Alternative Energy Development Board (AEDB)
Government of Pakistan

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Chief Executive Officer- AEDB

Sequence of Presentation . . .

- Brief Introduction of AEDB
- Salient Features of Pakistan's Renewable Energy Policy
- Potential of Renewable Energy Resources in Pakistan
- Current Status of Renewable Energy Projects
- World Bank Initiative- Wind, Solar and Biomass Mapping
- Prospective Projects for Technical Assistance of WB
- Questions/Discussion

Alternative Energy Development Board (AEDB)

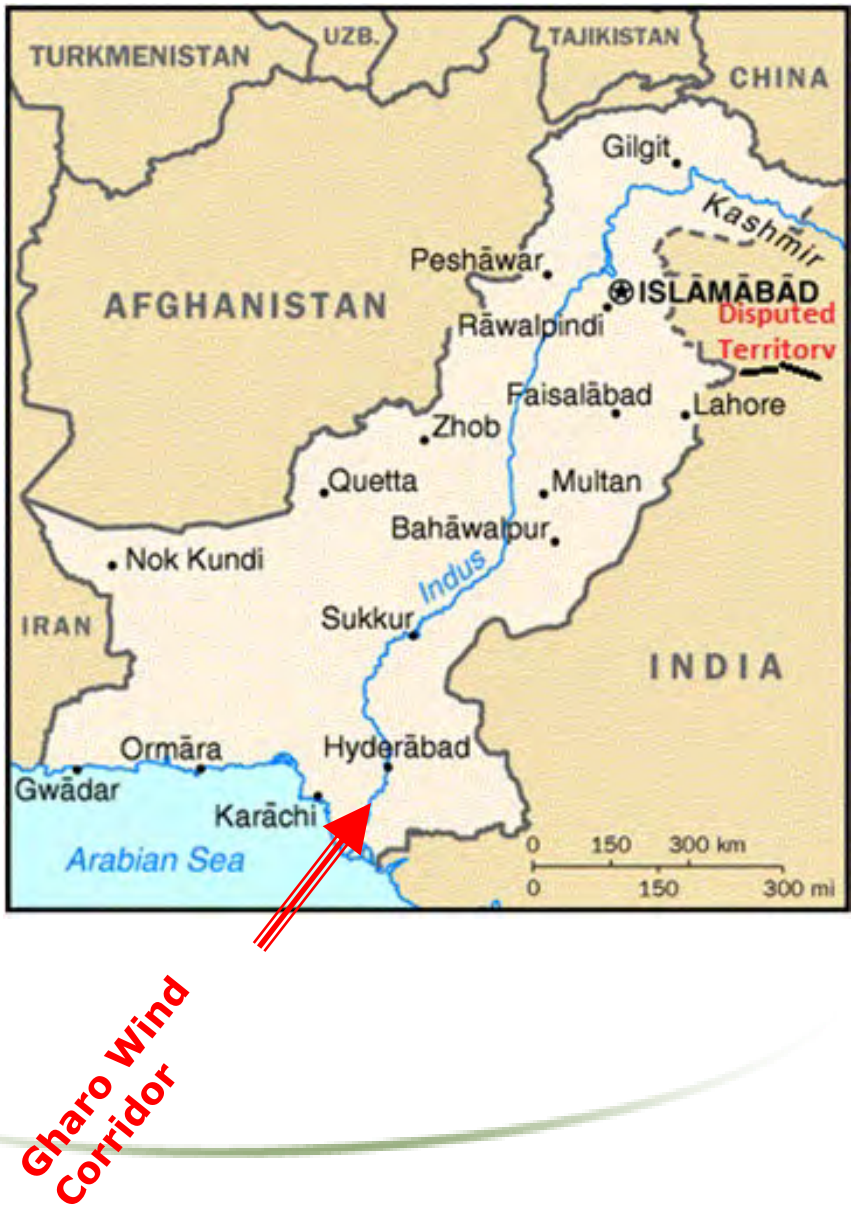
- One Window for all Alternative Energy Investments in Pakistan.
- Implement policies, programs and projects through private sector in the field of Alternative Energy
- Assist and facilitate development and generation of Alternative Energy to achieve sustainable economic growth
- Encourage transfer of technology and develop indigenous manufacturing base for ARE Technology
- Promote provision of energy services that are based on Alternative energy resources
- Setting up ARE projects on its own or through joint venture or partnerships with public or private entities.

