



Renewable Energy Application in Pakistan Potential and Barriers

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Energy and Power Situation in Pakistan

Energy and Power requirements in the future for Pakistan

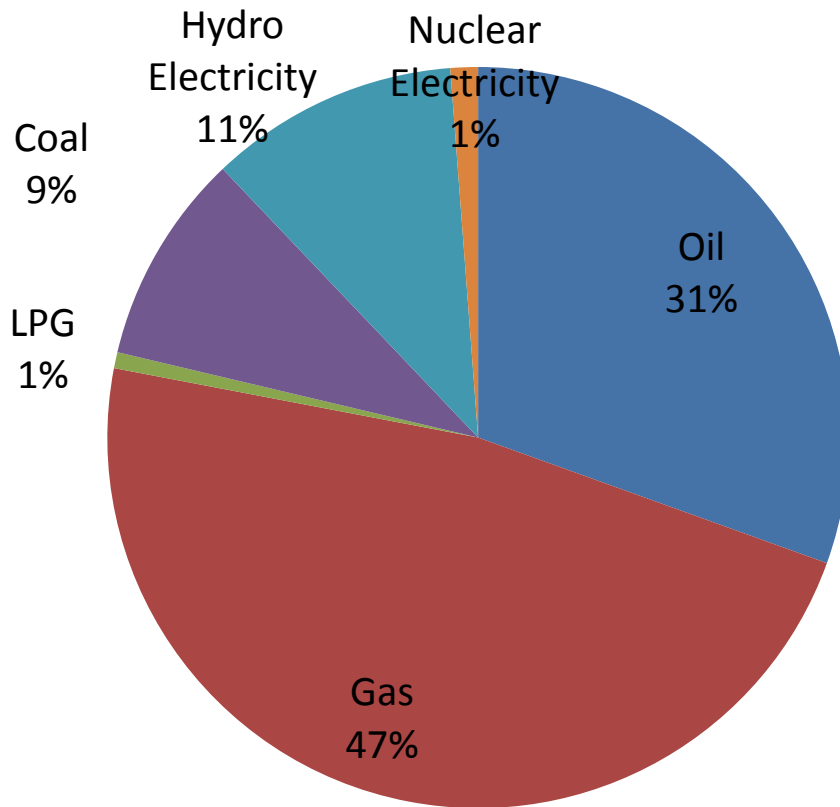
Potential Renewable Energy Sources in Pakistan

Barriers for the Development of Renewable Energy Projects



Primary Energy Supplies of Pakistan

Total Primary Energy Supply 63 MTOE (HDIP-Energy Year book-2008-09)



The Pakistan per capita energy consumption (0.36) TOE is one fifth of the world average of 1.77 TOE (IAE 2008)

