USAID
FROM THE AMERICAN PEOPLE

IUCN

# WOMEN AT THE FOREFRONT OF THE CLEAN ENERGY FUTURE

## SEPTEMBER 2014

A White Paper of the USAID/IUCN
Initiative Gender Equality for Climate Change Opportunities (GECCO)

**Disclaimer:**

This publication is made possible by the support of the American people through the United States Agency for International Development (USAID) Bureau for Economic Growth, Education, and Environment (E3). It was prepared by International Union for Conservation of Nature (IUCN). The author's views expressed in this publication do not necessarily reflect the views of USAID or the United States Government.

For information about GECCO contact:

**Natalie Elwell,** USAID - nelwell@usaid.gov

**Andre Mershon,** USAID - amershon@usaid.gov

**Lorena Aguilar,** IUCN - lorena.aguilar@iucn.org

**November 2014**

# TABLE OF CONTENTS


4 ACRONYMS

6 CONSULTATION PARTICIPANTS

10 1. ABSTRACT

11 2. INTRODUCTION

15 3. THE CLEAN ENERGY SECTOR: OPPORTUNITIES AND KNOWLEDGE GAPS

15 Opportunities in the Clean Energy Sector

19 Knowledge Gaps in Clean Energy and Climate Change Mitigation

25 4. VIEWING CLEAN ENERGY PROJECTS THROUGH A GENDER LENS

25 Resource Inequalities Determine Impacts

28 Enabling Policy

32 Private Sector Investment

33 Siting and Generation

35 Transmission and Distribution

36 End Users

40 5. WOMEN'S ADVANCEMENT IN CLEAN ENERGY EMPLOYMENT, ENTREPRENEURSHIP, AND LEADERSHIP

41 Engineers and Technicians

45 Energy Ministries, Public Sector Employees, Regulators

47 Corporate Executives, Board Members, and Project Managers

48 Construction Workers and Plant Operators

49 Entrepreneurs, Vendors, and Suppliers

52 6. ROADMAP ON WOMEN AND CLEAN ENERGY

52 Enabling Policy

53 Private Sector Investment

54 Generation, Transmission, Distribution (Infrastructure)

55 End Users

55 Women's Advancement in Employment, Leadership, and Entrepreneurship

# ACRONYMS

| | |
|---|---|
| **AfDB** | African Development Bank |
| **C3E** | Clean Energy Education and Empowerment initiative |
| **CCB** | Climate, Community, and Biodiversity Standard |
| **ccGAP** | Climate Change Gender Action Plan |
| **CDM** | Clean Development Mechanism |
| **CIF** | Climate Investment Funds |
| **COP** | Conference of Parties |
| **CSR** | Corporate Social Responsibility |
| **CTF** | Clean Technology Fund |
| **EC-LEDS** | Enhancing Capacity for Low Emission Development Strategies Program |
| **EGI** | Environment and Gender Index |
| **EIGE** | European Institute for Gender Equality |
| **ESIA** | Environmental and Social Impact Assessment |
| **EUPP** | Energy Utility Partnership Program |
| **FAO** | Food and Agriculture Organization |
| **FIT** | Feed in Tariff |
| **GECCO** | Gender Equality for Climate Change Opportunities |
| **GEF** | Global Environment Facility |
| **GHG** | Greenhouse Gas |
| **HDI** | Human Development Index |
| **IFC** | International Finance Corporation |
| **IPCC** | Intergovernmental Panel on Climate Change |
| **IRENA** | International Renewable Energy Agency |
| **IUCN** | International Union for Conservation of Nature |
| **LEDS** | Low Emission Development Strategy |
| **M2M** | Methane to Markets |
| **MW** | Megawatt |
| **NAMA** | Nationally Appropriate Mitigation Action |
| **NAPA** | National Adaptation Programme of Action |
| **NGO** | Nongovernmental Organization |
| **OECD** | Organization for Economic Cooperation and Development |
| **O&M** | Operations and Maintenance |
| **PFAN** | Private Finance Advisory Network |

| | |
|---|---|
| **RAP** | Resettlement Action Plan |
| **REDD** | Reducing Emissions from Deforestation and Forest Degradation |
| **SREP** | Scaling Up Renewable Energy Program |
| **STEM** | Science, Technology, Engineering, and Math |
| **UNCTAD** | United Nations Conference on Trade and Development |
| **UNDP** | United Nations Development Programme |
| **UNEP** | United Nations Environment Programme |
| **UNFCCC** | United Nations Framework Convention on Climate Change |
| **UNIDO** | United Nations Industrial Development Organization |
| **USAID** | United States Agency for International Development |

# CONSULTATION PARTICIPANTS

This paper and consultation process would not have been possible without the contributions and insights of the individuals listed below (in alphabetical order). These individuals participated in one-on-one consultation sessions with the author, commented on drafts, and/or participated in the expert workshop in September 2014. While the white paper draws on their insights and expertise, the findings do not necessarily reflect the views of the consultation participants or the institutions that they represent.

**Rana Adib**
*Research Coordinator*
Renewable Energy Policy Network for the 21st Century (REN21)

**Lorena Aguilar**
*Global Senior Gender Adviser*
International Union for Conservation of Nature (IUCN)

**Alex Apotsos**
*Climate Change Advisor*
Bureau for Africa
USAID

**Jacquie Ashmore**
*Energy Technology Program Manager*
Fraunhofer-Gesellschaft

**Andrea Athanas**
*Program Design Manager*
Agriculture and Energy
African Wildlife Foundation

**Roseann Casey**
*Deputy Director, Economic Growth and Infrastructure Office*
USAID

**Elizabeth Cecelski**
*Gender and Energy Consultant*
ENERGIA International Network on Gender and Sustainable Energy

**Becky Chacko**
*Senior Climate Change Integration Specialist*
Global Climate Change Office
USAID

**Kanika Chawla**
*Junior Policy Consultant*
Renewable Energy Policy Network for the 21st Century (REN21)

**Karen DeGannes**
*Principal*
DeGannes Consulting Group

**Christine Eibs Singer**
*Senior Advisor*
Sustainable Energy for All (SE4ALL)

**Adriana Eftimie**
*Social Development Specialist*
International Finance Corporation (IFC)

**Natalie Elwell**
*Senior Advisor for Gender and Environment*
Office of Gender Equality and Women's Empowerment, E3 Bureau
USAID

**Matthew Emry**
*Gender Advisor*
Africa Bureau
USAID

**Bevan Flansburg**
*Manager of International Programs*
National Association of Regulatory Utility Commissioners (NARUC)

**Rossanna Gonzalez**
*Social Advisor on Energy Policy*
Demand, Access, Energy Efficiency Unit
Ministry of Industry, Energy, and Mining
Government of Uruguay

**Kristen Graf**
*Executive Director*
Women of Wind Energy

**Irma Gutiérrez**
*Gender Specialist, PELNICA*
Government of Nicaragua

**John Hammond**
*Senior Director*
United States Energy Association (USEA)

**Corinne Hart**
*Program Manager, Gender & Markets*
Global Alliance for Clean Cookstoves

**Tahawar Hussain**
*Policy Advisor*
USAID Energy Policy Program-Pakistan
Advanced Engineering Associates International

**Britt Ide**
*Founder and President*
Ide Law & Strategy, PLLC

**Fareeha Iqbal**
*Climate Change Specialist*
Global Environment Facility (GEF)

**Vanessa Janik**
*Operations Officer*
Energy Sector Management Assistance Program (ESMAP)
World Bank

**Todd Johnson**
*Forestry & Climate Change Specialist*
Asia Bureau, Office of Technical Services
USAID

**Rachel Kastenberg**
*Senior Advisor*
Global Partnerships Initiative
US Department of State

**Anne Kuriakose**
*Senior Social Development Specialist*
Climate Investment Funds (CIF)
Dominique Lallement
Senior consultant on gender, energy, and infrastructure

**Sissy Larrea**
*Gender Equity Advisor,*
Latin American Energy Organization (OLADE)

**Simone Lawaetz**
*Office of Infrastructure and Engineering*
Bureau for Economic Growth, Education, and Environment
USAID

**Katherine Lucey**
*Founder and CEO*
Solar Sister

**Kristen Madler**
*Clean Energy Coordinator*
USAID

**Rachel Mahmud**
*Gender Program Associate*
Global Alliance for Clean Cookstoves

**Paloma Marcos**
*Gender and Diversity Division*
Inter-American Development Bank

**Caroline McGregor**
*Policy Analyst*
Office of International Affairs
US Department of Energy

**Andre Mershon**
*Climate Change Specialist*
Global Climate Change Office
E3 Bureau
USAID

**Denise Mortimer**
*Power Africa*
USAID

**Subha Nagarajan**
*Energy Investment Expert*

**Fleur Newman**
*Programme Officer/Gender Focal Point*
Sustainable Development Mechanisms
UNFCCC Secretariat

**Julieta Nikova**
*Associate Programme Officer*
Standards Setting
UNFCCC Secretariat

**Matthew Ogonowski**
*Global Climate Change Specialist*
Global Climate Change Office
E3 Bureau
USAID

**Sheila Oparaocha**
*International Coordinator*
ENERGIA International Network on Gender and Sustainable Energy

**Maria Beatriz Orlando**
*Senior Social Development Specialist*
World Bank

**Christine Roehrer**
*Senior Monitoring and Evaluation Specialist*
Climate Investment Funds (CIF)

**Ana Rojas**
ENERGIA International Network on Gender and Sustainable Energy

**Alice Rwema**
*Transaction Adviser*
Minister of State for Energy and Water
Ministry of Infrastructure
Government of Rwanda

**Inka Schomer**
*Program Coordinator*
Gender and Energy Program
Africa Renewable Energy Access
World Bank

**Dechen Tsering**
*Coordinator*
Finance, Technology, Capacity Building
UNFCCC Secretariat

**Jackeline Siles**
*Central America Energy Program*
International Union for Conservation of Nature (IUCN)

**Stacie Smith**
*Senior Mediator & Director of Workable Peace*
Consensus Building Institute

**Karla Solis**
*Team Lead*
CDM Regional Collaboration Centre
UNFCCC Secretariat

**Justin Sosne**
US Department of State

**Melanie Vant**
*Chief of Staff, Power Africa*
USAID

**Yoko Watanabe**
*Senior Biodiversity Specialist*
Global Environment Facility (GEF)

**Moritz Weigel**
*Associate Programme Officer*
Finance, Technology, and Capacity Building,
UNFCCC Secretariat

**Laura E. Williamson**
*Communication and Outreach Manager*
Renewable Energy Policy Network for the 21st Century
(REN21)

**Davida Wood**
*Project Manager, Electricity Governance Initiative*
World Resources Institute

**Zhihong Zhang**
*Senior Program Coordinator*
Climate Investment Funds (CIF)

# 1. ABSTRACT

This white paper was commissioned by USAID under the USAID/IUCN Gender Equality for Climate Change Opportunities (GECCO) initiative. Developed through a literature review and individual consultations with experts and validated through an experts' workshop, this white paper considers the most recent work on the intersection of gender and energy. There is currently a knowledge gap at the intersection of clean energy, climate change mitigation, and gender equality that is an impediment to reaching development and economic goals, including mitigating climate change and fostering the advancement of women. This knowledge gap is particularly acute when looking at the energy value chain connected to large-scale or utility-scale renewable energy production (defined as 10 megawatts or more) and for national Low Emissions Development Strategies, Nationally Appropriate Mitigation Actions, and other energy-related national mitigation processes. This paper identifies initial strategies for closing those gaps, while acknowledging and building on existing research and experience on gender issues around energy at the household and micro to medium-scales. This paper intends to demonstrate that gender equality can be a driver for more effective clean energy investments, and that this gender lens can be applied at every level of the energy value chain. The findings identify and address knowledge gaps, raise awareness, and provide recommendations for actions and further research to implement gender-responsive clean energy and climate change mitigation initiatives. With a wide range of intended audiences, these findings can assist policy makers and project implementers at the local, regional, national, and international levels. USAID and IUCN are also working to develop a community of experts and institutions to advance gender-responsive renewable energy initiatives and women's advancement in the energy field.

# 2. INTRODUCTION

This paper is part of *Gender Equality for Climate Change Opportunities* (GECCO), a five-year initiative launched by United States Agency for International Development (USAID) and the International Union for Conservation of Nature (IUCN) in 2014.

In the development of GECCO, USAID and IUCN recognized a significant gap in knowledge and guidance at the intersection of gender, large-scale renewable energy, and climate change mitigation. A consultation process was organized to identify key issues and challenges related to energy and climate change mitigation, in order to inform relevant areas of the GECCO initiative and share the results with other institutions and mechanisms that could apply the lessons learned.

The findings of this paper will directly inform GECCO's efforts to develop gender responsive climate change action plans in key countries and to build capacity to implement gender responsive actions in the climate change arena. The findings are also relevant to national Low Emissions Development Strategies (LEDS), Nationally Appropriate Mitigation Actions (NAMAs), and other energy-related national mitigation processes.

## GENDER EQUALITY FOR CLIMATE CHANGE OPPORTUNITIES (GECCO)

The goal of GECCO is to leverage advancements in women's empowerment and gender equality through, and for, the benefit of climate change and development outcomes.

GECCO is designed to provide an array of support options for national, regional and global activities that advance women's empowerment and gender equality and is also designed to complement existing or emerging USAID efforts on climate change.

The initiative aims to: 1) support the development of gender responsive climate change action plans; and 2) build capacity to implement gender responsive actions in the climate change arena.

## INTENDED AUDIENCE

The intersection of energy, climate change mitigation, and gender equality is a relatively new topic that has not yet received much attention from the global development community, and this paper intends to provide initial analysis to open this space. With this initiative, USAID and IUCN aim to raise awareness and build momentum for gender-responsive clean energy and climate change mitigation initiatives and to promote women's advancement in this arena. Beyond national planning processes in developing countries that are part of the GECCO initiative, the findings are also applicable to various international mechanisms and efforts on renewable energy and climate change. The intended audience includes:

- USAID, including country Missions, regional Bureaus, implementing partners, and clean energy initiatives, such as Power Africa
- National and subnational policymakers working on energy and/or gender equality
- Renewable energy private sector entities and industry associations
- Representatives of regulatory bodies and utilities
- Multilateral and bilateral agencies, including the World Bank, regional development banks, and donor countries
- UNFCCC, including Conference of Parties and subsidiary bodies negotiations as well as Secretariat support to the CDM and other mechanisms
- Funding mechanisms such as the Climate Investment Funds (CIF), Global Environment Facility (GEF), and Green Climate Fund
- Civil society and NGOs working on renewable energy and climate change
- Women's organizations, women's ministries, and gender experts
- Professional energy associations
- Academic and research institutions focused on energy and/or gender equality
- Media institutions covering renewable energy and/or gender equality

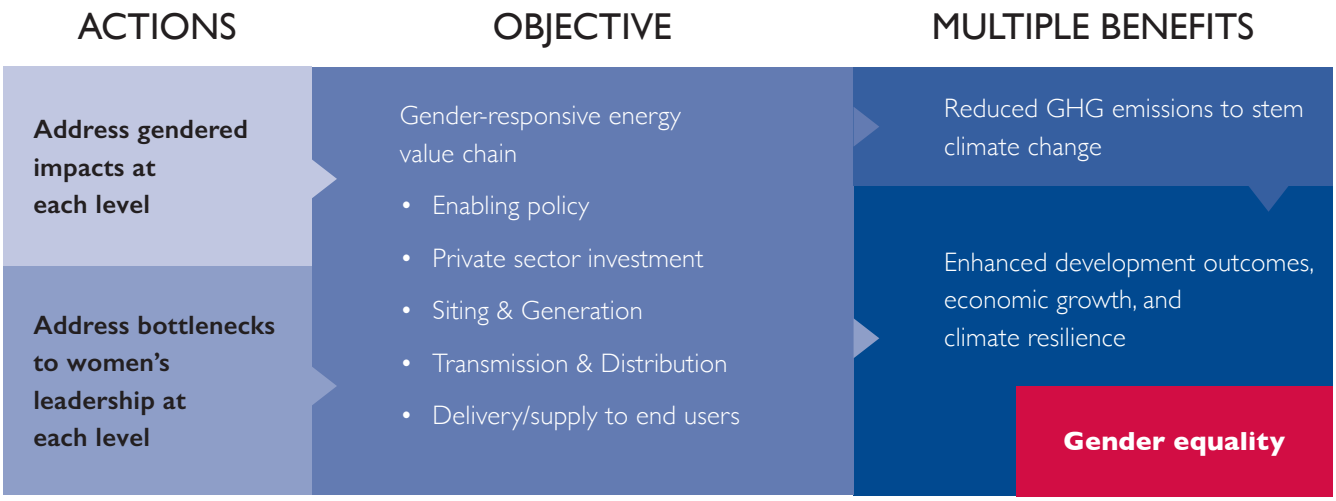
## METHODOLOGY

This paper was developed through a review of relevant literature and initiatives and individual consultations with experts in related disciplines. Additional inputs were garnered from an expert workshop to confirm the analysis and produce specific recommendations and validation with USAID staff. The consultation process and workshop were intended to create an informal community of experts and institutions seeking to move this agenda forward. The analysis and recommendations included here are intended as a jumping off point for coordinated efforts to enhance the ways in which governments, the clean energy industry, and others address gender considerations in clean energy policy, investments, and planning. USAID and IUCN expect to convene a follow-up workshop on this theme later in the GECCO initiative to assess progress and renew the recommendations.

## CONCEPTUAL FRAMEWORK

This paper intends to demonstrate that gender equality is a driver for more effective clean energy investments, and that this gender lens can be applied at every level of the energy value chain. Figure 1 represents the paper's conceptual framework. The concept is that actions to address gendered impacts and bottlenecks to women's advancement will lead to a gender-responsive energy value chain. This will result in the multiple benefits of reduced greenhouse gas (GHG) emissions to stem climate change and enhanced development outcomes, economic growth, and climate resilience fueled by gender equality.

## FIGURE 1—CONCEPTUAL FRAMEWORK: HOW A GENDER-RESPONSIVE ENERGY VALUE CHAIN WILL INCREASE THE REDUCTION OF GHG EMISSIONS ALONGSIDE MULTIPLE DEVELOPMENT BENEFITS.




### SCOPE OF THE PAPER

**Large-scale energy.** The scope of this paper includes all steps of the energy value chain connected to ***large-scale*** or ***utility scale*** renewable energy production, which is often defined as 10 megawatts (MW) or more and grid-connected.[1] As a comparison at the highest end of the spectrum, the largest solar thermal power plant in the world as of 2013 is the Ivanpah plant in California with a capacity of producing 327 MW[2], and the largest offshore wind farm in the world is the London Array off the coast of England with a capacity of 630 MW.[3] This choice to focus on projects above 10 MW is in line with the purpose of bridging the gender knowledge gap around these macro energy projects and the significant demand for guidance on large-scale projects. This scope is also meant to complement the household and community level efforts on gender and energy where extensive information already exists and a variety of interventions have been underway for some time. Large-scale renewable energy brings a particular set of challenges and opportunities linked to this level of scale.

