



# Scope of Renewables in Pakistan

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# Energy Crisis !!!

- Pakistan; Sixth most populous country - estimated population in 2010 > 169 million
- Pakistan needs about 20,000 MW electricity per day
- Presently, it can produce about 11,500 MW per day

# Solution Analysis

- The demand exceeds supply and hence “load-shedding” is a common phenomenon through frequent power shutdowns.
- If the country wishes to continue its economic development and improve the quality of life of its people, it has to make serious efforts towards framing a coherent energy policy.
- 17% of the total electricity used in Pakistan can be saved through conservation and efficiency measures

# Top 9 Sources of Renewable Energy

**1. Waves**



**2. Tides**



**3. Wind**



**6. Radiant Energy**



**5. Water**



**4. Sunlight**



**9. Nuclear Power**



**8. Biomass**

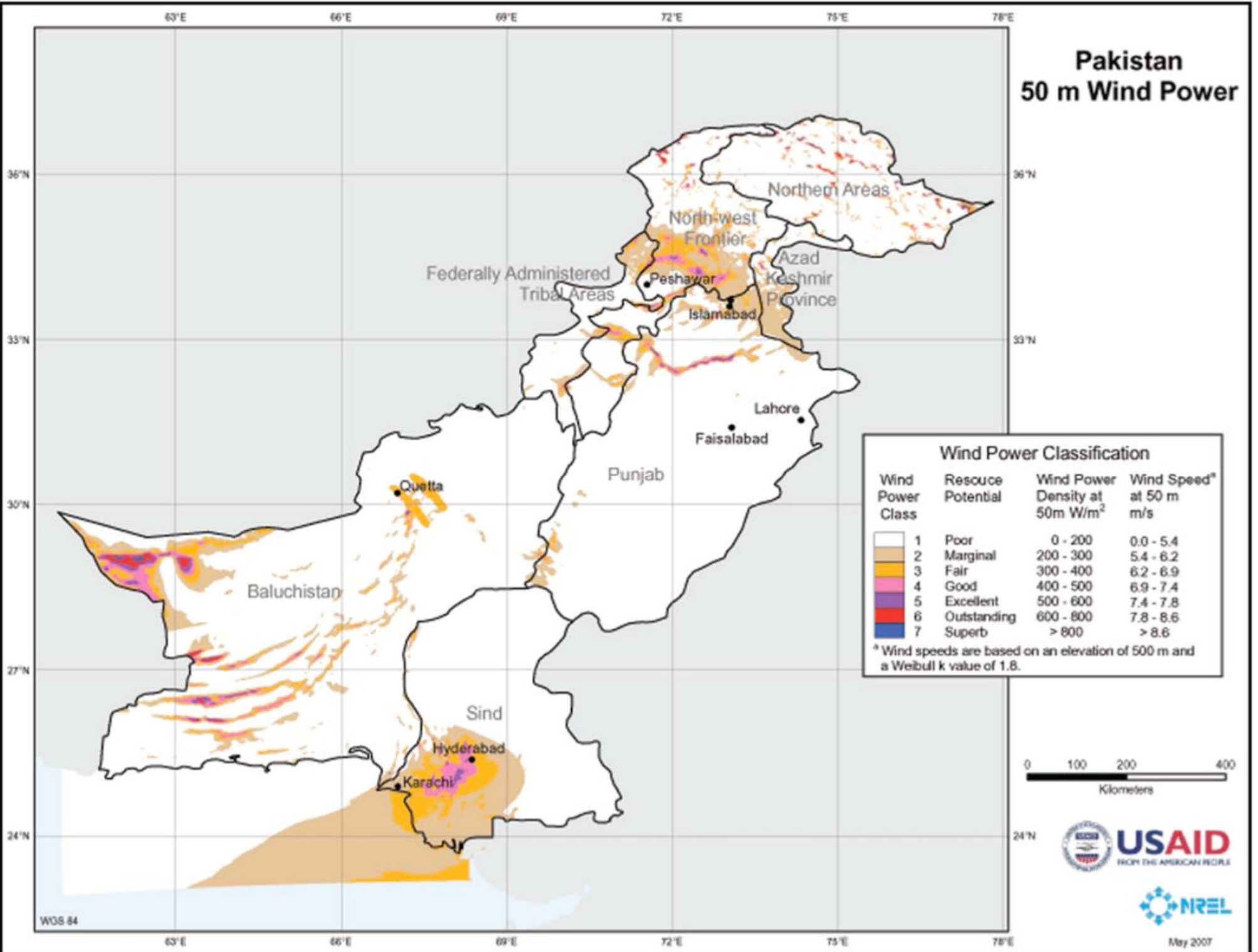


**7. Geothermal Energy**



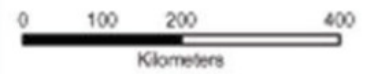
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- The wind map developed by National Renewable Energy Laboratory (NREL), USA in collaboration with USAID, has indicated a potential of 346,000 MW in Pakistan
  - The first requirement of conducting feasibility study is to install a wind mast.
  - The following issues should be discussed later:
    1. Birds collision or alteration of their migration routes
    2. Noise impact
    3. Flickering

# Pakistan 50 m Wind Power



| Wind Power Class | Resource Potential | Wind Power Density at 50m W/m <sup>2</sup> | Wind Speed <sup>a</sup> 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                               |

<sup>a</sup> Wind speeds are based on an elevation of 500 m and a Weibull k value of 1.8.

