SCHOOL ENGAGEMENT TOOLKIT

Empowering Girls to Pursue STEM Education & Careers in the Energy Sector

Enhancing Equality in Energy for Southeast Asia | A USAID/RDMA Activity

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ABOUT E4SEA

The Enhancing Equality in Energy for Southeast Asia (E4SEA) Activity is an activity under the Asia Enhancing Development and Growth through Energy (Asia EDGE) initiative overseen by USAID's Regional Development Mission for Asia (RDMA). Asia EDGE is a key component of the U.S. Government's approach to grow sustainable and secure energy markets throughout the Indo-Pacific region, and the E4SEA Activity aims to contribute to that effort by improving gender equality and inclusion in Southeast Asia's energy sector to strengthen the region's energy institutions and advance women's economic empowerment. Specifically, the E4SEA Activity is working towards three primary outcomes.

1. Increased workplace diversity in Southeast Asia (SEA)
2. Improved inclusive workplace environment
3. Expanded equitable promotion opportunities

Inspiring and motivating girls to consider and pursue Science, Technology, Engineering, and Mathematics (STEM) education and careers in the energy sector and equipping them with the information, confidence, and skills they need to succeed are key to achieving increased workplace diversity and, therefore, enhanced gender equality in the energy sector. Energy sector employers and tertiary educational institutions have a significant role to play in this process.

The E4SEA Activity has therefore developed this toolkit to assist energy sector employers, universities, and vocational institutions in their outreach to primary and secondary schools to help girls, boys, school staff, and parents better understand the challenges that discourage girls and young women from pursuing STEM education and careers in the energy sector, to support them in overcoming these barriers and challenges, and to build confidence and self-efficacy in girls and foster their skills and potential so that they may aspire to become the energy sector's leaders of tomorrow.

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ACRONYMS

EDGE	Enhancing Development and Growth through Energy
E4SEA	Enhancing Equality in Energy for Southeast Asia
ESMAP	Energy Sector Management Assistance Program
FGDs	Focus Group Discussions
ITU	International Telecommunication Union
RDMA	Regional Development Mission for Asia
STEM	Science, Technology, Engineering, and Mathematics
UNESCO	The United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

Women continue to be underrepresented in STEM education and energy sector employment across Southeast Asia, in great part due to pervasive and deeply entrenched challenges and barriers that discourage girls from exploring and pursuing these opportunities.

Throughout their lives—at home, in school, and via the media—girls are constantly exposed to disempowering gender biases and stereotypes that erode their confidence in their potential to succeed as STEM students and energy sector professionals. They also often find themselves without female role models and mentors from energy and STEM fields whom they can identify with and look up to for inspiration. Furthermore, many young students have limited access to accurate information and insights on careers in the energy industry. All of these factors combined make it more likely for girls to write off STEM education and energy sector careers as they plan their future.

Strategic interventions from relevant stakeholders such as tertiary educational institutions and energy companies to counter these challenges are crucial in the effort to increase women's participation in STEM programs and energy sector employment in the medium to long run.

This toolkit offers a range of strategies and interventions that tertiary educational institutions and energy sector employers can carry out in partnership with primary and secondary schools to empower and support girls in exploring their STEM identities and pursuing pathways towards careers in the energy industry. Figure 1 provides a brief introduction to these strategies and interventions.

STRATEGY 1: Enrich Students' Learning Experience

- Improve and enhance existing STEM curricula by integrating real-life phenomena, contemporary energy industry challenges, and other social and environmental issues into lessons.
- Supplement existing curricula with more applied, hands-on learning opportunities.

STRATEGY 2: Inspire & Inform through Role Models & Mentors

- Expose girls and boys to successful women in STEM and energy.
- Provide mentorship opportunities to students.

STRATEGY 3: Reinforce the Schools' Educational Counseling & Career Guidance Efforts

- Provide access to high-quality information on future study options and career opportunities relating to STEM and the energy sector.
- Help schools involve parents in the counseling and career guidance process for students.

Figure 1

Key Strategies and Interventions for Empowering Girls in School

Nurturing girls' interests in STEM and energy-related topics can go a long way towards closing gender gaps in the energy sector.

INTRODUCTION

The rapid rise in energy demand in Southeast Asia and the sector's transition towards clean energy are key drivers of job growth in the region. Energy sector jobs in Southeast Asia are projected to increase from 4 million to between 5.5 and 7.9 million by 2030, with an increase of up to nearly fivefold in the renewable energy sector.[1] Strong job growth not only supports economic development but also presents valuable opportunities for countries to advance societal goals and achieve greater gender equality.

Gender Equality and Women's Economic Empowerment

Efforts to support girls and young women to pursue STEM education and careers in the energy sector can go a long way towards realizing gender equality in society. Energy sector careers, especially those that require STEM skills and knowledge, typically offer a relatively sizable income as well as job security. However, barriers to education, especially in STEM, and widely held gender norms and systemic biases make it challenging for women to participate in the full value chain of the energy sector, resulting not only in the further deepening of gender inequality but also missed economic opportunities on a large scale. The growth and transformation of the energy sector should be regarded as a unique opportunity to revisit and reshape existing systems and practices towards more diversity and inclusion. It is imperative for governments and the private sector to ensure that women receive equitable access to career opportunities in the energy sector as they manage the transition process. Girls and women must also be enabled and empowered to

