



energy
for all

Subregional Conference - Going Beyond the Meter
Inclusive Energy Solutions in South Asia

11-12 April 2016 • Hotel Jai Mahal Palace, Jaipur, Rajasthan

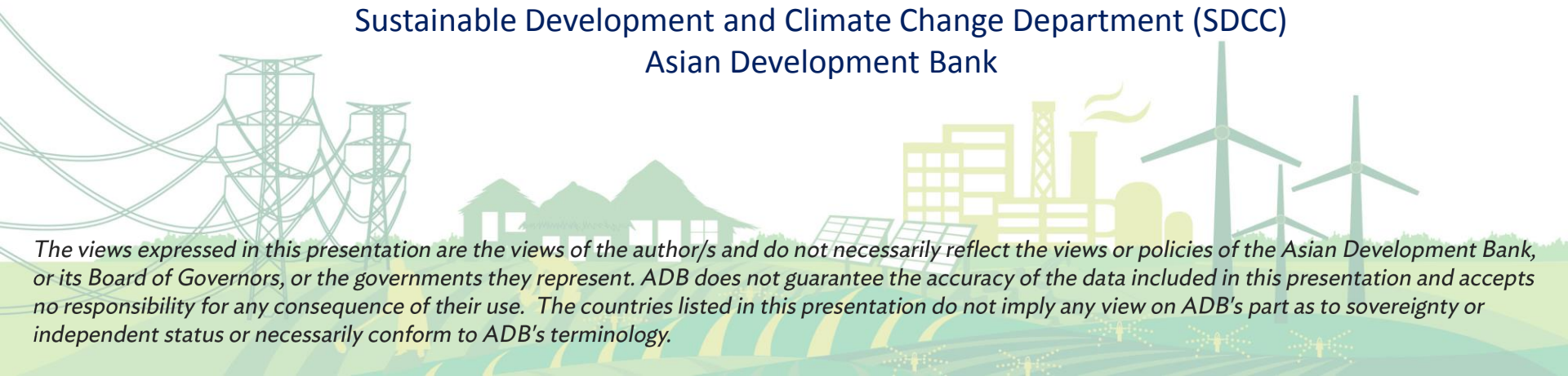
Employment Generation in Emerging Clean Energy Industries: How Can Women Break Through Traditional Barriers? South Asia

Brajesh Panth

Technical Advisor (Education)

Sustainable Development and Climate Change Department (SDCC)

Asian Development Bank

A stylized, light green illustration at the bottom of the slide depicts a sustainable energy landscape. It includes high-voltage power transmission towers and lines on the left, a cluster of small houses in the center, and modern clean energy infrastructure on the right, such as solar panels, a factory with smokestacks, and two large wind turbines. The background is a soft, hilly landscape with a winding path.

The views expressed in this presentation are the views of the author/s and do not necessarily reflect the views or policies of the Asian Development Bank, or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy of the data included in this presentation and accepts no responsibility for any consequence of their use. The countries listed in this presentation do not imply any view on ADB's part as to sovereignty or independent status or necessarily conform to ADB's terminology.

Outline of the Presentation

- **Energy sector in South Asia - trends in access to energy**
- **Implications on households and industry**
- **Employment opportunities in energy sector**
- **Training opportunities in energy sector**
- **Energy and Women Empowerment**



Trends in energy sector in South Asia: Consumption

Energy usage in most South Asian countries have more or less doubled in the last couple of decades

Country	Energy Use (kilotons of oil equivalent)					
	1990	1995	2000	2005	2010 ^a	2012
Bangladesh	12,736	15,897	18,591	23,868	30,756	33,172
Bhutan	900	940	1,066	1,233	1,366	...
India	316,743	384,285	457,198	539,388	723,743	788,126
Maldives	48	85	158	212	292	...
Nepal	5,789	6,712	8,108	9,132	10,218	10,100
Sri Lanka	5,516	5,949	8,327	9,001	9,844	11,268
Afghanistan	...	...	...	...	...	...
Pakistan	42,857	53,538	64,067	76,227	84,311	85,758

^a refers to 2008 data for Bhutan and the Maldives; ... = data not available at cutoff date

Source: Asian Development Bank (ADB), Key Indicators for Asia and the Pacific 2015. <http://www.adb.org/publications/key-indicators-asia-and-pacific-2015>

Trends in energy sector in South Asia: Production and import

Despite efforts to catch up with production, but demand grew faster leading to increased imports (except for Bhutan and the Maldives)

Country	Production (kiloton of oil equivalent)						Energy Imports, Net (% of energy use)					
	1990	1995	2000	2005	2010 ^a	2012	1990	1995	2000	2005	2010 ^a	2012
Bangladesh	10,758	12,777	15,144	19,269	25,760	27,187	15.5	19.6	18.5	19.3	16.2	18.0
Bhutan	980	1,036	1,115	1,284	1,720	...	-8.9	-10.2	-4.6	-4.1	-25.9	...
India	291,816	335,773	366,389	423,857	531,304	544,554	7.9	12.6	19.9	21.4	26.6	30.9
Maldives	–	–	–	–	–	...	100.0	100.0	100.0	100.0	100.0	...
Nepal	5,501	6,138	7,138	8,152	8,878	8,511	5.0	8.5	12.0	10.7	13.1	15.7
Sri Lanka	4,191	4,022	4,748	4,920	5,544	5,930	24.0	32.4	43.0	45.3	43.7	47.4
Afghanistan	...	...	...	...	...	...	...	...	...	...	...	...
Pakistan	34,178	41,045	46,895	60,719	64,303	65,992	20.3	23.3	26.8	20.3	23.7	23.0

