Country Report of The Islamic Republic of Pakistan

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COUNTRY REPORT - PAKISTAN

CONTENTS

- OVERVIEW OF THE COUNTRY
- GENERAL CONDITION OF ENERGY
- ENERGY TRANSFORMATION
- DEVELOPMENT AND POTENTIAL OF RENEWABLE ENERGY
- FUTURE PROJECTS
- PCRET - BRIEF INTRODUCTION

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OVERVIEW

- **Islamic Republic of Pakistan**
- **Provinces:** Punjab, Sindh, KPK, Balochistan, GB-FATA and AJK State
- **Independence Day:** August 14, 1947
- **Location:** South Asia and on junction of West Asia, Central Asia and East Asia
- **Area:** 881,913 km^2 / 340,509 square miles (33rd-largest country)
- **Population:** 210 Million (5^{th} most populous country of the world having **60%** population under **25**)
- **Population density:** 238 person km^2
- **Alleviation from sea level:** up-to 8000 + meters
- **Weather:** Four seasons (Winter, Spring, Summer and Autumn, Temperature ranges from -20^oC in the north to 45^oC in the south)
- **"Emerging and growth-leading"** economy

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GEOGRAPHICAL MAP

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Demographic Profile

- **Land Area: 880,000 km²** (latitudes 25- 35 North)
- **Costal Line:** 1,046-km (650-mile) with **Arabian Sea** and **Gulf of Oman**
- **Borders: India** (East), **Afghanistan** (West), **Iran** (Southwest), and **China** (Northeast) and **Tajikistan** via narrow Afghanistan's Wakhan Corridor (North-west), and also shares a maritime Border with **Oman** (Gwadar)
- Land Area 96.9 %, Green Area 4 %, Agri land Area 97 %, Mountains 1.4 %, dessert ~ 2 %, Water 3.1 %
- **River Basin:** one of the largest river/canal system i.e. Indus Basin Irrigation System (IBIS build in 1900s)
- World's deepest port (**Gwadar Port**), second highest plateau (Deosai Plateau) and mountain (The K-2)
- Largest glacier range outside Polar region (Siachen, **Biafo 67km** and **Hispar 49km**)

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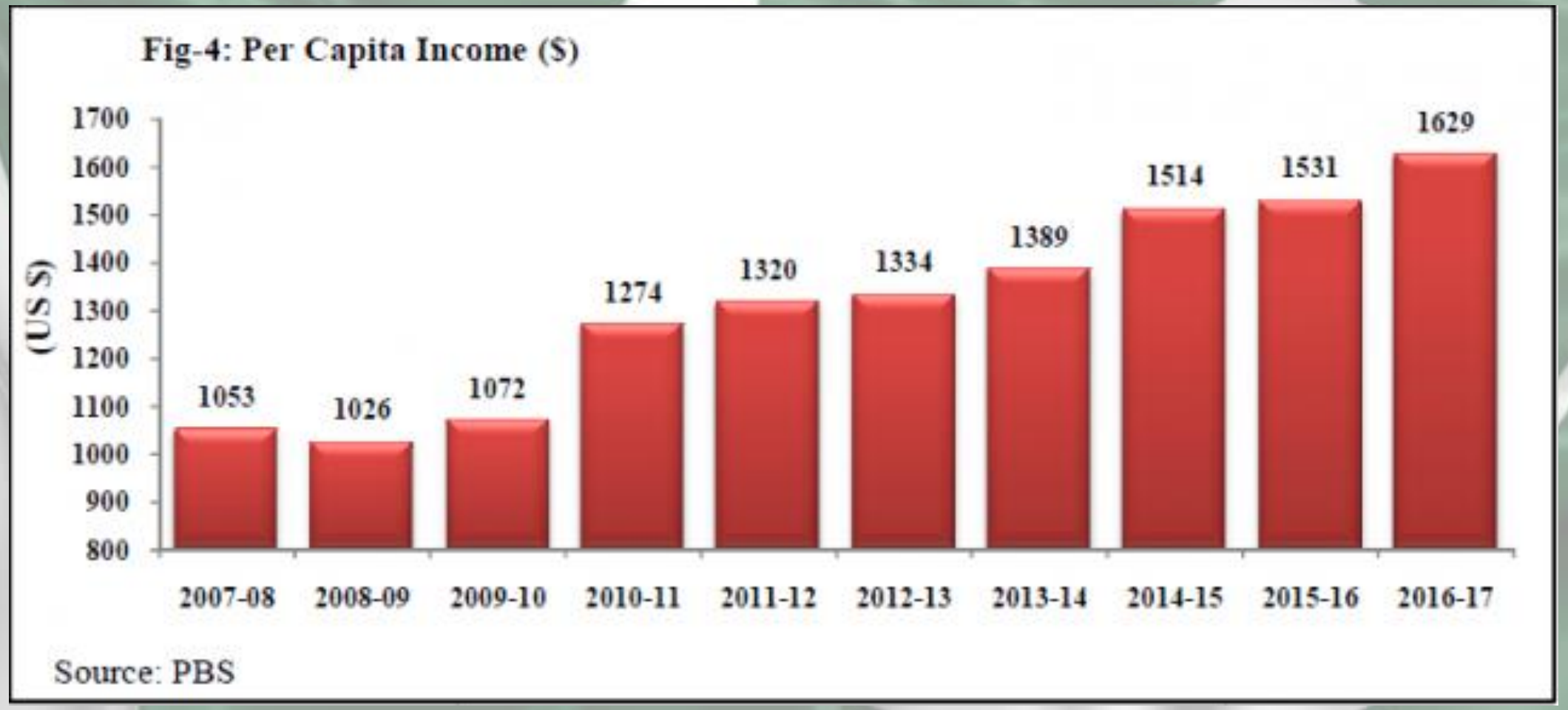
Pakistan's Economic Profile