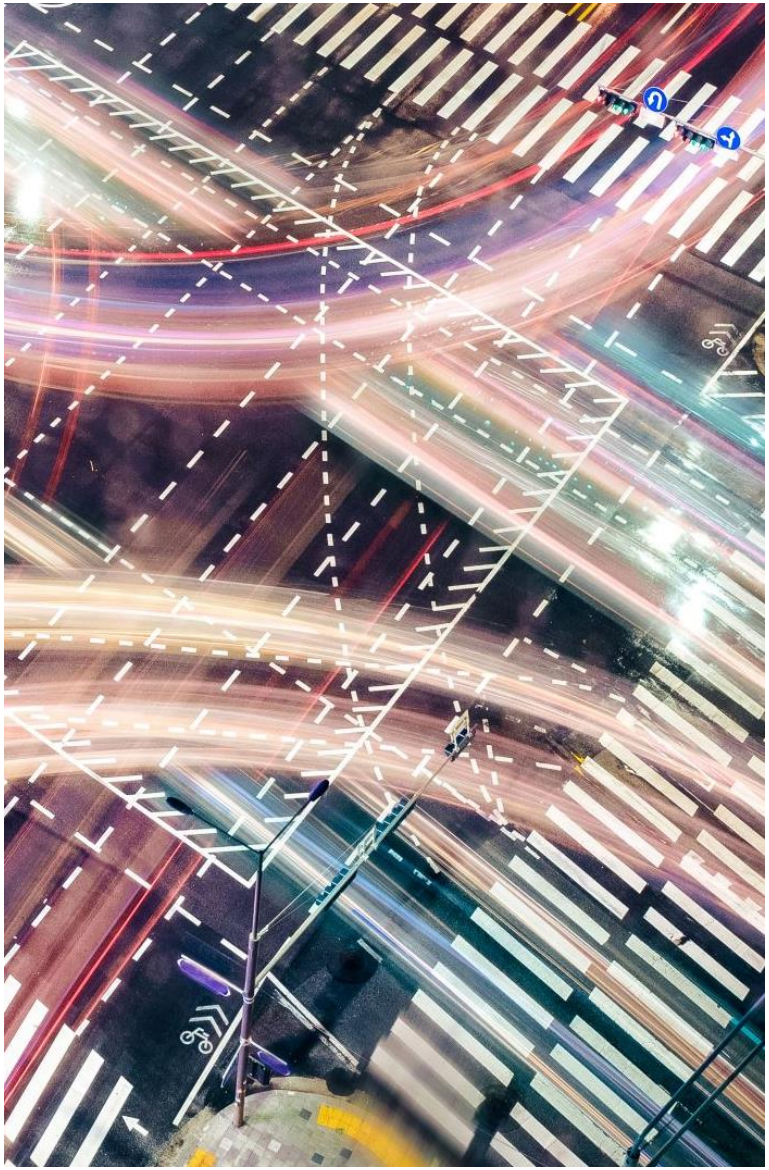

Photo Credit: Microsoft Stock Images

1. IRENA, *Global Renewables Outlook: Energy Transformation 2050* (Abu Dhabi: International Renewable Energy Agency, 2020), 226.

enhance their skills and potential to be able to take advantage of these career prospects that can significantly improve their economic security and well-being.

The Business Case

The benefits of increased gender diversity in the energy workforce span across multiple levels. Diverse perspectives and innovative solutions are critical for solving the tough, complex energy challenges and sustainability issues that companies face today. Tapping into women's unique perspectives and contributions can, therefore, strengthen energy companies' competitive advantage, environmental performance, and business results. There is a growing body of evidence that correlates the increased representation of women in corporate leadership roles with stronger business outcomes. Research shows that companies with more women on their boards perform better with regards to their return on investment, sales and equity, and performance during times of crisis or volatility.[2]

As the energy sector continues to expand and evolve, so does the demand for skilled talent. Hence, building and strengthening the talent pipeline should be of critical importance to energy businesses. Fostering girls' interests in STEM and other energy sector-related studies where girls are traditionally underrepresented can significantly help to widen the talent pool in the medium to long run. It follows then that interventions that contribute to a more equitable representation of girls and women in STEM education and the energy sector should be a key component of any energy company's talent recruitment and retention strategy.

Photo Credit: Microsoft Stock Images

2. ILO, *Women in Business and Management: The business case for change* (Geneva: International Labour Organization, 2019).

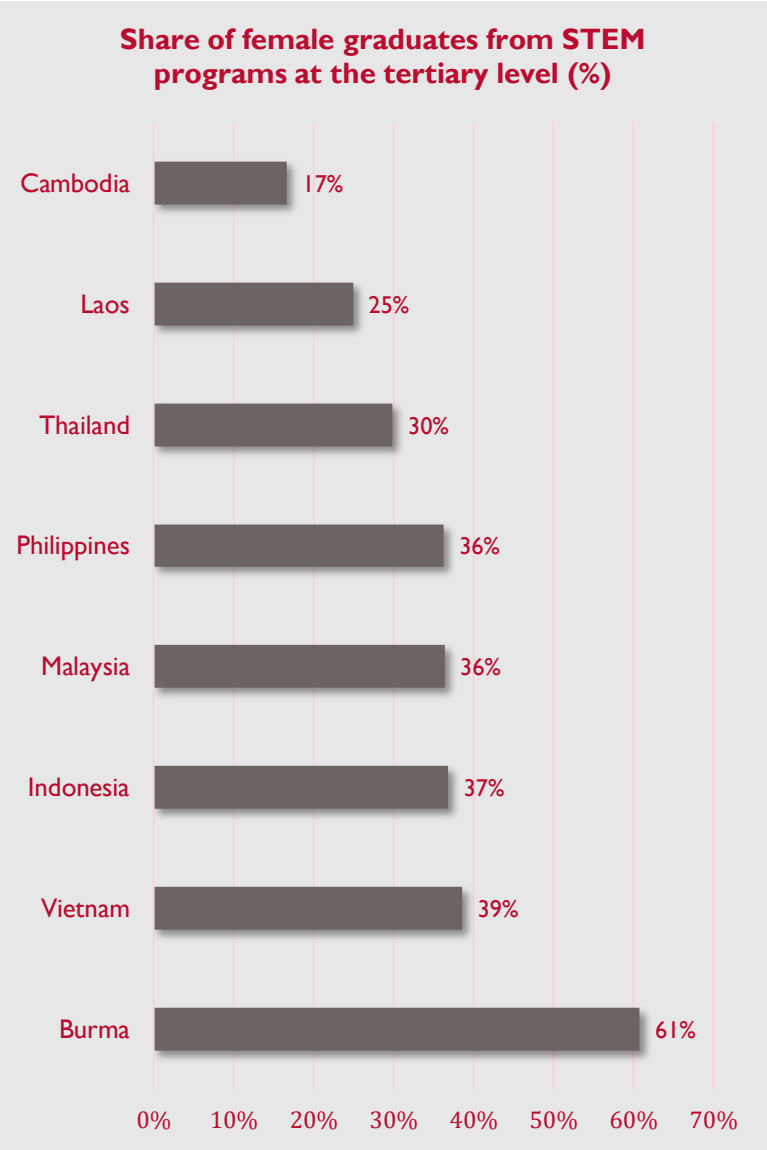

Figure 1

Source: World Bank Gender Data Portal[4]

