with graduate students. One of the most important points of this piece is that there is a huge diversity of talent and experience that, if encouraged and included, can bring about a more just and equitable energy transition. As such, I hope that other pieces with advice, experiences, perspectives and original research emerge from the existing wealth of experiences and perspectives on improving EDI in sustainable energy research, on how we can or are effectively making sustainable energy research more diverse, inclusive and equitable.

Table 1

Summary of advice for modern researchers for the practice of equity, diversity and inclusion in sustainable energy research.

Role	Suggested actions
Everyone in Sustainable Energy Research	<ul style="list-style-type: none"> Unlearn your own implicit bias Take the Harvard Implicit Bias Test Find, follow, read and cite the work of scholars from equity deserving groups Encourage transparency in roles and responsibilities of PIs, researchers, research groups, co-authorships and research projects Be accountable to communities involved or impacted by your research Value the time, energy and (mental) health of others Learn from available materials to reduce the burden of explaining from people from equity deserving groups Value your own time, energy and (mental) health: if needed, lean out with accountability.
Early Career Researchers (graduate students, untenured/newer professors/lecturers and researchers) from equity deserving groups	<ul style="list-style-type: none"> Find your people Look for other scholars from equity deserving and historically marginalized groups on social networks Join or follow networks like WISER, CSSN, Donors of Colour Start your own club: organize your own conference panel, special issue, edited volume, network Assign readings in courses from scholars from equity deserving groups Join supportive spaces –look for accountability, reciprocity, and transparency Follow through on opportunities offered, and value the time and energy of others (even when leaning out)
Professors with Tenure/ Permanence/ leading a research group	<ul style="list-style-type: none"> Create spaces of accountability, reciprocity, and transparency to encourage people from equity deserving groups to join your organization or endeavor Assign readings in courses from scholars from equity deserving groups Address the “hidden curriculum” and unpack hierarchy in your role as supervisor/ PI/ instructor Bring awareness to the values that you are encouraging in the research spaces you are responsible for. Sponsor ECRs from equity deserving groups.
Publishers and Editors	<ul style="list-style-type: none"> Transparently post journal editorial board and management diversity information and EDI policies Commit to diversity in editorial boards and management Commit to diversity in the peer-review process and special issues
Funders	<ul style="list-style-type: none"> Mandate diversity in the allocation of research funding and research chairs Reward EDI as process (rather than outcome only), with criteria based on proven and ethical EDI methods in research applications. Incorporate EDI processes into grant application design and review process. Provide training on the effectiveness of EDI strategies to grant selection and review committees and staff to reduce implicit bias on EDI activities.

Declaration of competing interest

There are no known conflicts of interest associated with this publication.

Data availability

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