Notes: a Refers to 2008 data for Bhutan and the Maldives; ... = data not available at cutoff date; – = magnitude equals zero;

Source: Asian Development Bank (ADB), Key Indicators for Asia and the Pacific 2015. <http://www.adb.org/publications/key-indicators-asia-and-pacific-2015>

Trends in energy sector in South Asia: Electricity consumption

Per capita electric power consumption has surged along with household electrification

Country	Electric Power Consumption (per capita kWh)				Household Electrification Rate (% of households)			
	1990		2012		Earliest Year		Latest Year	
Bangladesh	50		280		17.8	(1993)	59.6	(2011)
Bhutan	254		977	(2005)	41.1	(2003)	72.0	(2007)
India	270		760		50.9	(1992)	67.9	(2005)
Maldives	113		531	(2014)	83.8	(2000)	99.8	(2009)
Nepal	40		120		17.9	(1996)	76.3	(2011)
Sri Lanka	150		530		...		80.7	(2002)
Afghanistan	21	(2001)	81	(2013)	...		25.0	(2005)
Pakistan	270		450		59.6	(1990)	93.6	(2012)

... = data not available at cutoff date

Source: Asian Development Bank (ADB), Key Indicators for Asia and the Pacific 2015. <http://www.adb.org/publications/key-indicators-asia-and-pacific-2015>

Trends in energy sector in South Asia: Access to electricity

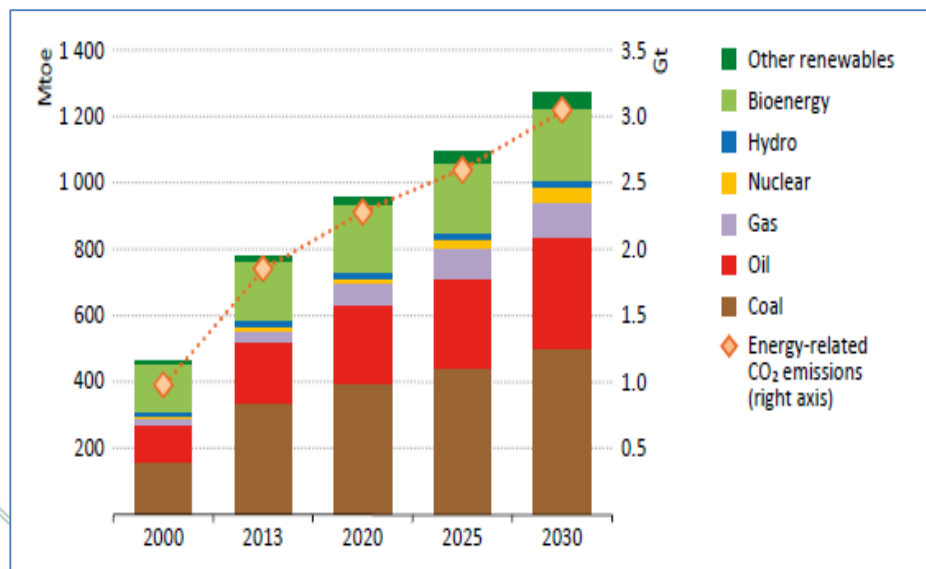
- A significant proportion of the population has no access to electricity
- There remains a high dependence on traditional biomass (e.g., wood and charcoal), mainly for cooking and heating

Country	Pop without access to electricity (in mil)	% of country's total Pop
Asia-Pacific	621.5	14.6
Bangladesh	62.0	40.0
India	304.0	25.0
Nepal	7.0	24.0
Sri Lanka	2.2	11.0
Pakistan	56.0	31.0

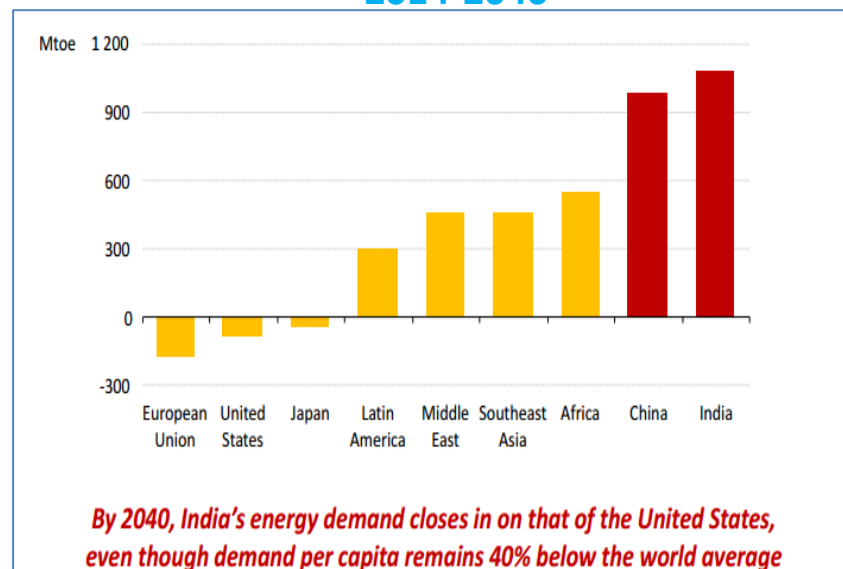
Trends in energy sector in South Asia: A focus on India

