

**Presentation for 16th Meeting of the CAREC
Energy Sector Coordination Committee
Almaty, Kazakhstan**

by

Alternative Energy Development Board

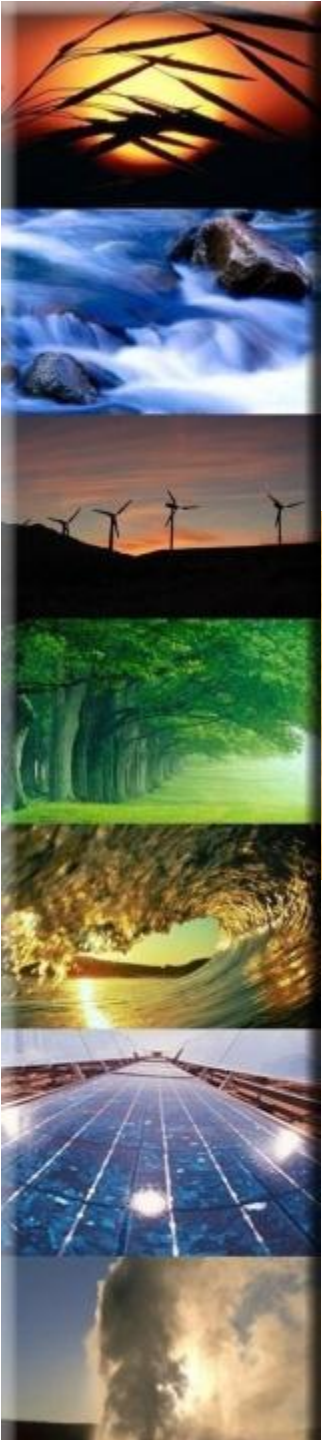


11th September, 2013

SCHEME OF PRESENTATION



1. Introduction to Alternative Energy Development Board (AEDB)
2. Alternative and Renewable Energy (ARE) Technologies being pursued by AEDB
3. Progress in AREs Development
4. ARE Investment Opportunities

A vertical strip of six images is located on the left side of the slide. From top to bottom, the images are: a close-up of a solar panel with a bright sun reflecting off its surface; a close-up of a flowing river with white water rapids; a silhouette of a wind turbine against a sunset sky; a lush green forest with a path leading through it; a close-up of a hydroelectric dam with water flowing over its spillways; and a close-up of a solar panel with a bright sun reflecting off its surface.

INTRODUCTION TO ALTERNATIVE ENERGY DEVELOPMENT BOARD (AEDB)

AEDB – MANDATED NATIONAL AGENCY FOR AREs

(Autonomous by AEDB ACT: MAY 2010)

- **Policies, Programs and Projects** through private sector in the field of Alternative Energy
- **Transfer of Technology** and develop indigenous manufacturing base for AE Technology
- Products and services in Off Grid Areas
- **Establish** (i) Alternate Energy Fund, and (ii) Institute of Renewable Energy Technologies.

POLICY AND FRAMEWORK

- Policy for Development of Renewable Energy for Power Generation 2006 (RE Policy 2006)
- Framework for Power Co-Generation 2013 (Bagasse/Biomass) was approved by ECC on March 06, 2013, and made part of the RE Policy 2006.

INCENTIVES FOR INVESTMENT IN (RE POLICY 2006)



- Attractive ROE (17%)
- Govt. has announced attractive Upfront Tariff for:
 - Wind (2013) : levelized US cents 13.51/kWh
 - Bagasse : levelized US cents 10.62/kWh
 - Determination of upfront tariff for solar, biomass, waste-to-energy and small hydro is in process
- Tax free revenues
- Duty free imports
- Guaranteed purchase of energy
- Grid Spill Over Concept (Small Power Producers & Cogeneration)
- Net Metering (Under process in NEPRA)
- Wheeling Provisions (Under consideration in NEPRA)
- Banking of Electricity (Concept stage)

A vertical strip of six images is located on the left side of the slide. From top to bottom, they depict: a close-up of a solar panel with a sun reflection; a fast-flowing river with white water rapids; a silhouette of a wind turbine against a sunset sky; a lush green forest with a path; a small boat on a river with a waterfall in the background; and a large solar panel array with a bright light reflection.

