Guidance Note for Mainstreaming Gender Considerations into Energy Access Programmes

Transforming Energy Access
LEARNING PARTNERSHIP

This Guidance Note aims to provide universities in Africa with examples and support to mainstream gender into post-graduate energy access programmes. It forms part of the Transforming Energy Access-Learning Partnership (TEA-LP) Gender Research Agenda (2020).

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Key Messages:

1. Integrating a gender perspective into a programme can transform how energy access is taught and learned, and can sensitise course conveners, lecturers and students to the gender-energy nexus and the critical role of gender inclusion and equality in transforming energy access.

2. Course designers, conveners and lecturers should adopt a holistic approach when mainstreaming gender into the -programmes, looking at learning outcomes, content, teaching methods and style, learning environment and assessments. There are six 'levers' for integrating gender into programmes:

   Lever 1: Gender-focused learning outcomes
   Including programme and course level learning outcomes that focus on gender inclusion; ensuring that these are formally assessed.

   Lever 2: Gender and energy access content
   Including content that highlights the gender-energy nexus (SDGs 5&7) and showcases how women are active in the energy access sector.

   Lever 3: Gender inclusive teaching & learning activities
   Creating an inclusive learning environment which fosters participation by all students and inculcates respect for women through gender conscious teaching and learning activities.

   Lever 4: Multi-disciplinary programmes
   Offering multidisciplinary programmes that attract students from diverse undergraduate backgrounds and prepare students for the broad range of job opportunities in the energy access sector.

   Lever 5: Enrolment & retention of female students
   Ensuring that marketing of programmes actively targets women, with specific female scholarship opportunities where possible; providing focused support, such as mentoring, to female students.

   Lever 6: An enabling environment for all university staff
   Creating an enabling institutional environment, supported by leadership, ensuring gender diverse faculty teams, gender sensitive HR practices, etc.

Introduction and context

"Embedded within a curriculum is the vision that a society aspires to shape, along with the knowledge, skills and values that the curriculum promotes; thus, a curriculum reflects the society itself."

(IBE-UNESCO, 2015)

In the context of the TEA-LP, gender mainstreaming is about equipping partner universities with positive gender practices and tools to create gender inclusive teaching and learning environments. The aim is that all students would derive the maximum benefit from their Masters programmes, irrespective of their gender identity, to be able to contribute optimally in professional settings and have a say in pertinent matters pertaining to energy access, energy systems and governance in their respective countries and globally. It is therefore important to consider how energy access curricula are being designed and delivered to foster gender inclusivity in curriculum content, pedagogy, learning environments and assessment.

Applying a gender perspective to the university curriculum could better adapt teaching and learning to the skills and competencies the labour market requires of young professionals (Grunberg, 2011). This could ehance the range of soultions and perspectives when these skills and competencies are applied to energy access solutions. Transforming how energy access curricula are designed and implemented, is an opportunity to transform energy access. Integrating gender into curriculum courses can serve to transform the knowledge base by challenging how we think about the roles of women and men in energy access systems.

Throughout the programme development process, there are six opportunities, or 'levers', through which gender inclusion and responsiveness can be integrated:

Lever 1: Gender-focused learning outcomes
Lever 2: Gender and energy access content
Lever 3: Gender inclusive teaching & learning activities
Lever 4: Multi-disciplinary programmes
Lever 5: Enrolment & retention of female students
Lever 6: An enabling environment for all university staff

This Guidance Note aims to provide universities in Africa with examples and support to mainstream gender into post-graduate energy access programmes, using these 6 practical levers. It forms part of the TEA-LP's Gender Research Agenda.

What is a gender inclusive curriculum and why is it important?

> *"Gender inclusivity has to be thought of as a continuous process rather than a feature that can be dealt with once and for all by the incorporation of appropriate curriculum content. Gender inclusivity involves continual reflection on the teaching and learning interaction and a constant alertness to the potential of the style and content of teaching to create situations where some may not feel included and consequently may choose to exclude themselves from further study"* (Mills, Ayre & Gill, 2008: 8)

At its core a curriculum entails content, pedagogical strategies, modes of assessment and learning environments (UNSESCO, 2015). The curriculum thus refers to more than the subject content or prescribed teaching methods. It impacts on the entire learning experience of the student in the programme.

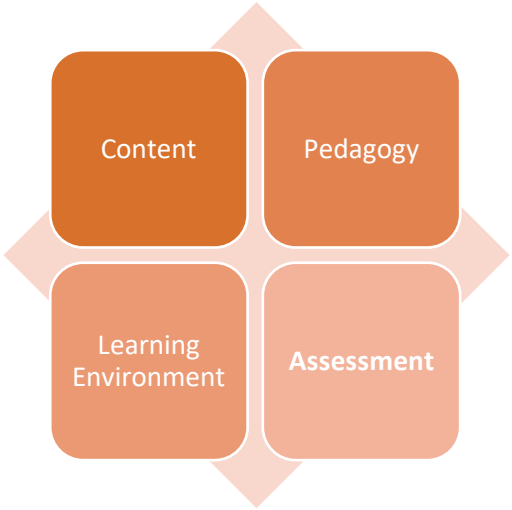

Figure 1: Curriculum dimensions (adapted from (Roberts & Moxham, 1995; UNESCO, 2015))

When developing a gender inclusive curriculum, course conveners and lecturers should adopt a holistic approach by integrating gender in all curriculum dimensions including learning outcomes, content, teaching methods and style, learning environment and assessments (Roberts & Moxham, 1995). Curriculum development needs to take into consideration varied needs of students who will experience the curriculum, including women and men, as well as the interactions between different genders.

As highlighted in the quote above it is important to reflect on the type of content and the way it is delivered as there may be biases (intentional or unintentional) that reflect in the content or teaching and learning activities. The curriculum could therefore either (explicitly or implicitly) re-enforce and legitimise existing gender social norms, or it could explicitly throw light on and challenge these norms. This ties in with the idea of the hidden curriculum, beyond what is visible and official, that is delivered without being reflected upon (Ihsen, 2005). As Ihsen (2005) points out 'this change in the universities', 'hidden curricula' makes it possible to accommodate in engineering teaching and research, the

different motivations[1] and experiences of men and women in their understanding of technology, and to find innovative solutions corresponding to these experiences (Ihsen, 2005). If the hidden curriculum is left unchecked, it could inadvertently reinforce gender stereotypes and biases through (e.g. role-modelled behaviour of lecturers; unconscious use of the 'he' pronoun). If focused on, it could allow positive reinforcement of gender inclusion and sensitivity (e.g. explicitly using 'they' or 'she/he' as pronouns) and ensure cross-demographic participation during class discussion. The curriculum should allow space for teachers and learners, in energy access and in broader science, technology, engineering and mathematics (STEM) fields, to challenge gender stereotypes about women and men in engineering and energy related disciplines and inspire students in their energy access studies and prospective career paths.

The curriculum should also consider prior learning[2] and the attitudes and associations learners bring with them into new learning environments (Mills, Ayre & Gill, 2008). When (re)designing a curriculum, the prior experience and knowledge of students need to be built on, and practical real life application encouraged (Roberts & Moxham, 1995).

Mainstreaming gender centralises gender considerations within a discipline (Sevelius & Stake, 2003). Gender should therefore be integrated into core courses as well as electives. For example, only clustering gender topics within electives reinforces the idea that gender is not important to the mainstream curriculum (Sevelius and Stake 2003). Furthermore, given the range of electives usually offered in university courses, it is easy for students to 'self-elect' out of a gender course by choosing other courses.

Kortendiek (2011) proposed ways to integrate gender into the curriculum, namely an interdisciplinary approach, an integrative approach and individual explicit approach. These approaches are discussed below.