Despite this focus on large-scale energy, it has become clear that many of the findings may be equally relevant to smaller scale renewable energy efforts and projects, including mini-grids.

**Renewable energy technologies.** The findings are based on renewable energy technologies and projects—particularly wind and solar, and are also relevant to geothermal and hydropower—given the opportunities present in the clean energy sector and the lack of knowledge and interventions on gender. However, the consultation process with a wide variety of energy experts indicated that the findings are largely relevant to the non-renewable energy sector, including coal, oil and natural gas. The findings may also be relevant to some efforts on energy efficiency, biomass, and transportation. Given the background of the institutional partners leading this effort, USAID and IUCN, the paper focuses on what can be done in developing countries and emerging economies.

**1.** California Energy Commission. Retrieved from http://www.energy.ca.gov/research/renewable/utility.html.
**2.** BrightSource. Retrieved from http://www.brightsourceenergy.com/ivanpah-solar-project#.U7BrfBZyQds.
**3.** London Array. Retrieved from http://www.londonarray.com/2014/02/19/london-array-to-stay-at-630mw/.

Renewable energy technologies and investments are critical to meeting climate change mitigation targets. The goal of USAID's 2012-2016 Climate Change and Development Strategy is to enable countries to accelerate their transition to climate-resilient low emission sustainable economic development. To accomplish this, one of the strategic objectives that USAID is pursuing is to accelerate the transition to low emission development through investment in clean energy and sustainable landscapes. In this work, USAID prioritizes existing major emitters, countries projected to significantly increase GHG emissions under business-as-usual scenarios, and partners most able and ready to demonstrate leadership in clean energy development.[4] **Gender equality and women's leadership.** This effort seeks to identify avenues for gender equality and women's leadership in the renewable energy sphere. Women must be part of the economic, social, and political transformations that come with a transition to a clean energy future, in order to participate as agents of change rather than merely recipients. Efforts to address gender in climate change adaptation often start the conversation with women as particularly vulnerable victims in extreme weather events, but this approach often undervalues women's potential as leaders and change agents. Similarly, promoting gender equality in climate change mitigation efforts (and climate change adaptation, for that matter) requires a significant conceptual shift away from victimization and toward seeing gender equality as an important driver of transformational change and improved outcomes.

USAID's Climate Change and Development Strategy acknowledges the importance of women to climate change efforts and prioritizes the employment of gender-sensitive approaches across climate programming:

> ***"Women often possess special skills and experiences relevant to climate change, especially knowledge of local ecosystems, agriculture, and natural resources management. They hold great potential as entrepreneurs in clean technology and ecofriendly enterprises. Women are also disproportionately vulnerable to the effects of climate change and are often left out of technological development. Climate change interventions are unlikely to be successful without the support and involvement of women. USAID's efforts in both adaptation and mitigation must therefore be inclusive and gender-sensitive."***

Similarly, numerous other publications have emerged in recent years documenting the transformative impact of women's empowerment on the economy[5] agricultural production[6], etc. This paper intends to demonstrate the imperative of applying these lessons to the renewable energy arena to significantly strengthen efforts to reduce emissions and combat climate change, while also achieving gender goals.

## STRUCTURE OF THE PAPER

The paper explores the primary issues and challenges on the topic, identifies knowledge gaps and entry points, and suggests a number of avenues forward. Part 3 is an overview of the knowledge gaps and opportunities; Part 4 applies a gender lens to clean energy projects and explores how gender inequalities could be addressed; Part 5 reviews the status of women's role in employment, entrepreneurship, and leadership and explores opportunities for enhancements; and Part 6 presents a roadmap of recommended actions and knowledge development needs.

**4.** USAID (2012). Global Climate Change and Development Strategy 2012-2016. Retrieved from http://www.usaid.gov/climate/gccs.

**5.** World Bank (2011). World Development Report 2012: Gender Equality and Development.

**6.** FAO (2011). The State of Food and Agriculture 2010-2011. Retrieved from http://www.fao.org/docrep/013/i2050e/i2050e.pdf.

# 3. THE CLEAN ENERGY SECTOR: OPPORTUNITIES AND KNOWLEDGE GAPS

***"Sustainable energy can revitalize our economies, strengthen social equity, and catalyze a clean energy revolution that benefits all humanity."***

**-United Nations Secretary-General Ban Ki-moon**

## OPPORTUNITIES IN THE CLEAN ENERGY SECTOR

The world is on the brink of a clean energy revolution. Renewable energy made up 19% of global final energy consumption in 2012. Renewable energy investments reached $260 billion globally in 2011, up from $40 billion in 2004, and the majority of the world's countries have now adopted policies to support renewable energy. As of 2013, investment in new renewable energy capacity in China surpassed investment in fossil fuel and nuclear power combined.[7] This is a welcome trend in light of the imminent challenges of reducing emissions, stemming the impacts of climate change, and global population growth that is expected to drive energy demand upward by between 27% and 61% within 35 years.[8] According to the latest report of the IPCC on climate change mitigation, the most realistic option for reducing GHG emissions is to triple or quadruple the investment in renewable power plants.[9]

### HOW GENDER EQUALITY COULD BE TRANSFORMATIVE

Women must be at the forefront of this clean energy future—reaping equal benefits from these investments and playing a leadership role at all levels of the energy value chain. Evidence from other sectors suggests that integrating women into all levels of the energy value chain will lead to more effective clean energy initiatives, unlock greater return on investments, and expand the prospects of reducing emissions. Research at the intersection of gender and development, as outlined below, demonstrates the benefits of addressing gender and the drawbacks of not doing so. These lessons could be applied to the clean energy sector.

- **Development outcomes and economic outcomes are enhanced through improving women's status.** Women in developing countries face significant inequalities in access to technology, assets, information, and decision making, which is particularly acute in relation to energy.[10] The 2012 World Development Report noted, "Greater gender equality is smart economics, enhancing productivity, advancing development outcomes for the next generation, and making institutions more representative." The report unveiled significant productivity gains that can be achieved by removing barriers that prevent women from having the same access as men to education and economic opportunities. It also showed how improving women's status has an impact on other development outcomes, including for children, and that institutions and policies become more representative and inclusive when women and men enjoy equal opportunities. Similarly, the clean energy sector stands to benefit from, and should contribute to, improvements in women's status. Efforts to expand clean energy with a development lens should also adopt a gender lens.

**7.** REN21 (2014). Renewables 2014 Global Status Report.
**8.** World Energy Council (2013). World Energy Scenarios: Composing energy futures to 2050.
**9.** IPCC (2014). Climate Change 2014: Mitigation of Climate Change.
**10.** UNDP and GGCA (2012). Gender and Climate Change Africa: Policy Brief 3 on Gender and Energy.

- **Gender balance in employment is a good business practice.** Women now represent 40% of the global labor force, 43% of the world's agricultural labor force, and more than half the world's university students.[11] Skilled people are needed for clean energy research and investments; education is key for developing those skills, and the educated will increasingly be women. ***The Economist*** found that the growth in employment of women in developed economies in the last 10 years contributed more to global growth than did China.[12] Specifically targeting the female half of the population is no longer just a "nice-to-have" or a characteristic of good governance—it is more readily understood as an essential element of good business practices, and could provide economic and other benefits to the clean energy industry.
- **Closing the gender gap leads to greater productivity and societal benefits.** Evidence from the agricultural sector indicates that women's access to key resources can unlock economic potential. In ***The State of Food and Agriculture 2010-2011*** the FAO found that, "Closing the gender gap in agriculture would generate significant gains for the agriculture sector and for society. If women had the same access to productive resources as men, they could increase yields on their farms by 20–30%. This could raise total agricultural output in developing countries by 2.5–4%, which could in turn reduce the number of hungry people in the world by 12–17%."[13] These findings may be applicable to the gender gap in the clean energy sector and deserve further examination.
- **Gender-neutral projects are not likely to achieve the desired outcome.** According to the European Commission, "policy decisions that appear gender neutral may have a differential impact on women and men, even when such an effect was neither intended nor envisaged.[14] There is ample evidence that benefits do not automatically "trickle down" to the most disadvantaged populations that development projects intend to serve. Women are often not included as key stakeholders in consultations or project design, and numerous technology enhancement efforts have failed because women's views and needs were not considered.[15] Similarly, bulk energy increases through large projects are not likely to automatically trickle down to women, due to inherent gender inequalities that women face. Applying this lesson from development projects could bring greater inclusivity and more meaningful consultation to clean energy projects.
- **Women face significant income inequality.** Worldwide, women remain the poorest of the poor,[16] partly due to deep income inequalities. A 2011 Organization for Economic Cooperation and Development (OECD) report confirmed that the gap between rich and poor, even in OECD countries, "has reached its highest level for over 30 years, and governments must act quickly to tackle inequality."[17] To address these inequalities, the report noted that women are among the populations that should be targeted for access to training, education, and equal wages.[18] This is equally relevant for women's advancement in the clean energy sector.

The newness and non-traditional nature of the clean energy revolution presents an invaluable opportunity to scale-up a gender-responsive approach, drawing from the lessons above, and to further cement the sector's innovative status. Women's participation in this industry has already surpassed the non-renewable energy industry, and there is an opportunity to attract additional societal value to the sector by pursuing specific benefits for women.

It is critical that the clean energy sector take stock of gender considerations now, at the outset of its tremendous growth, because efforts to add gender onto existing

**11.** World Bank (2011). World Development Report 2012: Gender Equality and Development.
**12.** The Economist (April 12. 2016). Women and the world economy: A guide to womenomics.
**13.** FAO (2011). The State of Food and Agriculture 2010-2011.
**14.** European Commission (1998). A Guide to Gender Impact Assessment.
**15.** Global Alliance for Clean Cookstoves (2011). Igniting Change: A Strategy for Universal Adoption of Clean Cookstoves and Fuels.
**16.** UNDP (2014). Human Development Report 2014: Sustaining Human Progress: Reducing Vulnerabilities and Building Resilience.
**17.** Energia (2012). Transmission Line Projects: Building Capacity for Gender Mainstreaming of Energy Sector Cooperation in Uganda: Baseline Study. Report to Ministry of Energy and Mineral Development and the Norwegian Embassy.
**18.** OECD (2011). Divided We Stand: Why Inequality Keeps Rising.

initiatives or projects often fall flat. Public and private investments in renewable energy installations, if designed without this important population in mind, are likely to lead to regulatory reforms, infrastructure development, and economic determinations that put women at a disadvantage given existing gender inequalities. In essence, one cannot assume that renewable energy benefits will automatically benefit women.

Growing evidence shows that renewable energy planning carried out without the interests of key stakeholders in mind have left those populations behind. Governments subsidizing renewable energy projects often prioritize industrial and commercial customers, and higher income households, over lower income businesses and households, due to the higher rates that can be charged.[19] This is not unlike the legacy of fossil fuel subsidies, which, as of 2014, are estimated at $775 billion annually at a global scale.[20] While fossil fuel subsidies ostensibly benefit everyone, practically in many developing countries they benefit the higher income population, who are more likely to have access to vehicles and generally use more energy. At the same time, disadvantaged populations may not have access to energy while subsidies are consuming government funds that could be used to provide services for them.[21] Clean energy policies should therefore deliberately be designed to serve those facing the greatest energy poverty, rather than assuming that all parts of society will benefit. Policies and investments in clean energy are likely to be more effective, and make simultaneous strides toward economic development and gender equality, if they are developed in a gender-responsive manner. However, the information needed for gender-responsive design is lacking in the energy sector. Sex-disaggregated data across the energy value chain would be a good start, but a comprehensive understanding of gender inequalities is also needed.

## THE ENERGY VALUE CHAIN IS LARGELY GENDER-BLIND

When it comes to gender equality, the energy value chain is broken. A conceptual difficulty exists in understanding how building a large wind farm or solar array might impact the eventual end users of the energy produced, and what could be done at the outset of such a project to mitigate negative outcomes and improve the experience for everyone involved—from individuals in a household to those employed in construction and design. Of course, women are not the only ones that are affected, as men also experience negative impacts in this context. However, women are more likely to experience negative impacts and be left out of educational and economic opportunities linked to energy projects given existing inequalities that pervade all societies.

On the one hand, women and men experience the impacts of large energy projects differently: upstream in generation and transmission there is the impact of land and resource use, and the impacts downstream are gender-differentiated by who benefits from the services and who makes decisions.[22] There is a need to transform every step of the energy value chain to be responsive to these differences. On the other hand, there is the challenge of moving women from the lower levels to the middle and upper levels of the energy value chain. In essence, looking at gender at every step "from the kitchen to the boardroom."[23]

The lack of a gender lens in existing clean energy investments in the global sphere is demonstrated in the earlier Implementation Plans of the Clean Technology Fund (CTF), the World Bank's largest climate change mitigation investment.[24] A gender review undertaken by IUCN and commissioned by the Administrative Unit of CIF found that:

**19.** Center for Investigative Reporting (April 16, 2012). Solar rooftops sought in poor communities.
**20.** Oil Change Internaitonal (2012). No Time to Waste: The Urgent Need for Transparency in Fossil Fuel Subsidies.
**21.** Reuters (July 6, 2014). Tempers fray, prices rise as Egypt cuts fuel subsidies. Retrieved from http://www.reuters.com/article/2014/07/06/us-egypt-subsidies-idUSKBN0FB0N920140706.
**22.** Sheila Oparaocha, personal communication, March 13, 2014.
**23.** Annecke, W. J. (1999). From the Kitchen to the Boardroom: Reflections on Power Relations in Gender and Energy Practice and Policy.
**24.** The World Bank's Climate Investment Funds (CIF) are delivered through four mechanisms: the Clean Technology Fund (CTF), Scaling up Renewable Energy Program (SREP), Forest Investment Program (FIP), and Pilot Program for Climate Resilience (PPCR). For more information: www.climateinvestmentfunds.org.

> ***"In certain investment sectors, particularly within the CTF, limited knowledge exists on the linkages between gender and renewable energy generation such as wind energy, geothermal, hydro and solar, for example, that could be drawn upon for the purposes of this review. Thus, the CTF team is not able to mainstream gender meaningfully into national renewable energy investment plans and to make a strong business case for proposed investments beyond a consideration at the household level."***[25]

Another marker of the limited attention to gender issues in the energy sector is the absence of measuring and monitoring of gender-related data. The International Energy Agency, which collects energy data across all countries, does not collect sex-disaggregated data or employ gender indicators.[26] This gap is also present in similar practices across many countries in national energy administration. An analysis of Zambia's energy sector found that despite strategic interventions made by the government, a lack of information and gender-disaggregated data sustained the challenges faced by women in accessing energy. Additionally, due to the limited information available, most of the government's energy reports and documents were silent on gender and energy issues, resulting in the fact that "the real position of women, as far as energy is concerned, has not yet been addressed by those in a position to do something about the problem."[27]

## MOVING THE GENDER AGENDA INTO CLEAN ENERGY

In recent years, the international development community and climate change negotiation sessions of the UNFCCC have acknowledged the gender dimensions of climate change, but knowledge development and policy action has largely been skewed toward the climate change adaptation side of the equation. This is partly due to the tremendous overlap of gender approaches in development and climate adaptation. In many cases, the interventions undertaken to address gender inequalities in human development are identical to interventions used to achieve equality in adaptation measures. Climate change adaptation efforts are, in essence, a continuum spanning traditional development interventions to address vulnerability at one end and interventions responding to climate change impacts at the other end.[28] Thus, moving the gender agenda to the realm of climate change mitigation could be a greater leap. Achievements at the intersection of gender and climate change adaptation may have paved the way, but the next frontier requires a more concentrated effort to build new knowledge and capacity in a highly technical and data-driven sector.

Energy is a politically charged and sensitive industry that is closely tied to a country's economy and development, and an area where gender equality and women's leadership issues are not adequately addressed. Efforts to address gender considerations in energy at the household and community levels are often targeted to women's access to energy sources and clean cookstoves, enhancing women's economic situation, or building women's entrepreneurship in energy markets. However, gender issues are not consistently addressed at the higher level of the energy industry or in energy policy. The consequences of this are policies and investments that do not take account of the full picture of

**25.** Aguilar, L., Rogers, F., Pearl-Martinez, R., Castaneda, I., Athanas, A., Siles, J. (2013). Gender Review of the Climate Investments Funds. Retrieved from https://portals.iucn.org/union/sites/union/files/doc/gender_review_of_the_cif_0.pdf.

**26.** Environment and Gender Index (EGI) 2013 Pilot. Retrieved from environmentgenderindex.org.

**27.** Energia (2011). Zambia Gender and Energy Mainstreaming Strategy 2011-2013.

**28.** World Resources Institute (2009). A Continuum of Adaptation Activities: From Development to Climate Change

energy access needs in a country, because women's needs are often hidden. Since women often make decisions in households about energy use, energy policies can tap into social implications by better understanding women's needs. According to a recent analysis conducted in Latin America:

> ***"Energy policies tend to be regarded as merely technical actions, with little or no social content… despite energy being a vital support to all human activities, from employment generation to agricultural production to cooking and service delivery. Energy interventions have the potential to either support human development and achieve gender equality or to intensify existing societal gaps."***[29]

Similarly in the case of renewable energy, these interventions can either facilitate transformative and inclusive development, or reinforce and exacerbate existing development challenges.

## KNOWLEDGE GAPS IN CLEAN ENERGY AND CLIMATE CHANGE MITIGATION

While efforts at integrating gender considerations into climate change and energy have progressed over a number of years, there is a significant knowledge gap on gender and large-scale renewable energy, as evidenced by a review of key climate change processes and mechanisms below. The mechanisms analyzed below—including the United Nations Framework Convention on Climate Change (UNFCCC) and Green Climate Fund, Clean Development Mechanism (CDM), Climate Investment Funds (CIF), Nationally Appropriate Mitigation Actions (NAMAs), Low Emissions Development Strategies (LEDS), and Climate Change Gender Action Plans (ccGAPs)—were selected because they are representative of the major international efforts on climate change mitigation that have a potential impact on gender equality.