India's growing energy needs are particularly huge

India's primary energy demand by fuel type

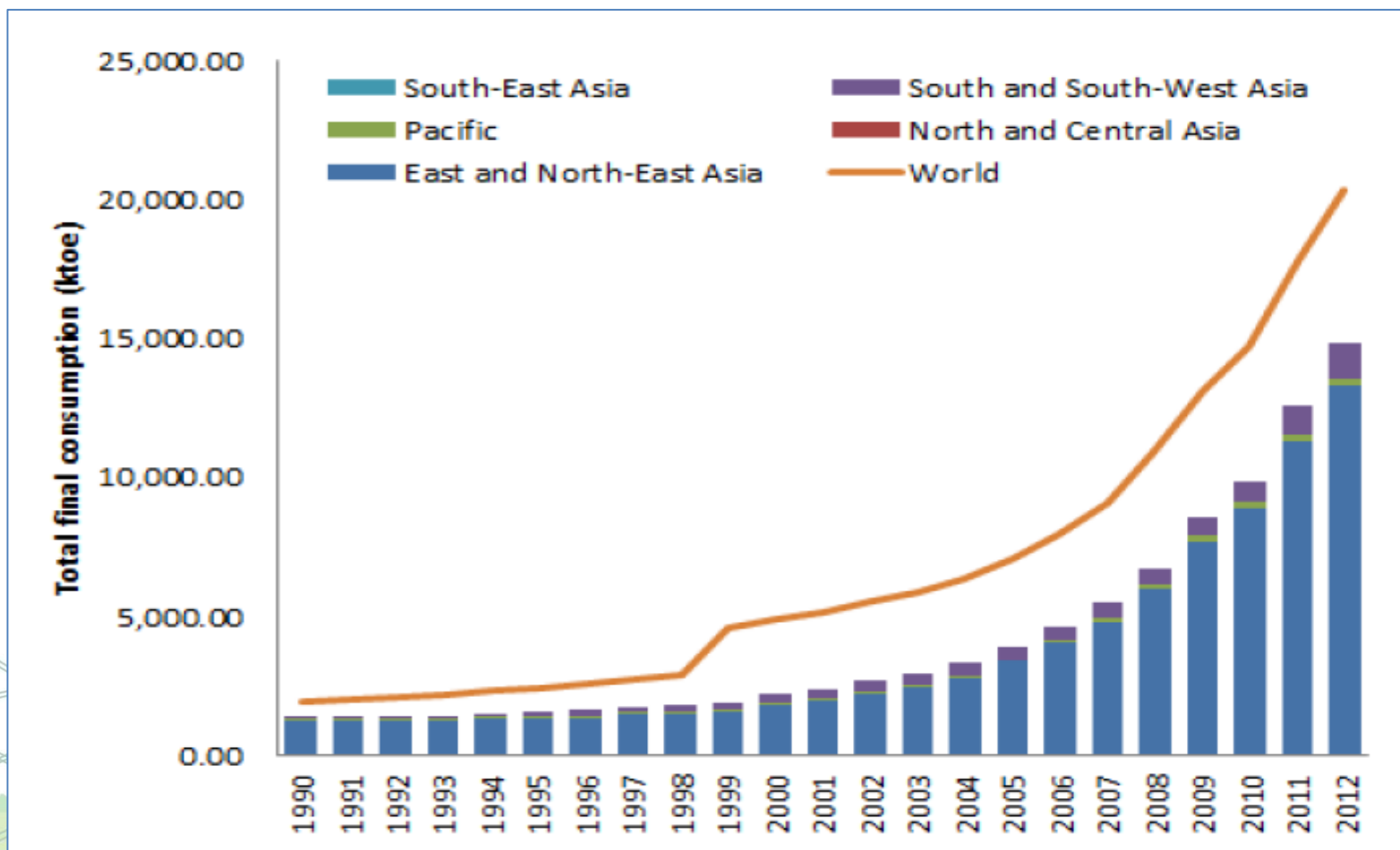


Change in energy demand in selected regions, 2014-2040



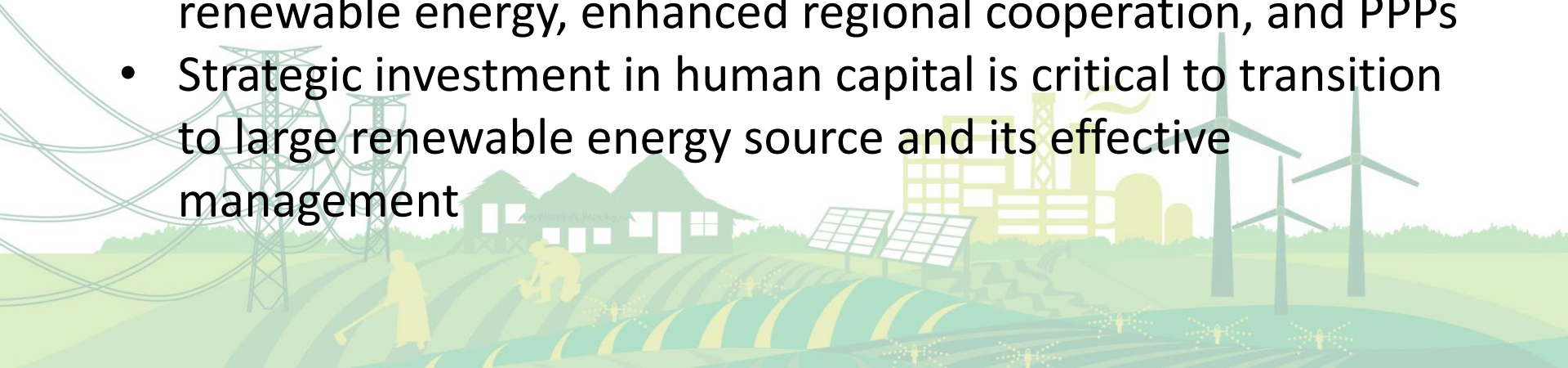
Trends in energy sector in South Asia: Renewable energy