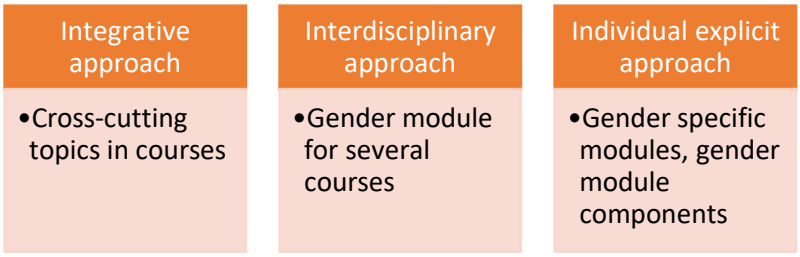

Figure 2: Ways to integrate gender studies into the curriculum (Kortendiek, 2011)

Integrative Approach

An integrative approach is considered the preferred method of integrating gender in the curriculum, by the majority of gender experts consulted in Kortendiek (2011). This method involves integrating gender as 'cross-cutting topics' in existing courses in a degree. This approach could avoid gender being marginalised, by only having a once off module. For example, an integrative approach could include

[1] Some students may be motivated by the technology aspects of engineering while others may be motivated by the people dimension and business case of engineering. A study of early career engineers by VanAntwerp and Wilson (2018) highlighted how these different motivations may influence early career engineers to continue working in the field and how motivations may be different for different genders.

[2] Prior learning could include workplace experience/ internships, undergraduate studies etc.

cross-cutting topics on gender and community engagement in Solar Energy Systems course or the gender and health impacts of the traditional use of biomass in a Bio-energy course. These topics are covered through different teaching and learning activities. This has been the approach taken by all TEA-LP universities.

Interdisciplinary Approach: Single-Gender Module for Various Programmes.

The interdisciplinary approach entails creating an interdisciplinary module that cuts across a number of subject areas or special gender classes in a general studies course. For example, a module on energy, gender and entrepreneurship; energy, agriculture and gender or energy, cooking energy and gender. This could be useful as it cuts across a few topics and how they are relevant to specific areas. It does not look at gender in isolation but how it's relevant to key energy or sustainable development issues.

Individual Explicit Approach: Gender Subject Modules, Gender Components

Incorporating explicit gender modules is considered an entry level approach to start incorporating gender aspects into the curriculum. In this case collaboration with other departments with a stronger gender focus is often essential. The advantage of an explicit dedicated module is that key gender concepts, e.g. gender and equality or gender as a social construct, can be given sufficient depth before integrating it with other key subject content. The disadvantage of this approach is that it still does not fully integrate gender into other core subject areas.

In some instances, a combination of approaches may be useful. E.g. having a dedicated baseline gender module to set a basic foundation and then integrating gender into course content, teaching and learning activities and the learning environment.

Six levers for mainstreaming gender into energy access programmes

The following six levers offer practical guidelines for integrating gender considerations into energy access programmes.

Lever 1: Gender-focused learning outcomes

Including programme and course level learning outcomes that focus on gender inclusion; ensuring that these are formally assessed.

Lever 2: Gender and energy access content

Including content that highlights the gender-energy nexus (SDGs 5&7) and showcases how women are active in the energy access sector.

Lever 3: Gender inclusive teaching & learning activities

Creating an inclusive learning environment which fosters participation by all students and inculcates respect for women through gender conscious teaching and learning activities.

Lever 4: Multi-disciplinary programmes

Offering multidisciplinary programmes that attract students from diverse undergraduate backgrounds and prepare students for the broad range of job opportunities in the energy access sector.

Lever 5: Enrolment & retention of female students
Ensuring that marketing of programmes actively targets women, with specific female scholarship opportunities where possible; providing focused support, such as mentoring, to female students.

Lever 6: An enabling environment for all university staff
Creating an enabling institutional environment, supported by leadership, ensuring gender diverse faculty teams, gender sensitive HR practices, etc.

Each of these steps are detailed below, with examples of how universities within and beyond the TEA-LP have approached this.

Lever 1. Gender focused learning outcomes

Formulating hard and soft skill learning outcomes[3] forms a key aspect of developing energy access curricula. When incorporating a gender perspective into a curriculum it is important to consider and formulate hard and soft skills learning outcomes in relation to gender. Gender learning outcomes can be developed at a programme and course level.

Below are illustrative examples of how a gender perspective can be incorporated into the learning outcomes of existing energy access courses, using examples of a Bioenergy course and an Energy and Entrepreneurship course. Inserted in red are examples of how gender specific learning outcomes could be formulated.

Illustrative examples

Bioenergy course

For a Bioenergy course that requires students to design a bioenergy system for rural users looking at appropriate technology design through applications like efficient biomass stoves, gender outcomes could be formulated per the table below.

Table 1: Illustrative example of gender learning outcomes for a Bio-energy course

Course Purpose	**Hard Skills Gender Learning Outcome** The student should be able to:	**Soft Skill Outcomes** The student should be able to:
Bioenergy course		
The student will be able to apply knowledge of gendered energy needs and preferences of improved biomass cookstove users when designing improved stove technologies.	Understand the cooking needs and regional preferences of cookstove users, e.g. women living in rural areas who cook with traditional biomass. Apply this understanding in the design of efficient biomass cookstoves.	Effectively communicate their cookstove designs with potential end- users.

[3] Soft skills include for example communication, teamwork, critical thinking and leadership. Hard skills refer to the more technical skills in a particular discipline: e.g. Design of a solar system PV system.

Pointers

When formulating gender learning outcomes for a technology design course it is important keep in mind the applications of a technology in society and how gendered needs, preferences and other considerations may impact its usability or suitability. Adding a gender perspective to technically focused courses can enhance the learning outcomes of the course as a whole and connect students to the purpose behind the technology. This will also cater to a wider range of student interests and intrinsic motivations.

Energy and entrepreneurship course

For a course on energy, entrepreneurship and business models, that requires students to acquire relevant knowledge and skills on business model innovation and entrepreneurial management in off-grid energy systems the following example in the table below can be used as a guide for potential ideas.

Table 2: Illustrative Example Gender Learning Outcomes for an Energy and Entrepreneurship course

Course Purpose	**Hard Skills Gender Learning Outcome** The student should be able to:	**Soft Skill Outcomes** The student should be able to:
Energy and Entrepreneurship course		
The student will be able to analyse the business models of energy entrepreneurs selling off-grid solar energy systems at the last mile and the impact of gender on distribution approaches and access to resources for scaling energy enterprises.	Analyse the business models of last mile entrepreneurs selling pico-solar and solar home systems in East Africa. Identify key gender responsive interventions to support these entrepreneurs to scale their enterprises.	Work in teams to develop a new business model for last mile entrepreneurs.

Pointers

This type of course draws on knowledge and skills from different disciplines (e.g. management studies, entrepreneurship and energy studies) and requires students to apply a gendered lens to energy access business models. In this type of course it could be important to keep in mind how gender and country specific or regional contexts impact the business models of last mile entrepreneurs, and the geographic and financial constraints that women and men may face. There could be specific gender norms or socio-cultural factors that could impact female and male entrepreneurs' access to financial and other resources, which may impact business models and the ability to scale an enterprise. Business models should also incorporate an understanding of the users of energy technologies (e.g. pico- solar and solar home systems) and that men and women may use or prioritise energy differently.

Actual example

In their Sustainable Energy Solutions course the National University of Lesotho (NUL) included gender in their course purpose and learning outcomes. From their curriculum structure excerpt, it can be seen that gender is primarily integrated in relation to socio-economic aspects and promoting social acceptance of energy technologies in communities in which the technologies will be deployed (red text below is highlighted for emphasis).