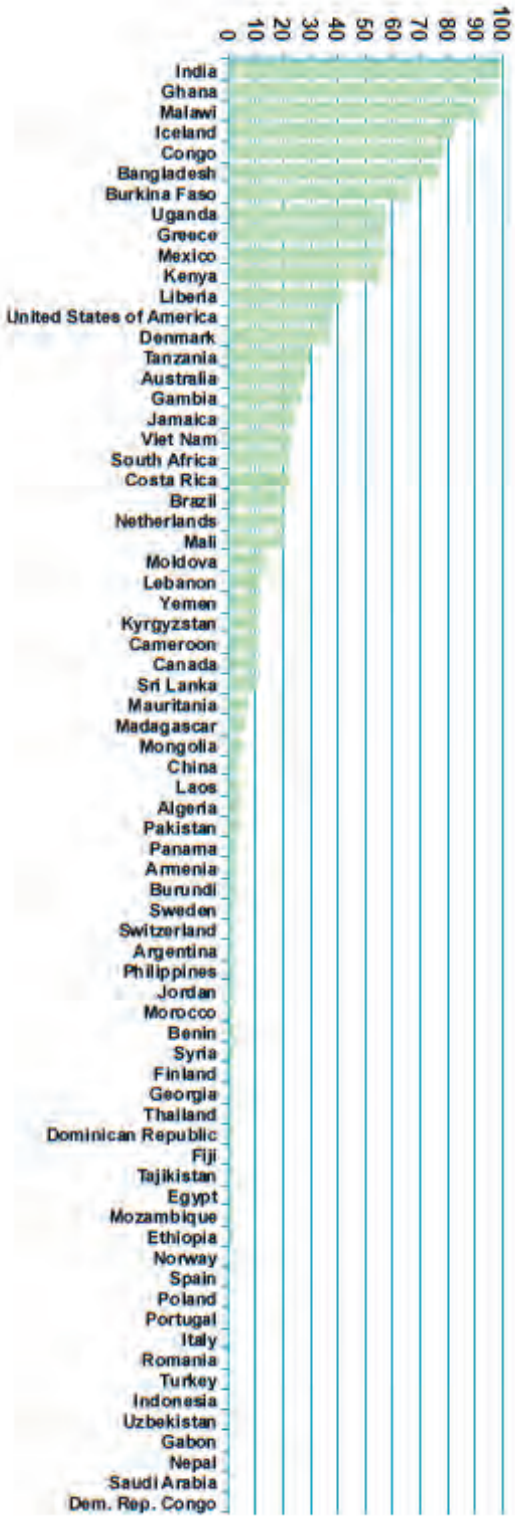
### UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE (UNFCCC)

The UNFCCC and its Kyoto Protocol is the major global framework for climate change mitigation, informing a number of other mechanisms such as the CDM and Green Climate Fund.[30] The UNFCCC 16th Conference of the Parties (COP) in Cancun[31] and COP17 in Durban produced the Convention's first internationally agreed language on gender and climate change. The 2010 Cancun Agreements and 2011 Durban Accord created the first formal agreements obliging Parties to the UNFCCC to ensure that gender is fully incorporated in their climate change efforts in the context of adaptation, capacity building, technology, and finance activities and mechanisms under the Convention. These mandates would benefit from more direction on gender and climate change mitigation, specifically on large-scale renewable energy. In addition, COP18 in Doha adopted Decision 23 on promoting gender balance and improving the participation of women in UNFCCC negotiations and in the representation of Parties in bodies established pursuant to the Convention or the Kyoto Protocol. Since COP18, the UNFCCC Secretariat tracks and reports annually on the gender composition of UNFCCC constituted bodies and delegations at relevant meetings.

A recent analysis of country performance on integrating a gender approach into national reports to the UNFCCC provides insight into the extent to which governments are implementing international agreements on gender and climate change. The Environment and Gender Index (EGI)[32] conducted an assessment of the most recent National Communications and NAPA of 72 government Parties to the UNFCCC and found that only a handful of countries have comprehensively addressed gender considerations in their reports—led by India, Ghana, and Malawi. Notably for this paper, all but one of the developed countries included in the analysis failed to consider gender in their reports on National Communications on climate change mitigation efforts. Iceland stood out as the only developed country to

**29.** Rojas, A, Siles, J (2014). Guía sobre género y energía para capacitadoras(es) y gestoras(es) de políticas públicas y proyectos. IUCN-OLADE. Costa Rica.
**30.** Launching the Green Climate Fund, decision 3/CP.17; Technology Executive Committee – modalities and procedures, decision 4/CP.17; National adaptation plans, decision 5/CP.17
**31.** Cancun Adaptation Framework FCCC/CP/2010/7/Add.1
**32.** Environment and Gender Index (EGI) 2013 Pilot. Retrieved from environmentgenderindex.org.

## FIGURE 2—INCLUSION OF GENDER IN NATIONAL REPORTS TO THE UNFCCC




acknowledge that, "Gender issues are therefore central in all discussion about climate change, both in mitigating and adapting to climate change," which contributed to the country's earning the top ranking in the Index. Figure 2 is an overview of how countries performed on country reporting on a scale of 1 to 100.

In the founding documents of the Green Climate Fund under the UNFCCC, the importance of a "gender sensitive approach" was noted, alongside gender balance in governing structures and among stakeholders. In 2014, the Board of the Fund is expected to consider a draft gender policy and gender action plan.[33] As part of its Momentum for Change initiative, the UNFCCC Secretariat recognizes women's leadership in addressing climate change by highlight innovative projects under the "Women for Results" pillar of the initiative.

### CLEAN DEVELOPMENT MECHANISM (CDM)

The CDM is a flexible mechanism established under the UNFCCC's Kyoto Protocol to help developed (Annex 1) countries meet emission reduction targets by investing in projects in developing (non Annex 1) countries. This mechanism was built on the assumption that it would be more cost effective to reduce emissions in developing countries, and that these investments would yield development benefits. In the CDM system, it is the prerogative of Designated National Authorities to assess how a CDM project activity or Programme of Activities contributes to sustainable development. A lack of quality data produced by host countries contributes to limited transparency around sustainable development co-benefits.

The CDM is relevant to the topic of this paper because it facilitates the greatest investment to date in large-scale clean energy under the UNFCCC, and because it has successfully mobilized finance for climate change mitigation. The total investment in CDM projects registered and undergoing registration as of June 2012 amounts to USD 215.4 billion. The total is dominated by wind and hydro due to the large number of projects and the capital-intensive nature of these technologies. Up until 2012, CDM projects had generated

**33.** Schalatek, L. (2014). Of Promise, Progress, Perils, and Prioritization: An Update on Efforts to Operationalize a Fund-wide Gender-Sensitive Approach after the 7th GCF Board Meeting.

120 gigawatts of installed renewable energy capacity and involved over 4500 organizations in 161 countries.[34]

Given the CDM's gap on quality data, it is important to ensure that gender variables are being addressed. The indicator related to gender equality used in the CDM is "Empowerment of women, care of children and the frail," which is noted as women's access to education and training and enhancement of their societal position. While a positive step forward, the grouping of women with children and the frail limits the measurement to benefits that women may receive, without leaving room for women's potential advancement or leadership role. As of 2012, only five out of 3,864 projects analyzed employ this indicator.[35] Despite this, observers have noted that some rural CDM projects on household energy, agriculture, and forest management do target women.[36] The UNFCCC Secretariat has issued fact sheets that highlight the types of co-benefits generated by the CDM, including household energy efficiency, efficient cookstoves, solar water heaters, biogas cookstoves, and micro-hydro power, which are intended to benefit women. One of the areas recognized as having a positive impact on women is rural electrification projects sourced from renewable energy.[37]

About half of the 7,500 registered CDM activities fall under the large-scale renewable energy category (above 15 MW installed capacity).[38] The CDM Methodology Booklet labels certain methodologies, including those that fall under large-scale renewable energy, as having the potential to benefit women and children. The specific potential benefits to women and children, as outlined below, characterize women as having a beneficiary role or being employed in CDM accounting activities:

- Increase access to affordable household fittings and appliances (e.g., light globes, refrigerators);
- Optimize tasks typically undertaken by women or children (e.g., fuel wood gathering, cooking, water collection);
- Improve the living environment of women and children (e.g., better air quality, heating, lighting);
- Utilize community-based participatory approaches that give women and children an opportunity to learn about the projects and contribute to decision making processes; and
- New local employment opportunities in accounting activities for CDM projects, because women often fill these positions.

One example of a CDM methodology that employs the "women and children" label is "Grid-connected electricity generation from renewable sources." The methodology allows projects to identify general benefits, such as income savings, access to electricity, and cleaner indoor air. However, besides the CDM's "women and children" designation that suggests a potential benefit, the summary of this methodology does not provide specifics on how women and children are to benefit or participate.[39] However, a voluntary tool on sustainable development co-benefits published by the CDM in 2014 asks to what extent the respondent's CDM project contributes to "Empowerment of women, e.g., optimize tasks undertaken by women."[40] To date, about 10 CDM projects have applied the sustainable development tool, two of which are large-scale wind projects in China. Both the *Xiehe Suzhou Yongqiao Fuli Wind Farm Project and the Suzhou Xiaoxian Xiehe Guanshan Wind Farm Project* list job opportunities as the primary social co-benefit of the wind projects, while "optimized women's empowerment" is listed as not applicable.[41] So far, this report-back from the projects demonstrates a

**34.** Kirkman et al (2012). Benefits of the Clean Development Mechanism 2012.
**35.** Ibid.
**36.** GreenStream for the Ministry for Foreign Affairs of Finland (2010). Gender and the Clean Development Mechanism: Opportunities for CDM to Promote Local Positive Gender Impacts.
**37.** UNFCCC. CDM Development Benefits. Retrieved from https://cdm.unfccc.int/about/ccb/index.html
**38.** Karla Solis, UNFCCC, personal communication, July 2, 2014.
**39.** UNFCCC (2013). CDM Methodology Booklet.
**40.** UNFCCC Clean Development Mechanism (2014). Voluntary Tool for Describing Sustainable Development Co-Benefits of CDM Project Activities or Programmes of Activities (Poa), Version 01.1
**41.** UNFCCC CDM (2014) Summary of all published sustainable development co-benefit (SDC) description reports. Retrieved from http://cdm.unfccc.int/SDTools/index.html.

limited interpretation of women's empowerment. To move this agenda forward, the CDM Secretariat launched a publication that uniquely encourages potential developers to consider the CDM when planning projects to help empower women.[42]

In other spheres outside the CDM, efforts to measure projects that provide benefits to women are starting to emerge. Several independent tools designed to enhance sustainable development aspects of the CDM offer broader assessments of women's empowerment, including the Gold Standard[43] developed by a group of non-governmental organizations, the CDM Gender Spectacles Tool[44] commissioned by Finland's Ministry for Foreign Affairs, and W-Plus certification[45] developed by Women Organizing for Change in Agriculture and Natural Resources Management (WOCAN) that endorses projects creating increased social and economic benefits for women, including in renewable energy.

A 2010 study reviewed the gender sensitivity of carbon standards operating in the Voluntary Carbon Market, including the CarbonFix Standard; the Climate, Community, and Biodiversity Standard (CCB); the Gold Standard; the PlanVivo Standard; and the SOCIALCARBON Standard. The Gold Standard, followed by the CCB Standard, was found to have a gender-sensitive approach to project design. However, small project developers often find the Gold Standard too expensive and complex to pursue, and the gender benefits may be perceived as non-tangible.[46]

## CLIMATE INVESTMENT FUNDS (CIF)

The recent Gender Review of the World Bank's CIF[47] also revealed the need for a concerted effort to address gender considerations in major clean energy investments. The Scaling Up Renewable Energy Program in Low Income Countries (SREP) under the CIF supports solar, wind, bio-energy, geothermal, and small hydro technologies and has amassed $551 million in pledges to date[48], although only $4.2 million has been dispersed as of December 2013.[49] While many of the country projects that make up the SREP program under the CIF mention gender, in most cases they characterize women as beneficiaries or vulnerable groups, which is not uncommon throughout the climate change, energy, and other environmental sectors. Few of the SREP country initiatives reference national policy frameworks on gender, and none of them earmark specific resources for promoting gender equality and women's empowerment.

The CTF under the CIF finances renewable energy, sustainable transport, and energy efficiency and has $5.5 billion in pledges to date.[50] The review found that the CIF entity with the highest allocation of resources—the CTF, with 69.4% of financial pledges as of August 2012—was the fund with the least consideration given to gender implications. The review attributed this gap partly to the fact that the CTF Investment Plans were finalized early on in the CIF program and that gender issues were not included in the guidelines, while more recent Investment Plans have started to address gender issues. Fewer CTF projects than SREP projects addressed gender, women, or women's organizations that were not engaged as stakeholders, and most of the countries did not utilize gender indicators.

**42.** UNFCCC CDM (2012) CDM and Women.
**43.** The Gold Standard. http://www.goldstandard.org.
**44.** GreenStream for the Ministry for Foreign Affairs of Finland (2010). Gender and the Clean Development Mechanism: Opportunities for CDM to Promote Local Positive Gender Impacts.
**45.** W-Plus: Ensuring benefits to women. http://www.wplus.org.
**46.** Galt, Hilda (2010). Gender-Sensitive Carbon Offsets: A Scoping Study.
**47.** Aguilar, L., Rogers, F., Pearl-Martinez, R., Castaneda, I., Athanas, A., Siles, J. (2013). Gender Review of the Climate Investments Funds. Retrieved from https://portals.iucn.org/union/sites/union/files/doc/gender_review_of_the_cif_0.pdf.
**48.** CIF (2014) SREP Program. Retrieved from https://www.climateinvestmentfunds.org/cif/Scaling_Up_Renewable_Energy_Program_in_Low_Income_Countries.
**49.** CIF (2014) CIF Disbursement Report (For reporting period July 1 - December 31, 2013).
**50.** The World Bank's Climate Investment Funds (CIF) are delivered through four mechanisms: the Clean Technology Fund (CTF), Scaling up Renewable Energy Program (SREP), Forest Investment Program (FIP), and Pilot Program for Climate Resilience (PPCR). For more information on CTF: https://www.climateinvestmentfunds.org/cif/Clean_Technology_Fund.

There are three more recent CTF Investment Plans that mention gender: India; Chile; and the Philippines. The Chilean plan addresses the role of women in renewable and energy efficiency industries and sex-disaggregated indicators for employment in this industry. In India's plan, gender is a consideration of the policy and regulatory analysis related to electricity access and in private sector financial intermediation. Finally, in the Philippines plan, reference is made to gender action plans in keeping with Asian Development Bank policies. In the case of these three countries, the programs and projects submitted under these Investment Plans did not follow through with attention to gender considerations, while at the time of the review, the CTF programs and project documents of other countries—Mexico, Vietnam, and Thailand—did incorporate a gender approach despite the lack of attention to gender in the Investment Plan. A lack of guidance on implementing these project documents is cited as a major barrier.

## LOW EMISSION DEVELOPMENT STRATEGIES (LEDS)

LEDS are particularly relevant to the topic of this paper because they pair the reduction of GHG emissions with sustainable social and economic development. These strategies could be prime vehicles for promoting gender equality and women's advancement due to the inherent development focus. The research for this paper did not include a comprehensive review of whether LEDS have addressed gender considerations, but IUCN's analysis of National Communications to the UNFCCC suggests that gender is usually not a focal point of these strategies.

While the various governments and institutions working on LEDS define the concept in diverse ways, USAID's definition is "a strategic economic development and environmental planning framework that articulates actionable programs and policies to put a country on a climate-resilient development path while working toward long-term measurable GHG emission reductions." LEDS aim to promote long-term economic growth alongside long-term emissions reductions, which is a shift from current trajectories due to the fact that growth and emissions often increase in parallel. LEDS serve as frameworks to facilitate the decoupling of economic growth from emissions, supporting governments to make informed decisions that will transform their economy at this fundamental level. While the largest share of GHG emissions have historically been produced in industrialized countries, economic growth in developing countries is shifting the emissions growth to those countries.

The social, economic and environmental co-benefits of LEDS and the potential to contribute to a country's national development goals, in addition to the reduction of GHGs, are what make these strategies unique. For example, according to a USAID training module, LEDS may contribute to the following development goals:

- Reduced dependence on fossil fuels may increase energy security by limiting exposure to price volatility and supply disruptions as well as reduce expenditures on fossil fuel imports;
- Reduced disease and mortality from local air pollution;
- Reduced poverty through the development of microenterprises;
- Increased employment as, for example, low carbon power generation creates more jobs per unit of electricity produced than fossil fuel power generation;
- Increased access to modern sources of energy; and
- Enhanced environmental sustainability, for example, through the conservation of forest carbon sinks that also provide valuable natural resources for local communities and a habitat for biodiversity.

About 120 governments and international institutions working on LEDS participate in the LEDS Global Partnership, which was launched in 2011 to facilitate coordination, information exchange, and cooperation on these strategies.[51] Some of the key multilateral institutions focusing on LEDS include the Global Green Growth Institute, the World Bank and its training unit, United Nations Development Programme (UNDP), and United Nations Environmental Programme (UNEP). The US Government's effort is Enhancing Capacity for Low Emission Development Strategies Program (EC-LEDS).[52] See Section 4 for initial ideas on developing gender-responsive LEDS.



**51.** LEDS Global Partnership (2014). About the Partnership. Retrieved from http://ledsgp.org/about.
**52.** Open EI (2014). Enhancing Capacity for Low Emission Development Strategies (EC-LEDS) Program. Retrieved from http://en.openei.org/wiki/Enhancing_Capacity_for_Low_Emission_Development_Strategies_(EC-LEDS)_Program.

## NATIONALLY APPROPRIATE MITIGATION ACTIONS (NAMAS)

Launched by the UNFCCC process in 2007, NAMAs are actions to reduce emissions in developing countries by 2020 as part of a national government initiative. They can be policies directed at one sector or multiple sectors, and are supported by technology, financing, and capacity-building. Two out of the three highlighted tools available to NAMA developers and support entities on the UNFCCC website—including guidance on NAMA design and NAMA implementation steps—mention gender once or twice in passing or solely in the context of stakeholder consultation, but do not offer any guidance on how to make NAMAs gender-responsive. The third guidance publication, which focuses on NAMA financing, does not make any mention of women or gender.[53]

## CLIMATE CHANGE GENDER ACTION PLANS (CCGAPS)

Distinct from the mechanisms analyzed above, ccGAPs specifically focus on gender considerations in climate change policy and planning.[54] In partnership with IUCN, 13 countries and regions have developed ccGAPs, which are anchored in national climate change planning processes. Ministries and regional bodies choose to establish ccGAPs when there is limited understanding of gender inequalities in the climate change context and when they seek to establish avenues to address these inequalities. In developing these plans, Ministries often request guidance on the linkages between gender, energy, and climate change mitigation beyond the household level.