- **GDP:** $283.7 Billion (2015-16 nominal)
- **GDP Growth:** 5.28 % (2015-16)
- **GDP Per Capita:** $1,629 (Nominal)
- **Inflation (CPI):** 11.2% (2017)
- **GDP By Sector:** Agriculture 19.53%, Industry 20.88%, Services 59.59% (2017 est.)
- **Exports:** (2011-12): $21.686 Billion, Imports $48.582 Billion, Deficit: $26.896 Billion
- **Annual Petroleum Imports:** $7.667 Billion (35.4% of exports earning)
- **Major Exports:** Agro-Chemicals, Sports Goods, Agricultural Products, Textiles, Medical Equipment, Software
- **Main Industries:** Textiles and Apparel, Food Processing, Dairy, Fertilizer, Pharmaceuticals, Construction Materials, Paper Products, Defense Industry

GDP Growth and Per Capita Income



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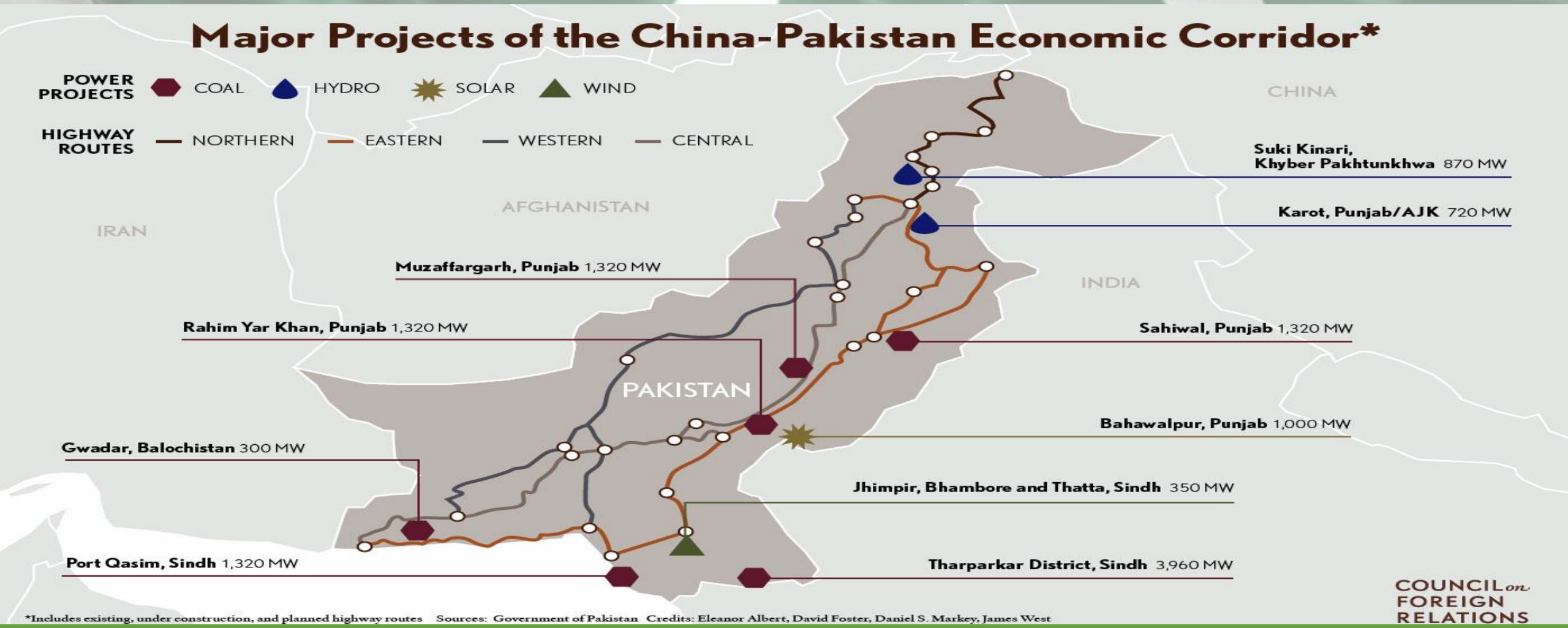
China-Pakistan Economic Corridor (Energy Projects)



ENERGY SCENARIO

- **Total Power Generation Capacity (**Installed**):** 24500.35 MW
- **Total Power Generating:** 18,482MW
- **Peak Hour Demand:** 24, 757 MW

S. No	Energy Source	Total Potential	Power Generating	Tapped Potential
Conventional Energy	Crude Oil	944.319 MB/day or 64064 GW	8412 MW	0.012 %
	Natural Gas	55.103 Trillion m^3	3610 MW	0.05
	Coal	188.812 BTones	1668 MW	~ 1%
	Nuclear	-	1405 MW	-
Renewable Energy	Hydel	100,000 MW	8500 MW	8.52 %
	Wind	150,000 MW	866 MW	0.57 %
	Solar	2900 GW	408 MW	0.01 %
	Biogas/Bagasse	5700 MW	631 MW	0.11 %

ENERGY TRANSFORMATION AND GHG REDUCTION

Government Policy/Incentives for Renewable Energy:

- Zero taxation on imports of RE products
- Provinces are allowed to managed up-to 50MW RE projects
- 1.1 million Tube-wells to be converted on Solar energy
- Encourage Hydel, Wind and Solar Village electrification
- Over 70,000 villages to be electrified
- USAID, UNDP, ADB funds will spend on Rural Electrification (12000 + Villages)
- NGOs will fund Rural Homes Hydel, Wind and PV projects and electrification kits distribution
- Encouraged Grid tied power generation
- Net metering, Subsidy on Hydel, Wind and PV panels and allied equipment
- Up-front power tariff of US Cents 14.66/kWh

DEVELOPMENT AND POTENTIAL OF RENEWABLE ENERGY
1). HYDEL POWER POTENTIAL

- Total Potential: up-to **100,000MW**
- Power Generation: **8500MW**
- Tapped potential: ~ **8.5%**
- Projects under development: 1). NJHP 970MW, 2). Dassu 3800MW, 3). DBD 4500MW 4). Bunji 7500MW
- Feasibility study of 11 Big hydel power plants
- **SHP/MHP Potential:** 40,000MW and tapped Potential is 1200MW
- Currently more than **1000** small and micro hydel power project's feasibility reports are prepared and **700** projects are in progress
- Hydel Power Development is the top priority in energy sector of Pakistan

