

Prospects of Renewable Energy in Pakistan

ARE Technologies Being Pursued

- Large Scale Projects
 - Wind
 - Solar
 - Bagasse Cogeneration (Sugar Mills based)
 - Small Hydro (< 50 MW)</p>
 - Waste-to-Energy
- Distributed Generation / Net Metering
- Off Grid Applications
 - Solar PV Systems, Solar Lighting
 - Solar Water Pumping
 - Solar Water Heaters

WHY ALTERNATIVE ENERGY ?

Short Gestation Period	Energy	Gestation
Relieves grid resources	Source	Period
Reduced dependence on Imported fuel		(Yrs)
Ensures Energy Security	Hydel (Large)	7 - 10
Low infrastructure needs	Thermal	3 - 5
Environment Friendly Clean Technologies	Coal	4 - 5
Other benefits include:	Small	2 - 3
Utilization of waste land	Hydro	
Employment creation and poverty	Wind	2 - 3
alleviation	Solar	2

Global commitments on environment and climate change mitigation



RENEWABLE ENERGY POLICY

Renewable Energy Policy 2006 (Salient Features)

- Determines scope and the role of different stakeholders throughout project cycle.
- Lays down Procedures, Roadmap, Engaging Mechanism for the development of RE projects
- Provides for two modes of Project Development;
 - Solicited projects
 - Unsolicited projects
- Different tariff options;
 - Cost-plus / Negotiated tariff
 - Upfront Tariff

Renewable Energy Policy 2006 (Salient Features)

- Grid provision is the responsibility of the power purchaser
- Fiscal and Financial Incentives
- Provision for Net Metering (Distributed Generation)
- Banking of Electricity
- Wheeling of electricity
- Grid Spill Over Concept introduced
- Carbon Credits through CDM Facility

INCENTIVES OFFERED (By Government of Pakistan)

- ✤ No customs duty or sales tax on import of equipment
- ✤ No Income Tax / withholding tax / turnover tax
- ✤ Repatriation of Equity along with dividends freely allowed
- ✤ Convertibility of PKR into USD
- Non-Muslims and non-residents exempted from payment of Zakat on dividends
- Mandatory purchase of electricity by power purchaser
- ✤ Government's Sovereign Guarantee

CURRENT STATUS OF ARE PROJECTS

WIND MAP OF PAKISTAN



WIND POWER – CURRENT STATUS

- 28 wind power projects (1397.6 MW), issued LOI by AEDB, are at various stages of development
 - 15 projects (788.5 MW) are operational
 - 9 projects (445 MW) have achieved Financial Close and are under construction
 - > 04 project (164 MW) at LOI stage
- Competitive Bidding to be carried out for new wind power projects

Wind Power Tariffs



FFC Energy, 50 MW project, Jhampir, District Thatta. COD: May 2013 Zorlu Enerji, 56.4 MW Wind Project, Jhampir, District Thatta. COD: July 2013

FWEL-50MW FOUNDATION WIND POWER PLANT-II

Three Gorges Pakistan 50 MW Project, Jhampir, District Thatta. COD: Feb 2015



10.00

Master Wind Energy Pvt. Ltd. 52.8 MW Wind Power Project

Gul Ahmed Wind Energy. Ltd. 50 MW Wind Power Project

Tower Manufacturing Facility of M/s CWE, China Three Gorges Jhampir, District Thatta.

Future Plans for Wind Power Projects

- NEPRA, vide its determination dated 27th January, 2017 has announced benchmark tariff for competitive bidding of new wind power projects.
- □ The Government plans to carry out competitive bidding for approx. 600 1200 MW capacity
- □ The spade work for development of necessary framework documents has been completed



SOLAR POWER

- 27 Solar PV projects (954.52 MW) are at various stages.
 - O6 solar PV power projects (430 MW) are operational
 - > 05 solar projects (42.52 MW) at LOS stage
- Competitive Bidding to be carried out for new solar power projects



Biomass

Bagasse Cogeneration projects are being developed through the sugar mills under Framework for Power Cogeneration (Bagasse / Biomass) 2013.

- ➢ 06 Bagasse Cogeneration projects (201.1MW) are operational.
- 29 Bagasse Cogeneration Projects (1001.5 MW) are at various stages of development.



