



GENDER AND CLIMATE CHANGE
Capacity development series
ASIA AND THE PACIFIC **Training module** **4**

Gender and energy

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I Purpose of the training module

Box 1: Icon key



Activity or exercise



Link to other training modules



PowerPoint or video presentation



Readings



Important information



Timing indication



Internet link

IA Rationale

The lack of international, regional and national gender-specific expertise on climate change and sustainable development issues poses one of the most pressing challenges to addressing the gender dimensions of climate change in developing countries.

To respond to this challenge, the United Nations Development Programme (UNDP) has developed a series of gender and climate change training modules and policy briefs directed at practitioners and policy makers in the Asia-Pacific region. The covered themes are specifically relevant to the region and focus on climate change issues such as adaptation and mitigation, disaster risk reduction, energy and finance.

These materials draw on the capacity development work being undertaken in partnership with other members of the Global Gender and Climate Alliance and complement the Alliance's existing training modules, resource guides and related knowledge products. They are designed to facilitate the work of the regional cadre of national experts and other partners in the Asia-Pacific region to mainstream gender into climate change efforts. The materials' preparation has been made possible by contributions from the Government of Finland and the Government of Denmark.

The materials target a range of practitioners and policy makers. The materials are designed to be used by those with experience in gender and development or by those with backgrounds in climate change, the environment and sustainable development. Readers will gain a greater and shared understanding of how gender and climate change intersect. The learning goals of this module are outlined in the Part II.

This fourth module in the series deals with gender issues in the production and use of energy and clean energy technologies.

IB *Module structure and method*

This module provides the basic information and learning tools needed to understand and advocate for integrating gender perspectives into regional, national and community-level climate change initiatives. It covers the following topics:

- Gender-differentiated aspects of energy production, use and distribution in the Asia-Pacific region;
- Climate stress on the energy sector and the gendered results of these changes; and
- The need and options for integrating gender perspectives into energy policy and development and the deployment of clean energy technologies.

Part II of this module outlines learning objectives and presents what users can expect to know when the training concludes. Part III spells out the key take-away messages, followed by parts IV and V, which examine the nexus between gender, energy and technology (including the gender-based constraints that women face in energy production and use), as well as the impact of climate change on the energy sector. Part VI presents tools and options for bridging the identified challenges.

The module also presents case studies and other learning tools (e.g. handouts and group activities) to help facilitate the use of the module and think through issues to consider when designing and implementing gender-responsive energy and clean energy technologies in response to climate change. In addition, the module employs seven icons to help make it user-friendly (see Box 1). The module includes several cross-references in order to encourage facilitators and participants to consult the other modules in this series.

Training based on this module can be delivered in three sessions:

- Session 1: Parts II and IV (1 hour)
- Session 2: Part V (1 hour)
- Session 3: Part VI (1 hour)

See Appendix B, Learning Tools, for a breakdown of time for different activities.

II Learning objectives

- Understand the relationships among climate change, energy, poverty and gender in general and the gender dimensions of rural energy production, distribution and use in the Asia-Pacific region.
- Identify gender barriers in the energy sector that contribute to women's poverty (time and resource poverty) and exacerbate health risks.
- Identify pathways for addressing the various gender barriers in the energy sector in order to achieve greater gender equity, reduce emissions and increase energy security.



III Key messages



- Energy is critical to development, poverty alleviation and the achievement of the Millennium Development Goals (MDGs).
- Climate change impacts the energy sector, including supply, demand, energy endowment, infrastructure and transportation.
- Many rural communities in the Asia-Pacific region do not have access to basic energy or energy services, especially South Asia; millions still rely on biomass and fuel wood, and their collection and management is generally women's responsibility.
- Women and men play very different gender-defined roles in energy production, distribution and utilization in households, communities and the market.
- Women are time-poor and disproportionately exposed to the health risks associated with some forms of energy production (e.g. poorly ventilated kitchens have indoor air pollution from burning biomass in traditional stoves).
- Climatic stresses on forest resources is increasing the burden on many women, forcing them to travel even longer distances and spend more time in fetching fuel wood, water and fodder.
- There are several small-scale clean technologies that can improve energy production.
- Improved, modern energy services can improve women's socio-economic status by reducing the time and effort involved in household chores and alleviating the health risks associated with current energy practices.
- Introducing cleaner, more efficient and renewable energy sources can bring training, employment and entrepreneurial opportunities for women and men.
- Empowering women and girls and drawing on their needs and knowledge is necessary for energy development, energy security and reducing emissions.
- Incorporating gender perspectives into energy projects, policy and planning is essential to ensuring their effectiveness.

IV Gender, poverty and energy in the era of climate change

Learning objective: Understand the relationships among climate change, energy, poverty and gender and, in particular, the gender dimensions of rural energy production, distribution and use in the Asia-Pacific region

1. Energy poverty remains one of the most formidable challenges to any progress in global development, including achievement of the MDGs.

1A. Energy is essential to life in the 21st century. Access to modern energy services (e.g. clean cooking fuels and stoves, advanced biomass cooking stoves and biogas systems) plays a key role in facilitating access to clean water, sanitation and health care. They also help advance development in general through “provision of reliable and efficient lighting, heating, cooking, mechanical power, transport and telecommunication services” (IEA et al. 2010). On the contrary, lack of access to modern energy services poses major roadblocks to economic and social development across all levels and, although there is no specific MDG on energy, lack thereof could potentially regress any gains made towards achievement of the Goals (UNDP and WHO 2009). Most of the countries that are currently off-track on achieving the MDGs are those with less energy access (See Part V, paragraph 10 and Box 4 for more information on the importance of modern energy sources in achieving MDGs) (Practical Action 2009).

1B. Energy poverty is one of the most daunting challenges facing the international community. Energy poverty is the absence of adequate modern energy services to meet basic household needs (e.g. cooking, lighting) and the lack of basic energy for essential services (e.g. health care, schooling, income generation) (see Box 2 for relevant definitions). “The hidden crisis of energy poverty condemns billions of men, women and children in the developing world to continue to live in absolute poverty because they have no access to modern energy services; energy which is taken for granted in the developed world at the flick of a switch or the press of a button” (Practical Action 2009). The number of people who have no access to modern energy is inexcusably high; worldwide, 2.7 billion people rely on the traditional use of biomass (the often unsustainable use of wood, charcoal, agricultural residues and animal dung for cooking and heating), and 1.4 billion do not have access to electricity (UNDP 2011a). Energy poverty is intimately linked to general poverty. With the absence of significant political commitment and investment in addressing equity issues in energy supply and demand, energy poverty is projected to increase further over the next 20 years (Danielsen 2012).

