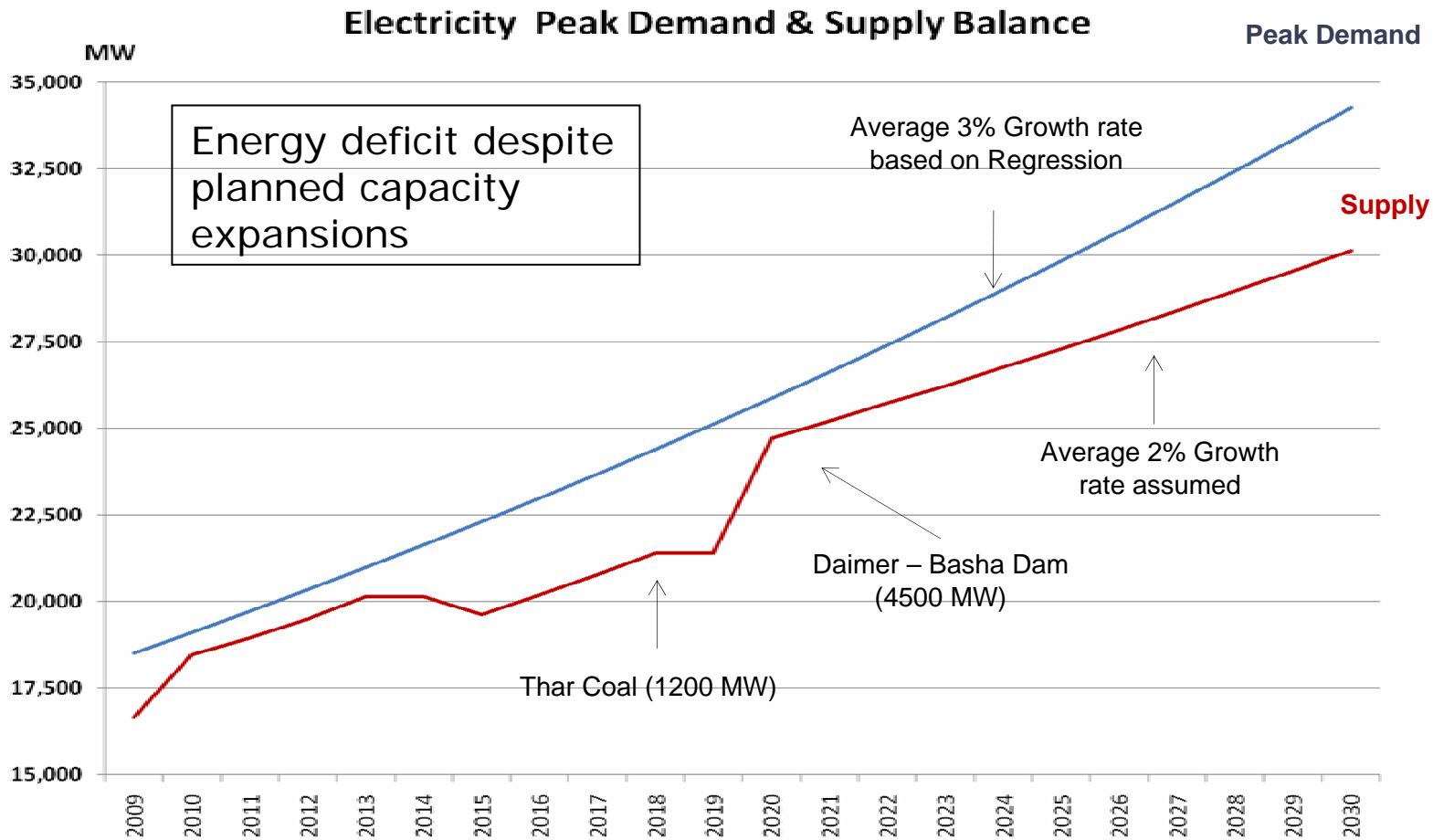


PAKISTAN ENERGY SECTOR CHALLENGES & OPPORTUNITIES

March 2011



Energy – Demand & Supply Outlook

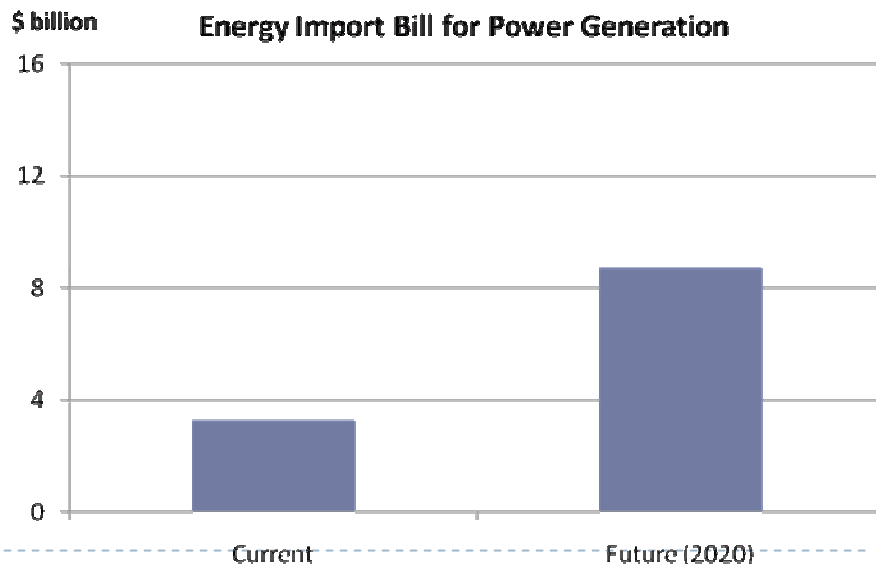


Cost to the Economy

- ▶ Electricity shortage of more than **4500 MW** and frequent power cuts translate to:

	Impact/Year
Total cost of load shedding to the economy	USD 2.5 billion
Cost as percentage of GDP	2 % decrease
Loss of employment in the economy	400,000 jobs
Loss of exports	USD 1 Billion

- ▶ Increasing dependence on expensive imported energy puts a severe constraint on ability to pay
- ▶ Import bill expected to increase to above USD 8 billion by 2020