Below is a sampling of energy-related actions that have emerged in the ccGAPs. Most of these actions are focused at the household or local level, demonstrating that governments and the development community at large need to shift attention to a larger scale, and are in need of guidance to address that scale. Liberia's action on its national energy plan and Panama's action on energy supply and consumption represent some preliminary movement in this direction. The reason for these two countries' focus on higher level actions in the energy sector could be that representatives of the Ministry of Energy participated throughout the ccGAP development process, including all of the trainings and discussions leading up to the ccGAP establishment.

| | |
|---|---|
| HAITI | Train women in repair and extension components of solar photovoltaic systems and the production of improved stoves. |
| LIBERIA | Ensure that gender and climate change linkages are integrated in the national energy plan, policies, and adaptation strategies. |
| TANZANIA | Increase the number of women experts on gender-sensitive energy technologies. |
| PANAMA | Make gender-disaggregated data available on energy supply, consumption, and demand for decision making and investment. |
| JORDAN | Ensure women's and men's involvement in decision making processes related to climate change at local government level. |
| NEPAL | Develop and implement a community mitigation initiative to address climate change and reduce emissions at scale by leveraging the role of women at the household level. |

**53.** UNFCCC (2014). Technical Support for NAMAs. Retrieved from http://unfccc.int/focus/mitigation/items/7429.php.

**54.**. For more information about ccGAPs, see: IUCN Global Gender Office (2013). The Art of Implementation: Gender strategies transforming national and regional climate change decision making. https://portals.iucn.org/union/sites/union/files/doc/the_art_of_implementation.pdf.

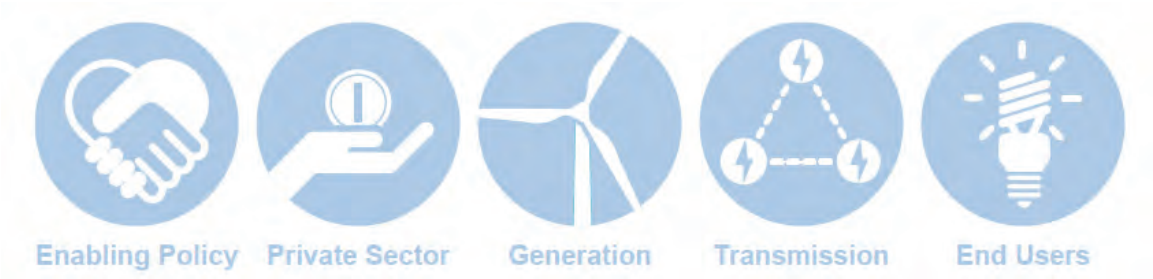
# 4. VIEWING CLEAN ENERGY PROJECTS THROUGH A GENDER LENS

***"Mainstreaming the gender dimension in infrastructure is an opportunity… to recognize the dynamic role that women can play in their countries' economic life."***

**-Dominique Lallement, in Handbook of Research on Gender and Economic Life[55]**

This section describes the gender impacts and potential gender-responsive approaches in key steps of the energy value chain, including Enabling policy, Private sector investment, Siting and generation, Transmission and distribution, and Delivery to end-users. The section begins with a discussion of resource inequalities that impact the value chain as a whole.

### FIGURE 3—KEY ELEMENTS OF THE CLEAN ENERGY VALUE CHAIN




## RESOURCE INEQUALITIES DETERMINE IMPACTS

Women and men experience economic opportunity, land and resource use, and poverty differently[56]—which is the key determinant in how they will be affected by clean energy investments. Efforts to expand clean energy with a development lens should therefore also adopt a gender lens.

Existing patterns of resource use determine how benefits will be distributed and are a major barrier for women when there is a physical implantation of any energy technology. Large-scale energy projects, such as solar arrays or wind farms, necessitate a physical footprint with a significant amount of land. For example, a company investing in a solar array in the desert may assume that the land is owned by the state, but ownership and use of the land may be governed by informal social norms among tribes or communities, with male and female herders relying on different segments of the land for their livelihoods.[57] In addition to direct impacts of a renewable energy

**55.** Lallement, D. (2013). Gender and Infrastructure, in Handbook of Research on Gender and Economic Life.
**56.** UNDP (2011). Human Development Report 2011: Sustainability and Equity: A Better Future for All.
**57.** Dominique Lallement, personal communication, April 10, 2014.

facility, there may be indirect impacts on water and forest resources, such as water supply for a solar plant, that have a greater impact on women's lives, due to the increased time and drudgery burden of water collection that often falls to women and children.

## LAND TENURE AS A PRIMARY EXAMPLE OF RESOURCE INEQUALITIES

One of the primary bottlenecks for women is widespread inequality in ownership and control of land, which is a gateway to the many resources that women access on such land, from water to non-timber forest products to biomass.

Gender inequalities in land tenure will likely have a direct impact on how the benefits and opportunities of renewable energy will be distributed. Women often face discrimination in their access to, ownership of, and control of land due to varying levels of legal protection, and lack of cultural acceptance of their land rights. In many countries statutory laws exist on gender equality in land rights, but in many rural areas traditional and religious practices prevail, due to poor interpretation and enforcement of the laws by authorities and slow rates of dissemination of information about the laws.

- ***Property*** **—** While civil codes and laws declare spouses to be equal proprietors of land in rural areas, this is not always demonstrated in practice. A persistent stereotype exists that women cannot manage agricultural operations, despite their extensive contributions to the sector, and are placed as workers only.
- ***Inheritance*** **—** Although statutory laws often state spouses are equally in line for inheritance of family assets, these laws are often not followed in practice.
- ***Income*** **—** Agricultural roles are often considered part of women's household duties and thus do not need to be compensated. Women do not have control over the distribution and use of land, or the distribution of profits from the sale of products, which affects their income and poverty levels.
- ***Financial independence*** **—** Women in many countries find it difficult to obtain financial independence, due to a lack of access to collateral that would facilitate obtaining credit or a mortgage.
- **Quality of land —** Women tend to be allocated land that is less fertile and poorer quality, making their agricultural outputs seem less productive, and diminishing their economic contribution.[58]

As an example of these challenges, a gender analysis of renewable energy in India conducted by IRADe and Energia unearthed the following finding:

> ***"Women in India are deprived of ownership of land. Hence, renewable energy systems that require land (such as solar systems, wind turbines and biofuel plantations) are inherently controlled by, and prove beneficial to, men. In order to integrate women in the management of these systems, policy options that enable land to be granted to groups of women need to be explored."*** [59]

Some countries, such as the example of Colombia presented in FAO's *Governing Land for Women and Men,* are experimenting with alternatives to land and property titling that can benefit disadvantaged populations:

> ***"Formal tenure systems are often considered essential in ensuring access to public services. In Colombia, however, legislation allows all citizens to obtain services such as water, sanitation, electricity, storm drainage, garbage collection, telephone and gas as long as they can prove that they live in their homes and can pay for the services provided. A range of intermediate tenure systems – such as declarations of possession, buying and selling of rights for future use, and communal tenancy – provide stepping-stones towards strengthened rights and protection from eviction, enabling poor households to obtain relatively secure, affordable housing regardless of their tenure status."*** [60]

**58.** FAO's Gender and Land Rights Database. For further data on gender and land tenure. Retrieved from http://www.icrw.org/where-we-work/measuring-property-rights-gender-land-and-asset-survey.
**59.** IRADe and Energia (2009). Gender analysis of renewable energy in India: Present status, issues, approaches and new initiates. Retrieved from http://www.irade.org/Gender%20Cover.pdf.
**60.** FAO (2013). Governing land for women and men. Retrieved from http://www.fao.org/docrep/017/i3114e/i3114e.pdf.

The realities of land ownership and control outlined above are a core challenge for achieving gender equality in almost every area of development, including renewable energy initiatives. While these initiatives may not be able to take on land reform, they can be aware of the land tenure policy framework and local customs, and take extra steps to counteract land discrimination. The recommendations developed by FAO to address these inequalities are applicable to the renewable energy sphere:

## SELECT RECOMMENDATIONS FROM GOVERNING LAND FOR WOMEN AND MEN (FAO)

- Use affirmative action, such as quotas, to ensure that women are equitably represented in the political and governance institutions and structures involved in land policy-making.
- Establish and train a pioneer group of government officials, including women, to visit districts and other decentralized government institutions to: identify contextual variations for women and men countrywide; establish and train groups of local women and men to take this process to the grassroots.
- Conduct an internal audit of gender-equitable participation.
- Work constructively with customary and religious institutions and their leaders, and involve the whole community in decision making processes and outcomes involving customary law and land tenure practices.
- Establish two-directional training programmes, with customary/religious leaders training formal judges on customary/religious law, and the judges training them on statutory law. This helps build bridges between different legal systems and can improve interactions to ensure overall outcomes that are more just.
- Assess the type and level of legal support that communities require, including how best to facilitate protection of the land rights of women and vulnerable groups during community land titling efforts.
- Develop a database of court cases and legal precedents that uphold and support gender equitable governance of land tenure at the national level, and develop awareness-raising campaigns to inform community watchdogs and paralegals about these examples.

**Source: FAO, Governing Land for Women and Men**

### WATER ACCESS

Water is another key resource for women. Women and girls are more likely to not have access to drinking water and they carry out the majority of household activities related to water, including walking many hours to fetch water, cooking and cleaning, and growing food. Reduced access to water increases this burden and reduces time for economic and educational activities. According to UN Women:

> ***"Globally, it is estimated that women spend more than 200 million hours per day collecting water. This burden could increase significantly in coming years. By 2030, nearly half the global population could be facing water scarcity, with demand outstripping supply by 40 per cent. One in every three people already lives in a country with moderate to high water stress."*** [61]

Although clean energy technologies require significantly less energy than non-renewable technologies, water is required to produce nearly all energy forms. Water is a key input for solar energy in order to generate steam or hot water and to cool for steam-condensing. Hydropower uses a significant amount of water for electricity generation and for reservoir storage and operating hydro-electric dams. Both of these technologies can, in turn, have an impact on water quality, causing thermal pollution through the discharge of cooling water and impacting aquatic ecosystems.[62] Thus, it is important to consider women's water needs in any large-scale renewable energy project to avoid further limitations to their access.

While it is important to address broader land tenure, water, and other resource inequalities, the renewable energy sector cannot wait for changes to these resource access issues and must take immediate steps to mitigate gender inequalities at each level of the energy value chain. The challenges and opportunities at each level are presented below, starting from the upper reaches of the energy value chain at the policy level and ending with the end users.

## ENABLING POLICY

Enabling policy and investment toward the expansion of renewable energy currently lacks an understanding of the potential differences in impacts on women and men, and opportunities for enhancing gender equality, climate resilience, and development outcomes. The broad and rapid expansion of renewable energy policies and investments in recent years is an important opportunity to avoid negative impacts and consider these parallel benefits.

The 2014 World Energy Investment Outlook, published by the International Energy Association, points to "consistent and credible policies and innovative financing vehicles" as the bridge to renewable energy expansion. Without dependable policy signals that reduce financial risk, produce competitive pricing, and accommodate the diverse nature of low-carbon technologies, governments are less likely to attract enough investors.[63]

### ATTRACTING RENEWABLE ENERGY INVESTMENT

Regulatory reform in Mexico to attract wind generation capacity is one example of how governments are communicating the right signals to the market, and could be a path for piloting gender-responsive clean energy development. First, a publicly-funded research project by the Mexican Electrical Research Institute analyzed renewable energy potential and built government confidence in a small wind farm pilot project. This was followed by a bidding process for a large-scale wind farm, with a financial structure supported by revenues from carbon credits. Secondly, international and domestic public financial support was leveraged for scaling up wind investments, including tariff support from the World Bank and GEF. CTF also financed renewable energy projects and helped create a national renewable energy financing facility. Finally, regulatory reform led the Ministry of Environment to

**61.** UN Women (2014). World Water Day press release. Retrieved from http://www.unwomen.org/en/news/stories/2013/3/on-world-water-day-un-urges-water-for-all

**62.** International Energy Association (2012). Water for Energy: Is Energy Becoming a Thirstier Resource? Excerpt from World Energy Outlook 2012.

**63.** International Energy Agency (2014). Special Report: World Energy Investment Outlook.

set a renewable energy generation target of 35% by 2024 and to work with the Ministry of Finance to set power purchase rates to attract developers.[64]

The lessons from Mexico's experience suggest similar avenues for securing gender-responsive approaches in clean energy development, including 1) demonstration of the financial and social benefits through research and pilot projects to build government and investor confidence; 2) leveraging the support of international multilateral institutions and financing mechanisms to enhance the investment environment; and 3) reforming policy and setting legally-binding targets to mandate gender-responsive clean energy investments.

### RENEWABLE ENERGY POLICY MECHANISMS

In addition to the ideas cited above, there are a number of renewable energy policy mechanisms that could benefit from adopting a gender-responsive approach. These include cost-reduction incentives, such as subsidies, tax credits, and abatements; market aggregation policies; and industrial policies on renewable energy jobs. A gender-responsive approach could also be readily applied to policies that leverage social benefits from renewable energy, and to pricing frameworks that look at the environmental and social cost of energy.

One of the most common policy mechanisms for accelerating investment in renewable energy—the feed-in tariff, or FIT—stands out as a priority. The FIT alleviates the uncertainty of financial return on investment, by offering a long-term contract with a set price for a specific renewable energy technology and guaranteed grid access to secure end users. Wind, solar, and other technologies are awarded a set price per kilowatt-hour, depending on the cost of producing energy through each technology. In order to incentivize lower technology costs and technological advancements, the prices associated with the FIT often decrease over time and often there are performance-based rates to encourage increased energy production and efficiency. A variety of renewable energy generators can benefit from the FIT, including private investors, businesses of all sizes, and homeowners that supply electricity to the grid.

The FIT mechanism, particularly when used at the national scale in developing countries, could be bundled with gender equality provisions to mitigate potential negative impacts of large renewable energy projects and ensure a women's empowerment approach in project development. The FIT's performance-based incentive is also a potential platform for mandating gender provisions in generation and distribution decisions. The specifics of gender-responsive renewable energy tariffs such as the FIT are beyond the scope of this paper but worth pursuing in the next phase of this effort. The research for this paper did not uncover any efforts to apply a gender lens specifically to the FIT or similar national renewable investment mechanisms, and this may be a priority for future investigation.

### LOW EMISSION DEVELOPMENT STRATEGIES (LEDS)

LEDS are important vehicles for transforming a country's economy toward a low emissions pathway while producing social, economic, and environmental co-benefits. Institutions that are working on LEDS, including USAID, often approach LEDS by considering the economic growth and GHG emission trajectories under business-as-usual and under low carbon development scenarios.[65] Research is needed to determine how these trajectories might change by including a gender component among the co-benefits. Economic and social co-benefits are important because they can help secure national support for shifts in government decision making in the energy sector and other sectors. The success of LEDS will rely in large part on the acceptance of new infrastructure and business models, thus an analysis of potential co-benefits for both men and women could enhance the framework.

**64.** World Resources Institute (2014). Lessons from Mexico: Mobilizing Investment in Wind Power. Retrieved from http://www.wri.org/blog/2014/06/lessons-mexico-mobilizing-investment-wind-power.
**65.** USAID (2013). Overview of Low Emission Development Strategies Concepts.

LEDS that are targeted to be responsive to women could deliver the following:

- Unlocking social and economic co-benefits for women who often do not receive co-benefits due to lack of land tenure, not serving as head of household, or not having access to decision making or markets;
- A broader entry point for addressing inequalities caused by land tenure policy and practice;
- Identifying specific co-benefits that could be made available for women;
- Responding to women's energy access needs and their potential roles beyond current traditional expectations, for example in engineering and entrepreneurship;
- Achieving buy-in and ownership among one of the most disadvantaged populations in any country;
- Producing co-benefits for women that reverse specific gender inequalities; and
- Avoiding the social and economic costs of deepening existing gender inequalities.

Including gender-specific data and information, as well as the perspective of stakeholders with gender expertise, would help prioritize pathways and technologies that provide co-benefits to both women and men and do not sustain or deepen existing gender inequalities. While many of the findings of this paper are relevant to LEDS, the analysis below is specific to LEDS processes:

- In the process of developing such a strategy, governments identify key stakeholders that should be engaged. National women's ministries, women's NGOs, and other entities with gender expertise can often be overlooked or will not have the capacity to engage in such a process. There is a need to build capacity on climate change for these entities that represent women's interests, and ensure they are invited to participate in the process, as well as provide gender training to energy sector managers, similar to Norad's efforts in Mozambique.[66]
- Governments also reference existing national development plans and objectives in the development of a LEDS. The gender components of these plans may not be considered relevant to LEDS, and while the national development plan may address more traditional "women's issues," such as education and health, it may not provide specific guidance at the intersection of gender and climate change. In either case, the engagement of an individual or institution with gender expertise would help interpret how the objectives of the national development plan could be served by a gender-responsive LEDS.
- The data that informs LEDS analyses could also benefit from gender-disaggregated data and survey information. In the energy sector, this includes electricity usage by women and men, instead of general household figures. In the transport sector, this includes information on the way in which women are dependent on transportation that is different than men's needs.[67] In forestry, land use maps need to be paired with information about women's different uses of and limited control of agricultural lands, as well as an understanding of how women fit into the identified drivers of deforestation. Given the data limitations that exist at the intersection of gender and natural resource sectors, estimations of gender differences may need to be extrapolated from case studies and consultations. As with other data points, LEDS can play a role in strengthening data collection and management on gender-disaggregated variables.

## MEXICO'S EFFORT TO INTEGRATE GENDER IN LEDS

Mexico is one example of a country that is pursuing gender-responsive LEDS. In the country's climate change program, REDD+ strategy, and legislative agenda, gender components are uniquely delineated:

- Mexico's Special Climate Change Program (PECC) 2014-2018 includes a section in the first chapter and eight specific lines of action on gender and climate change. The Program also outlines 35 cross-cutting lines of action that correspond to the National Program for Equal Opportunities and Non-Discrimination against Women (PROIGUALDAD 2013-2018).[68]

**66.** Energia (2011). Building Capacity for Gender Mainstreaming of Energy Sector Cooperation in Mozambique.
**67.** World Bank (2010). Mainstreaming Gender in Road Transport: Operational Guidance for World Bank Staff
**68.** Government of Mexico (2014). Special Climate Change Program (PECC) 2014-2018.

- The Mexican National REDD+ Strategy, which as of April 2014 is under public consultation, includes 15 references to women and gender equality throughout the text and establishes 13 lines of action related to gender equality.[69]
- Also in 2014, the Presidents of Mexico's Environment Commission and Gender Equality Commission of the Chamber of Deputies decided to establish an expert group to generate proposals to incorporate a gender perspective in the General Climate Change Law (LGCC) and the General Sustainable Forest Development Law (LGDFS), and to commission a study of how the federal budget has been applied to gender and climate change[70].