Box 2: Understanding energy poverty and access to energy

Energy Poverty: “The concept of ‘energy poverty’ has arisen from the definition of poverty itself. The World Bank study *Listening to the Voices of the Poor* concludes that poverty is a complex, multi-dimensional phenomenon—gendered, dynamic, complex, institutionally embedded and location specific. It is routinely defined as ‘the lack of what is necessary for material well-being’—particularly regarding food, but also housing, land and other assets. Poverty is the lack of multiple resources leading to physical deprivation. This definition is consistent with the more recent notion of Multidimensional Poverty Index as advocated in the 2010 Human Development Report, which relates poverty to overlapping deprivations suffered by households in areas of health, education and living standards. The dimensions of poverty go beyond inadequate income, encompassing poor health and nutrition, low education and skill levels, inadequate livelihoods, bad housing conditions and social exclusion.”

Energy access: “Making modern energy available and affordable. Over the years, energy access and energy poverty have been defined in many ways. These definitions converge in highlighting the role that modern energy services can play in reducing poverty and achieving the MDGs. As the perspective of poverty is becoming multidimensional, energy poverty is described as a lack of access to resources, denial of opportunities and choice in access to energy that is adequate, safe and reliable for economic and human development. Access is then a function of availability and affordability, where energy is considered available if the household is within the economic connection and supply range of the energy network or supplier and affordable when the household is able to pay the up-front connection cost (or first cost) and energy usage costs.”

Minimum energy access thresholds: “There is no universally accepted minimum threshold for energy access. Poor households spend a large portion of their incomes and human resources on energy because it is essential to meeting basic needs such as cooked food and transport. Using this as the starting point, the International Energy Agency proposed 100 kilowatt hour (kWh) of electricity and 100 kilograms of oil equivalent of modern fuels per person per year as a minimum threshold for defining energy access. The high-level Advisory Group on Energy and Climate Change states that access must be reliable, affordable (the cost to end-users compatible with their income levels and no higher than the cost of traditional fuels), sustainable and, where feasible, from low greenhouse gas-emitting energy sources. At the same time, it contends that expanding energy access must go beyond meeting the basic needs: it should aim to create improved conditions for economic take-off, contribute to attaining the MDGs and enable the poorest to escape poverty.”

Source: UNDP 2011a.

2. Energy-related challenges of the poor are likely to get worse as a result of climate change. Because rural communities tend to rely on biomass supplies for their daily energy needs, any climate change-induced stress on adjacent ecosystems is bound to cause biomass (and hence energy) scarcities.

2A. Climate change and energy are interrelated in at least two ways. Curbing global greenhouse gas emissions is critical to mitigating climate change. Because energy demand is growing, the attendant increase in energy-related emissions is a source of great concern. According to the International Energy Agency, world energy-related carbon dioxide emissions could rise from 30.2 billion metric tonnes in 2008 to 35.2 billion metric tonnes in 2020 and 43.2 billion metric tonnes in 2035—an increase of 43 percent over the projection period (IEA 2011). There is therefore a strategic interest in curbing the energy sector’s contribution to climate change. Energy also has strategic socio-economic benefits, which could be adversely impacted by climate-induced pressures on ecosystems that provide the much needed livelihood resources (e.g. fuel wood for energy) of many rural communities. Furthermore, “climate change also affects agriculture-dependent incomes, forcing many to switch to cheaper and inferior fuels” (UNDP 2011a). This module places more focus on the benefits of expanding energy access to poor communities, with emphasis on cleaner energy technologies.

2B. Other formal sources of energy are also expected to be more and more impacted by climate change. One aspect of the energy sector that will be noticeably impacted is energy supply and demand (ADB 2012, Ebinger and Vergara 2011). The severity of these impacts will also be driven in part by the current state of the sector at the time (e.g. inefficiencies in energy and water use mean energy services are vulnerable and have less capacity to deal with change) (see Table 1) (ADB 2012, Ebinger and Vergara 2011).

2C. The Asia-Pacific region accounted for 44 percent of the total global primary energy supply in 2008, the biggest in the world (in contrast, the North American share was 21 percent, Europe 16 percent, Latin America 6 percent and Africa 6 percent). Per capita energy consumption was 74 percent of the world average (in contrast, Africa’s consumption was 40 percent, Europe 187 percent and North America 413 percent of the global average) (UNESCAP 2011). Energy use in South Asia is expected to increase to one-fifth of the world’s total energy consumption by the end of 21st century (Bhattacharya and Parikh 2004). As the Intergovernmental Panel on Climate Change notes, “[a]n increase in the energy consumption of industry, residential and transport sectors could be significant as population, urbanisation and industrialisation rise. It is likely that climate change will influence the pattern of change in energy consumption that could have significant effects on CO₂ emission in this region” (Cruz et al. 2007).

These figures do not display the human face of the energy crisis in the developing world. At present, almost 800 million people in the Asia-Pacific region have no

Table 1: Energy sector vulnerability to climate change

Item	Relevant climate impacts			Impacts on the energy sector
	General	Specific	Additional	
Climate change impacts on energy supply				
Hydropower	Water availability and seasonality	Water resource variability Increased uncertainty of expected energy output	Impact on the grid Might Overload transmission capacity Extreme events	Increased uncertainty Revision of system reliability Revision of transmission needs
Wind power	Alteration in wind speed frequency distribution	Increased uncertainty of energy output	Short life span reduces risk associated with climate change extreme events	Increased uncertainty on energy output
Biofuels	Reduced transformation efficiency	High temperatures reduced thermal generation efficiency	Extreme events	Reduced energy generated Increased uncertainty
Solar power	Reduced solar cell efficiency	Solar cell efficiency reduced by higher temperatures	Extreme events	Reduced energy generated Increased uncertainty
Thermal power plants	Generation cycle efficiency Cooling water availability	Reduced efficiency	Extreme events	Reduced energy generated Increased uncertainty
Oil and gas	Vulnerable to extreme events	Cyclones, floods, erosion and siltation (coastal areas, on land)	Extreme events	Reduced energy generated Increased uncertainty
Impact on energy demand				
Energy use	Increased demand for indoor cooling	Reduced growth in demand for heating Increased energy use for indoor cooling	Associated efficiency reduction with increased temperature	Increasing demand and peak demand taxing transmission and distribution systems
Other impacts				
Cross-sector impacts	Competition for water resources Competition of adequate sitting locations	Conflicts in water allocation during stressed weather conditions Competition for good sitting locations	Potential competition between energy and non-energy crops for land and water resources	Increased vulnerability and uncertainty Increased costs

Source: Adapted from Ebinger and Vergara 2011.

access to electricity and almost 2 billion rely on the traditional use of biomass for cooking. “Lack of access to modern energy means using polluting kerosene lamps for illumination, cooking with inferior fuels and suffering lengthy exposure to harmful smoke and fumes and, in most cases, ending the productive day at sundown” (UNESCAP 2011, UNDP 2011a).