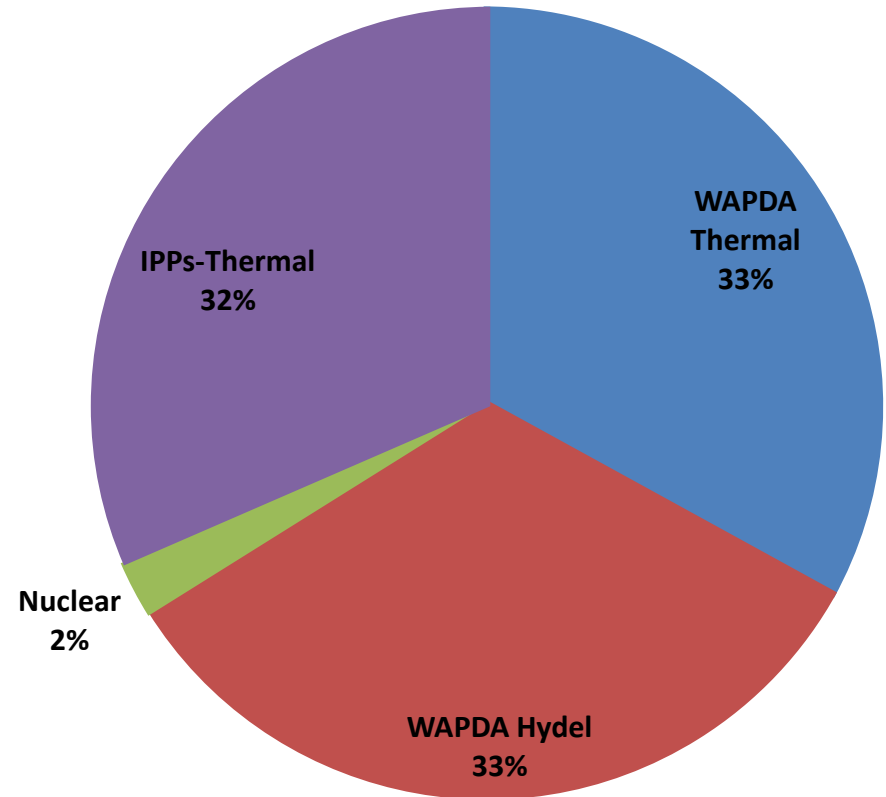


Installed Power Generation Capacity of Pakistan

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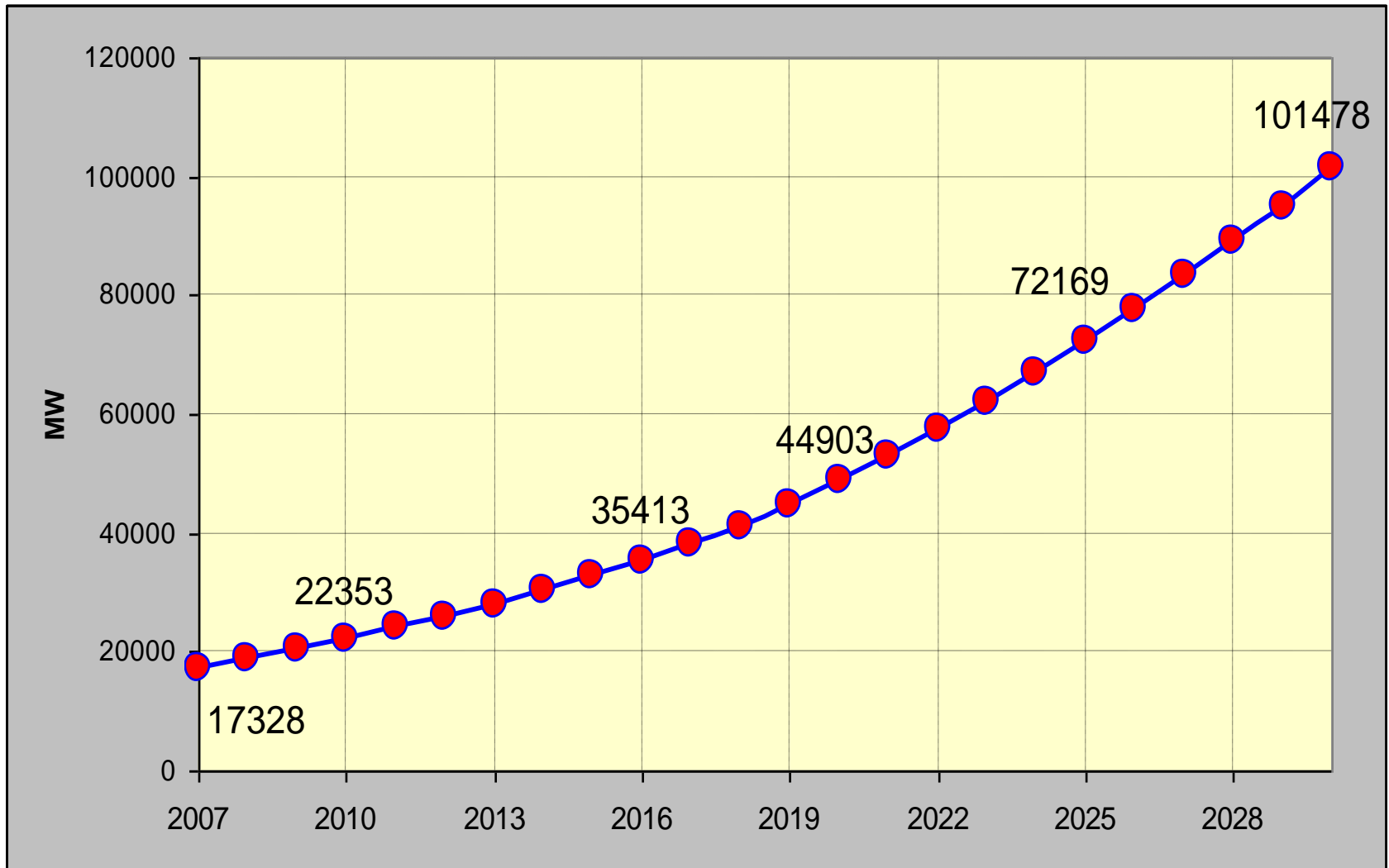
WAPDA Thermal	6441 MW
Hydel	6464 MW
Nuclear	462 MW
IPPS (Thermal)	6154 MW
Total	19521 MW