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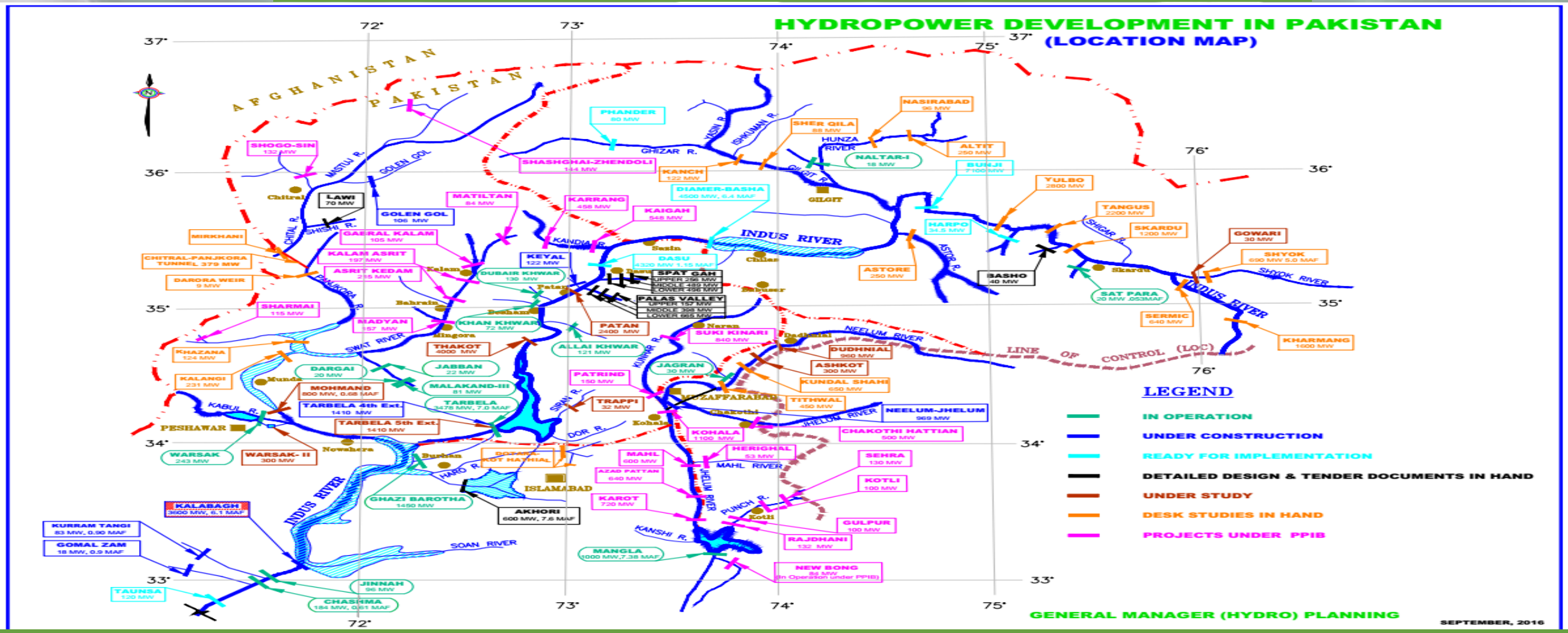