Table 3: NUL University Gender Mainstreaming, TEA-LP

Sustainable Energy Solutions for Communities (core course)		
Course Purpose	Hard Skills Gender Learning Outcome	Soft Skills Outcomes
	The student should be able to:	The student should be able to:
Students will be able to address gender and social dynamics of communities that have impact on energy access, and apply principles of sustainable development when formulating energy solutions for communities, taking into account climate change impact. They will also be able to assimilate the content learned from other (technical and socio-economic) courses when developing various optimal energy solutions for communities.	#H1 Analyze the gender and social context of communities (Gender and Socio-Economic Dynamics, Data Analysis)	# S1 Survey literature on sustainable energy for communities (Life-long Learning)
	#H2 Assess energy needs of identified communities (Energy Access, Gender and Socio-Economic Dynamics, Sustainable Energy Development)	# S2 Communicate effectively the designed solutions to the communities to solicit buy-in (Communication)
	#H3 Develop socially relevant, innovative and user-sensitive energy solutions (Energy Access, Gender and Socio-Economic Dynamics, Sustainable Energy Development, Teamwork, Creativity)	# S3 Work cooperatively in a student-team to identify socially relevant energy solutions (Teamwork)
	#H4 Design appropriate gender responsive sustainable energy solutions for communities (Energy)	# S4 Study sustainable energy material online (Digital Literacy)
	#H5 Access, Gender and Socio-Economic Dynamics, Sustainable Energy Development, Creativity)	# S5 Prepare a term paper on appropriate sustainable energy solutions for communities (Writing Skills)

Other useful examples of learning objectives and outcomes:

Other examples of gender learning outcomes can be found in the UNDP Gender and Climate Capacity Development Series[4]. This training series provided 12 training modules presented as issue briefs on the gender dimensions of climate change over several thematic areas. These training modules provide examples of how gender specific learning outcomes can be formulated. Training module 4: Gender and Sustainable Energy has the following objectives (or learning outcomes):

- Understand the relationship among access to affordable, sustainable and modern energy and sustainable development goals, including gender equality and women's empowerment as well as climate change mitigation.

[4]UNDP Gender and Climate Capacity Development Series can be found at:https://www.undp.org/content/undp/en/home/librarypage/womens-empowerment/gender-and-climate-change.html

- Identify entry points for gender responsive energy use and access and action that empower women and other marginalised groups.

While these have not been specifically formulated as hard and soft skill outcomes, it provides ideas of the linkages between energy access and other course dimensions and how it can be presented as a course objective/ learning outcome. Recall as well that, especially at postgraduate level, students should not just develop an understanding of gender sensitivity and responsiveness, but should also learn to *apply* this understanding in 'real-world' contexts that they may encounter in the energy access field.

Another example can be found from African Women in Agriculture Research and Development (AWARD) Gender in Agricultural research series[5] with the following course objectives:

- Articulate and work with the different gender concepts
- Select and use appropriate tools for gender-responsive research
- Make informed decisions on which approaches to include in their research
- Effectively incorporate gender issues in their research efforts and generate publications.

Offer diverse opportunities for assessment of learning outcomes

When looking at how learning outcomes will be assessed, it is important that students are presented with different types of assessment opportunities to demonstrate knowledge and skills acquired in courses. This could include oral presentations, written essays or submissions, group work design challenges, quizzes, tests and exams. This could help cater to different student strengths. Some students may be good verbal communicators and do well in conveying what they've learnt in an oral, whereas others may do better in written essays or submissions. Community engagement or research problems might appeal to some students more than others. Other students may show key strengths when presented with a real-life problem-based challenges. Female and male students may have different assessment preferences.

Course convenors should ensure that all students are given equal opportunity to participate optimally, particularly when it comes to assessments that involve group work and presentations.

TEA-LP universities have generally incorporated diverse assessment methods. E.g. NUL in their Solar PV Systems course have the following assessments linked to their hard and soft skills outcomes:

- Writing short online quiz before lectures
- Actively participating in the practical and writing a laboratory report
- Designing the Solar PV system and writing a major report
  Presenting group work and addressing questions

In their Energy Policy and Regulation course UniPort have included the following summative assessments:

- Individual report on energy policy/regulatory framework for off-grid communities in Nigeria

[5] Award Gender in Agriculture Research Series can be found at https://awardfellowships.org/training/#about-courses

- Individual presentation to varied audiences on different design approaches of an effective energy policies/regulations.
- Group report/presentation on modelling outcomes of existing energy policy and regulation

Lever 2. Gender and energy access content

Course content should be informed by the learning outcomes, and refers to the key topics and materials that will be covered through various teaching and learning activities to achieve the learning outcomes. The links between energy and gender are broad and there are a variety of ways to include gender relevant content into energy access courses. This would vary according to the types of courses taught with content tailored to the specific courses. Content and learning materials should acknowledge the positive contributions and potential roles of both women and men in the sector and increase the visibility of the contributions of women in energy. Energy and entrepreneurship courses, for example, could look at the role of female entrepreneurs in the value chain and role of women in driving clean energy transitions and how they can be supported to maximise their impact.

Other courses could highlight the gendered impacts of energy poverty, how gendered roles in society influence how the household management of energy as well as productive uses. It could look at the livelihood impacts on various fuels, e.g. the continued reliance of biomass in certain communities and parts of sub-Saharan Africa and the differentiated effects on women and men. It could also explore the factors that influence the acceptance and uptake of energy technologies.

It is important for students to gain an understanding of the various dimensions of energy and gender and how it may impact technology designs, energy policies, regulations and energy systems in their respective countries and beyond. They should also be able to apply this understanding in their course learning activities. It is necessary to give careful thought to the gender and energy content that will be relevant to the courses taught and key topics covered. The table below introduces a few of these dimensions with useful resources to draw on ideas for content and learning activities.

Table 4: Examples of the energy gender nexus

Gender Energy Nexus	
Gender, energy and entrepreneurship	Distributed renewable energy offers many opportunities for the engagement of women in entrepreneurship along the value chain and for skills development of local women who are well positioned both geographically and socially to deliver energy services at the last mile, considering their primary role as energy users and their existing social networks (IRENA, 2019). Last mile entrepreneurs continue to play a key role in delivering energy access technologies and services to geographically distant or socio-politically marginalised communities, and serve as a critical interface between off-grid solar companies and unelectrified households or businesses. Several publications highlight the importance of this role and how to support energy entrepreneurs and their gendered needs and can be used as resources for content ideas. Resources:

	Supporting last mile entrepreneurs: What works and what does not[6] highlights this critical role and lessons from supporting last mile entrepreneurs. Gender and energy entrepreneurship: a systematic review[7] Women Entrepreneurs as Key Drivers in the Decentralised Renewable Energy Sector[8]
Gender and clean energy transitions	Gender equality is a key part of clean energy transitions (Clancy & Feenstra, 2019; Giner-Reichl, 2020). Significant gains in improving energy access can be made through the involvement of women across the value chain, particularly in areas of influence including the design and delivery of energy access technologies as well as through policy development, programmes and interventions (UNDP, 2018; Govindan, Murali & Dholakia, 2019). This will contribute to a diversity of perspectives, priorities, innovation and optimally use and integrate the skills and expertise women can offer to the energy sector. Looking at energy justice, women have been at the forefront globally of driving more just and equitable transitions to clean energy, with women led organisations advocating for renewable and distributed energy, local ownership of energy resources and climate and environmental justice (Allen, Lyons & Stephens, 2019).
Gender and energy poverty	Energy poverty has many dimensions and affects access to energy sources for cooking, heating, lighting and an array of other domestic and productive uses. Households without access to modern energy are often dependent on traditional biomass or paraffin which results in many adverse health impacts. These impacts are often experienced disproportionately along gendered lines, as women and girls (particularly in rural areas) often spend a significant portion of their time fetching firewood and other traditional sources of biomass and are directly exposed to indoor air pollution, when cooking on traditional biomass stoves without ventilation for several hours a day. In urban or peri-urban settings energy poverty also manifests through the use of paraffin or charcoal for cooking or candles for lighting in low income housing or informal settlements. Low income energy poor households often spend a larger percentage of their income on poor quality or lower tier energy options. Energy poverty is also impacted by access to time and monetary resources, which often has gendered implications with respect to who controls and manages finances and how that links to the management of household resources. Resources: Linking energy access, gender and poverty: A review of the literature on productive uses of energy[9]
Gender and clean cooking technologies	Clean cooking technologies in the form of 'improved' biomass cookstoves provides a good illustration of where technologies are often designed without sufficient input from end users. In most cases there is very little gender diversity in the design of clean cookstoves, with cookstove design far removed from the end users and tested in conditions that don't match the cooking experiences or preferences of many cookstove users (who are mostly women particularly in rural contexts). This in part can be attributed to why many cookstove technologies fail. Courses that look at biomass energy and the design of efficient biomass stoves need to have an understanding of these gendered energy use and preferences on how it affects technology design.