2D. Despite the challenges it poses, climate change also presents opportunities for accelerating access to modern and clean energy. For example, the annual estimated greenhouse gas emission reductions through the installation of biogas plants in Nepal (through the Biogas Support Programme) are about 613,000 tonnes of CO₂ (UNDP 2011a). In addition to expanding energy access, this process reduces methane emissions from anaerobic degradation of cow dung and other biomass material, thereby reducing greenhouse gases. This programme testifies to the fact that creative policies and programmes can produce solutions that address both environmental sustainability and equity (Fernando 2008, UNDP 2011a).

3. Energy poverty has a disproportionate effect on women and girls.

3A. While energy poverty is a burden for all poor populations, women are disproportionately impacted since their access to energy resources and benefits is further limited by gender disparities (Danielsen 2012). The effects of energy poverty on women and girls are harsh, far reaching and include the physical and time effects of drudgery in travelling long distances for fuel-wood, health effects of indoor pollution and decreased school attendance (Danielsen 2012).

Box 3: Effects of energy poverty

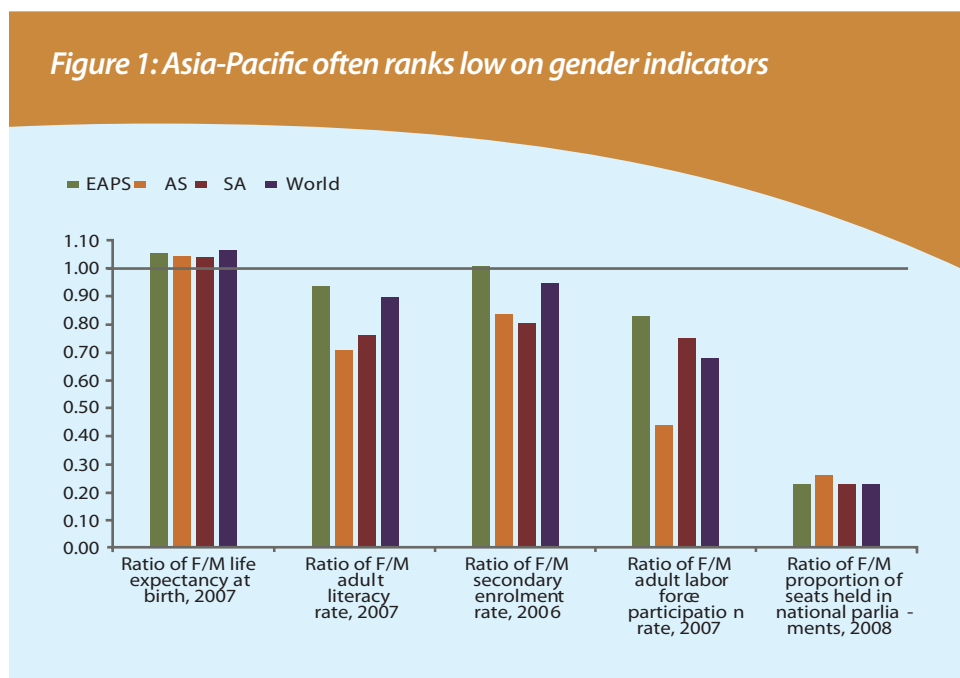
“As a result of time consuming and physically draining collection of biomass fuels, women and girls’ health conditions are poor, their options to earn additional income are minimal, the opportunities to improve their labour productivity are low, the options for social and political interaction outside the household are restrained, the chances of benefitting from training and extension are limited, and schooling carries high opportunity costs often making it inaccessible (especially for girls). Moreover, these conditions create further barriers to women’s ability to voice their energy concerns and claim rights, reinforcing women’s exclusion and exacerbating the problems. All other members of the household, including men, are negatively affected when women have limited access to modern energy services.”

Source: Danielsen 2012.

3B. Gender inequalities and the gender dimensions of energy access vary across social, cultural, economic and political contexts. Women in the Asia-Pacific region suffer from pervasive gender imbalances (UNDP 2010c). As the Asia-Pacific Human Development Report observes, “[i]n every country across Asia and the Pacific, pervasive gender inequality remains a barrier to progress, justice and social stability, and deprives the region of a significant source of human potential. Inequality persists despite robust growth and progress, and cuts even deeper for poorer or otherwise excluded groups” (see Figure 1) (UNDP 2010c). The region is home to about 70 percent of the world’s extremely poor rural people, with 1.8 billion people living on less than \$2 per day, and 947 million struggling on less than \$1.25 per day (Fernando 2008, UNESCAP 2011). A majority of this demographic are rural women, who tend to rely on climate-sensitive livelihood resources. For example, 47 percent of employed women in the region were engaged in the agricultural sector in 2008, compared with 38 percent of men (IEA et al. 2010, UNESCAP 2011).

4. Electricity is still a luxury for many rural women and men, and modern energy services (including cleaner cooking technologies) are far from accessible. This problem is more pronounced in the informal sector, which tends to include more poor women,

Figure 1: Asia-Pacific often ranks low on gender indicators



Note: EAP – East Asia and the Pacific, SA – South Asia, SSA – Sub-Saharan Africa, F/M – female/male. For each one of the indicators noted in the table above, a lower ratio demonstrates the presence of greater gender inequality.

Source: UNDP 2010c.

as biomass is the main source of fuel (See paragraph 3 for general content on gender-specific problems women and girls face as energy producers and users).

4A. In many developing countries, energy is the primary responsibility of women (especially in rural communities), where most energy is derived from traditional biomass fuels such as wood, charcoal and agricultural wastes (Carr and Hartl 2010, Karlsson 2007). Women face a range of gender-specific problems in relation to their roles in the production and utilization of energy services (see paragraph 3). There are a number of factors that account for this, including differing energy needs linked to gender roles (e.g. cooking, cleaning, food drying and preparation, and income generation), women and girls bearing the main burden of biomass collection, and women being generally disadvantaged in terms of ownership and access to land, natural resources, credit, information and decision making. These limitations also impact access to necessary resources, such as collateral, technology, education, and information to start and participate in energy projects and initiatives.

While the gender aspects of energy poverty are more acute in the informal sector, women also face gender-based constraints in the formal sector.