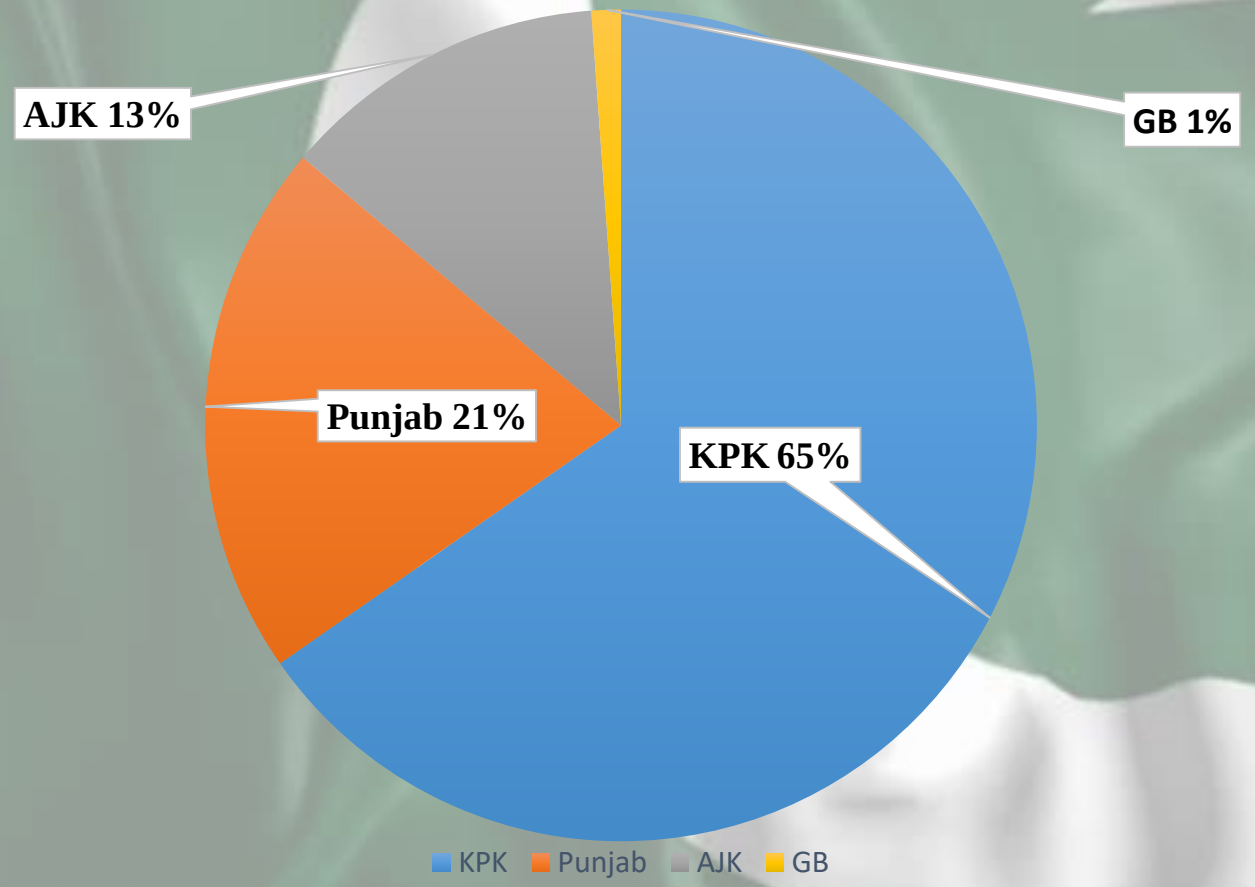
HYDEL POWER PROJECTS