Persistent Gender Gaps in STEM & Energy

Despite considerable progress, huge gender gaps in STEM education and energy sector employment remain. The average share of female graduates from STEM programs at the tertiary level among Southeast Asia's middle-income countries[3] (i.e., Cambodia, Indonesia, Laos, Malaysia, Burma, Philippines, Thailand, Vietnam) is merely 35%,[4] with Burma being the only country where more than 39% of STEM graduates are women.[5] Many factors across different levels—individual, societal, and institutional—interact together in complex ways that make it particularly challenging for girls to access and pursue STEM educational opportunities and aspire to successful careers in the energy industry. These factors, alongside other challenges and barriers for women across the energy sector's employee lifecycle, have resulted in a severe underrepresentation of women in the energy workforce, particularly at the leadership level. Indeed, the energy sector is one of the least gender diverse segments of the economy, with women accounting for merely 22% of the oil and gas workforce and 32% in the renewables workforce.[6] Moreover, women's participation is significantly lower in STEM jobs than in non-STEM and administrative roles within the sector.

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3. The average is calculated using data from 2015 to 2018 due to limited data availability; Timor-Leste is excluded due to unavailable data.
4. World Bank, "DataBank: Gender Indicators Report", accessed July 2021, https://databank.worldbank.org/id/2ddc971b?Code=SE.TER.GRAD.FE.SI.ZS&report_name=Gender_Indicators_Report&populartype=series#.
5. Note that Burma's 61% share of female STEM graduates is not typically regarded as an achievement in gender equality given its unique context. Education in Burma is widely considered to offer poor returns on investment, with jobs that require university degrees paying less than manual labor roles in farming and trade. Men generally drop out of school early to enter the workforce for better earnings prospects. Burma's case is an important reminder that gender parity does not guarantee gender equality.
6. IRENA, *Renewable Energy: A Gender Perspective* (Abu Dhabi: International Renewable Energy Agency, 2019).

TOOLKIT OBJECTIVE

Girls are exposed to stereotypes, biases, and other challenges that discourage them from pursuing STEM education and energy sector careers starting in their childhood years.[7] As a result, many begin to lose interest in STEM as early as middle school.[8] Early intervention from all relevant stakeholders are therefore critical to help girls overcome these challenges and feel confident and motivated as they cultivate interests and skills in STEM and energy sector-related areas. As key entities that can provide girls and boys with firsthand, accurate information and guidance on the routes to tertiary STEM education and energy sector employment, energy companies and tertiary educational institutions have a significant role to play in this process.

The E4SEA Activity has developed this toolkit to assist and guide energy companies and tertiary educational institutions in engaging with primary and secondary schools with the aim to help girls feel inspired, motivated, and prepared to explore, pursue, and thrive in STEM and energy sector-related education and occupations.

NOTE

While this toolkit places the spotlight on girls, readers should find that many of the strategies and interventions presented in this toolkit are also useful for boys. In fact, involving boys is an essential part of the equation towards more gender equality in education as boys must, likewise, learn to fully recognize girls' talents, capabilities, and contributions.

NOTE

Not all girls will want to pursue STEM careers in the energy sector even in the absence of challenges and barriers. However, all girls can nonetheless benefit from STEM learning and increased knowledge about the energy sector. The energy sector is the lifeblood of modern society and affects the daily lives of all individuals, while learning STEM helps to improve students' creativity as well as lateral thinking skills for solving problems, which are valuable throughout life.

After reading this toolkit, you will…

- ☑ *Gain a better understanding of the challenges that girls encounter which discourage them from pursuing STEM education and energy sector careers.*
- ☑ *Become familiar with important strategies and interventions that can help girls overcome these challenges.*

7. United Nations Children's Fund and ITU, *Towards an equal future: Reimagining girls' education through STEM* (New York: UNICEF, 2020).
8. Ann Y. Kim, Gale M. Sinatra, and Viviane Seyranian, "Developing a STEM Identity Among Young Women: A Social Identity Perspective," *Review of Educational Research* 88, no. 4 (2018): 589-625.

Photo Credit: Microsoft Stock Images

OVERVIEW OF TOOLKIT

A fundamental understanding of the root causes behind persistent gender gaps in STEM programs and the energy sector workforce is crucial for the development and implementation of strategic interventions that can effectively empower girls to explore their STEM identities as well as energy sector career opportunities. For that reason, this toolkit first focuses on guiding readers through the various challenges and barriers that make it difficult for girls to study STEM and aspire to successful careers in the energy industry.

The subsequent section of the toolkit presents strategies and interventions that tertiary educational institutions and energy companies can employ to help girls overcome gender stereotypes and biases and to foster their interests in STEM and energy-related topics. This toolkit section also provides the rationale behind each of the proposed strategies and interventions and offers suggestions for you to consider as your plan your interventions.

It is E4SEA's hope for this toolkit to serve as one of your first companions on the journey towards empowering and inspiring girls to enter STEM fields and contribute to solving the energy challenges of our time. To that end, this toolkit wraps up with a list of additional resources that you may want to consult as you begin to engage schools and flesh out the details of the interventions and activities that you would like to implement.

Many girls start losing interest in STEM as early as middle school due to gender stereotypes, biases, misconceptions, and other challenges.

UNDERSTANDING THE CHALLENGES

This section introduces you to the challenges and barriers that make it difficult for girls to explore and pursue STEM education and energy sector careers.

It is important to recognize that these challenges and barriers are closely connected. They reinforce and influence each other in complex ways that negatively impact a girl's life experience from multiple dimensions, starting from childhood through to her adulthood.

The challenges can largely be grouped into the following categories:

- Gender norms, stereotypes, and biases
- Misguided influence of parents, teachers, and friends
- Lack of role models and mentors
- Disempowering educational experience
- Insufficient and inaccurate information on educational and career opportunities

The next few pages describe each set of challenges in greater detail.