4B. Benefits of cleaner and more efficient energy sources for women and girls include:

- Providing clean water, sanitation and health care will save women and girls time in fetching water and ease their household cleaning and care responsibilities;
- Providing reliable and efficient lighting, which has both safety and an education benefits—it contributes to girls' education by allowing them to do schoolwork after their domestic chores are finished and greatly increases safety in public spaces; and
- Providing electricity and mechanical power for income-generating activities and reliable supply to households eases women's household burdens and increases their incomes (ENERGIA 2011, IEA et al. 2010).

Developing renewable, non-emission-generating and affordable energy sources and cooking solutions will make important contributions to addressing climate change and decreasing carbon emissions (Bathge 2010).

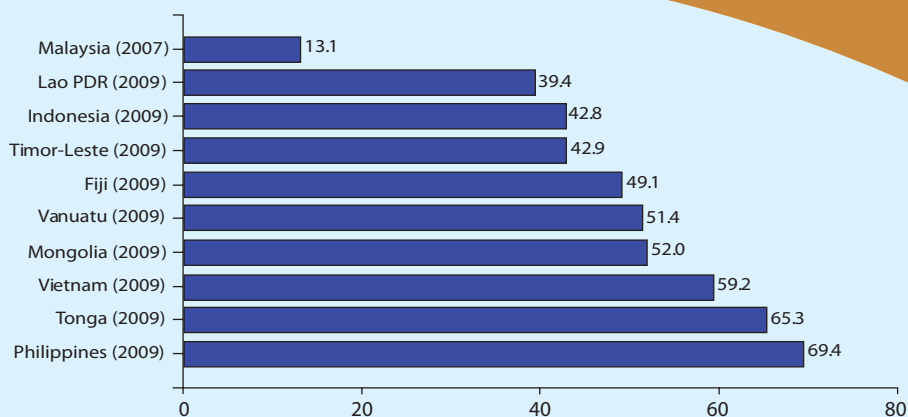
4C. Energy policies affect men and women differently wherever their home, work and community roles differ (Karlsson 2007). For example, many societies consider electrical energy for use in households and public facilities dangerous. Boys are expected to face and master these dangers; girls are encouraged to acquaint themselves with the basics but do not have access to advanced knowledge on the subject (Karlsson 2007). In the Lao People's Democratic Republic, for example, men are considered to be responsible for the technical side and investments in thermal

Table 2: Female participation in firm ownership, management and the workforce

Economy	Percent of firms with female participation in ownership	Percent of firms with a female top manager	Percentage of permanent full-time workers that are female	Percentage of permanent full-time production workers that are female
East Asia and the Pacific	54	27	39	11
South Asia	17	6	13	2
World	35	18	31	10

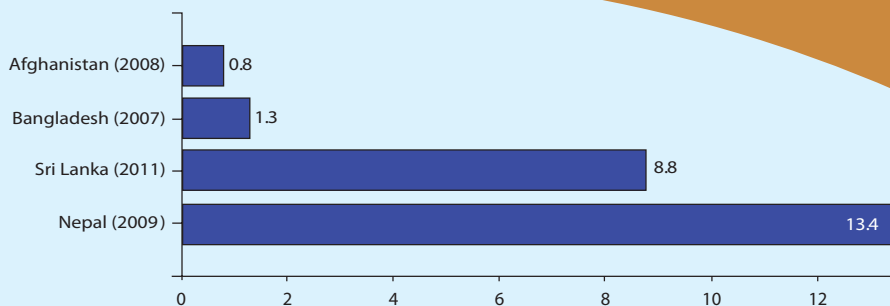
Source: Adapted from World Bank 2011.

Figure 2: Percentage of firms (manufacturing) with female participation in ownership – East Asia and the Pacific



Source: Enterprise Surveys, www.enterprisesurveys.org.

Figure 3: Percentage of firms (manufacturing) with a top female manager– South Asia



Source: Enterprise Surveys (www.enterprisesurveys.org).

insulation of homes, boilers and hot water installations. Electrical installation, plumbing and installation of heating systems are male domains (Aguilar et al. 2009). Such stereotypes often lead to women being excluded from training and employment opportunities and discussions about energy plans and policies (United Nations 2009).

5. Energy use in business and entrepreneurs also has a gender dimension.

5A. Women have lower participation in the formal sector in many countries in the Asia-Pacific region. Female employment in industry has increased only slightly from 17 percent in 1991 to 18 percent in 2008. In contrast, 47 percent of women are engaged in agriculture, compared to 38 percent of men (UNESCAP 2011). Table 2 shows women's primary source of employment in much of the region continues to be in small enterprises in the informal sector.

5B. Women-headed businesses generally face more impediments in accessing grid electricity compared to men (Enterprise Surveys at <http://www.enterprisesurveys.org>). Women's enterprises in this region need improved access to energy, including better lighting (Alstone et al. 2011).

5C. Small-scale energy projects that are run and maintained by women can serve the dual purpose of providing clean, renewable and affordable energy while improving women's incomes. Small-scale, off-grid renewable energy technologies can contribute

to income-generating opportunities and the overall economic empowerment of women, most notably in areas such as agriculture, fisheries and textile processing. In Bangladesh, Grameen Technology Centres are training poor women as Solar Technicians in an initiative to scale up Solar Home Systems across the country. Once certified, female technicians sign annual contracts with Solar Home Systems' clients for ongoing maintenance. In a similar initiative in India, the Barefoot College teaches rural women solar engineering, including how to build, install and maintain solar panels. These solar engineers can then install solar power systems in villages which previously had no energy access (Lal 2008). The EmPower project in India builds women's capacity to maintain small energy service units and associated technologies and services such as briquette machines and tree planting. In Rwanda, a group of women garbage collectors began producing biogas from the garbage they collected by compressing and selling briquettes. The cooperative they formed for this enterprise now employs 110 members to collect the garbage from 3,000 households and turn it into an energy source (ENERGIA 2011, UNCTAD 2011).

6. Lack of recognition of women's role in the energy sector often leads to financing and executing gender-blind energy policies. For example, the Clean Development Mechanism, one of the major global climate finance mechanisms, has been subjected to criticism for de-emphasizing investments in small-scale projects that benefit women and poor communities (Karlsson 2010, UNDP 2010a). Some finance mechanisms, including the Climate Investment Funds, are working to become more gender-responsive.

Large infrastructure projects designed to promote cleaner, more efficient forms of fossil fuels and renewable energy can bring many opportunities for gender equality when designed properly. For example, energy projects can offer women new skills training, increased employment, entrepreneurship opportunities and more equitable, community-level benefit sharing.