PROVINCE WISE SHARE OF HP GENERATION



HYDEL POWER PROJECTS - INCENTIVES

- Priority in 12th fifth year plan:
- Guaranty/ Warranty for project execution and payment
- Projects to be build on **Built Operate Transfer** (BOOT) model
- Availability of **Standardized security** agreements
- **Provinces** can manage the investment for projects up-to **50MW**
- Customs duty **@5%**
- No Levy of **Sales Tax**
- Tax Exemption on imports
- Exemption from **provincial and local taxes** and duties

2). SOLAR ENERGY POTENTIAL

- Pakistan is blessed with rich Solar Resources with average annual Solar Irradiance of **5.5Kwh/m2/day**
- **6-7 hours** of sunshine per day (25-35 degree North Latitude)
- **Potential:** 2900GW
- **Tapped potential:** < 1 %
- **Project Installed:** 408MW
- **Demand:** Shortage of power, increase in demand due to industrial development and rural (off grid area) electrification

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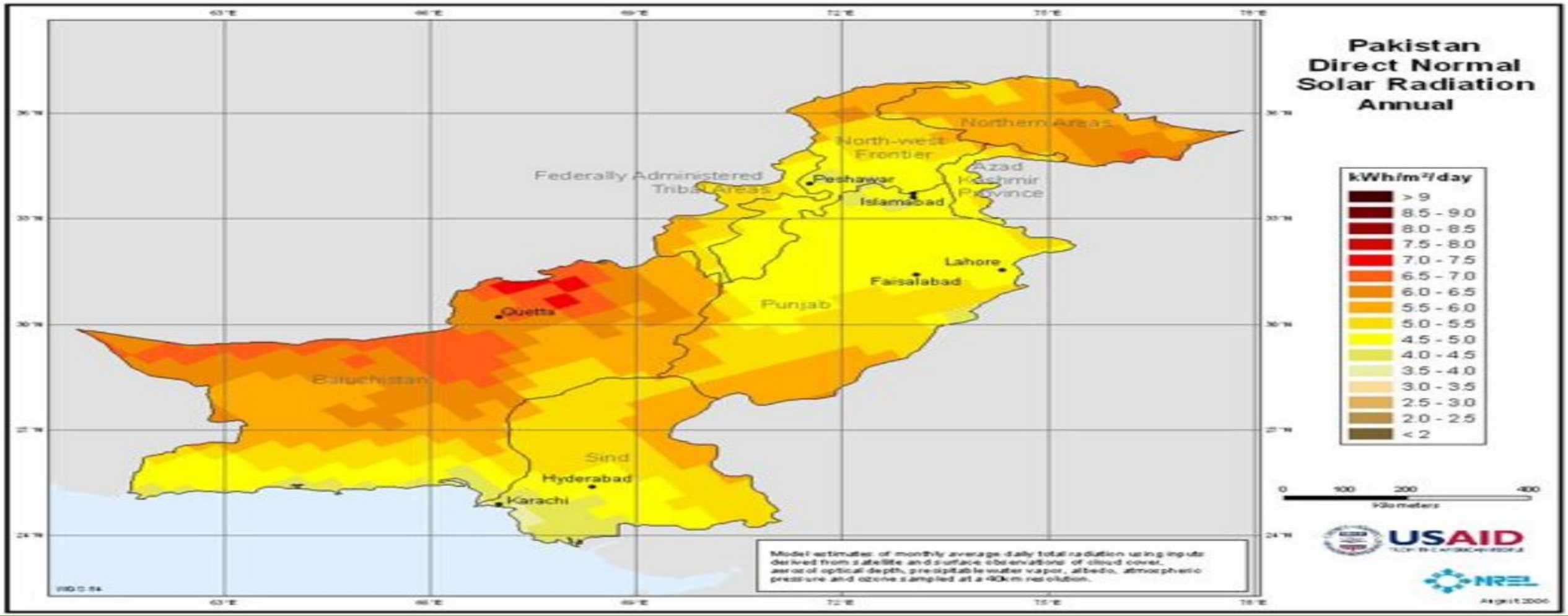
MAP OF SOLAR IRRADIANCE



3). Wind Energy Potential

- **Potential:** 150,000MW
- **Taped Potential:** ~ 1 %
- **Projects Installed:** 866MW
- **60 km wide 170 km** deep wind corridor – potential: **60,000 MW**
- **Projects in Pipeline in Pakistan**:1162 MW