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Gender Norms, Stereotypes, and Biases

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There has been a considerable decrease in overt sexism in recent times. However, subtler forms of gender biases are still prevalent. Gender biases and stereotypes that adversely impact girls' interests and motivation to study STEM and aspire to careers in the energy sector are potent drivers of the gender gaps in these fields.[9]

Research shows that people have a tendency to associate science with males, and in countries where this implicit stereotype is prevalent, boys are more likely to perform better than girls in science and mathematics.[10] Furthermore, even where the performance of boys and girls in STEM subjects are at the same level, in general, a smaller proportion of girls than boys would consider STEM careers due to the damaging consequences of gender norms, stereotypes and biases.[11]

Masculine traits are still widely ascribed to successful STEM and energy sector professionals, even among girls and women. A notable number of female STEM students and professionals who participated in E4SEA's focus group discussions (FGDs) indicated that they are quite "masculine" when asked why they decided to pursue the fields they did, implying the belief that having masculine traits makes them more suitable for STEM education and technical roles within the energy industry. When asked why many of their female peers would not choose to study engineering, some girls explained that several of their friends "care more about looking pretty", which suggests the perceived notion among some young students that being an engineer and looking pretty, to a certain extent, are mutually exclusive.

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9. Ming-Te Wang and Jessica Degol, "Motivational pathways to STEM career choices: Using expectancy–value perspective to understand individual and gender differences in STEM fields," *Developmental Review* 33, no. 4 (2013): 304-340.
10. Brian A. Nosek et al., "National differences in gender–science stereotypes predict national sex differences in science and math achievement," *Proceedings of the National Academy of Sciences* 106, no. 26 (2009): 10593-10597.
11. United Nations Children's Fund and ITU, *Towards an equal future: Reimagining girls' education through STEM* (New York: UNICEF, 2020).

E4SEA's FGDs also produced other key insights in line with previous research concerning male students' biases against their female peers.[12] Some male engineering students noted that "there are more capable men than women" within their fields because men are "quick learners" and "more enthusiastic". When asked why they believe so few women enroll in their study programs, the same male students immediately responded by describing their programs as very "intellectually demanding"—a statement which hints at their relatively low opinion of girls' intellectual capabilities.

Not all students and professionals share these stereotypical opinions. However, it is important to keep in mind that environments where these views are freely exchanged or even subtly expressed on a regular basis, even to a limited degree, can hardly be expected to properly support or empower girls to pursue STEM education and other energy sector-related subjects.

Gender stereotypes not only work against girls externally but also from within. Girls who internalize gender stereotypes have relatively low levels of confidence in their science and math abilities compared to boys and may feel out of place among their peers in STEM subjects.[13] A poor sense of belonging and the internalization of gender stereotypes can reduce girls' self-efficacy, which is the belief in one's capacity and skills to succeed or attain desired outcomes.[14] Self-efficacy plays a significant role in a person's educational and career choices. Research has shown that women are underrepresented in fields where innate talent is widely believed to be critical for success because they do not consider themselves to possess such talent[15]. Girls who underestimate their competence and capabilities in STEM and other subjects perceived as relevant to the energy sector are less likely to aspire to careers in the sector.

Internalization of gender stereotypes and biases can cause girls to underestimate their capabilities and potential to succeed in STEM.

12. Daniel Z. Grunspan et al., "Males Underestimate Academic Performance of Their Female Peers in Undergraduate Biology Classrooms," PLoS ONE 11, no. 2 (2016): e0148405.
13. UNESCO, *Cracking the code: girls' education in science, technology, engineering and mathematics (STEM)* (Paris: United Nations Educational, Scientific and Cultural Organization, 2017).
14. Albert Bandura, "Self-efficacy: Toward a unifying theory of behavioral change," *Psychological Review* 84, no. 2 (1977): 191-215.
15. Sarah-Jane Leslie et al., "Expectations of brilliance underlie gender distributions across academic disciplines," *Science* 347, no. 6219 (2015): 262-265.

Misguided Influence of Parents, Teachers, and Friends

Photo Credit: Microsoft Stock Images

Both parents and teachers are susceptible to gender stereotypes about boys being more capable and suitable for STEM. They may also prescribe to social norms that dictate appropriate behaviors and activities for girls. Across several countries, parents tend to have lower expectations of their daughters' capabilities in STEM and place higher expectations on their sons to pursue these subjects.[16] In addition, it is well established that the possession of gender stereotypes is not exclusive to male teachers; some female teachers also discriminate based on gender.[17] Caregivers and teachers who have gender biases and stereotypical beliefs pertaining to gender, consciously or not, are more likely to interact and communicate with girls in ways that can discourage them from exploring energy topics, studying STEM, and pursuing energy sector careers.

Relationships with peers also have a huge influence on the beliefs, behaviors, motivation, and aspirations of adolescents. Research shows that there exists a strong association between peer support and girls' determination to remain in STEM.[18] However, girls are significantly more likely than boys to report limited support from their peers for their STEM ambitions and pursuits.[19]

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16. OECD, *The ABCs of Gender Equality in Education: Aptitude, Behavior, Confidence* (Paris: OECD Publishing, 2015); Harriet R. Tenenbaum and Campbell Leaper, "Parent-Child Conversations about Science: The Socialization of gender inequities?," *Developmental Psychology* 39, no. 1 (2003): 34-47.
17. Victor Lavy and Rigissa Megalokonomou, "Persistency in Teachers' Grading Bias and Effects on Longer-Term Outcomes: University Admissions Exams and Choice of Field of Study" (NBER Working Paper 26021, National Bureau of Economic Research, 2019).
18. Rachael Robnett, "The Role of Peer Support for Girls and Women in STEM: Implications for Identity and Anticipated Retention," *International Journal of Gender, Science, and Technology* 5, no. 3 (2013): 232-253.
19. Rachael D. Robnett and Campbell Leaper, "Friendship groups, personal motivation, and gender in relation to high school students' STEM career interest," *Journal of Research on Adolescence* 23, no. 4 (2013): 652-664; Jayne E. Stake and Shannon D. Nickens, "Adolescent Girls' and Boys' Science Peer Relationships and Perceptions of the Possible Self as Scientist," *A Journal of Research* 52, no. 1-2 (2005): 1-11.