For more on the gender aspects of climate change see Module 1 and Module 2

Summary questions

- **What is your understanding of the nexus between energy and climate change in the Asia-Pacific region?**
- **What is the relationship between gender and energy?**
- **What factors account for gender-specific problems that women face in relation to their roles in the production and utilization of energy services?**

v Gender-related challenges in energy

Learning objective: Identify barriers in the energy sector that contribute to women's poverty (time and resources) and create health risks

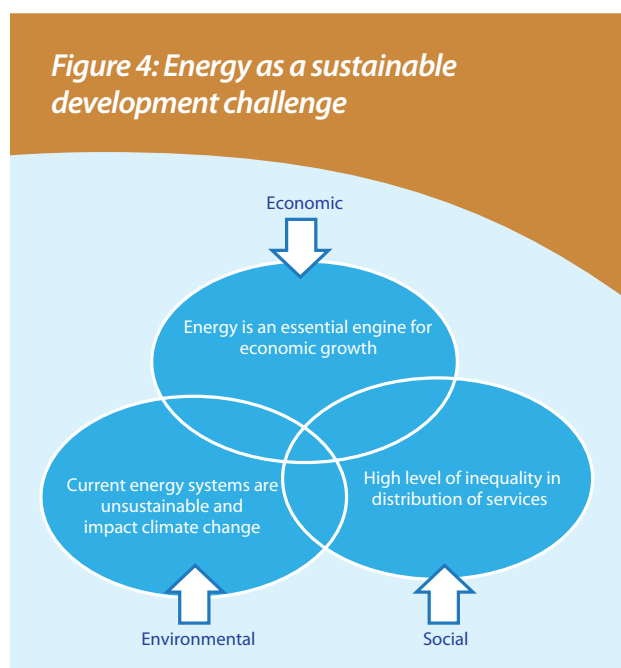
7. Lack of quality, clean and modern energy poses complex challenges ranging from gender inequality and achievement of MDGs to poverty eradication and climate change.

7A. Lack of energy poses complex social, environmental and economic challenges. Socially, inequalities in energy access and consumption must be addressed. Excessive use of greenhouse-gas emitting energy sources aggravates climate change, and therefore improving energy access must account for environmental concerns. Finally, limitations in energy supplies place restraints on economic growth. These three factors combine to make energy a fundamental challenge to sustainable development (see Figure 4) (UNDP 2011a).

7B. Grid-based electrical power does not reach many rural and poor urban and peri-urban communities in developing countries, nor do the communities receive

adequate distribution of gas or other cooking and heating fuels (UNDP 2011a). This training module focuses primarily on these communities. With approximately 800 million people with no access to electricity, the Asia-Pacific region has a highly energy-poor population comparable to Africa, where 550 million people (over 75 percent of the population) do not have access to electricity (see Table 3) (IEA 2011; UNDP 2010b, 2011a, 2011c; World Bank 2010b, 2011).

Figure 4: Energy as a sustainable development challenge



Source: UNDP 2011a.

Table 3 presents the number of people in the Asia-Pacific region who still rely on traditional biomass energy resources. In South Asia, about 700 million (about 50 percent of its population), lack access to electricity (about 90 percent of those without access in South Asia live in rural areas) (World Bank 2010a). The region's dependence on biomass will leave them vulnerable to climate change and variability impacts such as accelerated loss of vegetation and desertification caused by decreased rainfall and increased disasters.

8. Rural women are disproportionately exposed to energy-poverty and energy-related challenges, which in turn will be exacerbated by climate variability and change. Gendered roles in society often ascribe the responsibilities for collecting fuel to women and girls.

Table 3: People without electricity

	Without electricity		Relying on traditional use of biomass for cooking	
	Population (million)	Share of population (%)	Population (million)	Share of population (%)
<i>Developing Asia*</i>	675	19	1921	54
<i>India</i>	189	25	836	72
<i>Bangladesh</i>	96	59	143	88
<i>Indonesia</i>	82	36	124	54
<i>Pakistan</i>	64	38	122	72
<i>Myanmar</i>	44	87	48	95
<i>Rest of Developing Asia</i>	102	6	648	36
<i>Africa</i>	587	58	657	65
<i>Developing Countries</i>	1314	25	2662	51
<i>World</i>	1317	19	2662	39

Notes

*For purposes of this table, developing Asia includes Afghanistan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Chinese Taipei, Cook Islands, East Timor, Fiji, French Polynesia, India, Indonesia, Kiribati, the Democratic Republic of Korea, Lao People's Democratic Republic, Macau, Malaysia, Maldives, Mongolia, Myanmar, Nepal, New Caledonia, Papua New Guinea, Pakistan, the Philippines, Samoa, Singapore, Solomon Islands, Sri Lanka, Thailand, Tonga, Vanuatu and Viet Nam.

**World total includes OECD and Eastern Europe/Eurasia

Source: IEA 2011.

8A. Women carry greater loads than men but have a lower intake of calories in cultures with gender-based food hierarchies (Dankelman 2010, UNDP 2011a, WHO 2011). The physical burden involved in carrying out these responsibilities can pose a serious strain on women's health because carrying heavy loads over long periods can lead to early ageing of the vertebral column (WHO 2011). Women's poor nutritional access in relation to their workload leads to increased prevalence of anaemia, delivery problems, increased rates of intrauterine growth retardation, low birth weight and perinatal mortality (WHO 2011). Similarly, indoor pollution is a serious problem for women and girls. Inefficient burning of biomass indoors releases high levels of black carbon and accounts for nearly 2 million deaths per year, mainly of women and children in the poorest communities in the world (Parry et al. 2007, WHO 2011).

8B. Women and girls spend considerable time gathering fuel, cooking and performing other household chores, which raises another gender-relevant dimension of poverty: time poverty. Rural women are time poor in the sense that their ability to engage in other productive activities (such as education) is constrained by the time expended on energy production activities like the collection of firewood (World Bank 2006). This is evidenced by the difference in literacy rates and school enrolment levels for men and women—two third of all illiterate adults are female (UNESCO 2012). Because women collect firewood and water largely by foot, climate change-related scarcities of natural resources will increase women's time poverty (World Bank 2009).



Module 1
Module 2



Sisters of the Planet - Martina (video link)

(<http://www.youtube.com/watch?v=iSMB8m4-4BM>;
see Appendix B: Learning tools)

9. The dire situation for women as managers of energy production can be considerably improved by access to modern forms of energy.

