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# How Can Solar Energy Solve the Current Energy Crisis in Pakistan?



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## Abstract

Since independence, burning fossil fuels to fulfill the energy demand of Pakistan has led to the deterioration of the environment and an increase in air pollution in major cities such as Karachi and Lahore. Correspondingly, rapid industrialization and economic growth has also resulted in a large difference between the demand and supply of electricity in Pakistan due to rolling blackouts, which are common. This study focuses on the optimal utilization of solar energy as an alternative to fossil fuels which will lead to improvements in Pakistan's environment, economy and energy supply (EEE).

## Introduction

- Pakistan is a developing country and has an ideal location for solar energy utilization.
- Electricity is the backbone of any country and is crucial to its survival in the modern age (Mirjat N.H. et al., 2018).
- A large amount of electricity is produced through fossil fuels.
- The capital costs of solar powerplants are high, but the rising fuel prices in Pakistan and significant solar energy resources potential will be helpful for achieving energy security.

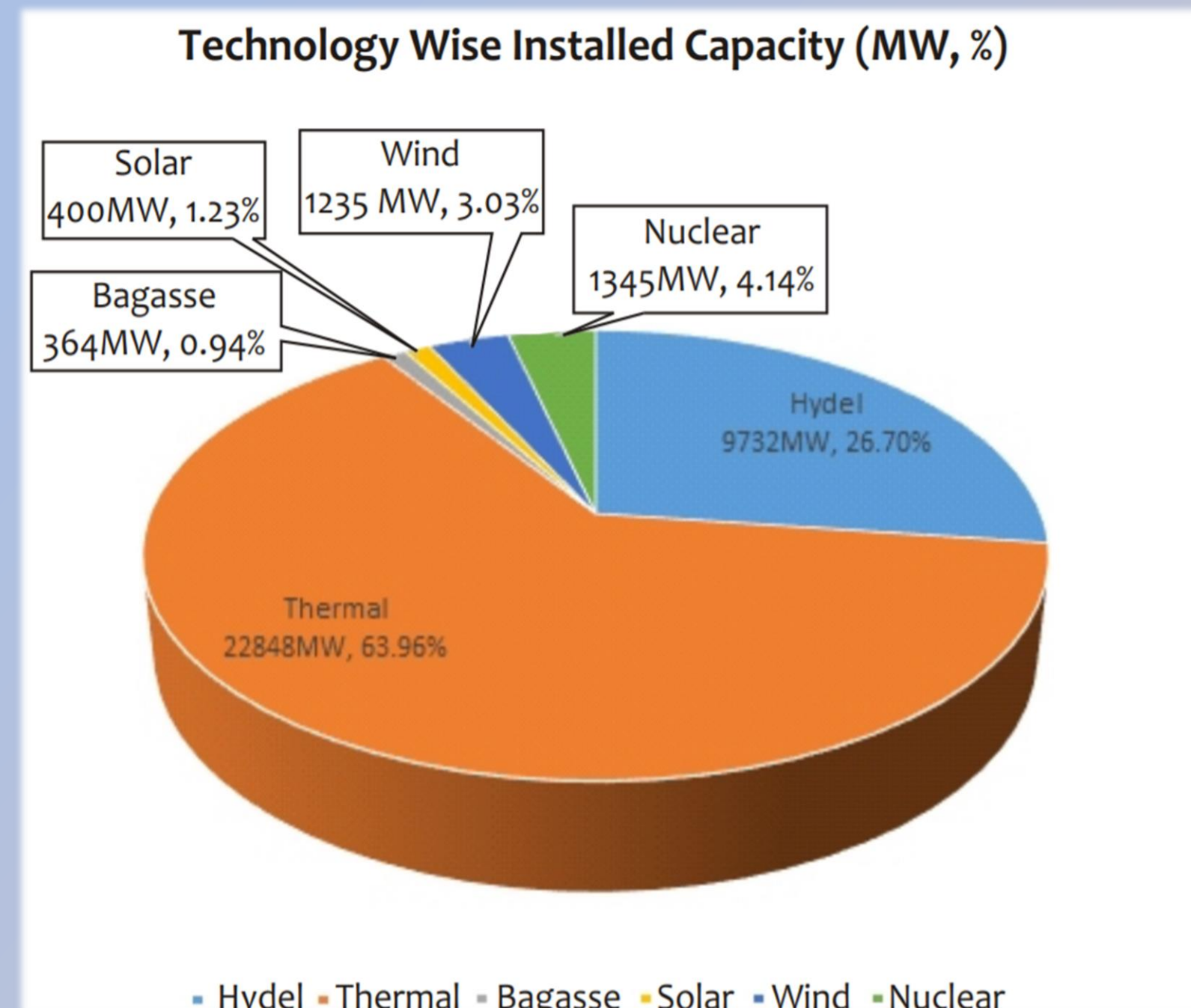


Figure 1 : Electricity Mix of Pakistan in 2019 (NEPRA, 2019).

## Solar Energy Potential in Pakistan

- Pakistan can generate about 2.9 million MW of electricity by utilizing solar energy (Farooq, M. K., & Kumar, S., 2013).
- 90% of the territory receives annual Global Horizontal Irradiance (GHI) values of 1500 kWh/m<sup>2</sup> (Schillings, C., & Stokler, S., 2015).
- 83% of the territory receives annual Direct Normal Irradiance (DNI) values of 2000 kWh/m<sup>2</sup> (Schillings, C., & Stokler, S., 2015).
- Small-scale photovoltaic (PV) systems rely on GHI values, while large-scale concentrating solar power (CSP) systems require the values of DNI.