[6] https://www.energia.org/new-supporting-last-mile-women-energy-entrepreneurs-what-works-and-what-does-not/
[7] https://sun-connect-news.org/fileadmin/DATEIEN/Dateien/New/RA7-Womens-Energy-Enterpreneurship.pdf
[8] https://www.ruralelec.org/sites/default/files/Gender%20%26%20Energy%20Publication.pdf
[9] https://www.sciencedirect.com/science/article/pii/S2214629618306145

Gender and agricultural or rural livelihoods	Energy access plays a key role in productive uses for agriculture and rural livelihoods. Going beyond the domestic uses of energy, the gendered implications of productive uses of energy are key to explore. The literature finds that productive uses are also gendered, and that women and men have varying levels of access resources and enablers for productive uses of energy. Women and men may also face different challenges in using and benefiting from electricity. This may vary according different types of productive activities, geographic locations and access to finance, markets, skills and time resources to be able to engage in productive activities (ENERGIA, 2019). Resources: Unlocking the Benefits of Productive Uses of Energy for Women in Ghana, Tanzania and Myanmar[10]
Gender, energy policy and energy governance	Gender diversity in policy development is especially important as energy policies are often gender blind, not recognising the gender needs in energy services, and assume that women and men benefit equally from energy policies (Clancy, 2009). Excluding women from energy policy and energy governance is likely to lead to policies and projects that are void of the needs, knowledge and contributions of women (USAID, 2018).

Questions to consider:

Universities can refer to these questions in light of their own unique country and regional contexts. Regional context and urban-rural differences can impact access to energy. For example, in Kenya, energy access disparities among urban low-income households in Nairobi, might look different to rural low-income households in a village in Marsabit County. Or gender disparities in energy access for productive uses may differ in different rural communities in Northern or Southern Uganda.

1. Why do gender disparities in energy access exist? How do they differ according to geographic regions (urban-rural), level of income?

2. How does this manifest within a household context? Who is responsible for decision making on household energy use?

3. How do gender disparities affect productive uses of energy e.g. gender and agricultural systems?

4. How do gender disparities impact the energy policies in your country? Are these policies gender blind or neutral? How can barriers to gender inclusive energy policies be overcome?

[10] https://www.energia.org/cm2/wp-content/uploads/2019/03/RA6-Unlocking-the-benefits-of-productive-uses-of-energy.pdf

Useful resources:

The ESMAP Gender and Energy Equality, E-Learning course[11] (a self-paced course for energy specialists, policy makers, practitioners) provides a comprehensive overview of gender equality and energy, drawing on country level experiences. This can be used as a guide for some content ideas to bring out the energy and gender linkages. These include presentations with talking points, introductory videos, reading materials, case studies and additional resources.

Topics include:

- Gender and energy access: Household Energy and Rural Development
- Gender and Electricity Infrastructure
- Gender and Clean Energy: Renewable Energy and Energy Efficiency
- Gender and Energy Policies
- Gender and Energy Tools and Guidance

Increasing the visibility of women in energy access content - examples of women in the energy sector

There are numerous examples of women making a significant impact in the African energy access space. Course conveners and lecturers can draw on positive examples in their countries and the continent to include as case studies in their courses where relevant. These case studies demonstrate the value of gender diversity in developing energy access solutions and can inspire female students in their studies. The following example of Strauss Energy is one example of African innovation and entrepreneurship that has impacted the sector.

Strauss Energy, Kenya

Strauss Energy[12] co-founded by Charity Wanjiku and her brother Tony Nyagah, is a Kenyan company that specialises in energy, engineering and construction. Their aim is to revolutionise clean energy access in Africa. Their innovative Building Integrated Photovoltaics, using solar cells in functional parts of construction including rooftops, glass and other building materials and applications, provides a cost effective, durable and more aesthetically pleasing alternative to normal solar panels. Charity has been recognised as a leader in the energy space and has been named among the Top 40 Women Under 40 in 2016, Forbes 'Top Women in the Tech World' in 2018, and 'Female Tech Entrepreneur' by the World Economic Forum in 2017. Strauss Energy is based at the Climate Innovation Centre at Strathmore University and also partners with the Strathmore Energy Research Centre.

Lever 3. Gender inclusive teaching and learning activities

Teaching and learning activities play an important role in enabling students to critically engage with course content and develop key skills that achieve the course and programme learning outcomes. Studies on gender inclusive teaching in African higher education acknowledge the challenges lecturers face when trying to incorporate gender inclusive teaching methods (Kahamba, Massawe & Kira, 2017; Alemayehu, 2020). In Kahamba, Massawe & Kira (2017), although workshops raised awareness about

[11] The ESMAP E-Learning Course can be found at: https://esmap.org/node/56954

[12] https://straussenergy.com

gender sensitive teaching methods, lecturers did not recognise practical ways to incorporate these techniques into their teaching. Similarly, Alemayehu (2020) finds that while some lecturers may be aware of gender inclusive teaching methods, these methods are often not included in lesson planning or practiced in lecture settings.

Gender inclusive teaching strategies should therefore be included as part of the curriculum development process and lecturers need to be equipped with practical strategies to make their lessons more gender inclusive. A few of these methods are detailed below.

Encouraging groupwork and collaborative approaches

Group activities and more 'active' forms of learning have been shown to be useful in mainstreaming gender in teaching and learning activities, and can effectively and powerfully be combined with problem-based learning. Experience with mainstreaming gender in the curriculum in the Political Science curriculum in Cassese, Bos & Duncan (2012) found that active discussion and group activities were an important way to include gender in the curriculum.

It is however also important to provide students with the tools to be able to work effectively in teams and group settings, as working in gender diverse groups does not automatically lead to gender inclusion. Lecturers, tutors or facilitators overseeing teamwork sessions also need tools to manage interactions between students (team dynamics) and understand how teams are formed and function. Furthermore, the *process* of teamwork is very tricky to assess, and very important to focus on in curriculum design, especially in the context of ensuring *inclusive* groupwork particularly across genders. The TEA-LP recently hosted a webinar on teamwork, providing capacity building support for effective teamwork.

Problem-based learning

Problem-based learning (PBL) is a form of student-centered learning where students are presented with a real-world problem in context and are required to establish the information, knowledge and skills they need to solve the problem, and then apply those skills. PBL has been cited as a tool that may foster greater gender inclusion. Placing a problem in context could appeal to a wider range of student interests, particularly female student interests. Providing scenarios that are connected to the context of learning could be appealing to female students in particular as studies find that female students often derive more value from the learning processes that are connected to context[13]. This could better engage students who are more socially motivated than technologically motivated. For example if a student is passionate about improving energy access for rural healthcare facilities using solar PV, linking the PBL scenarios to the challenges faced by a rural healthcare system and potential impact on doctors and patients in a specific regional context, could engage the student in the activity. In this regard it may be useful for lecturers to ascertain students' areas of interests and motivations for studying in the field

[13] This can be social, socio-economic or environmental context. Du & Kolmos (2009) finds that female interests in the social and environmental implications of engineering, collaborative and contextualised learning, aligned with the wide skills-sets required by employers.

of renewable energy and engineering and build these into the types of PBL scenarios.[14] PBL scenarios should also remain relevant to practice and industry, so input from industry partners e.g. renewable energy companies could be useful in the design of these scenarios and activities.