9A. Reliable and efficient energy sources are essential for basic household needs and other national development goals including mechanical power, transport and telecommunication services (Ouédraogo 2011). Increasing access to clean and reliable off-grid energy sources is an alternative way to improve the lives of millions, although this depends on expanding grids, limiting service interruptions and improving the quality of grid-based electricity access (Alstone et al. 2011). “Although access to more modern energy alternatives will not necessarily lead to greater equality in gender roles, it can at least relieve some of the most burdensome and unhealthy aspects of their daily lives and expand the development options available to women, their families and their communities” (ENERGIA 2011).

Box 4: The importance of modern energy sources to achieving the MDGs

Goal 1: Eradicate extreme poverty

and hunger. Access to modern energy facilitates economic development by providing more efficient and healthier means to undertake basic household tasks and the means to undertake productive activities more generally (and often more cheaply) than by using inefficient substitutes, such as candles and batteries. For example, modern energy can power water pumping, which provides drinking water and increases agricultural yields through the use of machinery and irrigation.

Goal 2: Achieve universal primary education. In impoverished communities, children commonly spend significant time gathering fuelwood, fetching water and cooking. Access to improved cooking fuels or technologies facilitates school attendance. Electricity is important for education because it facilitates communication, particularly through information technology, but also by the provision of such basic needs as lighting.

Goal 3: Promote gender equality and empower women. Improved access to electricity and modern fuels reduces the physical burdens associated with carrying wood and frees up valuable time, especially for women, widening their employment opportunities. In addition, street-lighting improves the safety of women and girls at night, allowing them to attend night schools and participate in community activities.

Goals 4: Reduce child mortality; 5: Improve maternal health; and 6: combat HIV/AIDS, malaria and other diseases. Most staple foods require cooking. Reducing household air pollution through improved cooking fuels and stoves decreases the risk of respiratory infections, chronic obstructive lung disease and lung cancer (particularly when coal is used). Improved access to energy allows households to boil water, thus reducing the incidence of waterborne diseases. Improved access advances communication and transport services, which are critical for emergency health care. Electricity and modern energy services support the functioning of health clinics and hospitals.

Goal 7: Ensure environmental sustainability. Modern cooking fuels and more efficient cookstoves can relieve pressures on the environment caused by the unsustainable use of biomass. Promoting low-carbon renewable energy is congruent with the protecting the local and global environment, whereas the unsustainable exploitation of fuelwood causes local deforestation, soil degradation and erosion. Using cleaner energy also mitigates climate change.

Goal 8: Develop a global partnership for development. Electricity is necessary to power information and communications technology applications.

Source: IEA 2010.

Box 5: Example of the co-benefits of gender-responsive energy projects: community-owned micro-hydro system in the Western Solomon Islands

"Bulelavata is a small, remote village in the Western Solomon Islands. The people here were used to a subsistence lifestyle, typical of men and women in thousands of other villages across the Pacific Islands. In 1998, the community began the process of establishing an energy-for-development project. The community-owned micro-hydro system (funded by the Australian International Greenhouse Partnerships, Caritas and the Provincial Government) was officially opened in 2001. The system produces 24 kilowatts of power and a 1.5-kilometre high-voltage transmission line enables the community to sell power to the Provincial Secondary School.

For the women of Bulelavata, the energy project has had a profound impact ranging from the practical, quantifiable advantages of lighting and increased community income to qualitative outcomes such as solidarity and empowerment. The project encompassed project policy support, specific women's awareness and training workshops, as well as community workshops (in which women also participated).

The electricity project has made the women of Bulelavata more confident and outspoken and they now participate much more in community development activities."

Source: Adapted from Bryce and Soo 2004.

9B. On a larger scale, energy policies could catalyse national development and play a vital role in poverty alleviation and climate change mitigation (IEA et al. 2010, Ouédraogo 2011). The 2010 World Energy Outlook has underscored the significance of the nexus between energy and poverty and states that lack of access to modern energy services must be overcome if the MDGs are to be achieved (see box 4) (IEA et al. 2010).

10. Clean energy has multiple benefits for women and the environment.

10A. In addition to relieving women of drudgery and bettering the livelihoods of poor and marginalized communities, curbing emissions from the power sector is required to mitigate climate change (see Box 4 and Box 5).

10B. Examples of low-carbon energy technologies that can be utilized in modernizing rural energy include solar photovoltaic panels, small hydro systems, wind turbines, generators fuelled by plant oils or biofuels (including biogas, biodiesel and bioethanol) and improved cooking stoves. These technologies can be used to provide electricity in off-grid or underserved areas (see Box 6) (Karlsson 2010). Other simple, yet

consequential, off-grid lighting devices such as pressure lamps could also be used along with the latest advances in clean energy technology (e.g. solar, LED and advanced batteries) to provide safe, efficient and affordable alternatives to fuel-based lighting (Alstone et al. 2011).



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(video: <http://www.youtube.com/watch?v=nsWGoRRY—Zs>)

Box 6: Modern fuels and technology options

Cooking, heating, food processing

- Liquefied petroleum gas or kerosene;
- More efficient stoves or solar cookers;
- Biomass briquettes; and
- Biogas or bioethanol produced in biomass digester.

Mechanical power for water pumping, household and commercial enterprises and transportation

- Windmills, water mills or solar pumps;
- Electrical grid; and
- Motors run on liquid fuel (gasoline, diesel or biofuel).

Lighting, communications, refrigeration, and health, education and social services

- Electrical grid;
- Diesel generators;
- Wind turbines;
- Hydro-electric generators;
- Solar photovoltaic panels; and
- Hybrid generating systems.

Source: ENERGIA 2011.

Summary questions

- **What is the importance of modern energy sources to achieving the millennium development goals?**
- **What are the health impacts of traditional energy sources to women?**
- **What is your understanding of time poverty?**
- **How does energy production lead to women being time poor?**

VI Embedding gender needs and issues into energy and technology

Learning objective: Identify policy responses to address gender barriers in the energy sector in order to achieve greater gender equity and energy security

11. Because women and girls are primarily responsible for the bulk of household work, access to energy would have a direct benefit to their wellbeing and health.

11A. Rural women still find basic technology such as electricity for lighting and cleaner cooking technologies a luxury. Properly developed and deployed sustainable energy technologies could provide effective climate change adaptation and mitigation responses and improve livelihoods of the poor in general (rural women in particular) (Harris et al. 2011). Sustainable renewable energy options are not only environmentally friendly but also more amenable for adaptation responses to the impacts of drought on the power sector.

12. Mainstreaming gender into energy projects and energy planning processes requires an appreciation of not only the different energy needs of women, but also women's contributions to climate change responses. This would lead to high quality, effective, gender-sensitive energy project planning processes. Women should be involved in the design and production of locally appropriate energy technologies.