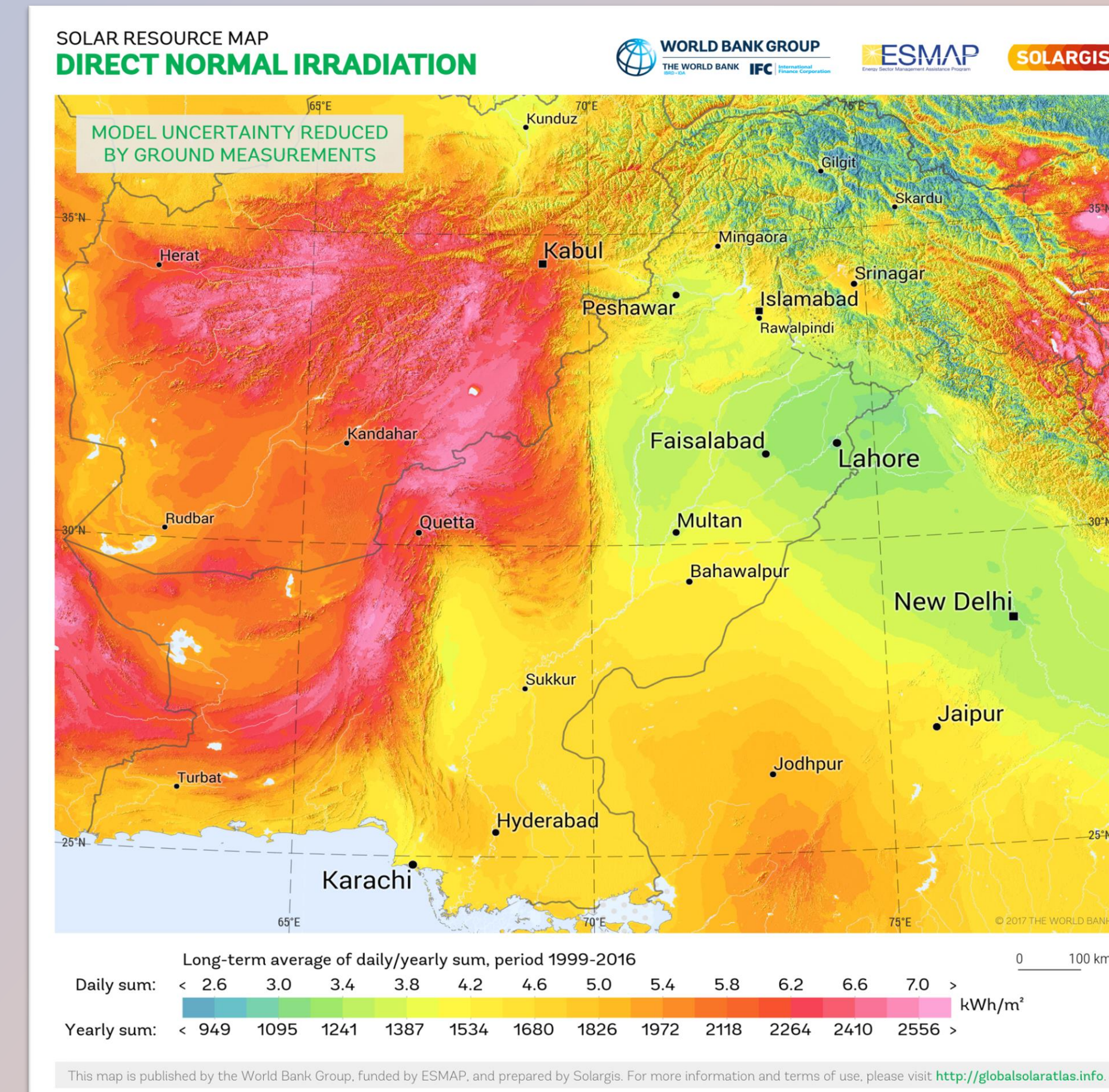


Figure 2 : Direct Normal Irradiation (DNI) of Pakistan (The World Bank, 2020).