Small Hydropower Potential in Pakistan



Small Hydropower Potential in Pakistan

S. No	Area	No. of Potential Sites	Potential Range (MW)	Total Potential (MW)	Remarks	
1.	Khyber	125	0.2 to 32	750	Small / Micro based on	
	Pakhtunkhwa				Natural Falls / Flow	
2.	Punjab	300	0.2 to 40	560	Canals	
3.	Gilgit –	263	0.1 to 38	1300	Natural Falls	
	Baltistan				and the second se	
4.	Sindh	18	5 to 40	193	Canal Falls	
5.	Azad Jammu &	52	0.2 to 40	365	Natural Falls	
	Kashmir					
	Total	758		3268		

- Small Hydropower (SHP) is considered as one of the lucrative options for generation of electricity.
- Small/ mini / micro hydropower projects mainly developed by provincial governments

Small Hydropower Current Developments

	Micro~Mini~Small Hydro Sites							
	Oper	rational	Under Implementation		Solicited Sites		Raw Sites	
	Nos.	Capacity (MW)	Nos.	Capacity (MW)	Nos.	Capacity (MW)	Nos.	Capacity (MW)
Khyber Pakhtunkhwa	16	50	14	165	4	77	91	458
Punjab	6	65	34	213	1	6	259	276
Gilgit -								
Baltistan	98	133	28	236	2	44	135	887
Sindh	0	0	0	0	5	67	13	126
Azad Jammu								
& Kashmir	8	39	32	263	1	1	11	61
Balochistan	0	0	0	0	0	0	2	1
Total	128	287	108	877	13	195	511	1809

• At present 128 MW is operational in the country, 877 MW is under development and around 2000 MW is available for development.

ARE RESOURCE MAPPING

- Resource mapping for wind, solar and biomass being carried with the assistance of Energy Sector Management Assistance Program (ESMAP) of the World Bank
 - Biomass Atlas for Pakistan has been launched
 - During Phase-1 of the project intermediate resource assessment using satellite and other existing data carried out
 - Detailed Wind and solar resource assessment through ground installations
 - > 09 solar data stations and 12 wind masts installed in different parts of country
 - Solar resource assessment completed



ESMAP Wind Resource Mapping of Pakistan – Potential Areas



ESMAP Solar Resource Mapping of Pakistan

Wind Data Measuring Masts Installations					
S.No.	Location				
1	Q A Solar Park, District Bahawalpur				
2	Gath Bairi, Sadiqabad, District Rahim Yar Khan				
3	Saroba, Chakri, District Rawalpindi				
4	Quaidabad, District Khushab				
5	Pul Chak Shikari, District Rajanpur				
6	Kandiari, Sanghar				
7	Sataar Goth, Umarkot				
8	Tandu Ghulam Ali, Badin				
9	Gwadar Institute of Technology, Gwadar				
10	UET Jalozai Campus, Nowshera				
11	Do Nali, Haripur				
12	BUITEMS, Quetta				



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Developing Other Wind Corridors

- Sindh & Balochistan have the highest wind potential and have many large wind corridors
- Wind corridors in Balochistan are yet to be developed.
- Potential areas in Balochistan identified using the meso scale map developed by NREL (simulated Wind Speeds at 100m from ESMAP).
- Planning underway to carry out ground based resource assessment of these corridors for their development
- These corridors lie within the western route of the CPEC corridor and can support energy requirements for development activities

Potential Wind Corridors in Balochistan



DISTRIBUTED GENERATION (NET-METERING)

Distributed Generation (Key Areas)

A. Net Metering through Solar and Wind Systems

B. Off-Grid Lighting Solutions – IFC-Lighting Asia/Pakistan

Net Metering in Pakistan (Current Status

- NEPRA approved Regulations on September 1, 2015 to put into effect Net Metering for solar and wind generation of up to 1MW.
- First net metering system of 1 MW capacity installed at Parliament House.
- Prime Minister of Pakistan launched new consumer friendly framework for net metering on 3rd January, 2018
- 242 customers of cumulative 6.126 MW have been issued Generation License for Net Metering
- Addition of 4000-5000 MW of net metering based installations is envisaged in next 3-4 years.

IFC – Lighting Asia / Pakistan Program

Lighting Asia/Pakistan aims at:

- Helping address the lighting needs of consumers
- Give access to low-cost, high-quality, safe, reliable, and cleaner lighting products.
- Target: enable 1.5 million people have access to modern energy services for lighting and associated services.
 - The Framework Includes:
 - Quality Assurance
 - Market Intelligence
 - Business-to-Business Connections
 - Consumer Awareness

IFC – Lighting Asia / Pakistan Program

> Establishing range of channels: microfinance institutions, retail shops, and own franchise network.

Progress

- Lighting Pakistan has reached the following milestones since its inception:
 - 102, 000 products sold
 - 630, 000 people reached
 - Six manufacturing associates found local distributors

IFC – Lighting Asia / Pakistan Program

Impact













- Customers feedback, their lives are changing
- Having access to modern electricity solutions
- Having long light hours
- Economic activities generated
- Working hours increased
- Business options like mobile charging created

Future Prospects

- Sizeable share of Renewables in the energy mix of Pakistan through solar and wind power projects
- Solar Water Pumps as replacement of electricity and diesel operated tube wells
- ✤ Waste-to Energy projects utilizing municipal solid waste
- Net-metering based installations
- ✤ Bilateral contracts using RE generation
- Village electrification though solar, wind and small hydel based generation in standalone and hybrid mode



Thank You