Box 7: Women and clean energy technologies

"Access to better energy services can improve women's social, economic and political status—reducing the time and effort involved in household chores, providing better health and educational conditions, expanding income generating opportunities, and easing their participation in public affairs. At the same time, greater sensitivity to gender issues increases the effectiveness of energy programmes and policies, as well as other types of development activities that involve energy use, by ensuring that the needs and concerns of both men and women are taken into account. Availability of kerosene or liquefied petroleum gas, improved stoves, electricity and mechanical power significantly improves the quality of life for women in rural areas and relieves them of much of the difficult, unpaid work currently required to care for their families."

Source: ENERGIA 2011.

Box 8: Energy project planning situations for gender mainstreaming

There are at least two different project planning situations in which gender, technology and energy can come together: energy technology projects and integrated development projects in which energy is a component.

Energy technology projects focus on the dissemination and adoption of one or two particular types of technology, such as solar home systems, improved stoves or decentralized mini-grids. In some ways, such projects can be thought of as supply driven—the purpose is to promote certain kinds of energy technology for the good of a given population. The main questions that arise include the extent to which the technology or technologies will bring about positive gender impacts; how the technology can affect household health, decision-making and time poverty; and how women and men may benefit from new training, employment, entrepreneurial and community benefit sharing. An energy technology project does not necessarily have to be initiated in the energy sector. For example, smokeless stoves could be initiated as a health sector project.

Integrated development projects try to assist communities develop over a broad range of sectors, of which energy may be just one, and in which energy may be just a component necessary for achievements in other sectors. The gender-energy questions include: what are the energy components necessary to achieve overall goals, including those centred around gender equality issues; and how can these energy requirements best be satisfied? Variations on this model are women's development projects, where the target is clearly women. The questions addressed here include the extent to which energy hinders the achievement of gender goals and how energy can be used to further women's development.

Gender concerns can be incorporated into two aspects of project planning: energy technology projects that specifically promote a particular type of technology, and integrated projects that include energy as a component of a larger development process (see Box 8).

A technology-only approach, however, is not the only option for gender mainstreaming in energy projects and policies. On the contrary, some theoretically women-friendly technologies can have negative impacts in the lives of women if they are not implemented in a gender-responsive manner. An energy service approach starts by identifying the different energy needs of women and men and then identifies the most appropriate technology.

13. Because gender inequality is often the root cause of the gender-based predisposition to energy poverty, explicit efforts should also be exerted to address this situation at all levels of governance. Box 9 provides key areas for the supporting incorporating gender in energy programming and strategic entry points at different scales of governance.

Box 9: Key areas for gender-aware energy programming

National government level

Government sector	<ul style="list-style-type: none"> ➤ Make gender and rights concerns an integral part of energy sector policy dialogue. ➤ Support capacity-building on gender and rights concerns. ➤ Support the design and implementation of regulatory processes that enhance access to energy in unreached areas and to groups whose needs are insufficiently met (focus on gender concerns related to accessibility and affordability). ➤ Support the establishment of energy sector information management systems and make collecting and analysing sex-disaggregated data a major focus. ➤ Support openness, transparency and the participation of stakeholders in policy processes, particularly women's rights constituency. ➤ Support the setting up of accountability systems (e.g. gender budgets), oversight processes (e.g. gender audits), and channels for rights claiming. ➤ Promote women's meaningful participation and representation in the energy sector.
Private sector	<ul style="list-style-type: none"> ➤ Make gender and rights concerns an integral part of public-private partnership arrangements. ➤ Support the establishment of an enabling policy environment for women energy entrepreneurs (focus on access to credit and financial services).
Civil society	<ul style="list-style-type: none"> ➤ Support civil society organizations initiatives that raise awareness about gender and energy rights. ➤ Develop civil society capacity to engage in energy policy dialogue at national level to advocate for the realization of women's energy rights. ➤ Involve civil society organizations in efforts to set up or expand national accountability mechanisms to hold the state as the primary duty bearer accountable to women's energy rights. ➤ Support energy rights claims to promote gender equality and women's rights.

Global governance level

UN processes	<ul style="list-style-type: none"> ➤ Support the recognition that access to energy is a human right. ➤ Promote (and fund) the establishment of an international monitoring system to assess the progress towards eliminating energy poverty that explicitly includes gender and rights concerns.
International CSOs and networks	<ul style="list-style-type: none"> ➤ Develop capacity of civil society organizations and international network/alliances that work on gender, rights and energy to engage in energy policy dialogue at international levels. ➤ Support energy rights claims to promote gender equality and women's rights.

Source: Danielsen 2012.

14. Climate change financing focusing on the energy sector should complement broader developmental goals, including gender equality, poverty eradication and sustainable development (UNDP 2011b). Existing mitigation financing schemes (e.g. Clean Development Mechanism) need to focus on projects that benefit poor and marginalized communities, including women. This should be true also for the nationally appropriate mitigation action under United Nations Framework Convention on Climate Change processes (Schalatek 2009). Gender and social impact assessments need to be undertaken during programme and project design (UNDP 2011a, 2011b). Existing and future carbon financing possibilities should expand women's access to energy by encouraging small-scale projects to qualify for the Clean Development Mechanism and streamlining the application process to reduce the associated transactional costs.



Module 5



Group exercise (see Appendix B: Learning tools)

Summary questions

- **What is gender mainstreaming? How does the gender analytical tool help mainstream gender perspectives in energy projects?**
- **What are clean energy technologies? Provide a few examples of clean energy technologies.**
- **Explain the benefits of clean energy technologies in relation to women and mitigation of climate change.**

VII Conclusion

Women, particularly among the poor and rural communities who do not have access to modern energy sources, play a pivotal role in energy production, distribution and utilization. In the Asia-Pacific context, South Asia stands out as over-reliant on biomass as a source of energy. Biomass collection is the primary responsibility of women, and therefore women are time-poor and overly exposed to health risks associated with energy production. Furthermore, climatic stresses on forest resources could potentially exacerbate this situation by forcing them to travel longer distances to fetch fuel wood.

Energy is key to development, poverty alleviation and achieving the MDGs. Access to better energy services can also improve women's socio-economic status, reducing the time and effort involved in household chores, giving them time to avail themselves of other social services (e.g. education), and improving their health conditions. The introduction of cleaner, more efficient and renewable sources of energy can also bring new training, employment and entrepreneurial opportunities for women and men.

Empowering women and girls is necessary for energy development and energy security. Gender perspectives need to be incorporated into energy projects, policy and planning in order to ensure their effectiveness and sustainability.