These gender-specific actions are the result of collaboration between the Mexican government, the country's REDD+ Alliance, UNDP, and gender expertise provided by IUCN to analyze the country's policy framework, provide training on gender and climate change, and propose recommendations for Mexico.

## NATIONAL GENDER POLICIES

National gender policies are often not applied to energy sector initiatives, and these gender policies may not address energy policy specifically, pointing to a weak policy framework to support gender-responsive approaches in clean energy. The following cases are representative of the policy environment in many countries:

- Uganda has a strong national gender policy and a Ministry of Gender, Labor, and Social Development whose mandate is to address gender inequality throughout the government's policies and programs, but as of 2012 gender considerations were not included in the national energy policy.[71]
- In the case of Kenya Power and Light, a lack of awareness of the country's gender policy was cited as one of the factors in the company's previous gender-blind approach.[72]

Though they are unlikely to provide specific guidance on large-scale renewable energy, and may not provide much guidance on energy in general, national gender policies can provide a baseline of information and guidelines on a country's primary gender inequalities.

## THE ROLE OF MULTILATERAL AND BILATERAL INSTITUTIONS

At the supra-national level, one of the key levers is the role of multilateral and bilateral institutions. In the energy sector, only 10% of total aid is targeted at gender equality,[73] and this could be boosted in the direction of large-scale clean energy initiatives. These institutions, such as the World Bank, Multilateral Development Banks, GEF, and ministries of developed countries, often have gender policies and mechanisms in place that could be applied to the same institutions' clean energy investments.

Applicable mechanisms include gender analysis before clean energy financing is deployed, integrating gender approaches throughout the project cycle and project documentation, and most importantly, building in gender-responsive reporting requirements that adequately assess the impact on women and men rather than a box-checking exercise. Gender safeguard processes could also be applied to clean energy investments. Some institutions already have in-house expertise at the intersection of rural women and clean energy that could be scaled up. The lessons learned that emerge from new initiatives to enhance women's access to small-scale clean energy, for example the Asian Development Bank's (ADB) *Improving Gender-Inclusive Access to Clean and Renewable Energy in Bhutan, Nepal and Sri Lanka* recently launched in 2014, could be applied to the ADB's large-scale renewable energy initiatives.[74]

**69.** Government of Mexico (2014). National Strategy for REDD+ (ENAREDD+)
**70.** Itza Castañeda, personal communication, July 7, 2014.
**71.** Energia (2012). Rural Electrification Projects: Building Capacity for Gender Mainstreaming of Energy Sector Co-operation in Uganda: Baseline Study.
**72.** Owuor, A. (2011). Mainstreaming Gender in Electricity Utilities. Presentation by Kenya Power and Light Company at Energia workshop.
**73.** OECD DAC Network on Gender Equality (2012). Women's Economic Empowerment.
**74.** ADB (2011). Improving Gender-Inclusive Access to Clean and Renewable Energy in Bhutan, Nepal and Sri Lanka.

# PRIVATE SECTOR INVESTMENT

## BENEFITS OF A GENDER-RESPONSIVE APPROACH

There are significant opportunities for the private sector in adopting measures that create gender-responsive clean energy investments, but analysis and evidence at this intersection is extremely limited. The primary benefit of making an effort to mitigate gender inequality and to reach both halves of a population is the potential to boost productivity, efficiency, and return on investment. Some evidence exists in other sectors, but more research is needed on these opportunities in the clean energy sector specifically. Additional benefits include a broader reach and consumer base for energy supply, enhanced operations through gender balance in technical positions and women-led vendors and suppliers, greater community ownership of clean energy facilities, and the ability to demonstrate and communicate an extension of the social and environmental benefits of the clean energy investment to gender equality. At the same time, private sector entities are likely to incur costs in not adopting gender-responsive measures, including technology design that is not useful to or cost effective for end users and not reaching all potential markets.

## INTRODUCING A GENDER APPROACH BEFORE PROJECTS ARE DEVELOPED

Rather than an add-on at the launch of operations, a gender analysis could be incorporated into the initial market and portfolio analysis and pre-development analysis that precedes large-scale projects moving forward. Research for this paper did not reveal any examples of this being attempted for large projects, so it's unclear whether there is a precedent for this. The enabling environment for clean energy investments includes a positive economic business case, acceptable development and operational risks, acceptable technology and performance risks, site characteristics suitable for the technology, supportive policies, and the availability of access to markets and financing. Once market analysis is complete, potential barriers to project execution are identified.[75] In this context, potential gender equality benefits and challenges can be researched and documented that will support the entire project cycle.

## CORPORATE POLICIES ON GENDER EQUALITY

A company's policies and practices in relation to gender equality—across the spectrum of how a company addresses social issues at project sites to how human resource policies impact female employees—can often determine how energy investments are managed. One marker is a company's openness to corporate social responsibility. The prevailing wisdom in corporate environmental responsibility is that improving environmental performance leads to profit opportunities, green practices can attract environmentally focused finance, and companies have the opportunity to differentiate themselves from non-renewable competitors. These win-win approaches need to be developed for gender in the clean energy sector.

Guidance on corporate reporting on gender from the International Finance Corporation and the Global Reporting Initiative (GRI) is applicable to the clean energy sector:

> ***"The tone of an organization's public policy is established by its governing principles. Respect for gender equality and transparency on social, environmental, and economic factors have been widely recognized as essential components of corporate governance principles. In its Guidance on Good Practices in Corporate Governance Disclosure, UNCTAD (2006, p. 23) states that "the board should disclose its policy and performance in connection with environmental and social responsibility and the impact of this policy and performance on the firm's sustainability". By extension, what organizations***

**75.** US Department of Energy Federal Energy Management Program (2013). Developing Renewable Energy Projects Larger Than 10 MWs at Federal Facilities.

**76.** International Finance Corporation and Global Reporting Initiative (2009). Embedding Gender in Sustainability Reporting.

*do to promote gender equality (or what they do to mitigate or avoid gender inequalities) as part of doing business promotes sound corporate governance."* [76]

### BUILDING THE EVIDENCE BASE AT PROJECT SITES

An important entry point with the private sector will be building evidence that there is a strong business case for applying a gender lens to the energy value chain. This could be developed at the local level, where community consultations on large infrastructure projects often lead to minimal inputs such as schools or clinics, without a deeper analysis of how the plant could transform gender inequalities or how women could be trained for employment at the plant. A good portion of the portfolio on Corporate Social Responsibility (CSR) is outsourced, implemented by external service providers hired by companies. There is a need to develop the capacity of these entities to adopt methods that bring women to the table of negotiations and secure benefits that target their needs.

### IDENTIFYING BUSINESS CHAMPIONS

Dominant responses to proposals to address gender equality in any industry include how this approach adds value, unlocks opportunity, improves impact, and reduces risk. Often, it can be advantageous to collaborate with an individual within a company who is passionate about gender equality, regardless of whether their role is on this topic. Collaboration with a gender champion can take the form of assessing the risks and opportunities to pursue a gender approach, including in the end market, financing, project design, and securing investment in a gender-responsive approach with monitoring system attached.[77]

## SITING AND GENERATION

### LEARNING FROM GENDER EFFORTS IN INFRASTRUCTURE

The lessons learned from efforts to address gender considerations in infrastructure can be applied to clean energy projects. An investor or government representative will often have a drastically different perspective than communities on the distribution of benefits and risks that might fall to women and men. Mitigating negative impacts and harnessing potential development wins are often reliant on meaningful participation and input from the community. Ensuring women have a voice doesn't require a significant financial investment—instead, it can be a matter of ensuring that women have a separate space for consultation, led by women, and arranged at a time that is convenient. The priorities of women and men can be different in such consultations. While men prioritize large infrastructure development, such as new roads, schools, and buildings, women may request less tangible improvements such as medicines, teachers, and other services.[78]

### LESSONS FROM A CONSULTATION PROCESS IN PAPUA NEW GUINEA

An example from Papua New Guinea illustrates that women's participation in a consultation process can result in community gains. However, implementation of the resulting agreements may be difficult. The Ok Tedi Mining Limited Company in Papua New Guinea was using rivers to dispose of mining waste, resulting in a polluted river system that fed into to the ocean. In relation to this case, the World Bank noted, "women in particular often bear the negative consequences associated with mismanagement of extractive industries." In negotiations for benefits to communities affected by the company's operations, a woman leader achieved an allocation of 10% of funds to be dedicated to women's and children's programs. The Memorandum of Agreement resulting from the negotiation directed women

**76.** International Finance Corporation and Global Reporting Initiative (2009). Embedding Gender in Sustainability Reporting.
**77.** Andrea Athanas, personal communication, March 10, 2014.
**78.** Adriana Eftimie, personal communication, May 8, 2014.

representatives to be on the Village Planning Committees and the Board of the company's foundation.

In the second round of negotiations, 30 women leaders participated and negotiated financial benefits to women and children up to 18%. While this represents an unprecedented achievement for the women in the community, they have not benefitted in the aftermath of these agreements. Due to limited understanding by the women's group of the Memorandum of Agreement and how to access the funding, the funds have not been implemented and the action plans delineated by the women have not been realized. There is one woman serving on the Board of the company's foundation, but the existing culture of decision making has not improved women's agency in that body.[79] The lessons from this example suggest that women's organizations could benefit from capacity building to better represent their interests, and that support for implementation of agreements may be needed after women gain a seat at the table.

### LESSONS FROM A WIND FARM IN COSTA RICA

Community responses many years after the construction of a large wind farm in Costa Rica provide some insights into how consultation processes could be enhanced. In 1999, the Tierras Morenas wind farm began operations near Arenal Volcano in the Guanacaste province of Costa Rica. An electric generation company based in Bermuda developed the project in partnership with wind companies from the US and Costa Rica, utilizing equity financing, loans, and grants worth $35 million from DANIDA, the Central American Bank for Economic Integration, and five Costa Rican banks. The project consists of 32 wind turbines that are 40 meters tall, generating 20MW of electricity that is sold to Costa Rica's state-owned utility, Instituto Costarricense de Electricidad (ICE).[80]

In 1994, a community engagement process was initiated to facilitate the relocation of the communities around the wind farm. Twenty years later, in 2014, community leaders have realized that the wind farms are still generating financial and other benefits beyond the community, but the short-term benefits provided to the community itself have already ran out or were abandoned after the turbines were operationalized. The main lesson learned by the women in the community was the need to secure community benefits that are beyond basic and immediate needs, such as water wells and schools, in exchange for the land and resources that would be lost for generations to come. Both the community and the facilitators of the consultation process failed to adopt a visionary and strategic approach. In addition, the facilitators were engineers without training in community consultations, and the community did not have capacity to represent their interests effectively in meetings with large companies.

### LESSONS FROM WIND POWER PROJECTS IN MEXICO

A lack of regulation on renewable energy investments in Mexico has created a similar situation of negotiations falling to private companies and local communities without government oversight. In Oaxaca, wind power projects have caused negative impacts for indigenous communities. The communities have not received enough and timely information, in violation of international law on free, prior, and informed consent; paramilitary groups and state officials have launched threats and violence against indigenous leaders who oppose the projects; and the projects lack a comprehensive environmental and social development plan. The legal institutions representing these communities have proposed a protocol for wind power development that guarantees human rights are not violated.

This protocol approach could be utilized to ensure gender-responsive projects as well—through gender criteria and indicators, incentivizing women's empowerment and employment through quotas or other means, training for women in renewable technologies, ensuring women's voices influence project decision making, and independent assessments to measure the gender-relevant externalities of projects before energy regulators guarantee access

**79.** World Bank Institute (2013). Negotiating with the PNG Mining Industry for Women's Access to Resources and Voice: The Ok Tedi Mine Life Extensions Negotiations for Mine Benefit Packages.
**80.** Giddy, I. (n.d.) The Largest Wind Farm in Latin America. Retrieved from http://pages.stern.nyu.edu/~igiddy/cases/tierrasmorenas.htm.

to selling electricity through the grid.[81] Communities, the private sector, and public sector institutions all need to develop capacity to attain mutually beneficial agreements around renewable energy projects.

### INEQUALITIES IN COMPENSATION FUNDS

When large renewable energy projects require the displacement of communities or individual land owners and users, women are often at a disadvantage. The distribution of compensation funds attached to project negotiations with communities is often based on land ownership, and a low percentage of women worldwide hold title to the land they use. Compensation of employment lost is often based on formal employment, whereas women are more prevalent in the informal sector. It is important for the potential negative impacts of large projects to be mitigated, but equally critical to take measures to ensure equitable benefits.[82]

### RISKS AT THE PROJECT SITE

Major capital projects require an influx of mostly male workers, sometimes in the thousands, and often in remote locations. This can present a shock to communities near the project site, raising critical health and socio-economic challenges. In Africa, large projects are exacerbating the HIV/AIDS crisis, due to migration of large groups of people across countries, changing sexual networks, and increased prostitution. Access to HIV services and other protections is limited, with significant negative effects falling to women and girls.[83] These large project sites exacerbate exploitation of male migrant laborers, and create safety concerns for women and girls in terms of limited lighting, communication, security, and social mobility.[84]

## TRANSMISSION AND DISTRIBUTION

### THE DISCONNECT BETWEEN GENERATION SITES AND END USERS

One of the core challenges in ensuring that clean energy reaches women and has the potential to reverse gender inequalities lies with how the generated energy arrives to end users. This is a challenge in the physical sense of infrastructure and a grid system that can facilitate geographic transmission (bulk transfer of energy from generating plants) and distribution (wiring between substations and end users), as well as in the conceptual sense that project developers and regulators need to know who the end users are. Often, delivering an established amount of energy supply to the grid is the end goal, without consideration of who may be accessing it downstream.[85] In some countries, transmission lines have been constructed on agricultural land where women produce subsistence agriculture, and compensation funds go to their husbands who hold the land title.[86] On average, men tend to spend more of incoming funds on personal entertainment, while women re-invest these funds into the family and household.[87]

Bulk energy increases through large projects are not likely to automatically trickle down to women, due to inherent gender inequalities that women face. Women and men may have different access to the grid, and women tend to operate small businesses off the grid. Large-scale energy installations may only benefit customers that are close geographically, and commercial operations that can provide a return on investment may be prioritized over residential needs, and particularly the needs of populations with less agency or income.

**81.** The Interamerican Association for Environmental Defense and The Mexican Environmental Law Center (2012). The Challenges of Deploying Wind Energy in Mexico: The Case of the Isthmus of Tehauntepec.
**82.** Energia (2012). Rural Electrification Projects: Building Capacity for Gender Mainstreaming of Energy Sector Co-operation in Uganda: Baseline Study.
**83.** UNDP (2013). Guidelines for Integrating HIV into Environmental Assessments.
**84.** Dominique Lallement, personal communication, April 10, 2014.
**85.** Katherine Lucey, personal communication, May 22, 2014.
**86.** Vanessa Lopes Janik, personal communication, April 21, 2014.
**87.** Nebel, B. J., & Wright, R. T. (2000). Environmental science: The way the world works, seventh edition. Upper Saddle River, NJ: Prentice Hall.

Understanding the needs of both women and men is about responding to customer demand, women being key energy consumers, and ensuring that the product and services being planned meet that demand. To achieve this, delivery strategies should be designed with community input at the macro level and renewable energy projects are ideally developed in coordination with infrastructure adjustments. However, so far there is limited political will to build infrastructure for the transmission of renewable energy to communities in developing countries[88]:

- In the oil-rich nation of Nigeria, the majority of the population relies on generators for electricity because the government has not prioritized connecting universal access to the grid.[89]
- Although it occurred many decades ago, the expansion of electricity infrastructure in the United States in the 1920s serves as a different example. The US Government invested in universal access and utilities joined together to establish a wider utility grid in order to reap the benefits of shared peak load coverage and backup power. The broad coverage of the grid meant that all entities—whether small farmers or large businesses—would have access, regardless of the potential return on investment.[90]

### IMPACT ASSESSMENTS AND RESETTLEMENT PLANS

The Environmental and Social Impact Assessments (ESIAs) and Resettlement Action Plans (RAPs) developed alongside transmission projects to identify safety, health, and environmental impacts need to be adapted to incorporate gender indicators. These tools are used by multilateral agencies such as the World Bank and ministries overseeing projects to establish a roadmap for mitigating impacts throughout the project cycle, including before and after construction. In the case of resettlement, a social survey is used to determine people who will be affected by the project and consultations can be held to develop the RAP.

## END USERS

### THE VALUE OF CONSULTATION

At the Archbishop's palace in Uganda, in order to replace the electricity supply from traditional fuels, an inverter system was upgraded to attach to the grid. The installers were directed to secure the system in all of the important rooms throughout the palace, including the Archbishop's office, the main hall, reception room, and dining room. However, since the workers in the palace were not consulted, including the women who did the cooking for the Archbishop and prominent international guests, the system was not extended to the kitchen. The palace ended up with electrification except for in the kitchen where kerosene continued to be used to prepare meals.[91]

At the national scale, this story is a common one in many countries—when women are not included in the design and implementation of energy systems, the country as a whole remains stunted in the resulting energy delivery system.[92] Any project that fails to consider the particular situation of half of the energy end users in a population cannot expect to meet their needs. A common pitfall that prevails across many projects and institutions, as noted above, is an assumption that project benefits will automatically trickle down to women and that resource uses and needs are equal at the project site. In reality, gender inequalities consistently prevent benefits and opportunities from reaching women and men equally. In the environmental sector, there is strong evidence that specific strategies and efforts to target women are a prerequisite for counteracting these inequalities.[93]

Consultation processes are important for a number of reasons, but a central purpose is to establish local ownership

**88.** Makhtar D. (2012). Africa's Energy Challenge: Remarks by World Bank Africa Vice President Makhtar Diop at the World Bank/IMF Annual Meetings.
**89.** Heinrick Boll Stiftung (2012). Green Deal Nigeria.
**90.** Katherine Lucey, personal communication, May 22, 2014.
**91.** Energia (2012). Transmission Line Projects: Building Capacity for Gender Mainstreaming of Energy Sector Cooperation in Uganda: Baseline Study. Report to Ministry of Energy and Mineral Development and the Norwegian Embassy.
**92.** Katherine Lucey, personal communication, May 22, 2014.
**93.** Pearl-Martinez, R., Aidis, R., Granat, M. (2013). Environment and Gender Index (EGI) 2013 Pilot.
**94.** World Bank (2014). Voice and Agency: Empowering women and girls for shared prosperity.

and agreement on a project. According to the latest analysis by the World Bank, women's participation in decision making has been proven to enhance perceptions of government legitimacy.[94] The Canadian Wind Energy Association produces one of several guides for companies seeking to engage communities in a process to approve renewable energy projects, demonstrating the way in which most guidelines don't specify women and women's institutions as specific stakeholders. The guide lists city officials, the Aboriginal community, residents, farmers, local media, community associations, environmentalists, manufacturing associations, and boards of education among the important contacts during the early stages of project development.[95] While the research for this paper did not review numerous guides on consultation processes for clean energy development, projects using guides like this one should also ensure that both women and men are among the important contacts, by considering women's organizations, women's agricultural networks, women's professional associations in energy-related areas, women's ministries and other gender-related government departments, and academics and institutes focused on gender issues. As an alternative measure when expertise is not available in-country, as is often the case on energy and environmental issues, projects can engage gender experts from other countries in the region or from international institutions.