Consumption of solar, wind and other renewables is growing



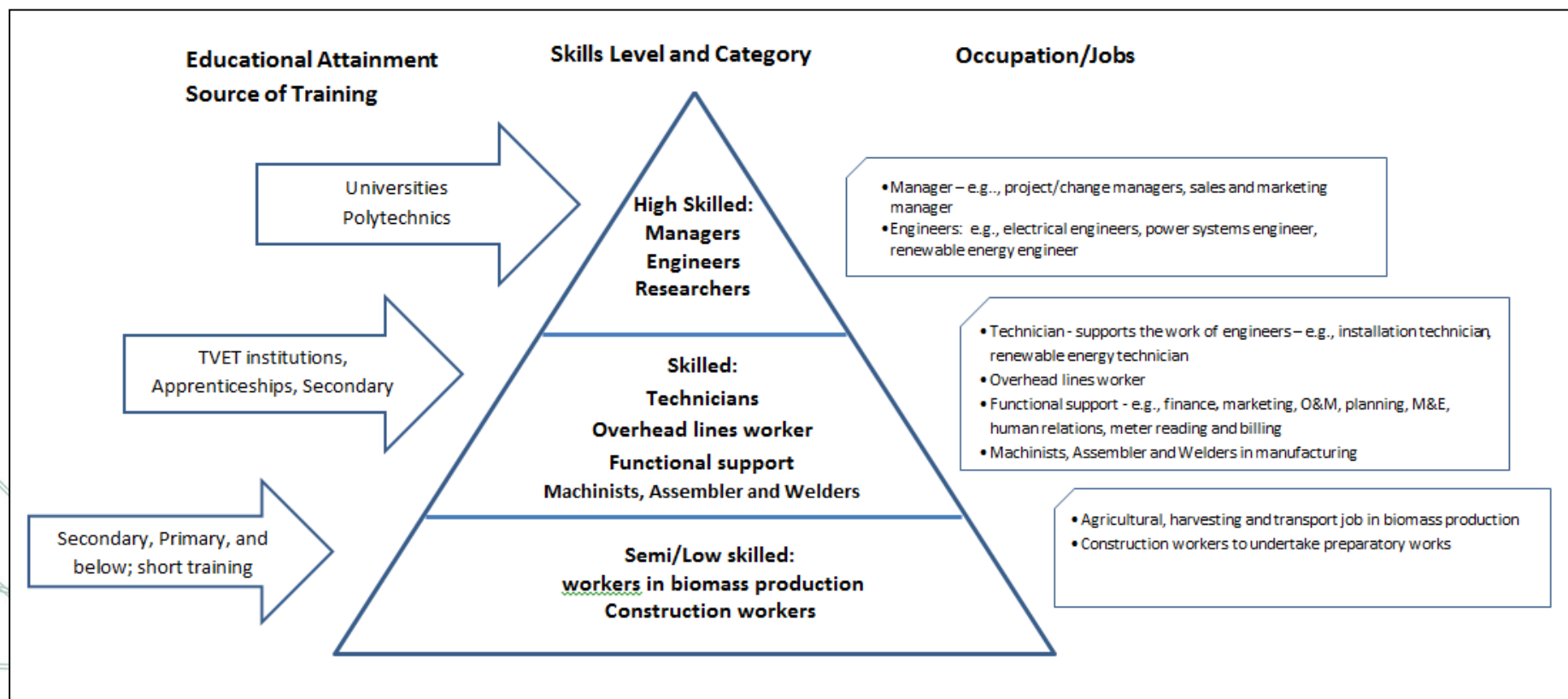
Implications on households and industry

- South Asia's rapid growth is accelerating upward social mobility which will continue to trigger increased demand for energy
- To sustain growth and sustainable development, it is important accelerate access to renewable energy sources
- There is a crisis of energy in South Asia which countries are trying to address with urgency to support sustainable growth
- Energy security will require increased investments in renewable energy, enhanced regional cooperation, and PPPs
- Strategic investment in human capital is critical to transition to large renewable energy source and its effective management