The per capita electricity consumption 402kWh is less than one sixth of the world average of 2,516 kWh (IEA 2008)



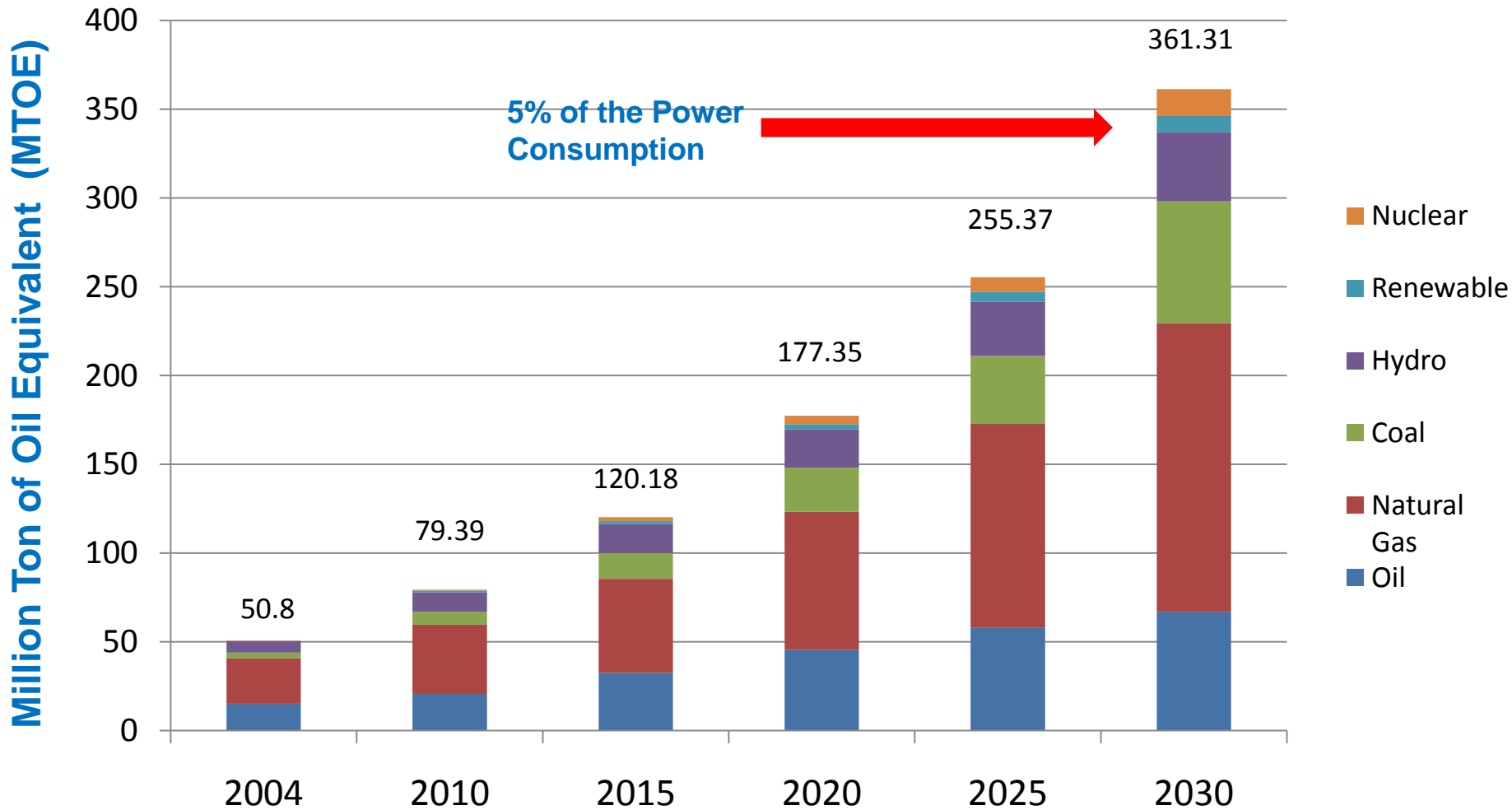


Electric Power Demand (2007-2025) Pakistan



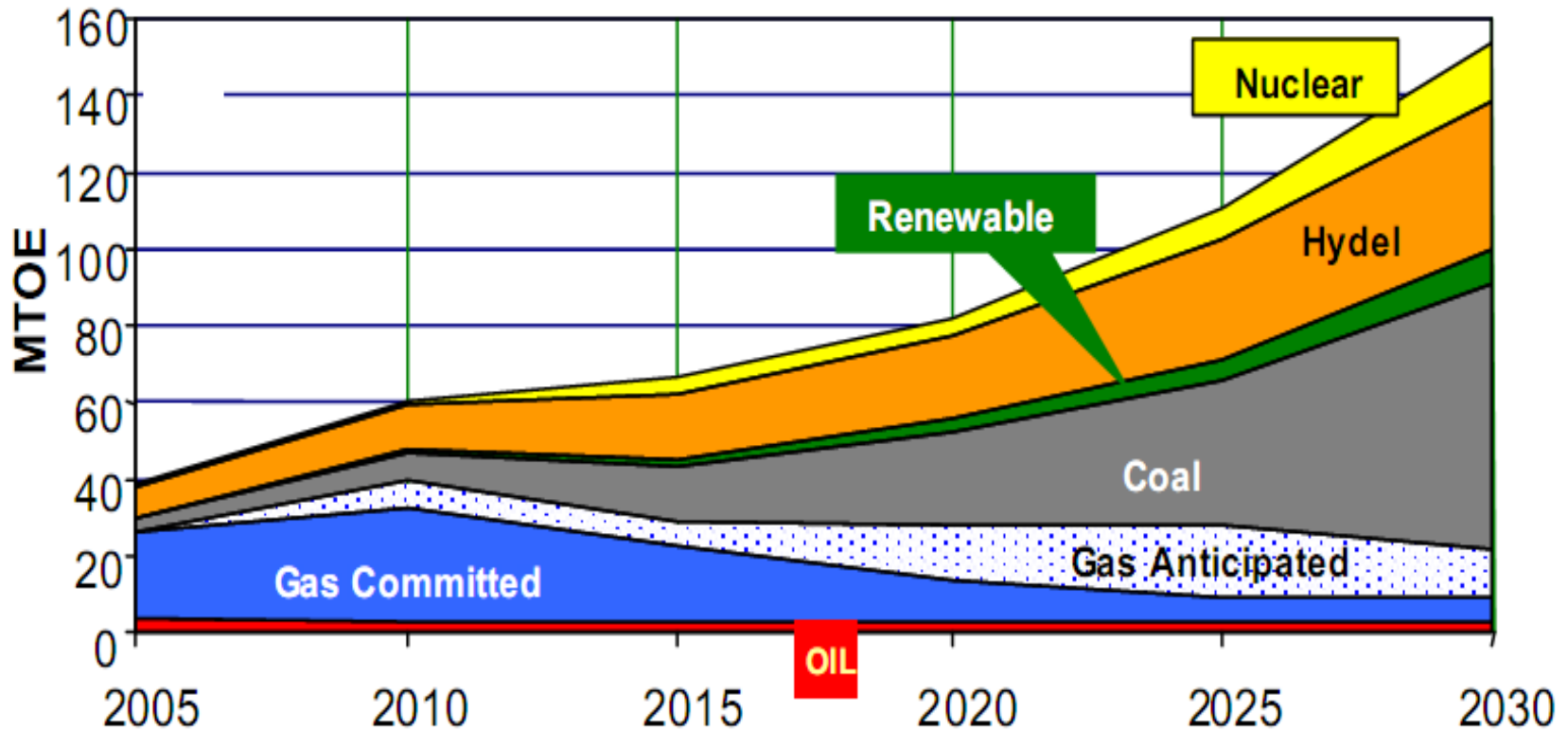


Energy Mix Plan Projections (Vision 2030-PC,GoP)





Indigenous Energy Projection (Vision 2030, Planning Commission)