ALTERNATIVE AND RENEWABLE ENERGY (ARE) TECHNOLOGIES BEING PURSUED BY AEDB

ALTERNATIVE AND RENEWABLE ENERGY SECTORS



➤ Abundant Indigenous RE Resources

- Wind: 3,000 MW in pipeline and abundant potential for development
- Solar: Extremely rich in solar resources
- Hydro
 - Small 3,000 MW (Approx.)
- Bagasse Cogeneration: 2,000 MW (Approx.)
- Waste to Energy: 1,000 MW (Approx.)
- Geothermal Studies underway
- Alternative Fuels Potential being determined

ALTERNATIVE AND RENEWABLE ENERGY BENEFITS



- **Relieves Grid Resources**
- **Energy Security - Focus on Domestic Resources**
- **Only Energy Option for many rural areas (off-grid)**
- **Reduced dependence on Imported Oil:**
 - Introducing 5% wind power into national grid can save \$ 0.8 billion oil imports and introducing 13% renewable power into national grid can save more than \$2 billion oil imports per year (In-house AEDB calculations based on 2011 prices)
- **Environment Friendly**
 - Carbon Credits – 13% renewable power supply to national grid is worth more than \$30 million annual carbon revenue
 - Utilization of waste land
 - Employment Creation and Poverty Alleviation

A vertical strip of six images runs down the left side of the slide. From top to bottom, they depict: 1) A close-up of a solar panel's surface reflecting a bright, orange-hued light. 2) A fast-moving river with white water rapids flowing over dark rocks. 3) A silhouette of a wind turbine against a sunset sky. 4) A lush green forest with sunlight filtering through the trees. 5) A small boat on a river, illuminated by warm, golden light. 6) A large-scale view of a solar farm with rows of panels stretching into the distance under a clear sky.

PROGRESS IN AREs DEVELOPMENT

AEDB CURRENT INITIATIVES

WIND

42 Private Projects at various stages of development. 106 MW commissioned (FFC & Zorlu).

150 MW under construction; expected generation by October 2014

Financial close for 1000 MW expected during 2013/14.

Expected by 2016: 1500 MW

Expected by 2018: 3000 MW (Subject to National Grid Availability)

SMALL HYDRO (≤ 50 MW)

8 Projects (80 MW) in public sector under various stages of implementation in Punjab & KPK.

Expected by 2016: 80 MW

Expected by 2018: 200 MW

SOLAR

On-grid: **22 Private Projects** (664 MW) solar PV initiated in private sector (LOIs issued by AEDB)

Off-Grid: Electrified over 4000 homes in villages. Programs initiated for solar water heating and solar water pumping (WB financed).

AEDB Initiated SROs resulting in approx. 70 MW off-grid solar equipment for home solutions, water heaters and water pumping.

OTHERS

35 MW bagasse to power plants operational.

15 Projects (294 MW) in advanced stages to be on-grid by 2016.

05 LOIs (57 MW) issued to Biomass & Waste to Energy Projects in Private Sector

02 LOIs (52 MW) issued under the new for Power Co-Generation from Biomass/Bagasse 2013, 02 LOIs of 20 MW under process

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RE INVESTMENT OPPORTUNITIES

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WIND

- DFI in IPP projects at potential sites like Jamshoro, Hyderabad, Thatta etc.
- EPC / Equipment supply services
- Financing IPP projects
- Export Credit
- Manufacturing of Equipment locally

Target: **by 2020: 3500 MW**
 by 2025: 5000 MW

SMALL HYDRO (≤ 50 MW)

- DFI in IPP projects at potential sites all over Pakistan.
- EPC / Equipment supply services
- Financing IPP projects
- Export Credit
- Manufacturing of Equipment locally

Target: **by 2020: 300 MW**
 by 2025: 500 MW

SOLAR

- DFI in IPP projects at potential sites all over Pakistan.
- EPC / Equipment supply services
- Financing IPP projects
- Export Credit
- Manufacturing of Equipment locally

Target: **by 2020: 1500 MW**
 by 2025: 2500 MW

- Off-grid applications SHS, SWP, SWH etc.