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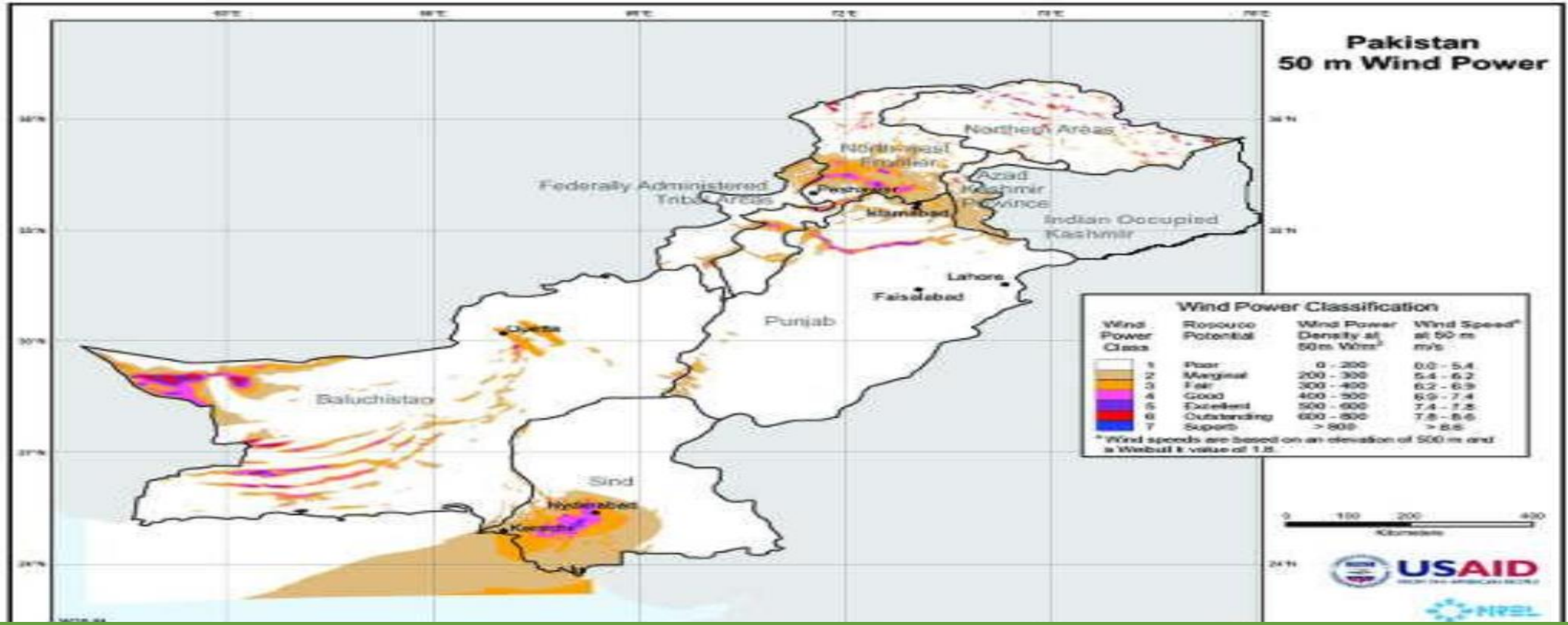