In addition, PBL simulations can prepare students for working in gender diverse groups, which is an important skill the job market requires. Learning to navigate gender differences in approaches to problem solving and contributions to group discussions, could better prepare students for the job market. For PBL to be effective at fostering greater inclusion, the types of problems need to resonate with student interests (i.e. problems that are personally meaningful) and students need to be provided with tools to work more effectively in groups. For example Tilley, Peters & Mitchell (2014) find that self-awareness and reflection can contribute to mutual respect among students and assist students to articulate or voice any frustrations that may arise in groupwork settings in a de-personalised and constructive way. This could contribute to a more inclusive environment with respect to both gender and cultural diversity.

Hirshfield & Koretsky (2017) studied the gender interactions of engineering students in PBL environments with respect to how team members contributed within group settings. They found that while the gender composition of the team did not significantly impact the balance of how much each person contributed to group discussions, gendered norms, stereotypes and 'traditional gendered behaviour' (e.g. female students taking notes in group sessions) were noticeable from the instructors' observations. The study further observed how different techniques instructors used to oversee the sessions impacted on participation in group work settings. Students who were initially quiet in the beginning of the group work sessions engaged more when they were asked for their opinion on discussion points or by engaging them early on in the discussion with 'ice-breakers' to stimulate conversation. Furthermore, a conversational and informal facilitation approach, used by one of the female instructors, was a good way to engage female students in discussions (particularly when overseeing groups of all female students). Facilitators of groupwork sessions can therefore play a role in facilitating balanced participation and encouraging students of different genders to take on non-traditional roles in groupwork settings.

Illustrative Example of PBL for an energy access course: Developing a Solar PV Hybrid mini-grid for a village in Turkana, North-western Kenya. Students would be presented with a scenario of an unelectrified rural village in Turkana county and would need to assess the demand profile, size the mini-grid appropriately, assess the potential for additional productive loads within the growth of the mini-grid, understand the community consultation and engagement processes and the potential gendered impacts on households and businesses[15], and social institutions like schools and heath care centres. With the information at hand students would need to understand the problem, develop a solution and model and test solution within its context. While simulation may be a good starting point, working on a real community project would be beneficial as students would be required to apply course knowledge and skills in real world settings, and gain exposure to real world design challenges.

[14] This could be based on input from an incoming cohort of students or feedback from previous cohorts who have completed the course or programme.

[15] A Power for All survey found that mini-grids had a significant positive impact women's entrepreneurship, boosting income's up to 11 times[15] (Power for All, 2018). https://www.powerforall.org/insights/dre-technologies/mini-grids-boost-women-entrepreneurship-11x-income-rise

Gender aspects of this illustrative example could be considered in the following ways:

- In the gender composition of the student teams - ensuring that the teams are as gender balanced as possible.
- In the development of the PBL activity itself - covering technical aspects (such as modelling the mini-grid) and allowing for the exploration of social, environmental and economic community impacts, to effectively draw on different student strengths and interests.
- In the gendered analysis of community impacts - how many men and women would benefit in the development of the mini-grid (e.g. though job opportunities and technical training in operation and maintenance) or entrepreneurship opportunities resulting from the new mini-grid.

The second presentation of an ESMAP webinar: Closing the Gaps between Women and Men as Employees, Entrepreneurs and Consumers in the Mini-Grid Sector [16]could provide useful areas for consideration when developing such a PBL activity.

Table 5: Examples of PBL in Universities in Africa

Examples of how PBL has been applied
Gulu University in collaboration with Alborg University in Denmark implemented PBL in their Department of Development Studies across all their programmes, at graduate and undergraduate levels. One of the participants (a post-graduate student) in the PBL workshop hosted at Gulu, said it was an effective tool for motivating students to work together and helped him to complete this MBA programme in record time through the tools and skills obtained.
The University of Nairobi, Makerere University and the University of Dar es Salaam partnered with Alto university in Finland for a three-year PLB East Africa project, to strengthen PBL and an interdisciplinarity in a more structured way in these institutions.
The University of Port Harcourt (Uniport) was one four universities in Nigeria to introduce PBL in the Medical Science Faculties for a final year Pathology course. PBL is starting to gain traction within Nigerian Higher education and has been acknowledged as a suitable and complimentary teaching method to more conventional pedagogies.
Moi University also adopted PLB in their College of Health Sciences. Moi found that for PBL to be successfully implemented lecturers need to be well trained, equipped and comfortable with PBL teaching methods.

[16] https://atainsights.com/recording-and-presentations-developing-minigrid-projects-in-ethiopia

Other university examples:

University College London (UCL) embarked on an extensive faculty wide curriculum reform [17] of their engineering programmes, which culminated in the Integrated Engineering Programme. PBL formed an integral part of this process and served as the 'spine' of their new curriculum (Mitchell et al., 2019). Key elements of their PLB design cycle include:

1. Identifying the need
2. Developing a brief
3. Conceiving (understanding) the problem
4. Proto-typing and testing
5. Building the model
6. Implementing or using the prototype

Useful resources:

The Masterclass for Engineering Educators is a collaboration between South African universities (the Universities of Cape Town and Johannesburg) and universities in the UK (UCL and Aston University) on topics for enhancing engineering education. Slides from the workshops and short video clips of each masterclass provide useful ideas for course designers and lecturers. Masterclass 4: Making effective use of teamwork and Masterclass 8: Fostering inclusivity in education in the South African context are useful to refer to.
http://www.eeescep.uct.ac.za

The *Include*All – Inclusive by Design: Group-work brief provides ideas for how course conveners and lecturers can deliberately design group work sessions for greater inclusion.
https://www.staffs.ac.uk/assets/internal/IncludeAll-Inclusive%20by%20Design-Group%20work.pdf

eLearning

eLearning as a form of Open and Distance Learning can be an effective way to foster greater gender inclusion as it creates an opportunity to move past possible gender barriers of not being able to attend physical contact lectures. This can be due to a number of reasons including time, geographical constraints, convenience, balancing family commitments and responsibilities etc. eLearning could offer more flexibility for female post-graduate students with families who appreciate the flexibility of being able to learn from home, with minimal contact required. eLearning also complements other physical contact modes of learning. Tambo et al., (2017) highlights that renewable energy programmes in higher education need to be flexible and innovative in their delivery. It should also be noted that students need to be equipped with devices such as laptops and data connectivity to be able to effectively make use of this mode of learning. The Pan African University (PAU) is developing a unique post-graduate programme with a Specialisation in Mini-grids, Digitalisation and Entrepreneurship, which will be offered online with access to virtual incubation and mentorship.

[17] A complete overview of their curriculum transformation process can be accessed below.
Faculty wide curriculum reform: the integrated engineering programme
https://www.tandfonline.com/doi/pdf/10.1080/03043797.2019.1593324?needAccess=true

Gender considerations in teaching and learning

TEA-LP Example – Gulu University

For TEA-LP courses Gulu University has integrated gender considerations in teaching and learning in their Solar Energy Systems and Research Methods courses. For several learning outcomes they have included gender considerations for teaching and learning. The example of their Solar Energy Systems Course is shown in the table below. This course is intended to equip the student with the knowledge and skills in the design and application of solar energy technology in an off-grid setting.