OTHERS

- DFI in IPP projects at potential sites all over Pakistan.
- EPC / Equipment supply services
- Financing IPP projects
- Export Credit
- Manufacturing of Equipment locally

Target: **by 2020: 1800 MW**
 by 2025: 2500 MW

Priorities for the ARE Sector

5% Energy Mix coming from ARE by 2030

(A) Private Sector & Public Sector Investments :

Wind, Solar PV & CSP, Biomass/Bagasse/W2E, Small and Micro Hydro etc.

(B) Accelerated Deployment of RE Technologies:

Agricultural Water Pump, Solar Water Heater, Biogas plants, Heat Pumps, Solar Powered / LED Street Lights

(C) Local Manufacturing of RE Equipment, Building Capacities & Technology Transfer:

Resource Mapping, Training, Capacity Building, and Technology transfer

THANK YOU

ALTERNATIVE & RENEWABLE ENERGY

Renewable Energy

- Wind
- Solar
 - Photovoltaic
 - Thermal
- Hydro
- Geo-Thermal

Alternative Fuels

- Bio Diesel
- Ethanol
- Biomass - Waste-to-Energy
- Biogas

Other Non-Conventional Energy

- Cogeneration
- Conservation



NATURAL GAS



OFF-GRID TECHNOLOGIES

- Solar Home Systems
- Solar Water Heater
- Solar Agri Water Pumping
- Clean Drinking Water
- Street lights
- Small and Micro Hydro
- Heat pumps
- Bio Gas
- Off Grid Wind/Solar



LIST OF COMPANIES TO WHOM LOIs ARE ISSUED FOR WIND POWER PROJECTS

S. No	Name of Company	Capacity (MW)
1	Fauji Fertilizer Company	49.5
2	Zorlu Enerji Pakistan Ltd	56.4
3	Foundation Wind Energy-II (Pvt.) Ltd.	50
4	Three Gorges First Wind Farm Pakistan Ltd.	50
5	Foundation Wind Energy-I Ltd.	50
6	Sapphire Wind Power Company Ltd	50
7	Metro Power Company Ltd.	50
8	Hawa Holding Limited	50
9	Sachal Energy Development Ltd	50
10	Master Wind Energy (Pvt.) Ltd.	50
11	Tenaga Generasi Ltd	50
12	Lucky Energy (Pvt.) Ltd	50
13	Tapal Wind Energy (Pvt.) Ltd.	30
14	Pakistan Wind Power Generation (Pvt.) Ltd.	5
15	Pakistan Wind Power Generation (Pvt.) Ltd.	5
16	Fina Enerji Holding AS	50
17	HydroChina Dawood Power (Pvt.) Ltd.	50
18	United Energy Pakistan Ltd.	100
19	Gul Ahmed Wind Energy Ltd.	50
20	China Sunnec Energy (Pvt.) Ltd	2.4
21	China Sunnec Energy (Pvt.) Ltd	52.4
22	Wind Eagle Ltd.	50