Lack of Role Models and Mentors

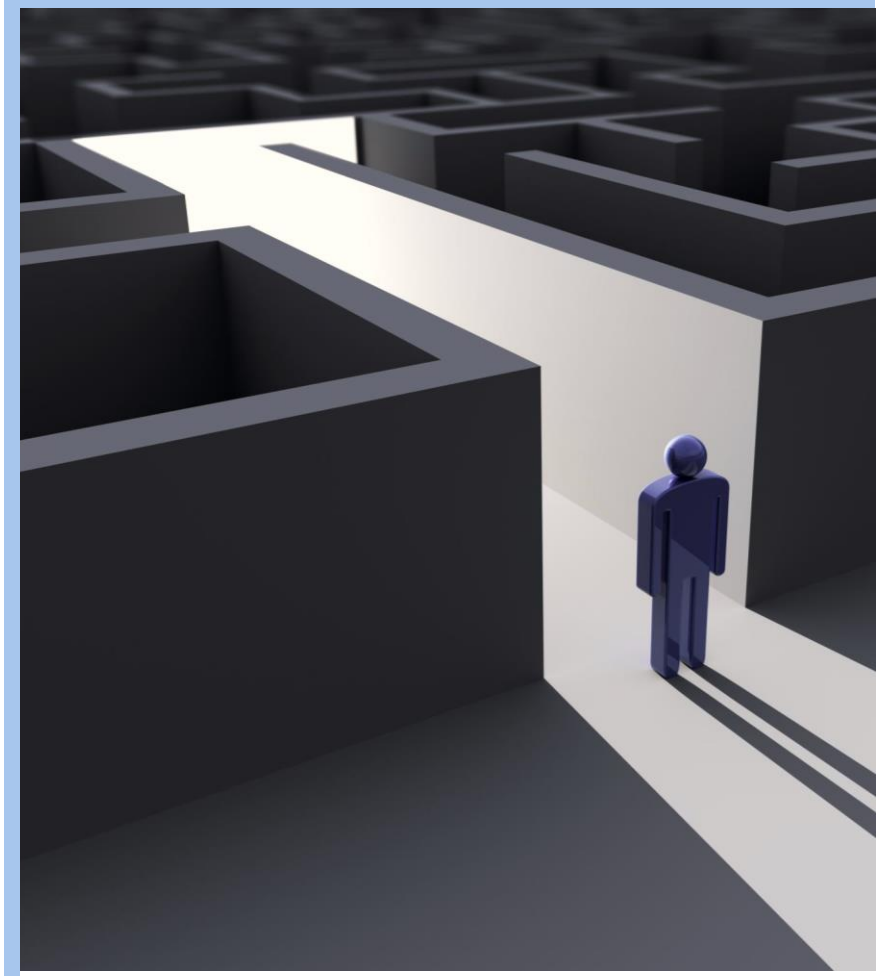

Photo Credit: Microsoft Stock Images

Female STEM teachers are relatively few and far between. The lack of such role models in education as well as limited exposure to and interaction with female energy sector professionals whom girls can more easily identify with and learn from make it difficult for girls to envision themselves succeeding in STEM and the energy sector. This, in turn, reduces their interest and determination to study STEM and pursue a career in the sector.[20]

Furthermore, the scarcity of role models in itself reinforces the gender stereotype that women are not as competent as men in STEM studies and at work.

If girls rarely come across successful female individuals in STEM and the energy industry, they are likely to struggle to envision themselves as such.

20. Nilanjana Dasgupta and Jane G. Stout, "Girls and Women in Science, Technology, Engineering, and Mathematics: STEMing the Tide and Broadening Participation in STEM Careers," *Policy Insights from the Behavioral and Brain* 1, no. 1 (2014): 21-29.

Disempowering Educational Experience

Photo Credit: Microsoft Stock Images

Learning materials that convey gender biases might include images that primarily depict men as scientists and engineers, text that uses gendered terms such as "housewife" and "chairman", and content that portrays women only in support roles.

Girls can feel disempowered when teachers call on boys more frequently than on them to answer questions in class, focus on their personal qualities and appearance rather than on their accomplishments, and assign more challenging tasks to their male counterparts.

Gender stereotypes and biases pervade a student's educational journey in the form of gender-biased instructional language, learning materials, and teaching strategies and practices. They perpetuate unequal gender norms and stereotypes and demotivate girls from pursuing fields in which women are underrepresented. A recent review by UNESCO determined that elements reflecting gender biases are rife in science and mathematics learning materials across primary and secondary schools in 78 countries.[21]

Girls may also be subject to inequitable treatment by teachers and peers in the classroom. Such biased behaviors are common, and the learning environment that results from it is referred to by various researchers as the "chilly climate", which can leave girls feeling excluded, demotivated, and less confident about their abilities.[22]

Despite STEM's critical role in solving the challenges of our time, such as climate change and energy poverty, STEM classes often fail to connect lessons to real-world problems and the important work carried out by energy businesses. The failure to do so makes STEM subjects generally less appealing to students, especially to girls since many of them tend to gravitate towards careers that are generally regarded as communally beneficial and altruistic given the influence of traditional gendered expectations.[23]

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21. UNESCO, *Cracking the code: girls' education in science, technology, engineering and mathematics (STEM)* (Paris: United Nations Educational, Scientific and Cultural Organization, 2017).
22. Project on the Status and Education of Women (Association of American Colleges), *The Classroom Climate: A Chilly One for Women?* (Washington, D.C.: The Project, 1982).
23. Nilanjana Dasgupta and Jane G. Stout, "Girls and Women in Science, Technology, Engineering, and Mathematics: STEMing the Tide and Broadening Participation in STEM Careers," *Policy Insights from the Behavioral and Brain* 1, no. 1 (2014): 21-29.