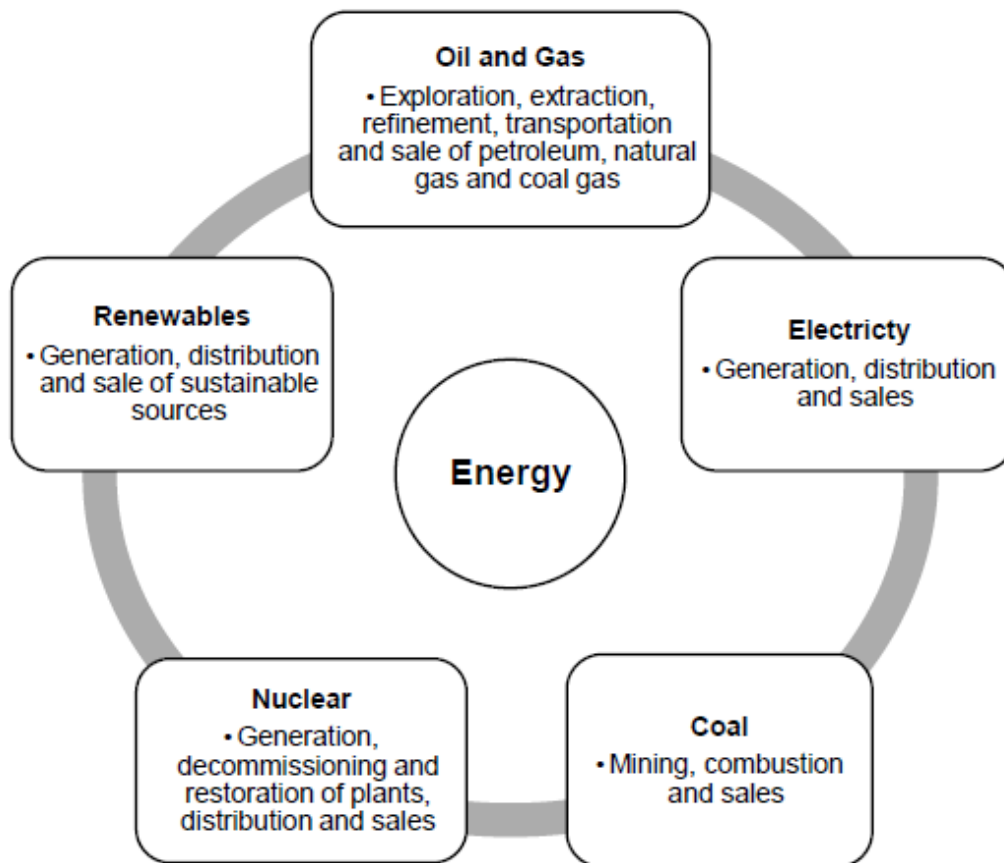


Employment and Training Opportunities

There is a wide range of employment and training opportunities across various skills levels in the energy sector



Subsectors in Energy Sector and the general value chain








Increasing focus on renewable energy creates opportunities in training and employment in the areas of hydro, biofuel/bioenergy, solar, wind, and geothermal energy sources

The renewable energy sector has four major elements to its value chain:

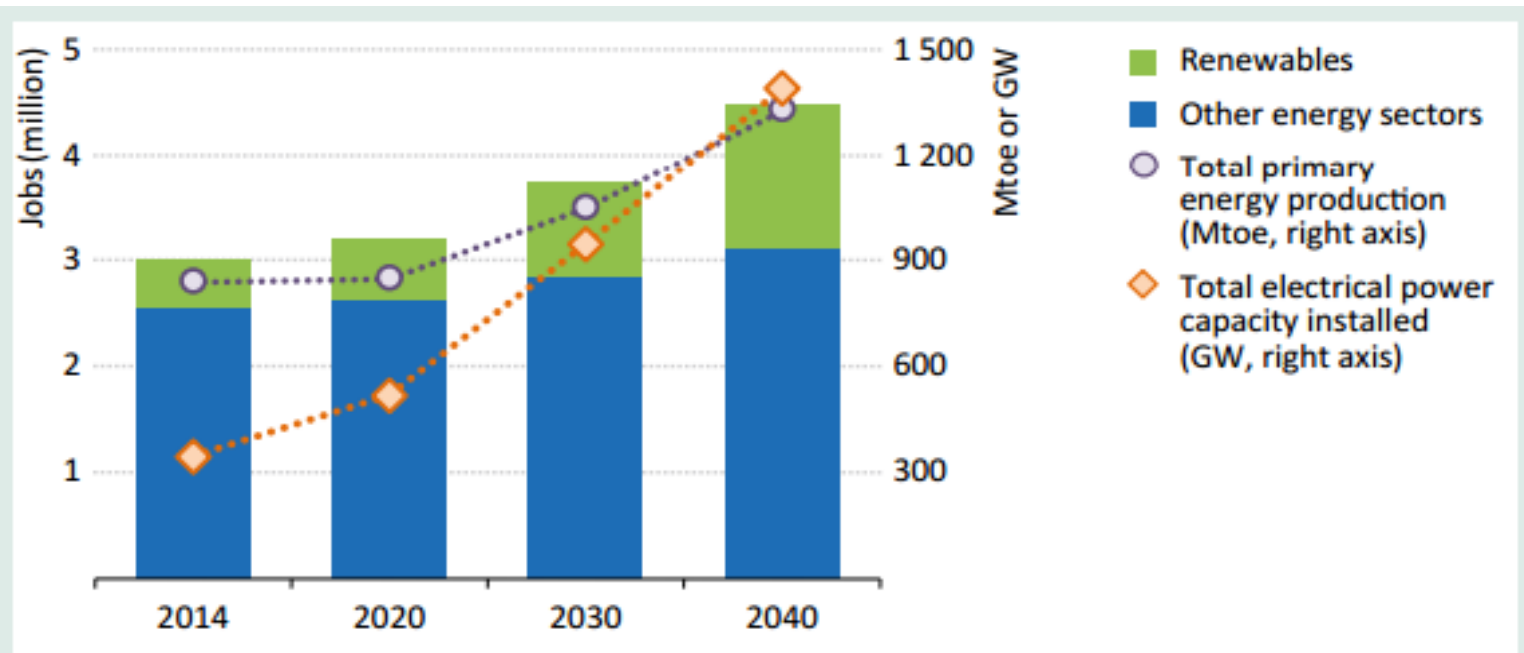
- Equipment manufacture and distribution
- Project development
- Construction and installation
- Operations and maintenance
- (Crosscutting/enabling activities – e.g., training, health and safety, policy making, and financing)

TABLE 1. RENEWABLE ENERGY OCCUPATIONS IDENTIFIED AS “DIFFICULT TO FILL”

SECTOR	OCCUPATION
 Wind energy	Project developers; service technicians; data analysts; electrical, computer, mechanical and construction engineers.
 Solar energy	Photovoltaic and solar thermal system installers and maintainers; building inspectors.
 Hydropower	Electrical, and operations and maintenance engineers; technicians; tradespersons; sustainability specialists.
 Geothermal	Trainers; geothermal engineers.
 Bioenergy	R&D and design engineers; service technician; trainers.