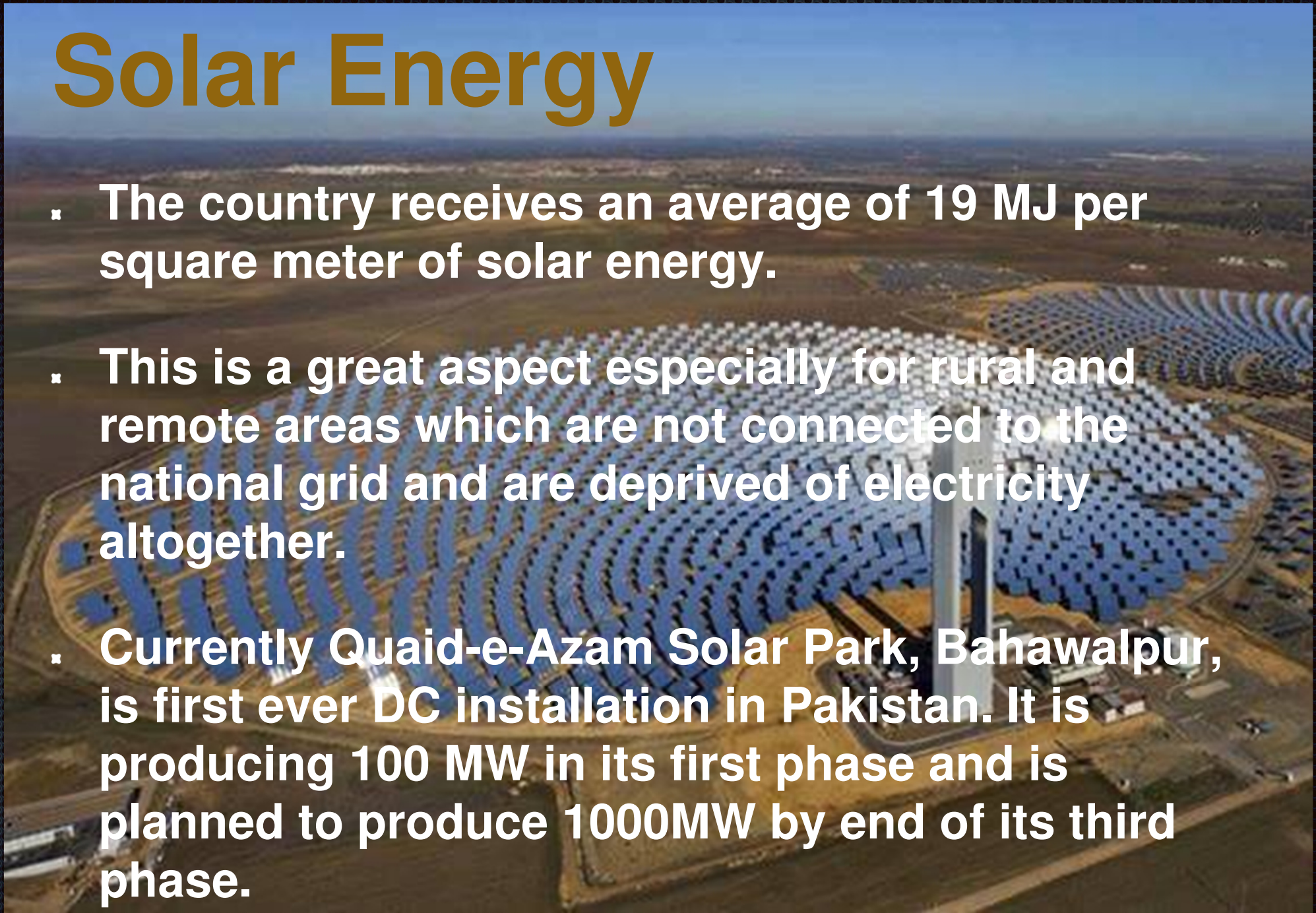


May 2007

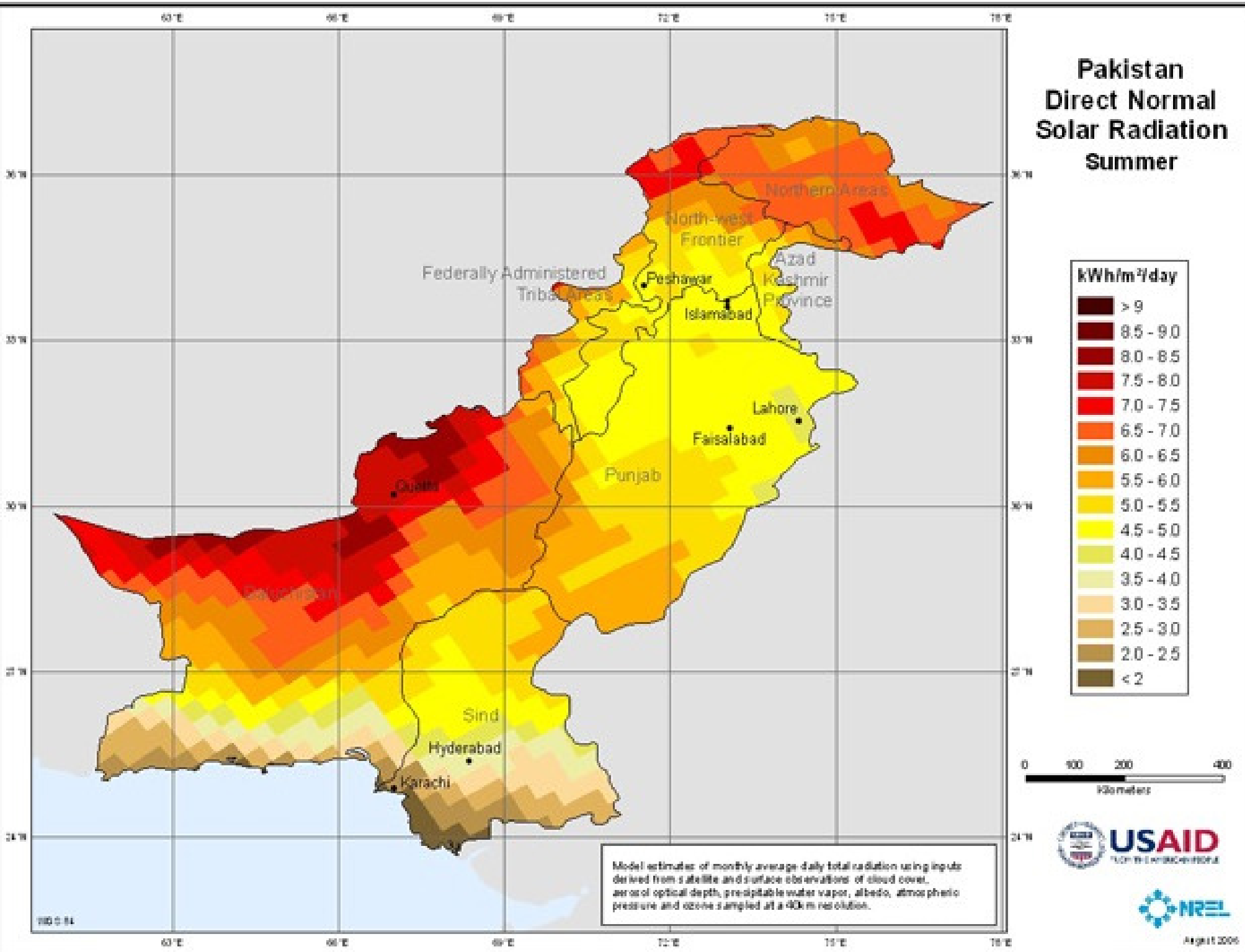
WGS 84

# Solar Energy

- The country receives an average of 19 MJ per square meter of solar energy.
- This is a great aspect especially for rural and remote areas which are not connected to the national grid and are deprived of electricity altogether.
- Currently Quaid-e-Azam Solar Park, Bahawalpur, is first ever DC installation in Pakistan. It is producing 100 MW in its first phase and is planned to produce 1000MW by end of its third phase.



# Pakistan Direct Normal Solar Radiation Summer



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 40 km resolution.