Salient Features of Renewable Energy Policy

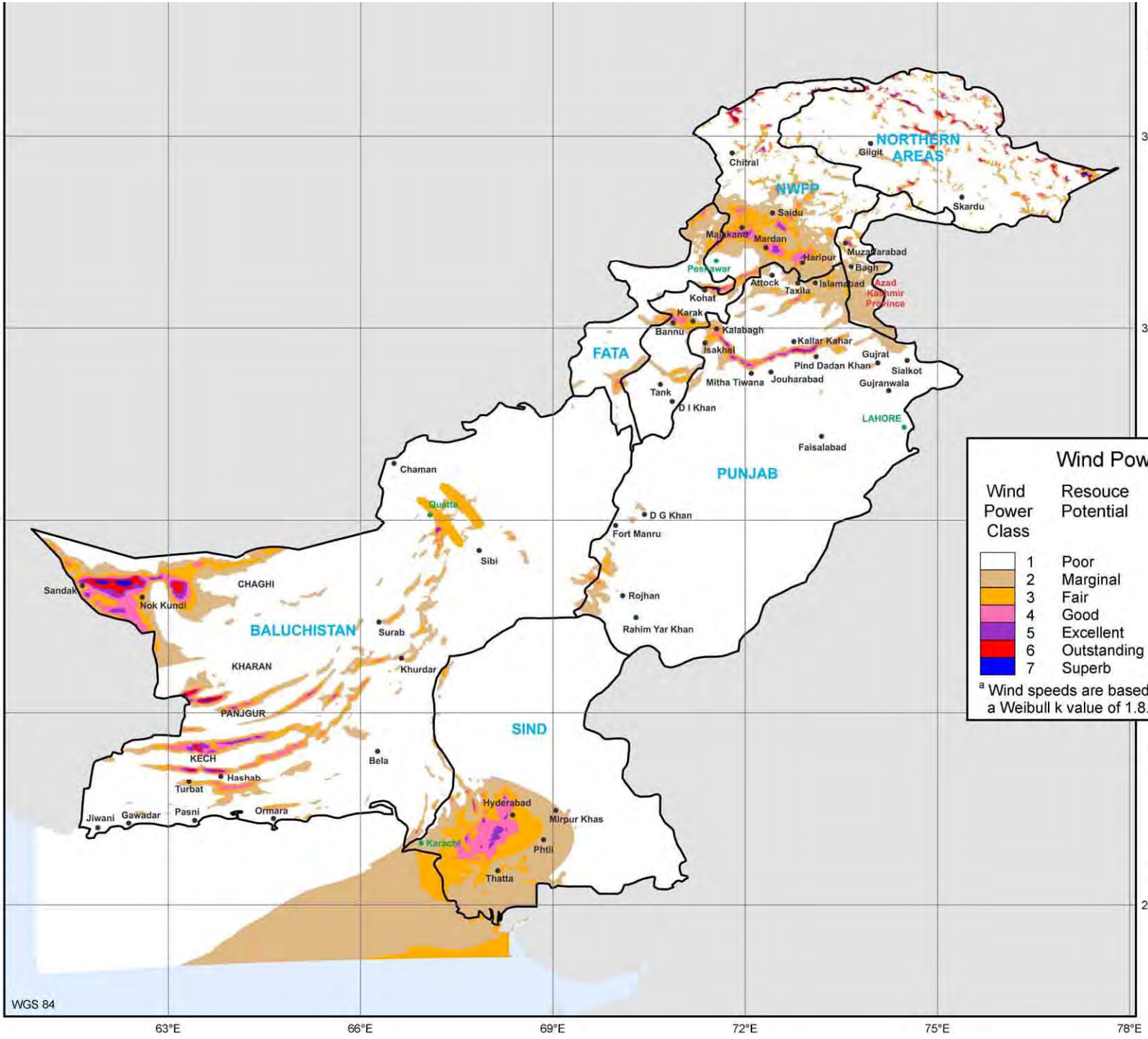
- Guaranteed Electricity purchase
- Grid provision is the responsibility of the purchaser
- Protection against political risk & change in law
- Attractive Tariff – Cost Plus
- Return on investment is between 17% to 18%
- Upfront Tariff of US Cents 13.51/kWh announced by National Electric Power Regulatory Authority (NEPRA) for Wind Power Projects, NEPRA is considering to announce Upfront Tariff for other RE Techs
- No Import Duties on Equipment
- Zero Sales Tax
- No Income Tax / withholding tax / turnover tax
- Repatriation of Equity along with dividends freely allowed
- Permission to issue corporate registered bonds
- Permission to issue shares at discounted prices
- Non-residents allowed purchase of securities issued by Pakistani companies without State Bank of Pakistan's permission
- Convertibility of PKR into USD