Renewable Energy Potential of Pakistan

- **Hydropower**

Documented potential : 51700 MW including large Hydros source PPIB, MoW&P

- **Solar PV**

Pakistan receives one of the best solar irradiation in the world

average solar irradiation is 5-7kWh/m²/day

It can produce over a Million MW of Solar PV electricity provided the adequate space for installation (Source: NREL-USAID- study)



Renewable Energy Potential of Pakistan(Cont.....)

■ Wind Power

Total wind power potential : over 300,000 MW

(Source NREL-USAID study)

■ Solar Thermal

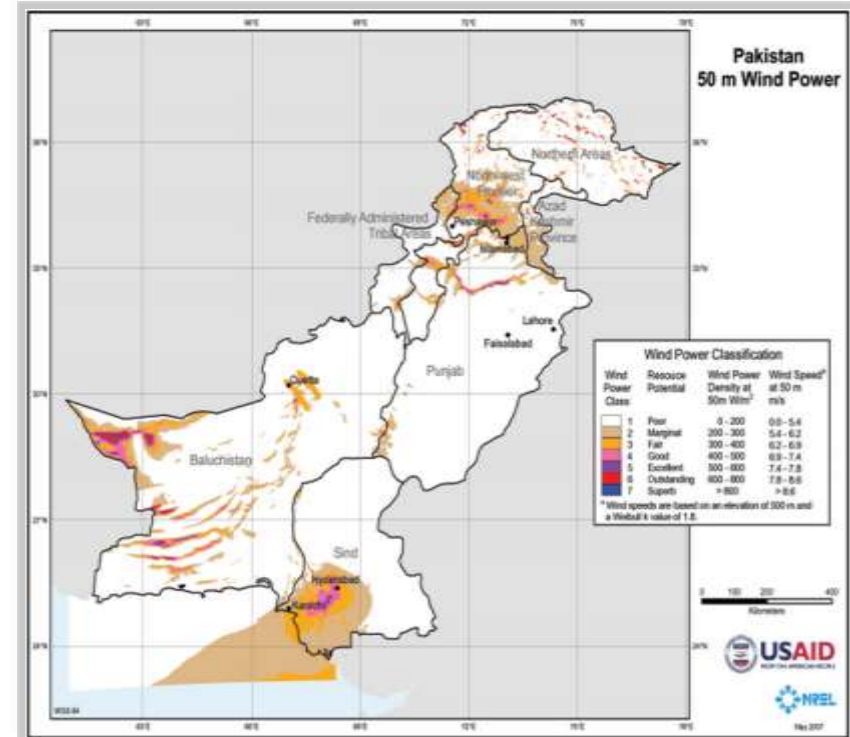
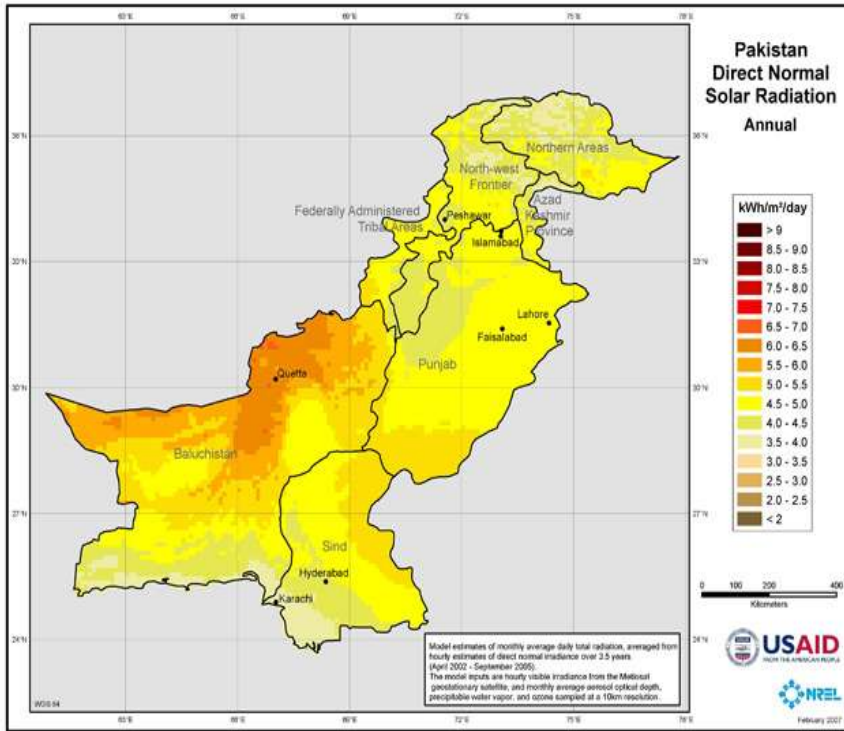
average solar irradiation 5-7 kW/m²/day