Energy policies need to be carefully designed in ways that benefit both women and men. All concerned—governments, civil society, the donor community, the private sector and individuals—should seek to understand the gender-differentiated needs and responsibilities of men and women, make gender-aware policy and programming decisions and give women greater voice in decision-making.

Appendix A. Case studies

Case study 1

Sustainable energy to support the MDGs—Tajikistan

Source: UNDP 2011a.

“Tajikistan’s population has one million people who go six weeks in winter with no power, and four to five million people who only receive two to six hours of power per day in the winter. Overall, the bottom 73 percent of the population consumes a mere 8.5 percent of the total power supply. These problems stem in large part from inefficient energy supply and use. Women spend up to eight hours a day collecting wood to heat poorly insulated homes and treat the dysfunctional water supply used for cooking. This has resulted in health risks from cooking indoors on inefficient cook stoves and deforestation from wood collection. UNDP’s approach to this problem is to develop, pilot and scale-up an integrated rural development model based on provision of renewable energy and energy efficiency. One hundred test families were provided with enough power to meet their basic needs, while hospitals and schools were better insulated. At the same time, local government was given the instruction and resources to set up a management agency for local power and water. A hydro system was set up to sell power at attractive rates and the government received assistance in setting up a more comprehensive energy policy for providing power to the citizenry.”

Case study 2

Carbon sequestration project—India

Source: World Bank 2009 - Gender & Agriculture Sourcebook: 441.

“An innovative agroforestry project in Gudibanda Taluk, Karnataka, India (implemented by the Women For Sustainable Development), supports local women and men farmers in planting mango, tamarind, and jackfruit tree orchards for harvest and carbon sequestration. The project supports women’s participation in decision-making processes. One way in which the project does this is by taking into account women’s time and cultural constraints when establishing public forums. The project set up a prototype carbon marketing facility to sell the certified emissions reduction of the global environmental services that the participants (poor rural women and men) provide. Because farmers have an average annual income of less than \$100, they cannot afford to plant fruit trees without financial assistance. Success requires expensive irrigation changes and planting tools. Farmers will live on the carbon sales from their mango plantations for the first few years, until they harvest their crop. Fruit production should start about four years after planting,

and one acre of crop will at least triple their annual income. The program anticipates sustainable incomes for women and men farmers, as well as the additional benefits derived from the ecofriendly farming techniques. The project lifetime is 35 years, with an estimated CO2 benefit of 23 tons of carbon sequestration per acre. The project target is 35,000 acres, for a total sequestration of 575,000 tons of carbon.”

Case study 3

Nepal national biogas project—Nepal

Source: Aguilar et al. 2009, p.170.

“This project promotes the use of biogas in Nepal for cooking and lighting in rural households by offering biogas units at below market cost. The project activities reduce greenhouse gas emissions by replacing current fuel sources (mostly firewood, dung and kerosene) with biogas produced from animal and human wastes. Only about 10–15 percent of people in the rural areas of Nepal have access to electricity.

In households with biogas units, women benefit through reduced time and effort in collecting and managing fuel wood supplies. They are also exposed to fewer of the health risks associated with indoor air pollution from smoky fires and kerosene lamps. The project estimates that women save three hours daily per household when they use biogas for cooking rather than collected firewood. Women report that they use the saved time in income generating efforts, attending literacy classes, social work and recreation.

When households directly connect their latrines to biogas production units, they and their communities enjoy better health and sanitation. In addition, there are new employment opportunities connected with biogas digester production and distribution.

This was the first greenhouse gas emission reduction project in Nepal approved for financing under the [Clean Development Mechanism]. Developed by the Alternative Energy Promotion Centre, the project is obtaining financing for subsidized distribution of the biogas units by selling a total of one million tons of greenhouse gas emission reductions to the Community Development Carbon Fund managed by the World Bank. The project estimates that each household biogas unit will eliminate close to five tons of carbon dioxide equivalent per year.

Selling emissions reduction credits allows the project to generate long-term funding without seeking ongoing assistance from donors. The country’s dependence on fuel wood has contributed greatly to deforestation, so the project will also reduce pressures on the forests. In addition, waste slurry from the biogas digesters can be used as organic fertilizer, boosting food production and avoiding the expense of buying chemical fertilizers.”

Case study 4

Micro-hydel programmes in Chitral improve lives and businesses—Pakistan

Source: UNDP 2006 (Adapted from: Aga Khan Rural Support Programme, Regional Programme, Shahi Qila District, Chitral).

The Aga Khan Rural Support Programme has been implementing a large number of microhydel programmes in the remote, hilly villages of Pakistan. The project communities are scattered, isolated and far removed from conventional electricity supplies. These villages have traditionally used smoky and unreliable pinewood torches and, more recently, costly kerosene lamps for lighting. In the northern province of Chitral, Aga Khan Rural Support Programme has established 172 microhydel power units, benefiting more than 20,000 households. The projects are implemented, maintained and managed by village management committees in which women play an active role. The villagers have been linked to various Aga Khan Development Network programmes and government institutions, which has enabled many of them to start small businesses.

The programme has a strong emphasis on women's capacity building. Availability of hydel power has improved women's economic productivity in many ways, directly by increasing incomes and by improving the quality of life and reducing the drudgery of labour-intensive tasks.

Appendix B. Learning tools

Task 1: Group discussion based on case studies

Learning objective: Understand the ‘big picture’ in the gender-energy nexus in the context of MDGs, climate change and broader sustainable development challenges



Group discussion based on Case Study 1: Sustainable energy to support the MDGs (Tajikistan), Case Study 2: Carbon sequestration project (India) and Case Study 3: Nepal national biogas project.



40 minutes

Notes to the facilitator

Divide the participants into three groups and facilitate a plenary discussion along the lines of the following questions:

- What did you learn from this project (all groups)?
- What are the linkages between energy and gender, MDGs and poverty eradication (Group 1)?
- How do we advance mitigation while also empowering the women (Group 2 and 3)?
- How do we make sure that climate change response is pro-poor and gender-responsive (all groups)?

Task 2: Coastal women's electrification project— Bangladesh (video and plenary)

Learning objective: Understand creative ways by which clean energy options could be used to empower rural women and the benefits to the society at large



Renewable Technology Opportunities for Women - Bangladesh

(video presentation: <http://www.youtube.com/watch?v=nsWGoRRY—Zs>)



10 minutes (video presentation)

20 minutes (group discussion and reflection)

Notes to the facilitator

- Encourage discussions on the take-away message of the video presentation and on the question “How do women benefit from clean energy technologies”?
- Encourage the participants to discuss experiences of the gender-energy nexus in their local contexts.

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