## WOMEN'S ENERGY ACCESS IS ABOUT SURVIVAL

The severe health impacts of indoor air pollution are now widely known, and clean energy deployment has a clear role to play in reducing these impacts. The World Health Organization estimates that 4.3 million people die each year from health complications caused by cooking with solid fuels, including 50% of premature deaths among children under five due to pneumonia. About three billion people cook and heat their homes with biomass and coal that create these illnesses.[96] Outdoor and indoor pollution, mainly caused by fossil fuels and household wood fires and stoves, causes more deaths than HIV or malaria combined. The United Nations Industrial Development Organization (UNIDO) has called for increased clean energy investments to simultaneously benefit human health and address climate change.[97] Women becoming comfortable with new technologies is, then, a matter of life and death, and can greatly improve quality of life and livelihoods. Equally important, energy access for women can combat gender inequality, opening up possibilities of women's empowerment through time savings that facilitate economic and educational pursuits.[98]

The stakes are very high, and the urgency great, for women's needs to be reflected in decisions that impact end users. While these impacts occur in thousands of households at the local level, they reflect day-to-day energy choices that could be alleviated through deployment of alternatives, including but not limited to large-scale renewable energy investments. A core challenge that has emerged from this research is the difficulty of connecting these household level needs to large-scale projects. While there are significant efforts to improve cookstoves for household use, such as the Global Alliance for Clean Cookstoves, a major chasm remains between household and macro-level energy choices. Additional research and innovations are needed to bridge this gap.

## GENDER DIFFERENCES IN ENERGY CHOICES

How women use and depend on energy should inform any new energy system put in place. In making energy choices, women often focus on function-based needs, while men tend to support energy solutions that demonstrate position, power, and visibility rather than functionality. Policymakers often establish large centralized installations to reach more of the population, attain visibility, and address the interests of the energy lobby. Centralized systems with large distribution chains are unlikely to be the first choice of women at the household level, due to the lack of autonomy and control

**94.** World Bank (2014). Voice and Agency: Empowering women and girls for shared prosperity.
**95.** Canadian Wind Energy Association (2011). Wind Energy Development: Best Practices for Community Engagement and Public Consultation.
**96.** WHO (2014). Household Pollution and Health. Retrieved from http://www.who.int/mediacentre/factsheets/fs292/en/.
**97.** Reuters (2013). Air Pollution Scourge Underestimated, Green Energy can Help, U.N. Retrieved from http://www.reuters.com/article/2013/04/09/us-pollution-idUSBRE9380PZ20130409.
**98.** Clancy, J., Winther, T., Matinga, M., and Oparaocha, S. (2011). Gender Equity in Access to and Benefits from Modern Energy and Improved Energy Technologies: World Development Report Background Paper.

offered by being at the end of that chain, compared to a community-scale or household-scale system that is more dependable. In an ideal world, the conversation would start from the user side to dictate which systems are chosen and how they are designed and constructed.

In general, renewable energy options are seen as having tremendous potential to expand women's energy access and combat energy poverty.[99] There are significant economic and health arguments for women to choose clean energy in order to meet immediate survival needs, while the broader moral argument of climate change or weather shifts may be too abstract to encourage this decision. Small-scale renewable energy installments are cost efficient, quickly installed and repaired, and are more resilient to climate-induced impacts. Kerosene can burn down houses and costs $2-4 per week for lighting in parts of Sub-Saharan Africa, while solar lights are cleaner, brighter, and safer and cost $10 each through initiatives like Solar Sister.[100] Women's management of energy assets is likely to have an impact on energy poverty, as World Bank research in numerous countries has demonstrated that women's control of income and assets is important as an instrument for household food security and child welfare.[101]

The transition to large-scale clean energy technologies, although with potential benefits, will mean significant changes in women's lives, including the displacement of an established energy chain in non-renewables that is dominated by women. Establishing a transition process from biomass to another system based on the end user's views and inputs is critical. Although much of the day-to-day control over energy choice is lost, using energy from a centralized or localized clean energy source may alleviate indoor air pollution and the burden of gathering biomass. In the end, women who rely on these technologies will need to make the choice based on the information available to them. Resistance can stem from changes in energy systems that challenge existing power dynamics. In one community, men initially resisted the simple technology of a Styrofoam box to reduce the use of solid fuels for keeping food warm, largely because it transferred the control over the technology to women.[102]

A number of steps can be taken to improve women's agency as end users, including helping female energy entrepreneurs participate in local energy committees; improving the way in which energy options are communicated to women and communities; adapting marketing strategies to target women specifically; and building gender sensitivity with energy industry associations.

## AGGREGATING SMALL-SCALE EFFORTS FOR GLOBAL IMPACT

In light of impending climate change effects and the urgency to identify strategies that can have a transformative impact on GHG emissions, the potential of aggregating thousands of women-led small-scale installations should not be overlooked. In developed and developing countries alike, women are the drivers of energy use decisions in the residential sector, which constitutes about 18% of energy use globally.[103] Billions of small decisions to use clean energy at the household level could have a significant global impact that complements large-scale efforts, and would transform the sector by building in a demand-driven approach that is not grid dependent. Models exist for scaling up access to solar and other technologies. Barefoot College, which priorities training women to install and maintain solar has facilitated 450,000 people accessing light and reducing carbon emissions by 13 metric tons per day. Similarly, Solar Sister has facilitated over 180,000 people benefiting from solar lights, mobile phone chargers and larger solar business solutions. Since 2013, Solar Sister has also included clean cookstoves in its product portfolio.

An initiative in Australia is measuring how many women contribute to the reduction of GHGs at the household level. The campaign—1 Million Women—builds on the fact that women in Australia make over 70% of the purchasing decisions that affect the household environmental footprint

**99.** Energy poverty is a lack of access to modern energy services. These services are defined as household access to electricity and clean cooking facilities, e.g., fuels and stoves that do not cause air pollution in houses. (International Energy Agency).

**100.** Yale Environment 360 (2013). For Africa's Solar Sisters, Off-Grid Electricity is Power. Retrieved from http://e360.yale.edu/mobile/feature.msp?id=2653.

**101.** World Bank (2012). World Development Report 2012: Gender Equality and Development.

**102.** Laura Williamson, personal communication, March 27, 2014.

**103.** US Energy Information Administration (2013). How much energy is consumed in the world by each sector? Retrieved from http://www.eia.gov/tools/faqs/faq.cfm?id=447&t=1.

and influence at least 80-90% of those decisions. Members of the campaign self-report their own activities and calculate the projected carbon savings using online tools. The campaign has over 80,000 registered members who have committed to cut over 100,000 tonnes of carbon dioxide. The goal of the campaign is to cut over a million tonnes of carbon dioxide pollution, equivalent to taking 240,000 cars off the road for a year.[104]

**104.** 1 Million Women: http://www.1millionwomen.com.au.

# 5. WOMEN'S ADVANCEMENT IN CLEAN ENERGY EMPLOYMENT, ENTREPRENEURSHIP, AND LEADERSHIP

***"Nothing, arguably, is as important today in the political economy of development as an adequate recognition of political, economic and social participation and leadership of women."***

**—Amartya Sen[105]**

The 2012 World Development Report presented unequivocal evidence that entire communities benefit when women are economically empowered.[106] These economic and social benefits could be applied to the renewable energy sector through a concentrated effort to achieve gender balance in roles and responsibilities at every step of the energy value chain. Research in other sectors suggests that harnessing the skills of both women and men could further support the expansion of clean energy and slow down climate change.

The global economy is at "the clean energy tipping point", according to The Pew Clean Energy Action Plan 2012, which announced that clean energy investments are 600% higher than they were in 2004.[107] Due to the spike in investment, the International Renewable Energy Association (IRENA) estimates that 6.5 million people are now employed worldwide in renewable energy. These renewable energy jobs are largely in developing countries, with the largest share in China, Brazil, India, Bangladesh, and Malaysia. [108] But these jobs are not reaching women at the same rate as men.

## THE CHALLENGE OF GENDER BALANCE IN THE ENERGY SECTOR

The energy industry remains one of the most gender imbalanced sectors. While globally comprehensive sex-disaggregated data is not available, estimates of women's employment in the oil and gas industries range from 27% in Canada to 20% in the US, and women make up 15% of the Australia mining industry (including coal). These three countries have significant wage gaps between women and men.[109] Women's employment rates in wind, solar, wave, and other renewable energies are often estimated higher—by one account prepared for the International Renewable Energy Association, the estimation is 33%.[110] In two countries that have uniquely monitored these numbers, women's employment was estimated several years ago at 26% in Spain (in 2010) and 24% in Germany (in 2007). The renewable energy sector is perceived to be less discriminatory than the fossil fuels industry because it is a new and non-traditional field. And there is some evidence that women are drawn to choose career paths in line with their worldview or that they believe will make a difference in the world. Still, women face particular constraints relevant to renewable energy employment, including their self-

**105.** Sen, A. (1999). Development as Freedom.
**106.** World Bank (2012). World Development Report 2012: Gender Equality and Development.
**107.** Pew Charitable Trusts (2012). Clean Energy Action Plan.
**108.** International Renewable Energy Association (2014). Renewable Energy and Jobs: Annual Review 2014.
**109.** Catalyst (2012). Women in Gas, Mining, and Oil in Australia, Canada, and the U.S. Retrieved from http://www.catalyst.org/knowledge/women-gas-mining-oil-australia-canada-us.
**110.** Lallement, Dominique (2013). Gender Dimensions of RET Employment.

perception of jobs that are acceptable, the ability to be mobile for projects in remote areas, technical skills, and the gender wage gap.

Of course there is great diversity across countries and companies in terms of women's share of renewable energy jobs. In Vietnam, there is less of a gender divide in engineering training, and progress has been made in West Africa where women's role is more visible than in other African countries. Women make up about 40% of the workforce on Science, Technology, Engineering, and Math (STEM) in China, according to the Chinese Academy of Science,[111] yet women do not apply for degrees or jobs in mining, tunnel engineering, and naval engineering because China's labor law draws from the societal view that these jobs are unsuitable for women. [112] Social stigmas prevent female engineering graduates in Sri Lanka from being placed in engineering jobs. At a recent renewable energy conference in India, of the 200 participants only four were women, who cited caste status as a prerequisite for either women or men participating. Only in the past few years has the first woman Dalit solar engineer broken through India's rigid caste system to secure her training.[113] And at a session hosted by the solar industry in Germany, of the 500 participants about 20 were women, most of whom worked in the companies' marketing departments and not in the technical divisions.

The following sections walk through the roles that are important in the clean energy sector throughout the energy value chain, including engineers and technicians; energy ministries, public sector employees, and regulators; corporate executives, board members, and project managers; construction workers and plant operators; and entrepreneurs, vendors, and suppliers.

## ENGINEERS AND TECHNICIANS

Women's representation is limited in energy policy and private sector management primarily because there are many fewer women than men in engineering. Technical training in science, technology, engineering, and math—called STEM in some countries—is viewed as a marker for upward movement in the energy sector, into the leadership of energy companies and policy spheres alike. A major worldwide gap exists for women in STEM, and there are some preliminary efforts to make strides in the renewable energy sector, but there is limited information about the number of women in STEM throughout Asia, Africa, and Latin America. Sex-disaggregated data collection on women's role in the energy sector would push the agenda forward on this issue significantly.

### DATA ON WOMEN ENGINEERS IN EUROPE

Although comprehensive data is not available on women engineers worldwide, data compiled by the European Institute for Gender Equality (EIGE) provides some insight into women's role in technical fields in Europe that are relevant to the clean energy sector. Figure 4 compares female and male tertiary graduates in climate change related fields among EU-27 countries in 2009, where women graduates are lowest in engineering and the engineering trades. While the majority of students graduating in life science disciplines are women, representation in technical fields is much lower at 27%.

**111.** Engineer Live (2013). How to Increase the Global Ranks of Women Engineers.

**112.** Hatton, Celia (2013). 100 Women : The Jobs that Chinese Girls Just Can't Do. BBC. Retrieved from http://www.bbc.com/news/world-asia-24534782.

**113.** Bhowmick, Nilanjana (2011). The Women of India's Barefoot College Bring Light to Remote Villages. The Guardian. http://www.theguardian.com/global-development/2011/jun/24/india-barefoot-college-solar-power-training.

## FIGURE 4: PERCENTAGE OF FEMALE AND MALE TERTIARY GRADUATES IN CLIMATE CHANGE RELATED FIELDS IN 2009

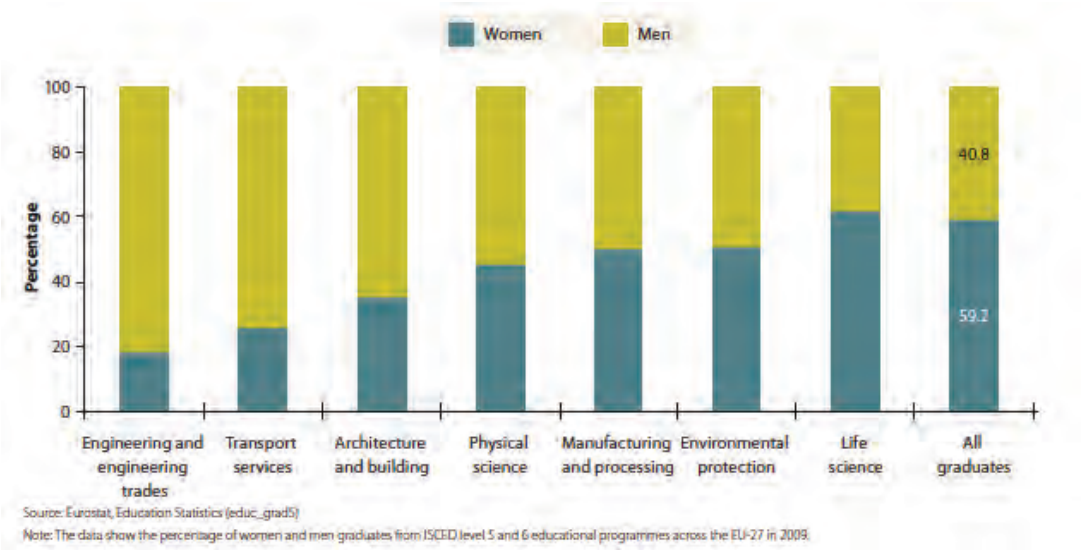
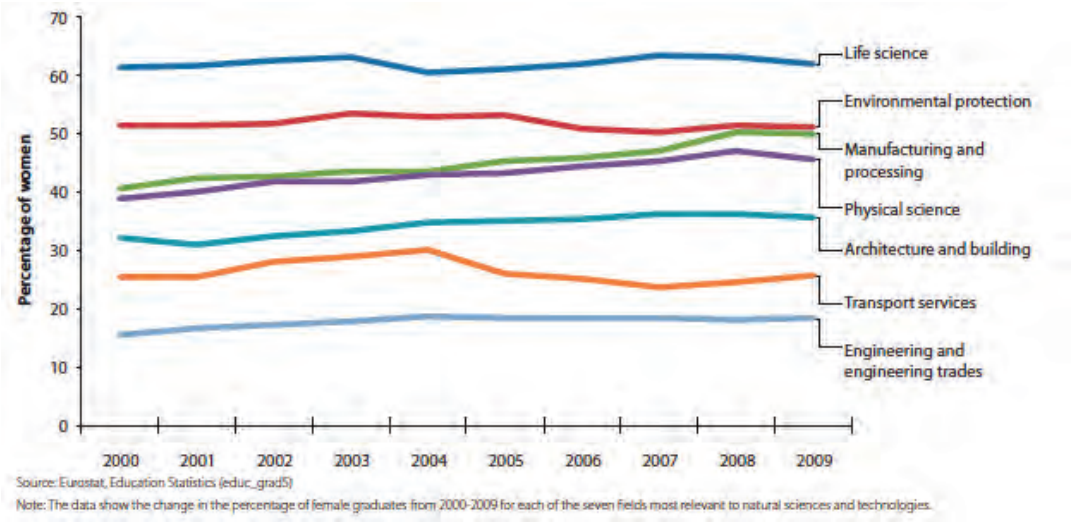



Figure 5 from the same report presents data on women tertiary graduates in selected fields among EU-27 countries between 2000 and 2009, showing a relatively steady state in the percentage of women in these fields for almost a decade.[114]

## FIGURE 5: PERCENTAGE OF WOMEN GRADUATES IN EUROPE IN NATURAL SCIENCES AND TECHNOLOGIES DURING 2000-2009.




114. European Institute for Gender Equality (2012). Review of the Implementation in the EU of area K of the Beijing Platform for Action: Women and the Environment: Gender Equality and Climate Change Report.

## BARRIERS TO WOMEN'S ADVANCEMENT

Training is critical, but it is far from the only support needed to achieve gender balance among engineers in clean energy. Research shows that the same number of girls and boys express interest in STEM careers and achieve an equal level of success through secondary education, but the lack of visible role models and mentorship for girls and women leaves them feeling isolated in undergraduate or graduate programs and in entry level jobs. Following undergraduate training in the US, about 50% of women are interested in careers in the STEM areas, but within the first 10 years, half of those women are leaving jobs or further training in those areas. There is evidence that some of the departure from the STEM fields is not only male-directed, in that women don't always perceive their identity as fitting into those fields and are reluctant to pursue those careers. [115] To ensure that women are not left behind, there must be a shift away from seeing technology as a male arena.

The challenge of visibility is perpetuated by major conferences of the energy industry, where women are more likely to be put forward by companies as moderators rather than as experts.[116] At a meeting on women's empowerment in the energy field, male energy company executives admitted their assumptions that women are not as concerned about safety, women don't want to work in technical fields, and are not interested in those kinds of positions. Making an extra effort to hire women is seen as extra work and something that goes against the existing merit-based hiring system. Managers can also be fearful of bringing a small group of women into a male-dominated team, because they imagine having to respond to sexual harassment issues in the workplace. This culture of maintaining the status quo points to a lack of awareness about the systematic discrimination against women in this arena. Building this awareness among energy company managers is thus an important driver for change.