Source: (ILO, 2011)

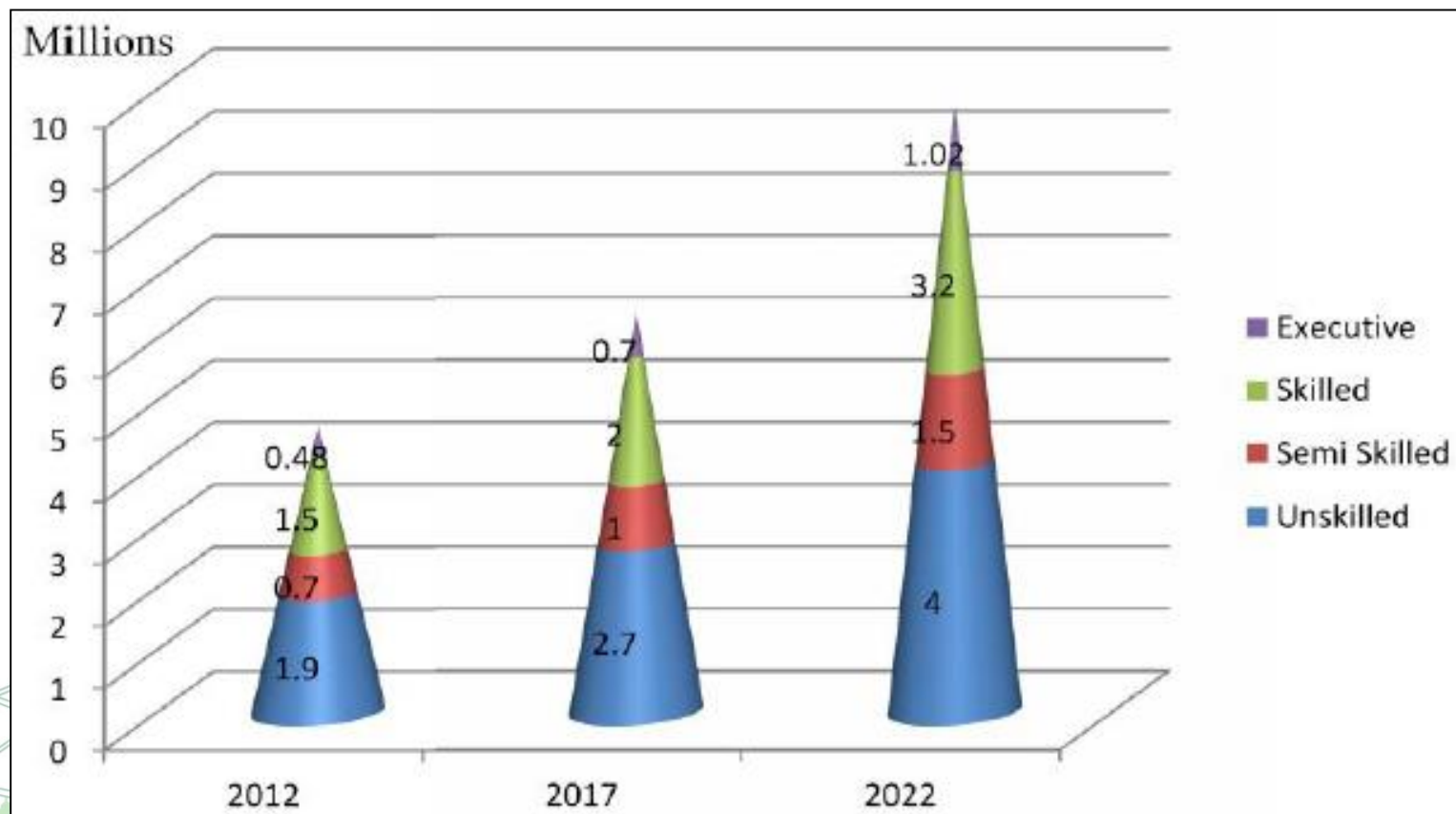
Estimated number of direct jobs in India's energy supply sector



Note: Mtoe = million tonnes of oil equivalent; GW = gigawatts.

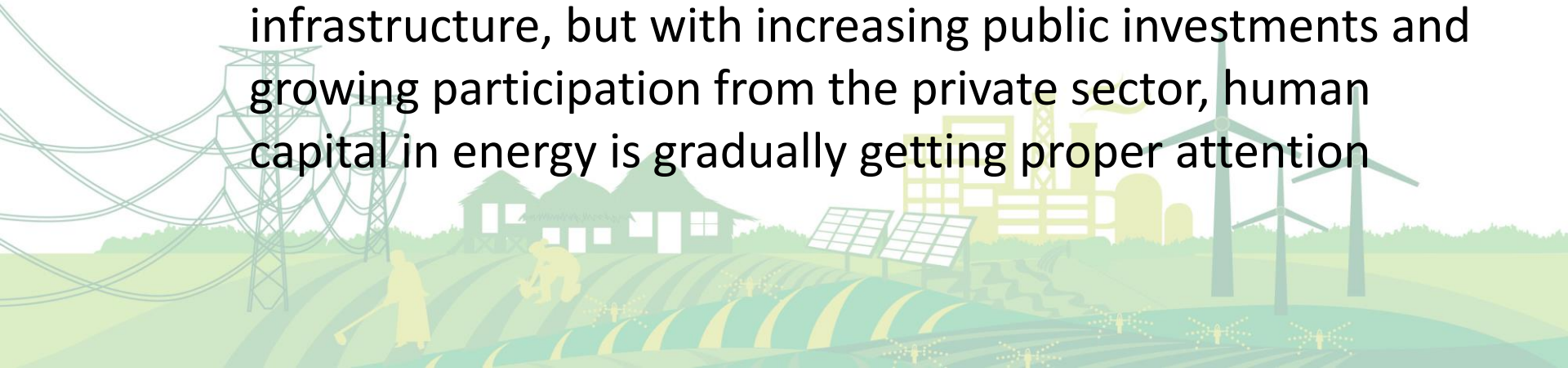
Sources: Ministry of Labour (2013); REN21 (2015); Council on Energy, Environment and Water and Natural Resources Defense Council (2014); Rutovitz (2012).