**It can produce thousands of MW from Thermal
Solar Power ...exact figure is not yet documented**

**Strong irradiation can be used for solar water
Heaters (Households as well as Industrial
applications)**



Wind and Solar Energy Maps of Pakistan





Renewable Energy Potential of Pakistan(Cont.....)

- **Biomass**

Estimated potential of biogas production: 8.8 to 17.2 billion m³ (equiv. to 55 to 106 TWh of energy equal to Pakistan current total power requirements)

Additionally an estimate electricity production from biogas: 5700 GWh (6.6% of Pakistan current power generation)

Source: Study of Energy Economics and Policy ETH Zurich

- **Other Sources like Geo Thermal etc. Potential exists but so far not properly evaluated and documented**



Barriers to the Development of RES

- **Policy Challenges**

Lack of Competition with conventional energy---
(economic incentives e.g. feed-in-tariff, time consuming and long licensing procedures, exclusion of external costs on non RES, etc.

- **Poor Infrastructure and Market Access**

RES power evacuation requires grid reinforcement, adequate grid codes and related infrastructure, which means investment in power infrastructure allowing RES into the national grid



Barriers to the Development of RES (Cont.....)

- **Institutional Barrier**

coordination and aligned decisions between relevant agencies of GoP required (AEDB, NEPRA, MoW&P, MoP&NRS etc.) to improve investment in RES

- **Information base and technical capacity**

Shortage of technical information (e.g. wind speed data, sunshine data, etc)

Shortage of technical professional and service companies (consultants, contractors, equipment suppliers etc.)



Barriers to the Development of RES (Cont.....)

- **Financial Barrier and lack of investors confidence**

Availability of adequate funds and financial incentive schemes for RES, Power circular debt, Country security and political risks

- **Lack of social awareness**

Inadequate awareness of general public about RES advantages and technology issues



**THANK YOU
FOR
YOUR ATTENTION**