**At present an addition of 200 megawatts of wind energy and 1000 megawatts of solar energy are planned projects within CPEC.**

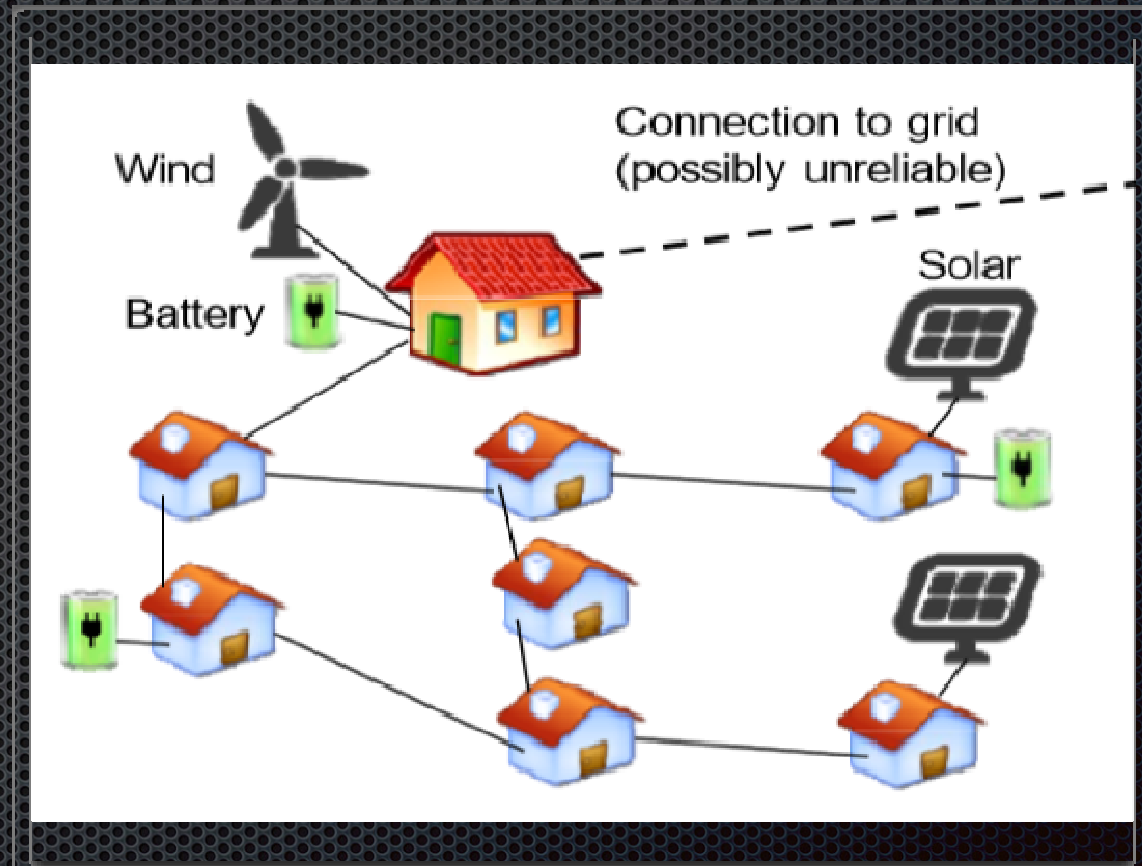


Proposed Solution for Green Pakistan

“Distributed Generation using Micro-grids”

# Solution for Rural Areas

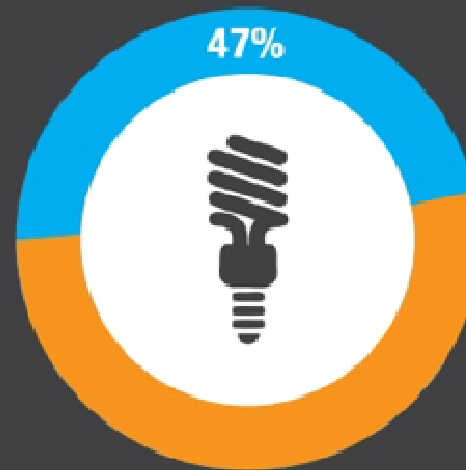
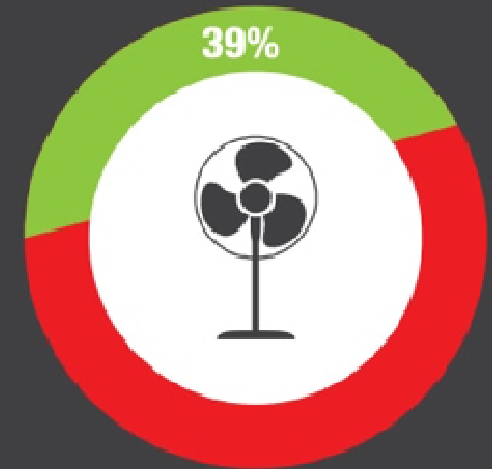
- Solar panels can be installed in individual villages, according to their demands
- Villages which produce more manure can benefit from biogas plants; and subsequent job creation



# Solution for Urban Areas

- **Promoting Energy Efficiency**
- **Switching to renewable energy sources for micro grids in new housing societies**

Energy efficient fans can reduce the total quantum of load shedding by 39% at existing consumption



while energy efficient lighting can reduce load shedding by 47%

Thank You!