Number of unskilled, semi skilled, skilled workers and executives in India's energy sector



Employment opportunities in energy sector

- Human capital is a major challenge in the energy sector; capacity across the value chain (e.g. equipment manufacturing; construction and installation; project management; O&M; marketing; R&D) need to be secured
- High quality human resources for engineering and managerial posts need to attract fresh talent
- A major barrier in training is insufficient training infrastructure, but with increasing public investments and growing participation from the private sector, human capital in energy is gradually getting proper attention





energy
for all

Subregional Conference - Going Beyond the Meter
Inclusive Energy Solutions in South Asia

11-12 April 2016 • Hotel Jai Mahal Palace, Jaipur, Rajasthan

Employment and Training Opportunities for Women in the Energy Sector:

Installation and maintenance

Distribution

Utility reading

Billings and collections

There are good opportunities for women in higher and special skills such as engineering, management and research and development



Skills development in energy sector

- Determine/project human capital needs in energy sector across various skills and resources (traditional and renewable)
- Attract new talent by showcasing opportunities and marketing campaign (e.g. university and training institute fairs, job fairs, financial assistance programs to students), especially in renewable energy where there is greater shortage of experienced and skilled human resources
- Expand and improve training infrastructure/facilities
- Encourage and strengthen participation of private sector in training; incentivize institute-industry partnership
- Introduce programs and/or options/electives in energy related degree programs, in undergraduate and graduate levels (Amity University have started courses in renewable energy.)
- Establish centers of excellence in collaboration with known brand names (e.g. Chevron established centers in Thailand and Indonesia)
- Develop market responsive and modularized intensive short- to medium-term (3 months - 1 year) vocational trainings through industry partnerships
- Promote quality jobs and a better workplace including occupational safety

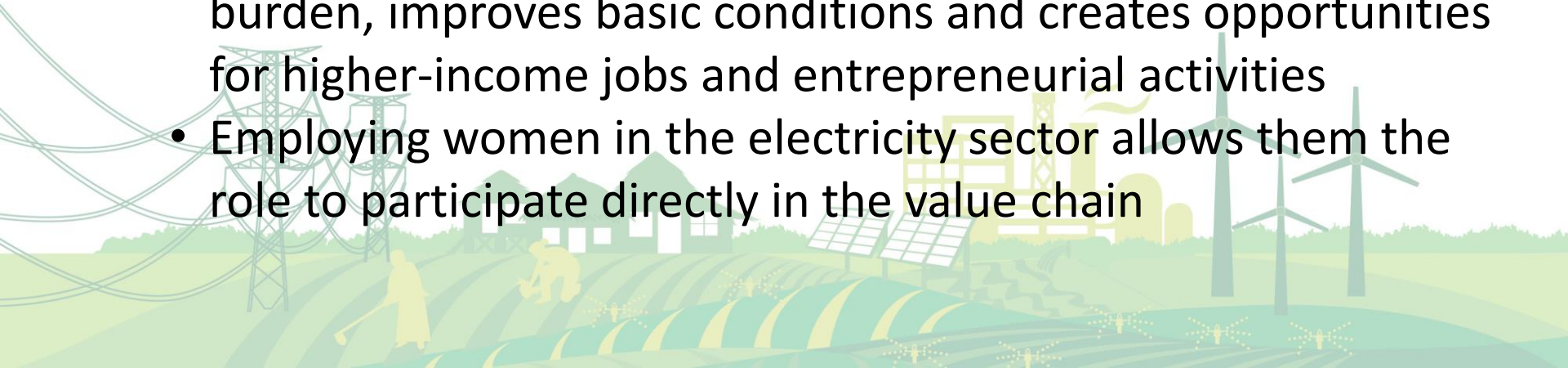
Energy and Women Empowerment

Implications on women:

- High dependence on traditional sources of energy has negative impact on female family members who do most of household work

Access to energy accelerates opportunities for women by enabling them to engage in more productive activities:

- Access to energy eases household works, reduces time burden, improves basic conditions and creates opportunities for higher-income jobs and entrepreneurial activities
- Employing women in the electricity sector allows them the role to participate directly in the value chain