Insufficient and Inaccurate Information on Educational and Career Opportunities

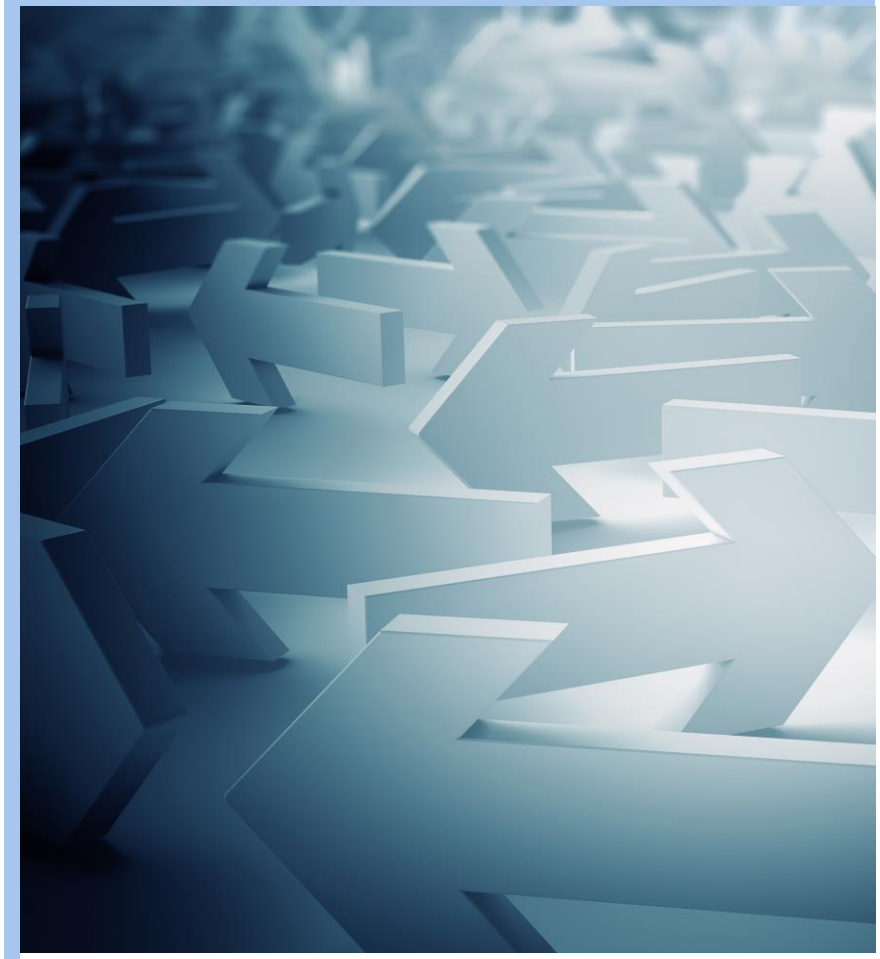

Photo Credit: Microsoft Stock Images

Many students have a limited understanding and awareness of STEM and energy sector job opportunities. Misconceptions surrounding the work of energy sector professionals are common. For example, many young individuals associate a significant amount of dangerous and physically laborious activities with the work of the average engineer in the industry despite the sector's high safety standards and technological advances that have made operations considerably less labor intensive. Much of the widespread belief about women being unsuitable for energy sector careers can be attributed to this impression combined with the gender norm that links men to physical labor and dangerous undertakings. In addition, despite the variety of careers in the industry, many students can only imagine upstream and power plant engineering roles when thinking of work in the energy sector.

Several students who participated in E4SEA's focus group discussions expressed dissatisfaction with the amount and quality of career information made available to them through official channels at their schools. Some tertiary students noted that they did not have a clear idea of career opportunities relevant to their study programs until after they had already begun their tertiary education.

As the energy industry continues to evolve, and with it its hiring needs, career counselors may find it increasingly difficult to keep abreast of the latest trends in the energy sector's job market as well as other relevant career insights. Limited access and exposure to up-to-date education and career information and insights relating to the energy sector can cause students to rule out energy sector-relevant pathways altogether when planning their future. When choosing a major, many students rely on the advice and opinion of parents, teachers, and friends as well as their self-perception of their aptitudes and weaknesses based on performance in school. Together, these circumstances leave girls especially vulnerable to the negative effects of gender stereotypes and biases as they make decisions regarding their education and career.

Tertiary educational institutions and energy employers can play a key role in inspiring and motivating girls to study STEM and pursue energy sector careers.

KEY STRATEGIES AND INTERVENTIONS

As potential future educators and employers of girls and boys and as entities that can provide firsthand, accurate information on the pathways to energy sector employment, tertiary educational institutions and energy sector companies can wield significant influence over the attitudes and understanding of girls, boys, parents, and teachers towards STEM education and energy sector career opportunities. In particular, you can play a significant role in addressing gender biases and dispelling stereotypes about women in STEM and energy as well as facilitate all involved to recognize the talents and capabilities of girls and women. Furthermore, your representatives can serve as an important source of inspiration for young students, both girls and boys, to study STEM and contribute to solving the complex energy challenges of our time.

This section introduces you to strategies and interventions that energy companies and tertiary educational institutions can employ in partnership with primary and secondary schools to support girls in their pursuit of STEM education and energy sector careers. The interventions can be grouped into the following strategy categories:

- Enrich students' learning experience
- Inspire and inform through role models and mentors
- Reinforce the schools' educational counseling and career guidance efforts

The next few pages provide further details on these strategies and interventions.

Photo Credit: Microsoft Stock Images

NOTE

Boys also stand to directly benefit from these strategies and interventions as they can become better informed and more well-prepared in navigating the increasingly difficult transition from school to work.

Strategy 1: Enrich Students' Learning Experience

Improve and enhance existing STEM curricula by integrating real-life phenomena, contemporary energy industry challenges, and other social and environmental issues into lessons.

WHY

- Girls are more likely to feel engaged in STEM lessons when the learning content features real-world problems.[24]
- As they come to better understand how meaningful and critical energy and STEM are to the world, girls may feel a greater sense of appreciation for these fields and want to learn more about them.

HOW

- ✓ Collaborate closely with instructors and other relevant school personnel to review the existing curriculum and identify opportunities to integrate real-world issues and situations.
- ✓ Provide instructors with relevant real-life cases that are being encountered/studied by your company/institution as examples to be shared in class.
- ✓ Support instructors in delivering these lessons and facilitating discussions as needed. The lessons should encourage students to connect and apply theories and concepts to real-world situations and problems, including contemporary energy industry challenges and other STEM-related issues in daily life. Students should also have the opportunity to actively discuss and propose solutions to the problems.

Photo Credit: Microsoft Stock Images

- ✓ Catch up with instructors and other relevant school personnel on a periodic basis to assess learning outcomes and work on improvements where needed.

24. Dale Baker, "What Works: Using Curriculum and Pedagogy to Increase Girls' Interest and Participation in Science," *Theory Into Practice* 52, no. 1 (2013): 14-20.

Strategy 1: Enrich Students' Learning Experience

Supplement existing curricula with more applied, hands-on learning opportunities.