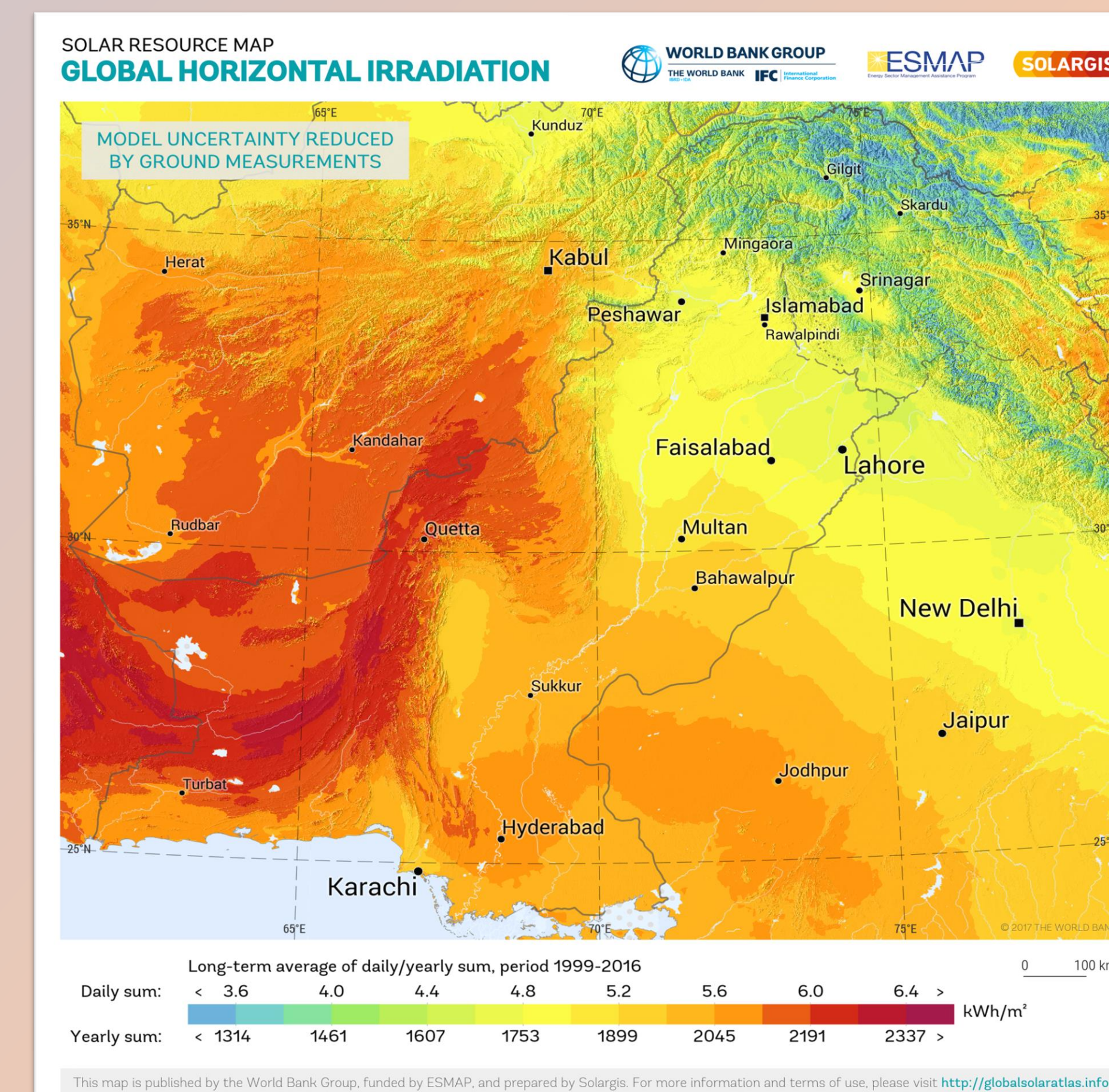
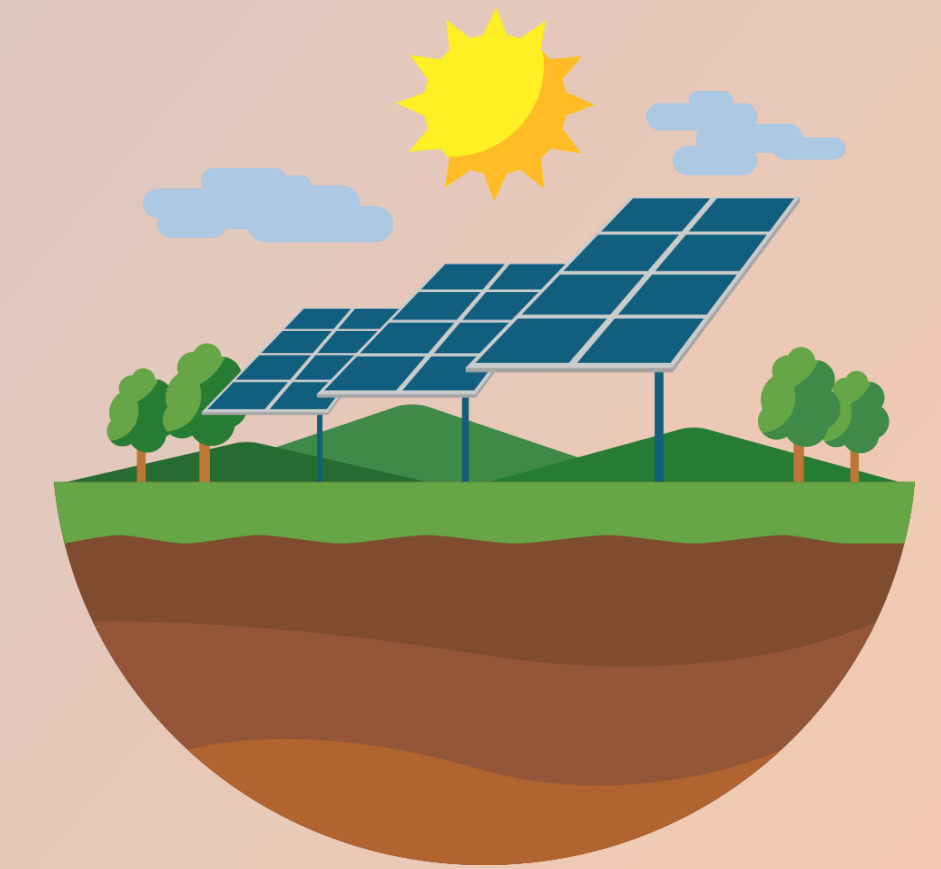


Figure 3 : Global Horizontal Irradiation (GHI) of Pakistan (The World Bank, 2020).



## Conclusion

Thus, by utilizing solar energy, Pakistan can expect the following:

- CO<sup>2</sup> emissions will be reduced.
- The electricity demand-supply gap will be reduced.
- Economic growth will increase.
- Various job opportunities will be created.
- Rural communities will also benefit from increased energy security.

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