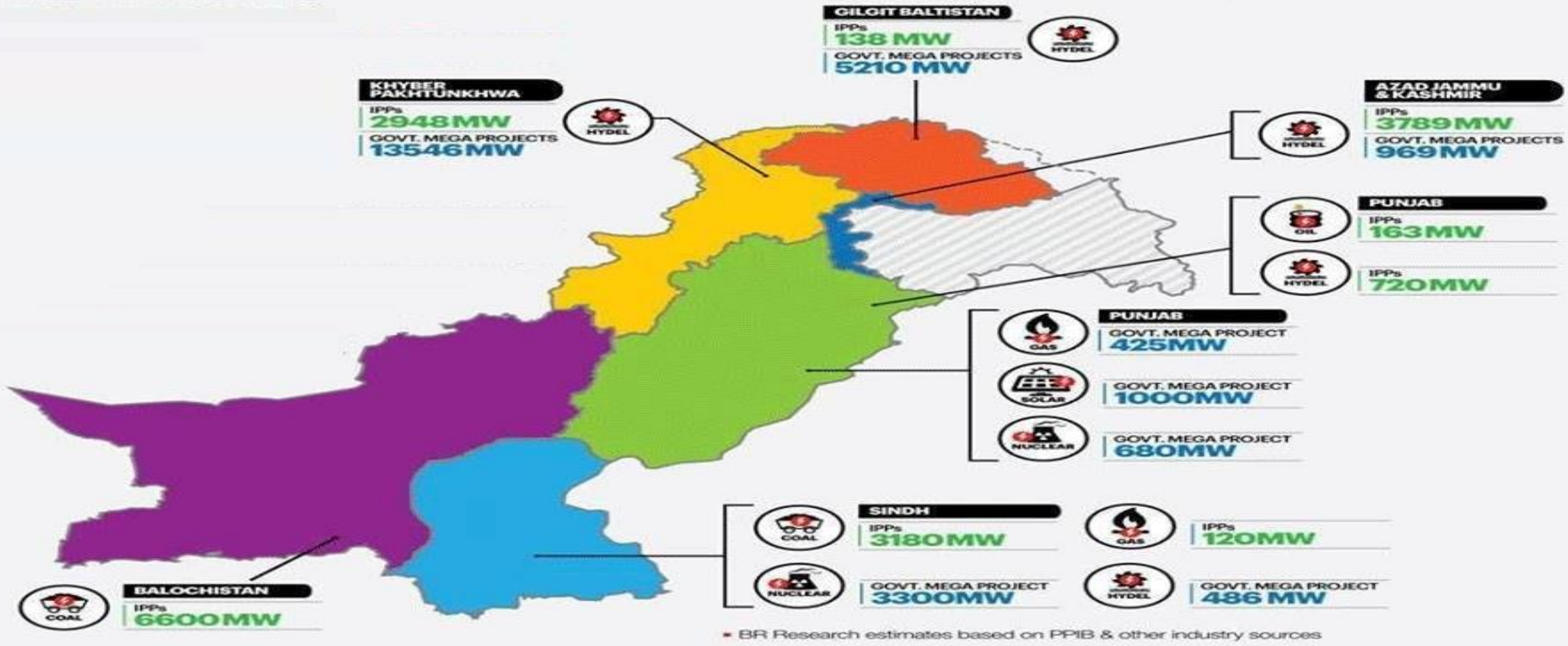
Wind Energy Map of Pakistan