WHY

- Girls demonstrate greater interest in STEM when they learn about STEM concepts through interactive, hands-on activities.[25]
- Non-traditional learning environments where gender biases are not as pervasive provide girls with a safer space to explore their interests in STEM.[26]

HOW

- ✓ Host one or more of the following learning opportunities for students: *Work Experience Programs, STEM Competitions, Work Site/Faculty Visits*
- ✓ Cooperate with instructors and other relevant school personnel to ensure that any chosen program/activity is aligned with current topics being covered in class as well as target learning outcomes.
- ✓ Brief all personnel involved in the chosen program/activity on relevant content in this toolkit so that they can pay extra attention to supporting girls.
- ✓ Discuss with the school about ways your company/institution could contribute to relevant extracurricular activities and initiatives the school already has in place, such as science clubs.

Intervention Highlight: Work Experience Programs

Energy companies can provide young students with the opportunity to contribute to real work projects that are being implemented. Work experience programs can go a long way towards strengthening the company brand as an employer of choice among the future generation of recruits. Moreover, such programs can provide students with significant insight into the energy sector and the world of work and can also serve as a key trigger for the students' journey towards energy sector careers.

Revising or replacing textbooks prescribed to students by educational authorities to remove gender biases is a time-consuming, costly endeavor and beyond the responsibilities of tertiary educational institutions and energy companies. However, you need not ignore the issue altogether as you engage schools. As guest lecturers in STEM classes, energy sector professionals and representatives from higher education can address the problem by encouraging students to identify possible elements of gender biases in their learning materials and to propose alternatives. Such an activity can help both boys and girls learn to critically evaluate their learning materials through a gender lens and overcome gender biases.

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25. Nilanjana Dasgupta and Jane G. Stout, "Girls and Women in Science, Technology, Engineering, and Mathematics: STEMing the Tide and Broadening Participation in STEM Careers," *Policy Insights from the Behavioral and Brain* 1, no. 1 (2014): 21-29.
26. Alicia Hammond, Eliana R. Matulevich, Kathleen Beegle, and Sai K. Kumaraswamy, *The Equality Equation: Advancing the Participation of Women and Girls in STEM* (Washington, D.C.: The World Bank, 2020).

Strategy 2: Inspire & Inform through Role Models & Mentors

Expose girls and boys to successful women in STEM and energy.

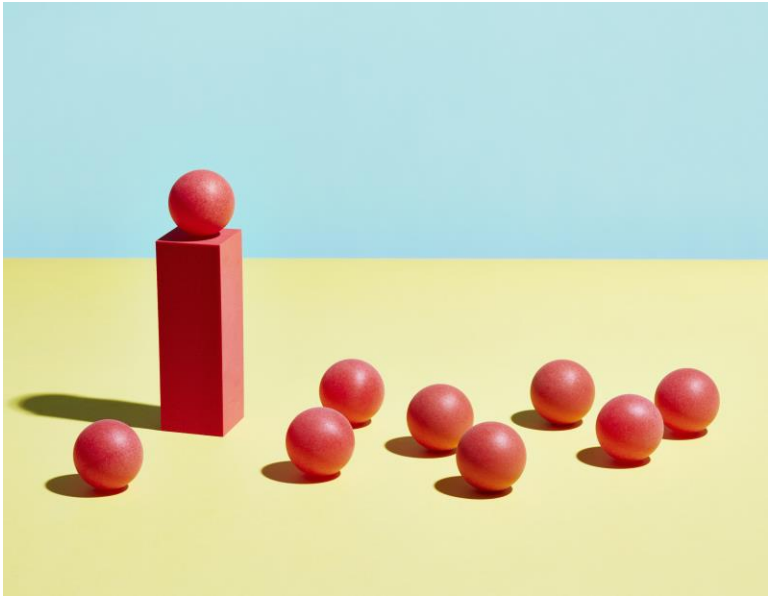

Photo Credit: Microsoft Stock Images

WHY

- Introducing students to female role models can help both boys and girls to recognize women's talents, capabilities, and contributions and to visualize the energy sector as a place for not only men but also women.
- Having female role models with whom they can identify is key to helping girls overcome negative stereotypes, enhance their self-perception, and feel inspired and motivated to pursue STEM education and energy sector careers.[27]

HOW

- ✓ Host *Talks* or *Workshops* where successful women from your company/institution can share with students, parents, and school personnel firsthand insights, experiences, and other key information relating to their pathway to STEM or energy sector careers.
  - Carefully select your representatives and ensure that they understand the objectives of the event.
  - Ask them to talk about gender equality initiatives and successes at your company/institution.
  - Encourage them to share personal stories about how they overcame gender-related challenges in their field.
- ✓ Produce communication materials highlighting female role models for the school to distribute to students, parents, and staff.
- ✓ Collaborate with teachers, counselors, and other relevant school personnel on opportunities for role models from your company/institution to serve as guest speakers/contributors in classes and/or other school activities and events, such as STEM clubs or science fairs.

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27. Jane G. Stout, Nilanjana Dasgupta, Matthew Hunsinger, and Melissa A. McManus, "STEMing the tide: Using ingroup experts to inoculate women's self-concept in science, technology, engineering, and mathematics (STEM)," *Journal of Personality and Social Psychology* 100, no. 2 (2011): 255-270; Yi-hui Liu, Shi-jer Luo, and Ru-chu Shih, "The investigation of STEM Self-Efficacy and Professional Commitment to Engineering Among Female High School Students," *South African Journal of Education* 34, no. 2 (2014): 1-15.

Strategy 2: Inspire & Inform through Role Models & Mentors

Provide mentorship opportunities to students.

WHY

- Mentors can significantly help to boost girls' confidence, self-esteem, and sense of belonging in traditionally male-dominated fields and also provide them with the guidance and insights they need to succeed in STEM at the tertiary level and in the energy industry.[28]
- Mentorship is strongly linked to long-term career success.[29]

HOW

✓ Work with the school to establish a program that will connect girls (and boys) to select mentors from your institution/company. The mentorship program should aim to
  - Motivate and inspire students to learn STEM;
  - Help them develop their STEM identity and realize the breadth of opportunities that STEM education can lead to;
  - Increase students' awareness and understanding of the various types of organizations, businesses, functions, and occupations within the energy sector as well as the significance of the sector to the modern world;
  - Support girls and boys in developing skills and capabilities that are key to success; and
  - Guide them as they explore career options and navigate the transition to higher education (e.g., advise them on college applications and interview preparation).

Photo Credit: Microsoft Stock Images

NOTE

Developing STEM identity refers to the process of aligning one's self-perception and aspirations with a STEM field.[30] A strong STEM identity can be a key driving force for girls to enter STEM fields.