Table 6: Actual gender mainstreaming approach Gulu University MSc in Renewable Energy Access – Solar Energy Systems course

Hard Skills Learning Outcomes	Soft Skills Learning Outcomes	Gender considerations in teaching and learning
Assess the energy demand profile of a given off-grid community	Critically evaluate the energy demand of a given off-grid community	Staff ensure a mix of both male and female students in each group
Select an appropriate solar energy system for a given off-grid community	Critically evaluate the potential solar energy technology alternatives for the off-grid community	Both men and women should be consulted while assessing the demand profile of the community
Design an appropriate solar energy system for a given off-grid community	Collaboratively work in groups to design different components of a given solar energy system for meeting the community energy access needs	Both male and female students should participate in the production and presentation of group reports
Design a management plan for ensuring optimal performance of the off-grid solar energy system	Collaborate with team members to design a management plan for optimal performance of an off-grid solar energy system	The designed solar system should fulfil the needs of both men and women in the community
	Effectively communicate findings through written reports to an academic community	Teaching and learning materials should include those written by both men and women

Other examples can be found in the TESCEA gender responsive pedagogy participant hand-out, with excerpts in the table below.

Table 7: Gender responsive pedagogy – Adapted from participant hand- out what teachers can do.

What lecturers can do
Gender responsive teaching and learning methodologies and activities
Select teaching methodologies that will ensure equal participation of both female and male students e.g. groupwork, group discussions, role play, debates, explorations and practicals can be effective.
Design activities that drawn on pre-existing beliefs (e.g. gender stereotypes) and then get students to consider how those beliefs influence/d their own problem-solving, decision-making, responses etc.
Develop and use case studies, learning activities, examples with content that is relevant, meaningful and personalised to female students and male students.

Develop activities to support students in recognising and identifying gender stereotypes, gender bias, lack of/ under representation etc. e.g. analysis of course relevant news articles or teaching and learning materials - or in countering them. Gender stereotypes and generalisations that need to be interrogated. Examples of stereotypes: men are more comfortable with the technical aspects of renewable energy engineering and more likely or willing to work on site e.g. solar power plant. Women are more comfortable as design engineers in an office. It is important to avoid generalisations and over-implications and expose all students regardless of their gender to various aspects of energy access and renewable energy engineering and allow them the freedom to see where they are most comfortable and where they can contribute optimally.
Gender responsive teaching and learning materials
Lecturers develop (or co-develop with students) and use learning materials that depict both genders performing activities and roles (associated with women and men) e.g. use images and cases that reinforce attitudes and beliefs that women are equal to men. For examples showing images of women and men as engineers on renewable energy projects.
Introduce students to the gender dimension of the presented contents, including publications that take gender-sensitive approach into the course readings.
Use gender-equitable research when presenting teaching and learning content (Are all data or information that is used gender-disaggregated? Are gender differences analysed and addressed in the research examples? Is there any effort to create awareness based on the data presented, for example, regarding gendered divisions of labour?)
Look at hidden curriculum (exclusion of particular content) which re-enforces stereotypes about reinforces stereotypes about gender, ethnicity, race, class and power relations.

Further approaches can be found in Grunberg (2011) are detailed below.

Having a balance of women and men teaching gender and energy content in courses or modules could enhance the teaching of energy access course. Partner universities can encourage a balance of male and female lecturers to teach gender content in energy access courses, specific gender modules (if an interdisciplinary or individual explicit approach is used) or address gender specific considerations of more technical content.

Incorporate culturally relevant and sensitive content into the curriculum, with a focus on regional cultural dynamics. Course convenors and lecturers can include culturally relevant and sensitive gender content into examples used in the classroom context for teaching.

Promoting diversity in publication of books. Supporting the publication of papers, books and other teaching materials that promote a gender balance and cater to the needs of students. Course convenors should encourage fair representation in the scholarship of women and men (i.e. that contributions of women and men are equally acknowledged), encouraging publishing opportunities and balanced content in lecture settings.

Gender inclusive learning environment

Very closely linked to teaching and learning methods is the learning environment. The above teaching and learning activities in part can be used as tools to create more conducive learning environments.

In addition, the *Gender responsive pedagogy participant hand-out – what teachers can do* from the TESCEA workshops provides useful practical steps and ideas for course conveners and lecturers for creating gender inclusive learning environments. This includes:

- Gender responsive class-room interaction
- Gender responsive class-room management
- Gender responsive classroom set -up

Some consideration for gender inclusive eLearning are also discussed.

Excerpts from this hand-out are included in the table below:

Table 8: Gender responsive classroom interaction and set-up - adapted from participant hand- out what teachers can do.

What lecturers can do
Gender responsive classroom interaction
Divide the class into small groups to promote better participation of male and female students. Try to ensure the groups are as balanced as possible.
Group students in ways that do not rely on gender – table groups, letters in their names, numbering or where possible, stimulate students to work in gender-mixed groups.
Actively encourage equal participation and involvement of all students in class activities, including presentations.
In groupwork sessions allow students to alternate in different roles e.g. group leader, note takers etc.
Gender responsive classroom set-up
Encourage a balance of students in classroom seating arrangements. E.g. being seated towards the front and centre of the lecturer rooms. While students should be able to feel free to sit where they are comfortable, occasionally changing the seating arrangements especially for more interactive classroom activities can mitigate against some students feeling isolated and disconnected at the back of the lecture venues.
Ensure that both female and male students have equal to access and use of equipment, textbooks, library, laboratory, computers etc.
Gender responsive classroom management
Develop a learning contract (ground rules) in collaboration with the students to ensure that gender needs, participation, respect etc. are championed within the learning space.
Break the class into small groups to promote better participation of male and female students. Be careful of the composition and ensure that the groups are as balanced as possible.
Allow male and female students to be become gender champions and report on adherence to the student contract (referred to above) and observations about student interaction.

Assign male and female students different (non-traditional) roles within classroom and project activities (including setting up and tidying up). Allow all students to alternate in roles of group leaders and note takers and tasks like tidying up after group projects.
Gender responsive language
Use language that reinforces positive gender attitudes e.g. use terms, expressions and tone which promotes equality among students of different genders.
Use encouraging and inclusive language in the classroom e.g. avoid using gender specific pronouns where possible.
Encourage female students to take STEM subjects and highlight the relevance and interest of these subjects to their lives and of their families and communities.
Be mindful of non-verbal communication and how it might be interpreted by female and male students.
Pay attention to language used to describe the course and how this might discourage/encourage a particular gender from taking the course over another (e.g. findings show that women are more likely to choose STEM courses related to society and the environment, such as medical sciences).

Considerations for eLearning

When delivering an online course, course designers and lecturers need to facilitate a sense of 'connectedness' among students taking the course, and encourage all students in the in the virtual classroom to participate and critically engage with the material.

A few considerations are listed below:

- Require students to regularly participate in online discussion forums. Similar to the physical classroom set-up, develop a learning contract or 'ground-rules' to allow discussion forums to remain construtive, respectful and relevant the to the course topics. Course convenors or lecturers can also monitor the forums to periodically check the gender balance in the posts.
- Provide a range of topics that may appeal to a wider range of student interests in discussion forums. E.g. discussion on the environmental, social, economic and political aspects of energy access, to allow students with different interest to engage more.
- Allow for interactive webinar sessions where students, lecturers and guest speakers can interact and critically engage in discussions. During the time allocated for questions, faciliators should take the questions of both female and male students. Ackowledging the questions of female students early in the webinar may enourage other female students to ask questions (should time allow for more questions to be answered).
- Ensure a balance of female and male speakers (presenters) in webinar sessions.
- During virtual teamwork sessions, try to ensure that the groups are as gender balanced as possible, and allow for an initial session where students can get to know each other and start to build a rapport.
- Ensure that all students in the course have access to the necessary devices and software applications to be able join teamwork collaborative sessions. For students without laptops or

access to computer labs, explore avenues to to provide financial assistance for the purchase of laptops. Universities can also loan laptops to students for the duration of the programme.