4). Biogas Potential in Pakistan

- **Capacity:** 5.66 million m^3 / day
(from approximately 56 million cattle)
- **Potential:** 5700MW
- **Installed Projects: 10,000**
- **Capacity Range:** (5-250 m^3)

FUTURE ENERGY PROJECTS



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PAKISTAN COUNCIL OF RENEWABLE ENERGY TECHNOLOGIES (PCRET)

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- PCRET under Ministry of Science & Technology, Govt. of Pakistan is the focal point in Pakistan dealing with all types of sustainable energy resources such as RE.

- Involved in Research, Development, Dissemination, HRD, Design & Deployment of RE technologies such as **PV, Solar thermal, SHP/MHP, Biogas and Wind energy** as per its mandate.

- RE projects such as Solar, Wind, MHP and Biomass were designed, developed, and installed at far flung rural areas of the country for provision of electricity and fuel

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PCRET's Laboratories for Renewable Energy Technologies

CRYSTAL GROWTH LAB

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WAFERING LAB

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CELL PROCESSING LAB

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LAMINATION LAB

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SOLAR EQUIPMENT TESTING/QC FACILITY

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ADVANCE PV LAB

R & D in 3rd and 4th Generation Solar Cell Materials such as Perovskite, Dye-Sentisize, Quantum Dot and Flexible Solar Cells.

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Small Hydel Power Lab

INTERNATIONAL COLLABORATION IN RE PROJECTS

- PCRET Collaborated with various international organization for promotion and development of RE Technologies/Projects, such as: UNDP, GCF, KOICA, JAICA, ADB, SAARC etc.

- SHP Research center and Hybrid model of Solar, Wind, MHP was established in 2015, in collaboration of HRC/NRIRE, China

- 2nd phase of the project for establishment of "Pak-China R&D Center for Development of Key Technologies of SHP and Rural Electrification," is in progress

LOOKING FOR COLLABORATION

谢谢

Thank You