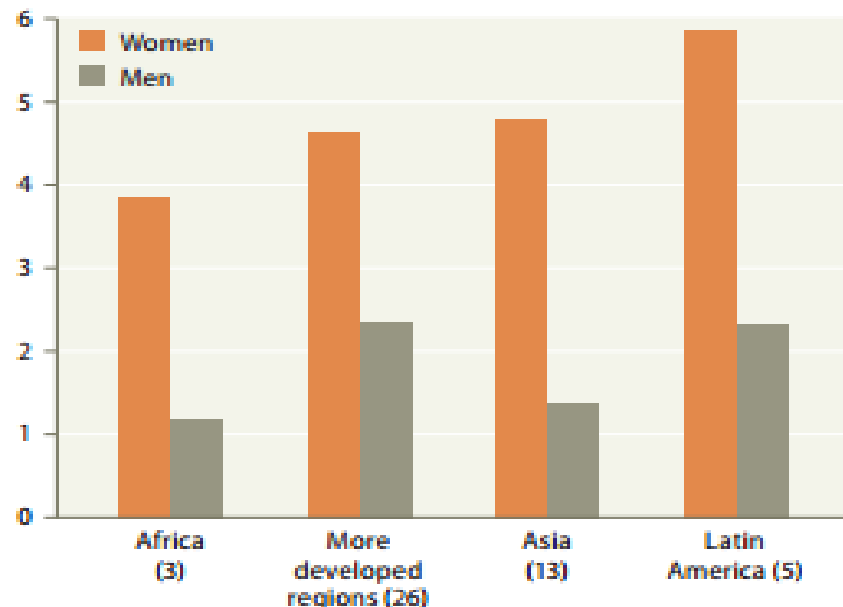
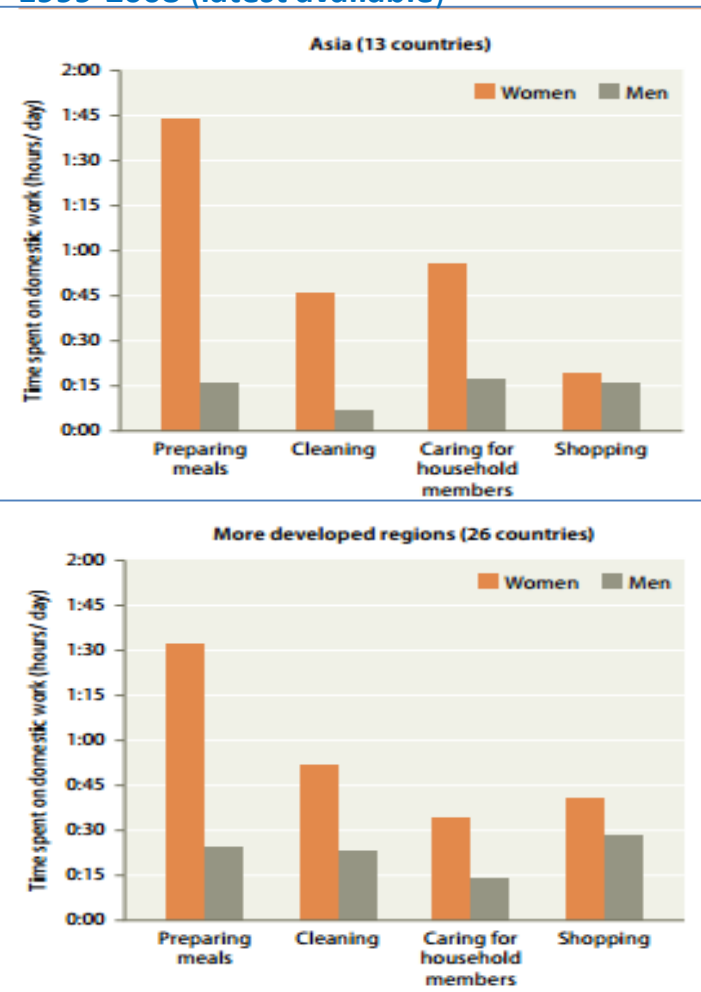


Time spent on domestic work by region and sex,
1999-2008 (latest available)

Figure 4.9

Time spent on domestic work by region and sex,
1999-2008 (latest available)

Time spent on domestic work (hours/ day)

Time spent on major household tasks,
1999-2008 (latest available)

Source: Computed by the United Nations Statistics Division based on country-level data from Statistics Sweden, UNECE, UNECLAC and national statistical offices (as of December 2009). Note: Unweighted averages; the numbers in brackets indicate the number of countries averaged.

Enhancing participation of women in the energy sector:

- Study/assessment to understand the local environment for women
 - potential impact of access to energy (cultural, religious and others)
 - jobs women want and how access to energy helps create opportunity
- Engage women in planning and design process on relevant programs
- Create enabling environment for women's economic participation – access to energy that targets job creation and entrepreneurial activities
- Rigorous monitoring and evaluation methods to determine impact on women (e.g. gender disaggregated indicators)
- Promote communication and awareness campaign (use of clean energy for sustainable environment, capacity building for women to support energy development)
- Marketing employment and training opportunities for women



energy
for all

Subregional Conference - Going Beyond the Meter
Inclusive Energy Solutions in South Asia

11-12 April 2016 • Hotel Jai Mahal Palace, Jaipur, Rajasthan

Examples of Women Training for Jobs in Energy Sector

Bangladesh: Training youth and women as solar technicians and repair and maintenance specialists in Bangladesh to complement a programme of microloans to install home solar systems by Grameen Shakti; ILO

Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka:

South Asia Women in Energy (SAWIE) Network was formed in 2008 to promote access of women to renewable energy technologies (with special focus to solar energy) through empowerment of rural women. South Asia Women's Institute for Sustainable Energy Research (WISER), the Center of Excellence for SAWIE, was launched in 2010 to encourage and strengthen the development of application oriented clean energy management program and their dissemination to the women in South Asia through close partnership with SAWIE Network.