Several USAID initiatives aim to address gender imbalances in technical positions in the energy sector:

- USAID's Mission in Kosovo is trying to increase the number of women engaged in technical leadership of the country's energy sector by providing scholarships for women to study abroad.[117]
- The Energy Utility Partnership Program (EUPP) of USAID and the United States Energy Association (USEA), which provides technical support to developing countries, is counting the number of women in trainings on energy policy and regulatory practices, energy technical fields, and energy-related business management systems.
- Tanzania, a participant in the Energy Utility Partnership Program, is tracking how many women and men are serving as energy technicians and senior managers. In the country's primary utility company TANESCO, which has 7,000 employees, women make up 7% of their 300 engineers, and 7.5% of their 1,000 technicians. The partnership set a target of seven women out of 50 people in trainings, as opposed to countries such as Bangladesh and Afghanistan where it was not possible to project for women's involvement. For the program globally, the preliminary goal is that 10% of the 600 people trained would be women. Though this is a positive step forward, the women nominated to participate in trainings by the energy companies and governments are often in human resources administrative posts.

## LEARNING FROM PAKISTAN'S EXPERIENCE

An example from Pakistan highlights some of the challenges and strategies that energy projects face in promoting women's advancement. USAID's interventions in the rehabilitation of Pakistan's underperforming power generation facilities and transmission network have restored more than 1,200 MW to the grid. These efforts contributed $2.57 billion to Pakistan's GDP, and directly benefited 12.4 million people. An energy sector internship program

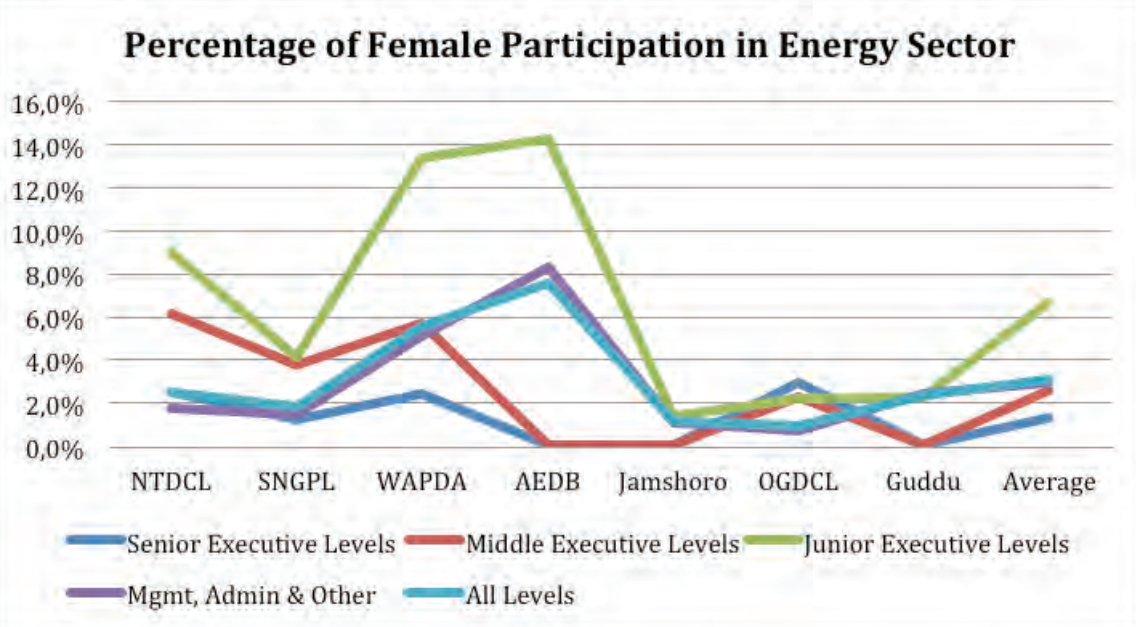
**115.** Girl Scout Research Institute. (2012). Generation STEM: What Girls Say about Science, Technology, Engineering, and Math.
**116.** Caroline McGregor, personal communication, March 28, 2014.
**117.** USAID (2014). Kosovo 2014-2018 Country Development Cooperation Strategy.

of USAID's Energy Policy Program (EPP) aggressively recruited female participants, offering them on-the-job training at many of Pakistan's state-owned power sector entities. Within the internship program, 20% of participants were women, and 25% of those women received full-time employment in the energy sector after completing their training.

As part of this effort, USAID's EPP has collected current data from stakeholder organizations related to current employee statistics, hiring practices, and gender-specific policies. EPP is using this data to establish a baseline of female participation in the energy sector and propose steps to increase their participation. Through interviews, surveys, and site visits, EPP collected data from Pakistan's transmission, hydro generation, thermal generation, alternative energy, and oil and gas authorities. While the Government of Pakistan sets female employment quotas, the energy sector has consistently lagged behind other sectors in female participation at all levels of employment. Across all of the organizations that EPP gauged, only 3.1% of employees are females. None of the organizations have achieved more than 10% of women in their workforce.

Figure 6 illustrates that the percentage of female participation is lowest at the Senior Executive Levels (average 2.5%), and highest at the Junior Executive Levels (average 5.6%). Comparatively, 14% of the engineering graduates from the University of Engineering and Technology (UET-Lahore) are women.

## FIGURE 6—PERCENTAGE OF FEMALE PARTICIPATION IN THE ENERGY SECTOR IN PAKISTAN



Many of the organizations interviewed had employment policies intended to promote equality, but did not give specific preferences to women or take gender into consideration when hiring. Additionally, several organizations have established anti-harassment policies and make infrastructure adjustments to support increased numbers of female employees. For males as well as females, training and promotion opportunities are limited for junior management as a result of a hiring freeze mandated by the government.[118]

## ENERGY MINISTRIES, PUBLIC SECTOR EMPLOYEES, REGULATORS

Energy is an important sector with respect to a country's economy and finance, and the sector tends to bring public sector and private sector entities very close together. These high stakes could be a contributing factor to the significant shortage of women's voices in energy decision making in the public sector.

### WOMEN'S POLITICAL REPRESENTATION LINKED TO SUSTAINABILITY

There is new evidence that women's participation in environmental decision making leads to improved environmental outcomes. Thus, women's participation is not only important for gender equality itself, but may also determine the effectiveness and trajectory of clean energy growth. The 2011 Human Development Report found that:

- Countries with higher female parliamentary representation are more likely to set aside protected land areas, according to a study of 25 developed and 65 developing countries.
- Countries with higher female parliamentary representation are more likely to ratify international environmental treaties, according to a study of 130 countries with about 92% of the world's people.
- Of the 49 countries that reduced carbon dioxide emissions between 1990 and 2007, 14 were countries ranking very high on the Human Development Index (HDI), 10 of which had higher than average female parliamentary representation.[119]

### WOMEN'S REPRESENTATION IN DEVELOPING COUNTRIES

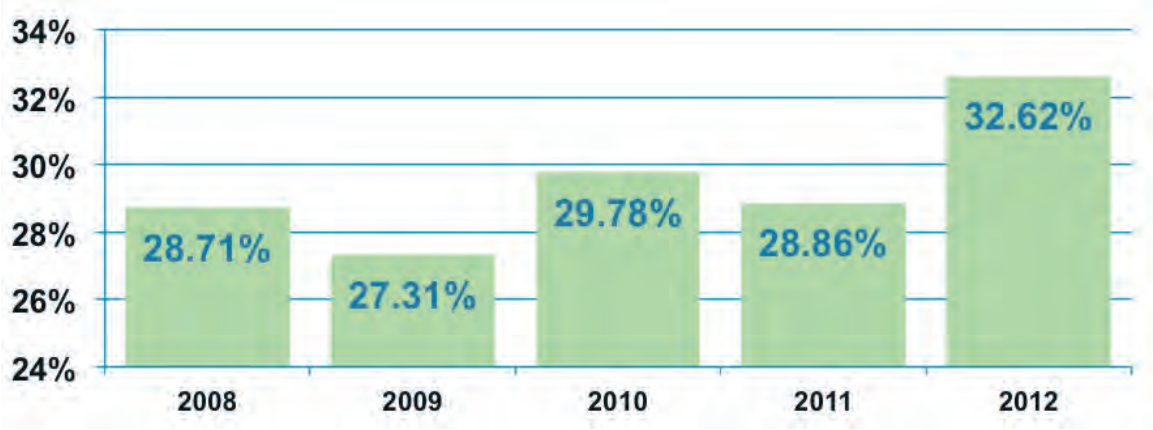
Data on women's share of decision making positions in developing countries is rare, but the information available indicates that additional strides are needed toward gender balance. Women account for less than 22% of parliamentarians worldwide. Women's representation is estimated to be lower at the local level, although data is even more limited. In Northern Africa, women make up 8% of local councilors, while the percentage reaches 30% in Sub-Saharan Africa. Women constitute less than 5% of mayors worldwide.[120] Following the findings of the Human Development Report above correlating women's representation and sustainability, these low numbers may have an impact on a country's or locality's environmental concerns.

### WOMEN'S REPRESENTATION IN ENERGY AND CLIMATE CHANGE POLICY MAKING

Women's representation in energy policy is limited, from the top national positions to the local level. In a 2013 analysis of 72 countries, only four countries (6%) worldwide—Gambia, Greece, Sweden, and Switzerland—had female ministers overseeing the country's energy policies and programs. Comparing this to other ministries, 27 of the 72 countries (about 38%) had a female minister of environment or environment-related ministry such as agriculture or fisheries. And in comparison to national representation at global negotiations, the rate of female participation in official government delegations to the COPs of the UNFCCC during 2008-2012 averaged around 30% (see Figure 7).

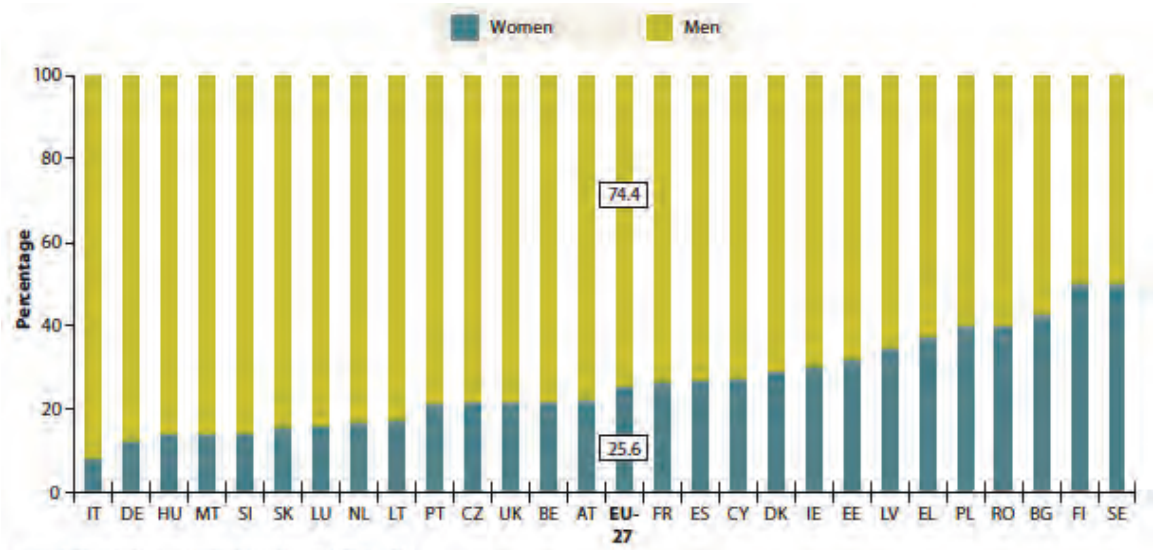
**118.** USAID Energy Policy Program (EPP) in Pakistan, implemented by Advanced Engineering Associates International Inc. (AEAI).
**119.** UNDP (2011). Human Development Report 2011: Sustainability and Equity: A Better Future for All.
**120.** World Bank (2014). Voice and Agency: Empowering women and girls for shared prosperity.

## FIGURE 7: FEMALE PARTICIPATION IN DELEGATIONS TO UNFCCC COPS




A study by EIGE found that women in Europe hold about 25.6% of high-level decision making positions in the environment, transport, and energy sectors. The research also found that women's participation is higher in the environmental sector than in energy and transport, and the same holds true for parliamentary committees on these topics. Figure 8 displays the percentage of women in high-level positions in ministries responsible for the environment, transport, and energy in EU countries as of 2011.[121]

## FIGURE 8: PERCENTAGE OF WOMEN IN HIGH-LEVEL POSITIONS IN ENVIRONMENT, TRANSPORT, AND ENERGY MINISTRIES




Source: Data collected from Member States August–October 2011

Note: Total percentage of women in high-level decision-making related to climate change in Ministries responsible for the sectors of the environment, transport and energy, by Member State. In Italy, the level 2 position in the energy authority was vacant at the time when the report was prepared; for the energy sector in Romania, level 2 data have not been confirmed and level 3 data were not available from the institution.

**121.** European Institute for Gender Equality (2012). Review of the Implementation in the EU of area K of the Beijing Platform for Action: Women and the Environment: Gender Equality and Climate Change Report.

### DIFFICULTIES IN RETAINING WOMEN STAFF

An analysis by Norad points to some of the difficulties in retaining women staff in energy institutions and utilities in developing countries:

> ***"Discriminatory attitudes and difficult working conditions can present obstacles for women's entry into energy institutions. When given the opportunity to speak out, women working in energy institutions in Asia and Africa describe obstacles to advancement being harassment and lack of essential facilities. Attention is clearly needed to remove barriers to women's entry into this sector. Family-friendly human resource policies have been shown to improve recruitment of both male and female staff in utilities in Europe."***[122]

Even when women have significant training and hold positions of power, a culture of preserving the status quo and an "old boy's network" prevents them from making decisions. In one case in a developing country, female senior energy experts attempting to pursue demand-side energy management to improve the country's contribution to climate change mitigation and to diversify contracting to include women-led businesses were forced out after a couple years of their tenure. They understood that being a woman was one of the barriers to succeeding in their positions—their significant expertise was not valued and decisions were often arranged behind the scenes without their involvement. In addition, the needs of female-headed households were not understood by those in control of decision making. Gender equality in decision making comes down to not just being elected, but being perceived to have legitimate knowledge and contributions.

## CORPORATE EXECUTIVES, BOARD MEMBERS, AND PROJECT MANAGERS

The limited number of women in the energy policy realm and public sector is echoed in the private sector. About 61% of US energy companies have no female representation on their Board of Directors.[123] A similar lack of diversity in renewable energy company leadership is seen by some to extend to a disconnect with communities at the site of renewable energy technologies. These gender imbalances are viewed by some as potentially holding back the expansion potential of the renewable energy sector.[124]

### BENEFITS OF GENDER EQUALITY TO CORPORATE PERFORMANCE

New efforts have emerged to understand the benefits of diversity and gender equality in decision making in the private sector, which could be applied to the clean energy industry:

- Research by Catalyst on the largest corporations in the US, some of which have a global reach, found that companies with three or more women on their Board enjoyed higher financial performance, including on equities, investment, and sales, than companies with no women on their Board.[125]
- A study by the MIT Center for Collective Intelligence analyzed group decision making and found that diversity leads to better decisions, due to three factors including how many women are in the group. The study drew on the fact that women are sometimes stronger at reading non-verbal cues and ensuring that everyone's voice is heard.[126]
- A study led by the Center for Responsible Business at UC-Berkeley found that companies with more women on their board of directors are more likely to

**122.** Norad (2013). Technical Note: Gender Cooperation in Energy Sector Cooperation.
**123.** GMI Ratings (2012). 2012 Women on Boards.
**124.** Britt Ide, personal communication, April 14, 2014.
**125.** Catalyst (2007). The Bottom Line: Corporate Performance and Women's Representation on Boards.
**126.** Woolley, A. W., Chabris, C. F., Pentland, A., Hashmi, N., & Malone, T. W. (2010). Evidence for a collective intelligence factor in the performance of human groups, Science Magazine, 29 October 2010, 330 (6004), 686-688.

"proactively invest in renewable power generation and related services… and measure and reduce carbon emissions of their projects throughout the value chain and implement programs with their suppliers to reduce carbon footprint."[127]

- Research by Goldman Sachs found that in the BRICS countries (Brazil, Russia, India, China, and South Africa) and N-11 countries,[128] narrowing the gender gap in employment could increase income per capita as much as 14% by 2020 and by 20% in 2030.[129]

### EFFORTS TO IMPROVE GENDER BALANCE IN THE ENERGY COMPANIES

Many companies are already aware of the benefits of paying attention to gender differences, for example incorporating the full range of inputs at the level of product design, but have not applied this diversity of input at the executive and Board level.

Some companies are beginning to apply these lessons by engaging men in gender equality initiatives, working on retention and promotion of women, setting accountability goals, adapting management training, and launching diversity and sexual harassment training to improve the work environment for women. Specifically in clean energy, a Parliament-led campaign in the UK called POWERful Women has set a goal of 40% of energy company middle management to be female, and 30% of executive energy company board members to be female, by 2030.[130] And Clean Energy Education and Empowerment (C3E), led by the US Department of Energy and the MIT Energy Initiative, organizes an awards program to bring visibility to mid-career women working to advance clean energy.[131]

Based on existing evidence, the benefits of gender balance need to be clarified for renewable energy companies and investors. These benefits include enhanced financial performance, informed risk-taking, the adoption of a development and rights perspective, collaborative processes, and enhanced communications to engage the other half of energy consumers.

## CONSTRUCTION WORKERS AND PLANT OPERATORS

Large-scale renewable energy projects require a sizeable labor force for the installation and operation of the plant itself, as well as indirect labor inputs such as manufacturing the technology, a wide spectrum of vendor services, accounting and financial oversight, and providing food, housing and other services for the on-site labor force. As of 2009, women made up 9% of the workers in construction worldwide and 24% in manufacturing. Three decades ago, the US government attempted to improve the numbers of women in the construction industry with a quota of 6.9%, but today female carpenters make up only 1.1% and female laborers make up 2.6% of the US construction industry.[132] The reasons vary for women not entering or advancing in the construction and other green economy infrastructure trades. In addition to antiquated union and apprenticeship practices, women sometimes face physical intimidation, employment practices that are not family friendly, or are not given training opportunities.