Opportunities for student feedback

Student feedback can serve as a valuable source for continually improving the teaching and learning experience. Students should frequently be given the opportunity to provide anonymous feedback though course evaluation forms, including their experience of gender inclusive teaching methodologies and how that has contributed to the learning experience and understanding of the material.

Lever 4: Multidisciplinary programmes

Multi-disciplinarity in programme design is a key aspect of the TEA-LP. In the literature several studies find that multi-disciplinarity and interdisciplinarity are an important way to foster greater gender inclusion in degree programmes[18] (Wächter, 2004; Du & Kolmos, 2009; Schraudner, 2011; Khisa et al. 2019; Mitchell et al., 2019). In order to better prepare graduates for the job market, energy access and renewable energy degree programmes need to be designed with flexibility and innovation and offer comprehensive curricula to enable graduates to enter the job market in a variety of roles (Golba et al., 2015). Furthermore, energy access programmes should be able to accommodate students from a wide range of backgrounds.

Multidisciplinary programmes can benefit students from engineering and non-engineering backgrounds by complementing technical engineering skills and competencies with critical non-technical skills and expose graduates from non-engineering specialisations to key engineering concepts related to energy access. Comprehensive curricula for energy access programmes should ideally incorporate social science, economics, finance and environmental science perspectives to ensure that all aspects of energy access are considered. Flexible admission for students from different undergraduate backgrounds could create additional entry points to enable students to enroll in post-graduate energy programmes. Designing engineering-based MSc energy access programmes for students from non-engineering backgrounds may be challenging in practice as non-engineering graduates need to be provided a foundational understanding of key engineering concepts and principles. The LEAP Masters Programme for non-Engineers at Boston University College of Engineering allows students from non-engineering backgrounds to leverage their non-engineering backgrounds to transition into engineering Masters programmes[19]. This programme can be useful for ideas on how to accommodate diverse educational backgrounds in engineering-based MSc programmes.

[18] These studies were mainly in the context of engineering programmes (with the exception of Khisa et al. (2019)) but are applicable much more broadly. As many post-graduate energy courses are housed in engineering faculties these findings apply to making technically focused degrees more well-rounded and holistic.

[19] This programme provides non-engineering students with accelerated learning and key undergraduate engineering courses related to their chosen MSc specialisations. http://www.bu.edu/eng/prospective-graduate/leap/

While STEM skills are important in the energy sector, achieving universal access to energy requires a range of interdisciplinary skills and knowledge including non-STEM skills and expertise (IRENA, 2019). There needs to be an awareness that energy access is more than STEM[20], and that women and men engaging in other sectors, e.g. Finance, Law, Social Science can enter the energy space. In order to create this awareness, students need to be familiarised with career opportunities and specialisations in the energy sector. For example, graduates from energy access programmes could go on to work in academia, within national electric utilities or rural electrification agencies, as site or design engineers in renewable energy companies, in energy policy and governance, management consulting or as entrepreneurs in their own energy start-ups.

In addition to opening up energy access programmes to multiple disciplines, barriers or perceived barriers to women in Engineering and other STEM disciplines should also be addressed. More positive messaging should be provided in the marketing of STEM programmes to prospective female students.

Examples of interdisciplinary programmes from the literature are included in the table below:

Table 9: interdisciplinary programmes - examples from the literature

Interdisciplinary Programmes – Examples from the Literature
Wächter (2004) studied how interdisciplinary degrees in science and engineering could be used as a tool to attract more female students compared to traditional engineering degrees using case studies of interdisciplinary engineering degrees at the Gaz Technical University Austria. In the 'nontraditional' Industrial Economics & Management – Mechanical Engineering degree 74% of the credit hours was for science and engineering fields and 26% for economics. The philosophy of the course was to develop holistic and practically oriented programme in science and engineering, incorporating social science and economics perspectives. Learning outcomes of the course included interdisciplinary thinking to solve technical, social and economic problems. Soft skills included communication and conflict management and the ability to apply knowledge creatively and innovatively. The number of female students in this non-traditional degree was 25% to 50% higher than in the traditional degree offering over the period 1997-2002. In addition, the total number of students was also higher than the traditional degree, suggesting that interdisciplinarity not only attracts female students but male students to the programme as well. To make traditional engineering degrees more interdisciplinary, the study recommends including at least 25% of socio-economic content e.g. economics, management, business languages, intercultural studies, ethics, technology and society, communications and gender studies etc.
Khisa et al. (2019) looked at the Consortium for Advanced Research Training in Africa (CARTA) Fellowship which provided interdisciplinary training to PhD students in Population and Health research across Africa. A unique value add of the programme was four interdisciplinary joint advanced seminars that offered fellows exposure to alternative learning and teaching environments. This consisted of a month-long residential training bringing together the cohort of each year with international faculty, teaching specifically created curriculum promoting critical thinking, advanced research skills, preparing fellows for academia, developing independent research programmes and training and mentoring the new generation of academics.
Mitchel et al. (2019) provided an overview of their Integrated Engineering Programme at UCL. Interdisciplinarity is a key aspect of their curriculum with multi-disciplinary design challenges in the first term of year one, interdisciplinary one-week scenarios at the end of year one and two-week interdisciplinary

[20] The perception that energy is primarily a STEM profession often exists because engineering and technical specialisations are often more visible within the energy sector.

scenarios at the end of year 2. In their third-year students are required to take interdisciplinary minors, which culminates in a final year interdisciplinary capstone project.

Lever 5: Enrolment and retention of female students

Bursaries and scholarships

Bursaries and scholarships play an important role in overcoming some of the financial hurdles to enrolling in post-graduate programmes. Recognising this, the TEA-LP partnered with the Liechtenstein Institute for Strategic Development (LISD) to create the REED / TEA-LP Scholarship Programme, launched in 2020. This Scholarship provides students enrolling TEA-LP Masters programmes with two-year tuition support and is currently being piloted with Mekelle University in Ethiopia. One of the female students studying an MSc in Sustainable Energy Engineering at Mekelle is among three initial recipients of the of the Scholarship. Other scholarship opportunities are listed and regularly updated on the TEA-LP's website[21].

Mentorship and increasing the visibility of female role models

Mentorship and increasing the visibility of positive female role models is an important aspect of attracting and retaining women in STEM and related interdisciplinary fields related and improving student success (Crumpton-Young, Elde & Ambrose, 2014; Botella et al., 2019). Mentorship opportunities are particularly important at a post-graduate level, where gender roles and balancing studies, work and family commitments can make it challenging for female students to pursue and complete post-graduate studies. Mentorship could thus encourage students to continue with their studies, through role models and offering the necessary support for students to successfully complete their studies and establish linkages with industry. Mentors can be within the department or faculty, industry or part of structured mentorship programmes outside of the university. Mentorship programmes could offer value to mentees and mentors alike. The Global Women's Network for the Energy Transition (2020) highlights some of these benefits.

For mentees these include:

- Gaining a wealth of experience from practitioners in their field
- Building on strengths and addressing weaknesses
- Setting tangible career goals and incorporating career enhancing actions
- Developing key competencies and values
- Inspiring innovation ideas and strategic thinking

Benefits for mentors:

- Gaining insights into other fields and cross-generational imperatives
- Career reflection
- Growing young talent
- Encouraging more women in the energy sector
- Knowledge transfer

[21] https://tea-lp.org/scholarships/

Examples of mentoring programmes and initiatives in Africa:

ISNAD – Africa

ISNAD is a multi-disciplinary network of students, professionals and researchers to promote sustainable energy, the environment and education in Africa. Their mentoring for research programme for PhD students included one-on-one technical and thematic assistance and the participation in a series of webinar trainings in the areas of sustainable energy, climate change and the environment by experienced researchers and professionals.