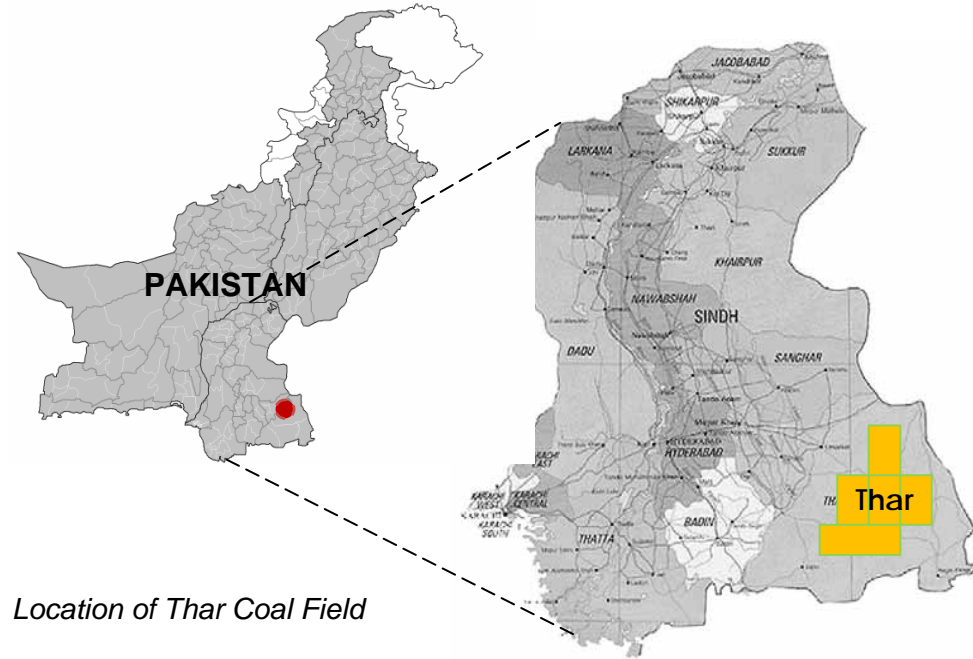


Future Energy Strategy

- ▶ **Change the fuel mix** in the Power Sector to reduce cost of electricity
- ▶ **Revamp existing Generation, Transmission & Distribution infrastructure** to increase efficiencies and availability
- ▶ **Efficient rationing strategy of energy resources** to ensure least cost to the economy
- ▶ **Expedite development of indigenous energy resources** to reduce economic vulnerability to oil price shocks
- ▶ **Incentivize investment in the entire energy sector** to overcome prevailing energy crisis

Indigenous Energy - Coal

- ▶ Pakistan has estimated **coal reserves of 188 billion tons**, 93% of which are located in Thar¹
- ▶ Total power generation potential of **100,000 MW** over 200 years



Location of Thar Coal Field

- ▶ **Block-II of Thar Coal was awarded to Engro for development** – Technical, Environmental & Social viability assessment completed:
 - ▶ Phase 1: development of a 6.5 million tons/annum coal mine in parallel with power generation capacity of 1200 MW.
 - ▶ Subsequently, the coal mine will be scaled up to 22.5 million tons/annum capacity and power plant capacity will be increased to 4000 MW.

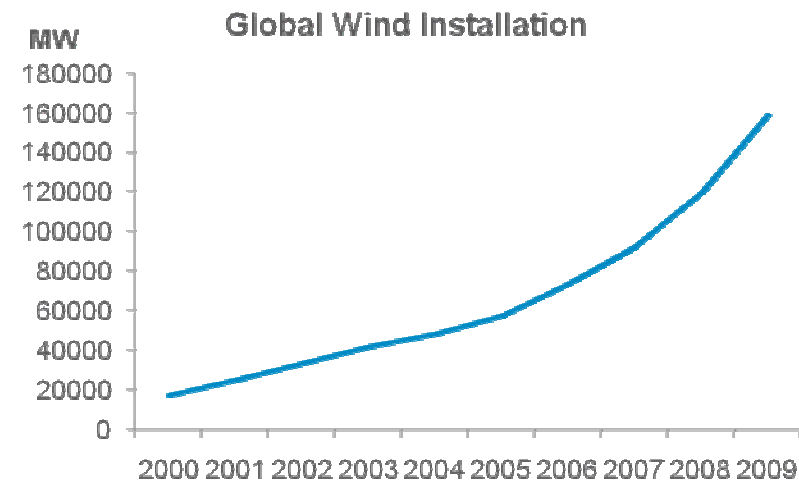
Renewable Energy – Wind/Hydro

▶ Hydro Power:

- ▶ **Current installed capacity: 6555 MW** (including 1,400 MW Run of the River)
- ▶ **Realizable potential : 17,000 MW**, of which 12,000 MW is reservoir based hydel and 5,000 MW is run of river based power generation

▶ Wind Energy:

- ▶ Pakistan's Wind Energy **potential is estimated at 50,000 MW**
- ▶ Mean Wind Speed in Gharo Corridor is around 7m/s and is class III wind according to IEC standards
- ▶ Many successful projects in U.S., China, India, and Europe are located in class III wind locations



Renewable Energy – Solar

▶ Solar Power:

- ▶ Lies in the Solar Belt of the world, and has solar irradiation of up to 7kWh/m²/day
- ▶ The solar irradiation is comparable to irradiation of countries like U.S
- ▶ Major technologies for Solar Power utilization include Photovoltaic cells (off-grid and on-grid applications), Solar Thermal and Concentrated Photovoltaic (on-grid applications)
- ▶ These technologies can become commercially viable in 5-10 years timeframe and can be made part of Pakistan's energy portfolio.