RE Resource Potential – Wind Energy Potential

- National Renewable Energy Lab (NREL) under USAID Program – Rolled Out Wind and Solar Atlas of Pakistan (based on available data and data collected through satellite)
- **350,000 MW** National Potential of Wind Energy (according to NREL Study)
- **50,000 MW** in province of Sindh (Gharo – Keti Bandur Wind Corridor)
- Pakistan has more than 300 sunny days and has one of best solar resource



Pakistan
50 m Wind Pow



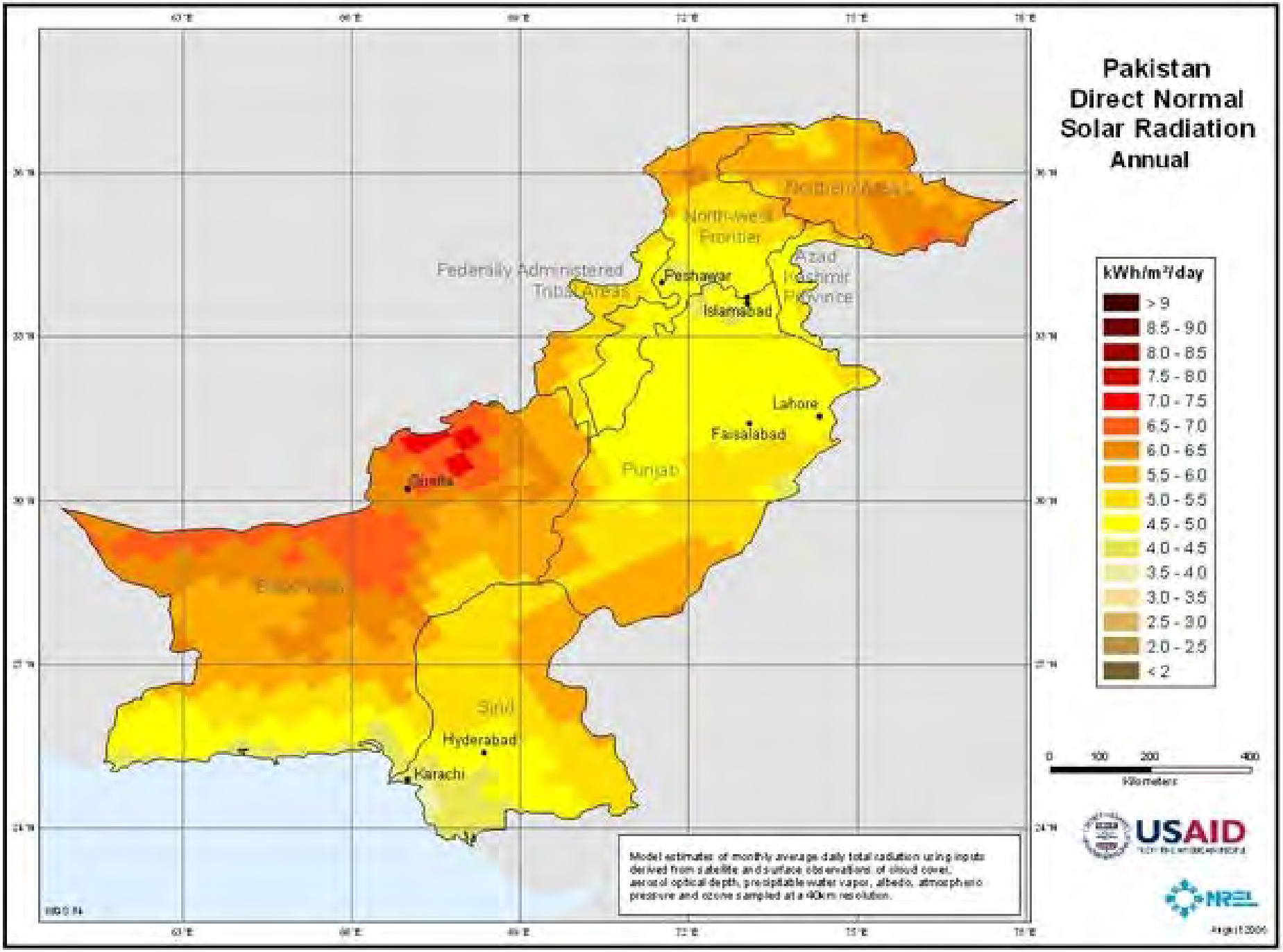
Wind Power Classification

Wind Power Class	Resouce Potential	Wind Power Density at 50m W/m^2	Wind Speed[a] at 50 m m/s
1	Poor	0 - 200	0.0 - 5.4
2	Marginal	200 - 300	5.4 - 6.2
3	Fair	300 - 400	6.2 - 6.9
4	Good	400 - 500	6.9 - 7.4
5	Excellent	500 - 600	7.4 - 7.8
6	Outstanding	600 - 800	7.8 - 8.6
7	Superb	> 800	> 8.6

[a] Wind speeds are based on an elevation of 500 m and a Weibull k value of 1.8.