LIST OF COMPANIES TO WHOM LOIs ARE ISSUED FOR WIND POWER PROJECTS

Sr. No.	Name of Company	Capacity (MW)
23	Wind Eagle Ltd.	50
24	NBT Wind Power (Pvt.) Ltd.	250
25	NBT Wind Power (Pvt.) Ltd.	250
26	United Energy Pakistan Ltd.	350
27	Zephyr Power (Pvt.) Ltd.	50
28	Titan Energy Pakistan (Pvt.) Ltd.	10
29	Hartford Alternate Energy	50
30	Tricon Boston Consulting Corporation	50
31	Tricon Boston Consulting Corporation	50
32	Tricon Boston Consulting Corporation	50
33	Hydro China Xiebei Engineering Corporation	100
34	Hydro China Xiebei Engineering Corporation	100
35	Hydro China Xiebei Engineering Corporation	100
36	Associated Technologies Ltd.	100
37	Anadolu Wind Pakistan	200
38	System Wind Energy	150
39	Trident Energy (Pvt.) Ltd	10
40	Burj Wind Energy (Pvt.) Ltd	14
41	Western Energy Ltd.	15
42	Zaver Petroleum Corporation Ltd.	50
	Total Capacity of Lols Issued	2999.7



LIST OF COMPANIES TO WHOM LOIs ARE ISSUED FOR SOLAR PV POWER PROJECTS

S. No	Name of Company	Capacity (MW)
1	First Solar (Pvt.) Ltd.	2
2	DACC Associates	50
3	Techaccess FZ LLC	10
4	Wah Industries Ltd	5
5	Silicon CPV (Pvt.) Ltd	1
6	Associated Technologies (Pvt.) Ltd	20
7	Bukhsh Energy (Pvt.) Ltd	10
8	Avelar Solar	50
9	Sunlux Energy Ltd	5
10	Sapphire Solar Power Company Ltd	10
11	Transtech Paksitan	50
12	Solar Gen	50
13	Realforce Ruba Pakistan Power (Pvt.) Ltd	20
14	Global Strategies (Pvt.) Ltd	10
15	Hecate Energy	50
16	Jafri & Associates	50
17	Solar Blue	50
18	Integrated Power Solutions	50
19	Forte Pakistan (Pvt.) Ltd.	0.99
20	Hecate Energy	150
21	Dawood Group	10
22	Zahir Khan & Brothers (ZKB)	10
	Total Capacity of Lols Issued	663.99



REDSIP /AEDB PUBLIC SECTOR PROJECJTS – 80 MW BY 2016



<p>● Khyber Pakhtunkhwa (56 MW)</p> <ul style="list-style-type: none">● Ranolia● Daral Khwar● Machai <p>Feasibility Studies</p>	<p>US \$ 150.99 Million</p> <p>(17.0 MW)</p> <p>(36.6 MW)</p> <p>(2.6 MW)</p> <p>03</p>
<p>● Punjab (24MW)</p> <ul style="list-style-type: none">● UCC Main Lower (Chianwali)● Deg fall Sheikhpura● Pakpattan Canal● LBDC Okara● UCCM Marala <p>Feasibility</p>	<p>US \$ 138.74 Million</p> <p>(5.38 MW)</p> <p>(4.04 MW)</p> <p>(2.82 MW)</p> <p>(4.16 MW)</p> <p>(7.64 MW)</p> <p>05</p>
<p>● Gilgit Baltistan</p> <ul style="list-style-type: none">● 26 MW Hydro Power Plant at Shegherthang in Skardu● 4 MW Hydro Power Plant at Chilas <p>Feasibility Studies</p>	<p>US \$ 71.12 Million</p> <p>30</p>



LIST OF COMPANIES TO WHOM LOIs ARE ISSUED FOR BIOMASS / BAGASSE / WASTE-TO-ENERGY PROJECTS

S. No.	Name of Company	Capacity (MW)
1	SSJD Bioenergy Ltd.	12
2	Lumen Energia (Pvt) Ltd.	12
3	Biomass Power Generation Ltd	12
4	Green Sure Environmental Solutions	12
5	Pak Ethanol (Pvt) Ltd.	9
6	JDW Sugar Mills Unit-II	26
7	JDW Sugar Mills Unit-III	26
	Total Capacity of Lols Issued	109