### CULTURAL BARRIERS TO WOMEN'S ADVANCEMENT IN CONSTRUCTION AND INFRASTRUCTURE

In many countries, cultural views of women's roles, perpetuated by men and women alike, prevent them from pursuing traditional male roles in the renewable energy sector. The growing size of wind turbines that requires climb many meters high, and the potential electric shock associated with large solar installations bring certain safety risks that are assumed to be more difficult for women.[133] Climbing ladders to work on wind turbines or solar panels is sometimes considered a job only for men. In one country in Africa, solar panels installed on a roof did not generate

**127.** Center for Responsible Business (2012). Women Create a Sustainable Future.
**128.** The following N-11 "Next Eleven" countries, according to a 2005 report by Goldman Sachs, have a high potential of becoming, along with the BRICS countries, the world's largest economies in the 21st century: Bangladesh, Egypt, Indonesia, Iran, Mexico, Nigeria, Pakistan, Philippines, South Korea, Turkey, Vietnam
**129.** Goldman Sachs (2008). Global Economics Paper No. 164: Women Hold up Half the Sky.
**130.** POWERful Women: http://powerfulwomen.org.uk.
**131.** C3E is a program of the Clean Energy Ministerial, a forum of 23 major economy governments accelerating the transition to clean energy technologies and policies.
**132.** International Labour Foundation for Sustainable Development (2009). Green Jobs and Women Workers: Employment, Equity, Equality.
**133.** Dominique Lallement, personal communication, April 10, 2014.

any power because women in the community would not climb the ladder to reach them and men were not willing to clean them.[134]

Jobs in heavy machinery and infrastructure are perceived as the domain of males, which prevents females in these jobs from succeeding. In a study of construction workers in India, people believed that women construction workers were unfit to acquire skills for advanced masonry work, despite the fact that their capability and desire to progress into those jobs was equal to men.[135] In Pakistan, women do not participate in plant Operations and Maintenance (O&M) activities, and O&M services in the energy sector in Pakistan remain a male-exclusive domain. Women staffed in Pakistan's generation companies primarily work in the administration or finance departments.[136]

### EFFORTS ON WOMEN'S ADVANCEMENT IN CONSTRUCTION AND INFRASTRUCTURE

There is evidence of specific benefits to projects when women are employed in construction and infrastructure. When women are the ones operating heavy mining equipment such as trucks and excavators, companies in Chile, Ghana, and Papua New Guinea have noticed that women maintain the machinery better and operating costs are lower.

Several countries have instituted training programs to increase the number of women in infrastructure-related employment. Brazil is among the countries that have launched training programs for women to secure technical jobs in infrastructure projects[137], and Haiti's Ministry of Rural Works trained women to use heavy earth-moving equipment for road construction jobs. Liberia set a 30% quota for women's employment in infrastructure reconstruction in order to boost the economy, by providing women with income to develop new economic endeavors.[138] New York City found success in securing 10% of apprenticeships for women and 15% of jobs for women on construction sites by setting targets with developers, contractors, and unions.[139]

### THE GENDER WAGE GAP

The gender wage gap is another important factor in renewable energy employment, especially in lower wage positions such as construction and manufacturing. Lower wages may impede women's pursuit of or retention in these jobs, and lower income may create a greater hardship for women and their families. In the US, where data is available, women in the STEM field earn 86% of their male counterparts. [140] Policy mandates can help ensure equal pay in the clean energy and all industries.

## ENTREPRENEURS, VENDORS, AND SUPPLIERS

There is great potential in the economic opportunities and revenue streams provided by large-scale clean energy programs, including for entrepreneurs, vendors, and suppliers. But if governments and energy companies are going to change existing gender imbalances, they must be proactive to identify and support women-led businesses in procurement processes and other contracting decisions.

### WOMEN'S SHARE OF ENTREPRENEURSHIP

Data is available on women's entrepreneurship in general, including through the Gender Global Entrepreneurship and Development Index (GEDI), which measures favorable conditions for high-potential female entrepreneurship development. Among the thirty variables used for ranking countries for this potential are female science graduates, networking potential, technology transfer, female business investors, and equal legal rights.

There is great variety in the levels of women's entrepreneurship in developing countries. In seven countries—Panama, Thailand, Ghana, Ecuador,

**134.** Katherine Lucey, personal communication, May 22, 2014.
**135.** Barnabas, A., Anbarasu, D.J., and Clifford, P.S. (2009). A Study on the Empowerment of Women Construction Workers as Masons in Tamil Nadu, India. Journal of International Women's Studies, 11(2), 121-141.
**136.** USAID Energy Policy Program (EPP) in Pakistan, implemented by Advanced Engineering Associates International Inc. (AEAI).
**137.** World Bank (2009). Mainstreaming Gender Equality in Infrastructure Projects
**138.** Lallement, Dominique (2013). Gender and Infrastructure, in Handbook of Research on Gender and Economic Life.
**139.** Moir, S., Thomson, M., Kelleher, C. (2009). Unfinished Business: Building Equality for Women in the Construction Trades.
**140.** Lallement, Dominique (2013). Gender Dimensions of RET Employment, and Hegewish et al. (2013).

Nigeria, Mexico, and Uganda—the level of women's entrepreneurship was equal to or slightly higher than men's in a 2012 study. The highest ranks for gender parity by region went to Sub-Saharan Africa, where 27% of the female population were entrepreneurs, and developing countries in Asia. Zambia is among the highest in Africa, with 40% of women in this role. The average in Latin America and Caribbean was 15%. On the lower end, only 4% of women in the MENA and mid-Asia region, and only 1% of women in Pakistan were entrepreneurs.[141]

More research is needed to confirm the entrepreneurship potential specifically in clean energy—perhaps with the help of existing data on renewable energy potential by country produced by institutions such as IRENA—and to identify what could be done to encourage the growth of women-led businesses in this sector.

Research on women's entrepreneurship suggests that increasing the number of female energy entrepreneurs who could provide services to large-scale projects will require their entry into the formal sector. Worldwide, women own or manage between 25% and 33% of formal sector businesses, but they own a higher percentage of businesses in the informal sector. Women's entrepreneurship activities are more likely to be based on necessity rather than opportunity, however there is evidence that this changes in situations where economic development exposes women to new opportunities. [142]

## STRATEGIES TO EXPAND WOMEN'S ENTREPRENEURSHIP

While women often manage credit and finance at the household level, they face concrete constraints to translating those skills to entrepreneurship, including access to credit, loans, information, education, markets, technology, and financial systems. A recent research initiative of the United Nations Foundation and ExxonMobil, featured in *A Roadmap for Promoting Women's Economic Empowerment,* discovered lessons for overcoming these constraints, which could be applied to clean energy. Some of the key lessons are summarized here:

- Capital alone, as a small loan or a grant, is not enough to grow women-owned subsistence level firms. The binding external constraints women face compared to men limit the size and type of firms they operate, as well as the impact of capital alone on firm profits and growth. A relatively large capital transfer, if paired with income generation training and follow-up technical visits, can transform occupational choices of very poor women, and can be cost-effective.
- Capital alone can work if it is delivered in-kind (e.g., inventory) to more successful (or profitable) women micro-entrepreneurs, with larger microbusinesses (closer to the size of men's businesses). In-kind capital seems to nudge women to keep the money invested in the businesses.
- Business training, in the way it has been delivered in the studies to date, improves business practices but has few measurable effects on the growth of women-owned subsistence level firms. Promising ways to improve the impact of business training include increasing the quality and duration of the training, following up the training with customized technical visits or expert advice to the firm, and targeting women running larger sized firms.

One way that renewable energy projects could incentivize women's entrepreneurship is to consider gender certification of vendors, suppliers, and other partners in the procurement process for these services. In Mexico, the National Institute for Women has found success with a program to certify gender equitable enterprises in both the private and public sectors, with participating entities reporting higher worker performance and productivity, reduction of gender gaps, and promotion of women to managerial positions.[143] Another recommendation that emerges across the gender and energy literature is the importance of helping women who are energy entrepreneurs participate in local energy committees.

**141.** Kelley, D., Brush, C., Greene, P., Litovsky. Y., and Global Entrepreneurship Research Association (2012). Global Entrepreneurship Monitor: 2012 Women's Report.

**142.** UN Foudation and ExxonMobil (2013). A Roadmap for Promoting Women's Economic Empowerment.

**143.** International Renewable Energy Association (2013). Renewable Energy and Jobs.

Successful champions are also needed to build visibility of women in this sector. Women in Oil and Energy South Africa (WOESA) promotes business opportunities for black women in South Africa in collaboration with the government.[144] One outstanding example in Asia is Dr. Wandee Khunchornyakong, the Chief Executive Officer of Thailand's largest solar farm developer who has been called the "solar queen of South Asia." She started Solar Power Company Group (SPCG) in 1993, and it currently has 36 solar farm projects. Dr. Khunchornyakong won the 2013 Women Entrepreneur of the Year award from Asia Pacific Entrepreneurship Awards and has committed herself to developing the next generation of women entrepreneurs in the industry. [145]

**144.** Women in Oil and Energy South Africa: http://www.woesa.com/
**145.** Wandee Khunchornyakong on Forbes List: http://www.forbes.com/profile/wandee-khunchornyakong/.

# 6. ROADMAP ON WOMEN AND CLEAN ENERGY

The aim of this paper, and the consultation process and workshop, is to explore the gaps in action and knowledge at the intersection of gender and large-scale renewable energy and to identify initial strategies for closing those gaps. Below are suggested steps organized under the themes of the paper drawn from the energy value chain—Enabling Policy; Private Sector Investment; Generation, Transmission, and Distribution; End Users; and Women's Advancement in Employment, Leadership, and Entrepreneurship. Given the lack of guidance that exists at most levels of the energy value chain, the emphasis is on initial steps and knowledge development that will benefit a wide variety of institutions and establish a launching point for momentum on this agenda. The recommendations draw from the author's research, the consultation process, and the workshop, and are relevant to both USAID's activities and those of other stakeholders.

## ENABLING POLICY

- Advocate for gender-responsive energy policies and ensure that energy is a focus of gender policies.
  - Analyze the national policy framework on clean energy in key countries, including LEDS, report on NAMAs, and national renewable energy polices, in order to establish a baseline for potential policy change in the future and provide this to major energy projects.
  - Assess countries' gender policy frameworks and the state of gender and clean energy, and identify policy gaps that could be addressed.
  - At project sites, assess gender-differentiated land use to identify opportunities for enhancing gender-responsiveness of projects.
  - Develop an example of a gender-responsive national renewable energy policy and budget. Since a comprehensive example of this does not yet exist in any country, it would be helpful to produce policy language and budget elements to aspire to.
- Create policy and project development support tools on gender and large-scale renewable energy.
  - Develop a checklist and decision tree.
  - Identify key indicators and evaluation ideas.
  - Create baseline assessment tools on gender-specific data and employment/entrepreneurship potential.
  - Provide sample project document language.
- Develop training content and methodology on gender and large-scale clean energy.
  - Offer gender training to policy makers, industry representatives, regulators, technicians, and independent evaluators.
  - Enhance the capacity of gender experts, women's organizations, and multilateral gender focal points on renewable energy and climate change mitigation, in order to encourage engaged participation in policy and LEDS processes and large scale project development.
- Mandate the collection of gender-disaggregated data in clean energy.
  - Monitor gender balance in utilities and ministries, and in employment and entrepreneurship.
  - Identify potential gender impacts of large-scale renewable energy projects.
  - Adapt gender indicators from other sectors establish baselines.
- Develop gender-responsive LEDS.
  - Collaborate with national women's ministries and women's organizations to collect gender-specific data and information.
  - Engage gender experts to propose gender elements for strategy drafts, drawing on national gender plans, identifying gender-specific co-benefits, and adapting assessment and monitoring methods.

- Pursue policy innovations to address gender inequalities in clean energy.
  - Research incentives to target low-income women ratepayers in policies to stabilize renewable energy pricing, considering relevant elements of the country's policy framework on gender and/or energy.
  - Recognize, incubate, and support innovative organizations and individuals that are bridging the gender divide in clean energy.

## PRIVATE SECTOR INVESTMENT

- Build gender-specific co-benefits into project design.
  - Leverage the existing gender policies and practices of donors and international finance institutions, including specific reporting standards and data requirements.
- Employ a voluntary tool for sustainable development co-benefits that includes gender for project design and monitoring.
  - Ensure that carbon market standards such as the Gold Standard include gender as part of project design requirements.
- Undertake gender-specific research initiatives to inform the implementation of clean energy projects that are backed by multilateral institutions, donors, and private sector.
  - Investigate solutions to gender inequalities in other sectors that could be adapted to clean energy, e.g. women entrepreneurs in agriculture and gender-responsive transportation policies.
  - Identify, for example, the data and capacity needs of Power Africa partners, considering the role of standards and targets and the data that companies already have.
  - Analyze internal data from energy companies, for example Catalyst data on corporate performance.
  - Research avenues for addressing gender as a way of reducing risk and increasing returns on clean energy investments.
  - Examine methods of institutionalizing gender in onboarding of staff.
- Map key private sector actors and the general landscape of the clean energy value chain to identify entry points, including different models of energy distribution.
- Document success stories and benefits to women at small scale in order to catalyze success at larger scale and explore the possibility of aggregating many small projects.
- Advocate for gender to be addressed in future carbon markets and standards, as well as domestic schemes such as NAMAs.
- Build awareness that women are essential actors in the entire energy value chain, and move the agenda beyond characterizing women only as beneficiaries and vulnerable populations.
  - Interact with energy industry associations and their national partners, by establishing best practices, embedding gender experts in national utilities for technical assistance assignments, and organizing learning exchanges among female utility executives.
  - Identify champions and speakers.
  - Establish a presence at private sector energy conferences and partnership with other government programs, such as Methane 2 Markets (M2M) and Private Finance Advisory Network (PFAN).
- Apply a gender approach to clean energy investment tools, such as feed-in-tariffs, renewable energy auctions and competitive bidding techniques, power purchase agreements, performance metrics, private sector subsidies and other economic incentives, and credit facilities for women.
- Build awareness about the importance of gender-responsive projects among institutions that support private sector investment.
  - Incorporate a gender dimension in the standardized project development templates for renewable energy, by collaborating with the Private Infrastructure Development Group.
  - Address gender in credit enhancement guarantees, by collaborating with the Overseas Private Investment Corporation.

- Explore an incentive or quota system for procurement and manufacturing tied to renewable energy portfolio that promotes women's employment and entrepreneurship.
- Invest in the community consultation process of a renewable energy project to achieve transformative value for women (rather than band-aid solutions) to establish a best practice. This includes training for institutions that provide the community consultation service.

## GENERATION, TRANSMISSION, DISTRIBUTION (INFRASTRUCTURE)

- Adapt project documents and assessments to be gender-responsive throughout the project cycle.
  - Explore a requirement of gender-responsiveness in all contracts and agreements.
  - Engage and/or hire gender specialist(s) with energy expertise.
  - Include gender-disaggregated data in the environmental and social impact assessment, resettlement action plan, and project monitoring system, and gender requirements in the terms of reference for producing these.
  - Address gender issues in the project's operational manual.
  - Ensure that both female and male stakeholders participate throughout the project cycle.
  - Establish line items for gender-disaggregated data collection, gender training, and gender analysis in the project budget.
  - Build capacity of implementing partners, culling lessons from peer countries, collaborating with women professionals and energy industry associations.
- Ensure that existing frameworks for Environmental and Social Impact Analysis & Resettlement Action Plans that are attached to clean energy generation and transmission agreements incorporate a gender dimension, for example in collaboration with the International Association for Impact Assessment.
- Develop rapid assessment tool to identify renewable energy projects that could offer gender equality wins.
- Identify promising practices from other utilities to address gender inequalities, including the use of technology, pricing, interface, and marketing (for example, USAID's Sustainable Water and Sanitation in Africa (SUWASA) regional program in Africa and World Bank activities in Nigeria).
- Build and harmonize national system indicators and data collection across multilateral development banks, bilateral institutions, OECD, non-governmental organizations, and civil society organizations.
- Incentivize sharing of data between utilities and services, for example with banking, communications, water, and other sectors.
- Support local advisory committees to address and monitor the strategic needs of women, considering the model of Uruguay's energy ministry presented at the workshop.
- Collaborate with gender focal points in ministries, institutions, and utilities, and consultants that advise energy sector at local levels.
- Develop a compendium of case studies, data, webinars, and other tools on gender in clean energy infrastructure that is publicly accessible.
- Create and implement a gender scorecard for utilities, building on reporting criteria under Corporate Social Responsibility frameworks.
- Develop and require gender training across institutions and positions engaged in clean energy infrastructure development, for example lawyers, contract officers, human resources, finance, etc.
  - Require gender content in subsector trainings and modules and build this into Power Purchase Agreements, contracts, Memorandums of Agreement, etc.

## END USERS

- Explore "community energy" models that specifically benefit women, allowing energy production equipment (wind turbines, solar panels, etc.) to be owned by women community members and for those owners to receive a return on their investment, a vested interest that would simultaneously encourage paying energy bills.
- Build cross-cutting partnerships within countries to engage rural electrification agencies, education, and maternal health care sectors on distributed energy access through women's enterprise.
- Document case studies of women's involvement in the value chain and resulting benefits, for example actions taken by donors, governments, private sector, etc.
- Expand gender mainstreaming in energy policy to more countries and deepen existing efforts in Latin America to promote dialogue, networking, and ensure institutions are gender-responsive.
- Develop cooperation across regions on gender mainstreaming in the energy sector.
- Engage end users to identify their needs, the business opportunities they seek, and the innovations in which they could engage.
- Explore bottom-up approaches and innovations that draw from the perspective of end users.

## WOMEN'S ADVANCEMENT IN EMPLOYMENT, LEADERSHIP, AND ENTREPRENEURSHIP

- Map the state of women's roles and potential for advancement in renewable energy by region, through quantitative and qualitative data analysis, including data on renewable energy potential by country housed at IRENA and ESMAP, and surveys. Mapping exercises could include:
  - Existing players, actors, activities
  - Identity and location of champions
  - Bottlenecks for women
  - Data that is collected and not collected
  - When energy or gender policies are open for review
  - Successful models for training and advancement
  - Largest renewable energy projects in developing countries
- Develop a network of stakeholders on women's advancement in clean energy, including donors, multilateral institutions, national energy institutions, industry associations, civil society, academia, private sector, investor forums, etc.
- Build awareness of women's role in clean energy, including stories of women and girls in the energy sector, side events at major energy meetings, communication campaigns, identifying high level champions, and replicating successful models for women's advancement.
- Facilitate south-south leadership exchange on women's advancement in the clean energy sector, in order to share experiences and methods across countries and regions.
- Build vocational training programs through partnership with local universities to address the skill gaps in the clean tech sector. Such programs should be designed to especially support women leaders, managers and entrepreneurs.
- Support women entrepreneurs, especially in underserved communities.
- Explore incentives for women's advancement in STEM, for example through collaboration across universities and industries.