0 100 200
Kilometers

UNDP/GEF WIND ENERGY PROJECT PAKISTAN
AEDB
USAID
FROM THE AMERICAN PEOPLE


Pakistan
Direct Normal
Solar Radiation
Annual
kWh/m²/day
> 9
8.5 - 9.0
8.0 - 8.5
7.5 - 8.0
7.0 - 7.5
6.5 - 7.0
6.0 - 6.5
5.5 - 6.0
5.0 - 5.5
4.5 - 5.0
4.0 - 4.5
3.5 - 4.0
3.0 - 3.5
2.5 - 3.0
2.0 - 2.5
< 2
Northern Areas
North-west Frontier
Federally Administered Tribal Areas
Peshawar
Islamabad
Azad Kashmir
Province
Lahore
Faisalabad
Punjab
Quetta
Baluchistan
Sind
Hyderabad
Karachi
0 100 200 400
Kilometers
Model estimates of monthly average daily total radiation using inputs derived from satellite and surface observations of cloud cover, aerosol optical depth, precipitable water vapor, albedo, atmospheric pressure and ozone sampled at a 40km resolution.
USAID
NREL

Current Status of Different Renewable Energy Projects in Pakistan

- Currently 106 MW wind power projects installed.
- Wind Projects in Pipeline:

Year	Financial Close	Commercial Operation Date (COD)
2012	106 MW	-
2013	200 MW	106 MW
2014	500 MW	200MW
2015	800 MW	500 MW

- **Solar Energy:** Letter of Intent (LOIs) for **700 MW Solar Projects** issued and Projects at Various Stages of Development
- **Biomass: 34 MW Projects** using Bagasse to Energy Operational in Sugar Mills, Other Projects at Different Stages
- **Biogas:** 14000 Household Biogas Plants being Constructed through Rural Support Program Network (RSPN) with Dutch Government Funding
- **Hydro Power Projects**: Potential of 50,000MW Hydro Projects in Northern Areas

WB Initiative - Wind/Solar/Biomass Resource Mapping

- Based on request from Government of Pakistan, World Bank initiated US$ 1.96 million project for wind, solar and biomass resource mapping
- Project will be based on earlier work done by UNDP and NREL
- Minimum 8 wind masts and solar data collection equipment will be installed at promising sites
- AEDB has requested for minimum 25 wind and solar masts owing to large windy areas and interests of IPPs in wind/solar sector
- World Bank exploring options for additional funds
- Project will help in;
  - identification of additional wind farm areas and bankable resource data
  - Increase investors' confidence
  - Resolving current energy crisis
  - Reduce GHG Emissions, Reduce Global Warming

Prospective Projects for Technical Assistance

- **Geothermal Energy**: Study shows 29 different sites across the country having good geothermal energy potential sites- need for feasibility studies
- **Institute of Renewable Energy Technologies (I-RET):** AEDB intends to establish IRET for skilled manpower and R&D
- **Zero-Energy Building**: AEDB intends to construct zero-energy office building
- **Net-metering and wheeling-** RE Policy allows net-metering and wheeling arrangements, however study/pilot projects can pave the way forward
- **Off Grid Projects**: Thousands of village/communities in remote areas having no grid connectivity can be electrified through solar/wind hybrid projects
- **Desalination Plants for Saline Water-** Need for setting up desalination plants for communities located in coastal areas
- **Capacity Building of Technical Staff-** Need to train technical staff in different areas of Renewable Energy

Thank You


Hyderabad
N
AEDB-UNDP-Jherk Mast
AEDB-UNDP-BaburBand Mast
Nooriabad
GA Mast 5
GA Mast
Lucky Energy Mast
Zorlu 1
Master Energy Mast
Jhampir
arachi
کراچی
AEDB-UNDP- HawksBay-KPT Mast
Gharo, Pakistan
Zephyr Power Mast
TGL Mast
Green Power Mast
Arabian Sea Mast
AEDB-UNDP-Sajjawal Mast
AEDB-UNDP-KetiBandar Mast