28. Nilanjana Dasgupta, "Ingroup experts and peers as social vaccines who inoculate the self-concept: The stereotype inoculation model," *Psychological Inquiry* 22, no. 4 (2011): 231-246.
29. Tammy D. Allen, Lillian T. Eby, Mark L. Poteet, Elizabeth Lentz, and Lizzette Lima, "Career Benefits Associated With Mentoring for Proteges: A Meta-Analysis," *Journal of Applied Psychology* 89, no. 1 (2004): 127-136.
30. Ann Y. Kim, Gale M. Sinatra, and Viviane Seyranian, "Developing a STEM Identity Among Young Women: A Social Identity Perspective," *Review of Educational Research* 88, no. 4 (2018): 589-625.

Strategy 3: Reinforce the Schools' Educational Counseling and Career Guidance Efforts

Provide access to high-quality information on future study options and career opportunities relating to STEM and the energy sector.

WHY

- Firsthand insights on educational and career opportunities from tertiary educational institutions and energy employers can significantly help to bridge existing information gaps.
- School counseling programs equipped with high-quality information pertaining to future study and employment options for students are in a better position to encourage girls to pursue STEM and energy sector careers as well as help their pupils make informed decisions about their future.

HOW

- ✓ Talk to the school's career counselors and other relevant school personnel to identify existing information asymmetries and gaps where your contributions would be valuable.
- ✓ Create knowledge products (e.g., information booklets, posters, flyers) and other communication materials to address identified gaps that the school can distribute to students, teachers, and parents. These may include information such as STEM study options, scholarships, energy sector jobs, qualifications required, potential earnings, anticipated future skills gaps, and industry developments.
- ✓ Host a workshop to disseminate the information.
- ✓ Participate in the school's education and career fairs.

Photo Credit: Microsoft Stock Images

TIP

Emphasize not only technical but also non-technical skills such as organizational, planning, negotiation, and communication skills when talking about the skills that are critical to career success in STEM and the energy sector. Doing so can make it easier for girls to envision themselves as successful STEM and energy sector professionals as they struggle to cope with stereotypes, biases, and misconceptions related to women's technical capabilities.

TIP

Girls may become more motivated to pursue STEM education and energy sector careers despite the challenges they face if they are made aware of the careers' attractive potential earnings, which holds the promise of increased economic security and enhanced well-being for them and their family.

Strategy 3: Reinforce the Schools' Educational Counseling and Career Guidance Efforts

Help schools involve parents in the counseling and career guidance process for students.

WHY

- Parents hold significant influence over their children's STEM aspirations and career choices.[31] Equipped with the right tools and information, parents can overcome gender biases and stereotypes and serve as key supporters of their daughters' STEM and energy sector career ambitions.

HOW

✓ Assist the school in preparing communication materials for parents that would
  - Increase their awareness of STEM and energy-related study routes and career opportunities;
  - Bring to their attention available scholarships and funding as well as data on the attractive potential earnings of energy sector professionals;
  - Help them recognize that women can be as successful as men in STEM and in the energy industry; and
  - Guide them in supporting their children in STEM learning, college preparation, and career planning.

Photo Credit: Microsoft Stock Images

✓ Help parents recognize and appreciate their daughters' interests, capabilities, and potential in STEM.
  - Keep track of girls' success stories from the interventions you have carried out at/with the school to be shared with teachers and counselors for them to pass them on to the girls' parents.
  - Highlight these success stories to parents at events where you have the opportunity to serve as guest speakers, such as career fairs and workshops.

31. Kathleen M. Jodl, Alice Michael, Oksana Malanchuk, Jacquelynne S. Eccles, and Arnold Sameroff, "Parents' roles in shaping early adolescents' occupational aspirations," *Child Development* 72, no. 4 (2001): 1247-1265; Adam Lloyd, Jennifer Gore, Kathryn Holmes, Max Smith, and Leanne Fray, "Parental Influences on Those Seeking a Career in STEM: The Primacy of Gender," *International Journal of Gender, Science and Technology* 10, no. 2 (2018): 308-328.

RECAP: STRATEGIES AGAINST CHALLENGES

Below is an overview of the strategies and interventions proposed in this toolkit to address the challenges and barriers that make it difficult for girls to explore their STEM identities and pursue pathways towards careers in the energy sector.

STRATEGY 1: Enrich Students' Learning Experience

- **Improve and enhance existing STEM curricula by integrating real-life phenomena, contemporary energy industry challenges, and other social and environmental issues into lessons.**
- **Supplement existing curricula with more applied, hands-on learning opportunities.**

STRATEGY 2: Inspire & Inform through Role Models & Mentors

- **Expose girls and boys to successful women in STEM and energy.**
- **Provide mentorship opportunities to students.**

STRATEGY 3: Reinforce the Schools' Educational Counseling & Career Guidance Efforts

- **Provide access to high-quality information on future study options and career opportunities relating to STEM and the energy sector.**
- **Help schools involve parents in the counseling and career guidance process for students.**

CHALLENGES

- Gender Norms, Stereotypes & Biases
- Misguided Influence of Parents, Teachers & Friends
- Lack of Role Models & Mentors
- Disempowering Educational Experience
- Insufficient & Inaccurate Information on Educational & Career Opportunities

OTHER USEFUL RESOURCES TO CHECK OUT

REPORT: *The Equality Equation: Advancing the Participation of Women and Girls in STEM*
– World Bank –

REPORT: *Cracking the Code: Girls' Education in Science, Technology, Engineering and Mathematics (STEM)*
– UNESCO –

REPORT: *Towards an equal future: Reimagining girls' education through STEM*
– UNICEF and ITU –

REPORT: *Stepping Up Women's STEM Careers in Infrastructure: An Overview of Promising Approaches*
– ESMAP/World Bank –

GUIDE: *Toolkits for Managing Employer-Led Inputs Into Schools and Colleges*
– The Education Developing Gloucestershire's Employability Project –

GUIDE: *The Global STEM Toolkit*
– World Learning –

GUIDE: *STEM Careers Support for School and Colleges: Resources and Toolkits*
– STEM Learning –

GUIDE: *An Employer's Guide to Supporting STEM Careers Education in England*
– The Careers & Enterprise Company and STEM Learning –

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