Women in Sustainable Energy and Entrepreneurship (WISEe) Kenya – Strathmore University

WISEe[22], based at the Strathmore Energy Research Centre in Narobi, consists of female engineers, technicians, trainers and entrepreneurs working in the area of Renewable Energy in Kenya. WISEe, in collaboration with We Share Solar and Remote Energy, provides technical capacity building and mentorship to women in high quality solar PV systems, with a footprint in several counties in Kenya and expanding into East Africa. WISEe offers practical hands on training with women trainers with who serve as positive role models for women undergoing the training. They also encourage entrepreneurship, and solar installation business opportunities. WISEe aims to address the gender gap in certified technicians in Kenya (i.e. women only constitute 2%-6% of certified technicians in Kenya). As the results of these trainings more than 10 women solar technicians were licenced by the Energy and Petroleum Regulatory Authority of Kenya, with over 80 solar PV women technicians trained and 6750 beneficiaries of clean highlighting and other energy services through solar PV.

WomEng in Malawi:

WomEng, in collaboration with the Malawi Institution of Engineers, Women in Engineering chapter, ran a leadership capacity development workshop[23] in Blantyre to promote gender diversity and the relevance of gender in engineering. The workshop was made possible through a GCRF Africa Catalyst Grant for capacity building for women in engineering bodies in sub-Saharan Africa, with the aim of improving the number of registered female Engineers in Sub- Saharan Africa.

Supporting women's practical needs – the CARTA Fellowship case study

In addition to scholarships and mentorship, addressing the practical needs of female post-graduate students is important for attracting students to a programme and providing the support needed to successfully complete their studies. This could include childcare facilities for post-graduate students with young children or suitable accommodation to students who come from out of town or live far from the university campus.

The CARTA programme, jointly implemented by the African Population and Health Research Centre in Kenya and University of the Witwatersrand in South Africa, recognised the importance of addressing women's needs as a way to encourage enrolment and successful completion of post-graduate programmes, through financial assistance, mentorship and an emphasis on practical gender needs of women. To this end the CARTA Fellowship focussed on catering for practical childcare needs and

[22] http://wiseeafrica.org/about/#achievements
[23] https://www.womeng.org/news/womeng-hosts-leadership-development-and-training-workshop-in-malawi

opening the fellowship specifically for African female post-graduate students to enrol for Doctoral programmes in Population and Health research on the continent. The selection criteria was based on purely merit but offered a differential age cut-off for admission (45 years for women and 40 years for men) and support for mothers with children, which made the programme attractive as it responded to practical needs faced by female students on the continent.

CARTA allows female post-graduate students with young children to actively participate in the full programme offerings while allowing them to care for their children. For example, CARTA supports mothers who are breastfeeding to attend the joint advised seminars with their babies as they participate in the month long residential joint advances seminars. The programme also accommodated spouses to attend and look after children while mothers participated in the programme. In this way gendered roles that may have limited participation and successful completion of doctoral roles were accommodated and balanced.

Impact: In the first two years more men were admitted to the programme than women. From year 3 more women were admitted to the programme and by year 8 of the programme in 2018, 62% of the cohort of that year were women. Furthermore, women made up 53% of the total cohort of CARTA fellows since the programme's inception. A number of female graduates went on to occupy roles in leadership and served on committees. This includes 4 women graduates who occupy positions in university faculty or heads of departments at the universities of Malawi, Ibadan and the University of the Witwatersrand (Khisa et al., 2019).

Lever 6. An enabling environment for all university staff

> *"To mainstream gender in the curriculum of any given institution requires the re-schooling and re-tooling of teaching faculty. This is a process which requires not only a high level of leadership and commitment within the institution, but also the mobilisation of existing expertise and capacity from across the disciplines."*
>
> *Mama (2006: 75)*

Reflecting on the above quote, gender mainstreaming in the university context does not take place in a vacuum. Academic staff would benefit from institutional leadership support at a departmental or faculty level or at the office of the Vice Chancellor for gender mainstreaming activities. Course conveners would firstly need to assess the required gender expertise and see to what extent these skills can be met inhouse and where external support is needed. They would then need to identify gender champions in their teams who can liaise with other university structures and communicate their curriculum needs and how gender mainstreaming can be supported. A few recommendations are listed below.

Working in gender diverse curriculum design teams

Gender diversity is an important part of the curriculum design process. It is essential to have gender diversity in curriculum design teams to allow for diverse viewpoints, perspectives and experiences as the curriculum will be experienced by gender diverse cohorts of students. Working in gender diverse teams to develop energy access programmes is an integral part of the TEA-LP process, where university teams collaborate at their universities and during capacity building workshops to develop their energy access programmes.

Capacity building support and multi-disciplinary collaborations

Grunberg (2011) recommends the following for institutional support and capacity building for gender mainstreaming:

Co-designing energy access courses with gender specialists

Where possible, academic staff can arrange collaboration between departments of gender studies (or specialist gender centres in the universities) and engineering departments to co-design energy access courses. Capacity building and collaboration with gender units and departments of Gender Studies is key for understanding foundational gender concepts [24] and being able to effectively enrich their courses with suitable gender content teaching approaches.

Interdisciplinary research groups and staff training

Forming interdisciplinary research groups and organising training sessions for staff on gender mainstreaming. Types of training could include faculty development seminars, conferences, lecture series, symposiums and summer schools etc. to encourage knowledge and expertise sharing and debate on best practice theory and methodology in the field.

Financing and budgetary support

Financing gender mainstreaming training for academic staff. A gender audit at a university or departmental level can be useful to examine how much of the departmental budget has been allocated for gender mainstreaming in the curriculum, and if additional finance can be mobilised for staff training.

Being part of a University Network

A university network can be a valuable resource for sharing lessons and best practices and receiving gender mainstreaming support outside of the university. This has been a key value add for the TEA-LP for all aspects of the curriculum design process, including gender mainstreaming support to partner universities.

[24] Faculty need a sound understanding of foundational gender concepts and be able to relate and apply this to their own contexts.

Example: Makerere University – Institutional support for mainstreaming gender in the curriculum

The example below illustrated the link between intuitional support and gender mainstreaming in the curriculum. Makerere University in Uganda is recognised as having a long-standing history of gender mainstreaming on the continent, through the policies and practices they put in place.

MUGEP 2009 Policy Resolution on Curricula No. 1
Makerere University shall take all necessary steps to engender the curricula of all its academic programmes.

Strategic Actions:

- Create a framework for engendering the University curriculum
- Review and engender all existing curricula and ensure that they are gender
- responsive.
- Conduct a gender audit of all proposed academic programmes before they are approved by Council
- Impart gender analytical skills and knowledge to all staff to enable them
- Engender the University teaching and learning programmes and build a gender responsive teaching & learning environment.
- Implement a mandatory cross cutting core course on Gender and
- Development for all first year undergraduate and postgraduate students.
- Integrate Gender Analysis into all subject content

Concluding remarks

This Guidance Note provides practical guidance and examples to integrate gender into energy programmes using 6 levers. Programme designers, course convenors and lecturers need to reflect on gender inclusion in each of these 6 areas: learning outcomes, content, teaching and learning, multidisciplinarity, support for enrolment and retention of female students and an enabling environment for staff. Embracing gender inclusivity in the design and delivery of energy access programmes can create gender inclusive teaching and learning environments and enhance the learning experience for all students.

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Resources

From Gender Studies to Gender in Studies: Case Studies on Gender Inclusive Curriculum in Higher Education
Commonwealth of Learning Gender Mainstreaming Toolkit
Garcia Toolkit (Toolkit for integrating a gender-sensitive approach)
Forum for African Women Educationalists (FAWE) Toolkit
Gender responsive pedagogy – what teachers can do.