

# Presentation on Country Report of Pakistan

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# GENERAL COUNTRY INFORMATION



Location: Situated in South Asia

Area: 881,913 square Kilometer

Population: 191.7 million (2015)

GDP: \$270.96 billion

Literacy Rate: 58%

per Capita Income: \$ 1,513

per Capita Energy  
Consumption (2011): 481 kg of OE

# PRIMARY ENERGY SUPPLY PATTERN

(%age)

<b>SOURCE</b>	<b>FY 10</b>	<b>FY 11</b>	<b>FY 12</b>	<b>FY 13</b>	<b>FY 14</b>
<b>Gas</b>	48.8	47.6	49.5	48.2	46.3
<b>Oil</b>	31.4	32.0	30.8	32.5	34.4
<b>Hydro</b>	10.6	11.8	10.5	11.0	11.4
<b>Coal</b>	7.3	6.7	6.6	6.0	5.4
<b>Nuclear</b>	1.1	1.3	1.9	1.7	1.8
<b>LPG</b>	0.6	0.5	0.5	0.5	0.5
<b>Imported Power</b>	0.1	0.1	0.1	0.1	0.1
<b>TOTAL</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

## PETROLEUM EXPLORATION & PRODUCTION

Modest petroleum discoveries over the years. Not enough to meet the demand of the country

	Natural Gas	Crude Oil/Condesate
<b>Reserves (Dec-2014)</b>	19,460 BCF	387 MMBBL
<b>Production (2014)</b>	4,092 MMFCD	86,533 BPD
<b>Reserve Life</b>	13 Years	12.3 Years

### REASONS FOR DECREASE IN PRODUCTION OF GAS & CRUDE OIL

- Absence of very large discoveries:
  - 97 BCF -Average discovery between 1992-2014
  - only 12 discoveries larger than 1 TCF
  - Crude average 3.4 MMBBL & 5 reservoirs of 10 MMBBL or more
- Higher finding and development costs
  - Cost per barrel of oil equivalent have grown by approximately 74% in 2010-14 against 2005-09 mainly due to decline in average discovery size
- Concentration of exploration activities
  - Two major areas i.e. Potwar Basin in Punjab and Middle/Lower Indus Basin in Sindh and Punjab
- Security risks preventing access to hydrocarbon rich areas
  - Poor security conditions in KPK and Baluchistan have constrained exploratory activities.

# ROLE OF NATURAL GAS IN PRIMARY ENERGY SUPPLY

- Accounts for nearly 46% of Pakistan's total primary energy supplies.
- Natural gas production has been stagnant at approximately 4,000 Million Cubic Feet per Day (MMCFD) level for last 10 years.
- The Country constrained demand for Natural gas is 6,000 MMCFD.
- Total consumers in FY-14 was 7.5 million which has increased by 0.38 million consumers per anum during last five years.

## Sector wise Natural Gas Consumption in Pakistan (%age)

SECTOR	FY 11	FY 12	FY 13	FY 14
Residential	17	18	21	20
Power	35	35	34	33
Industry	16	16	16	13
Fertilizer	15	14	12	16
Transport	8	8	7	7
Unaccounted for Gas Losses	9	9	10	11
<b>TOTAL</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

## NATURAL GAS DEMAND-SUPPLY GAP

Pakistan was gas sufficient till 2005, however, due to increased demand, lack of alternative fuels and price subsidies resulted in gas shortages. The gap started ascending when gas being cheaper was substituted for oil and political will of adding new consumers on account of annual development schemes

(BCFD)			
Year	Natural Gas Demand	Indigenous Gas Supplies	Shortfall
<b>FY 14</b>	5.8	3.8 (Actual)	2.0
<b>FY 16</b>	6.2	4.5	1.7
<b>FY 20</b>	6.9	3.1	3.8
<b>FY 25</b>	7.6	1.6	6.0
<b>FY 30</b>	8.7	0.7	8.0

## **BRIDGING THE GAP**

Government of Pakistan is pursuing its policies of enhancing gas production to meet the increasing demand of energy in the country. Government of Pakistan is taking following steps to overcome the shortage of Natural gas in the country

- Restrain Natural gas demand at current level,
- Enhance indigenous gas production,
- Promotion of LPG air mix,
- Import of LNG,
- Import of Gas from Iran,
- Import of Gas from Turkmenistan

## ROLE OF OIL IN PRIMARY ENERGY SUPPLY

- Oil accounts for 34.4% of the energy needs of the country.
- The five refineries in the country processed 11.757 million metric tons of crude oil in FY 2014.

*Million tons*

	FY-10	FY-11	FY-12	FY-13	FY-14
Local Crude	2.98	2.99	3.03	3.47	3.83
Imprted Crude	6.89	6.79	6.16	7.28	7.93
Total Crude Processed	9.87	9.77	9.19	10.75	11.76

- The country's total demand of oil was 21.109 million tons.
- 11.523 million tons have to be imported during the year.

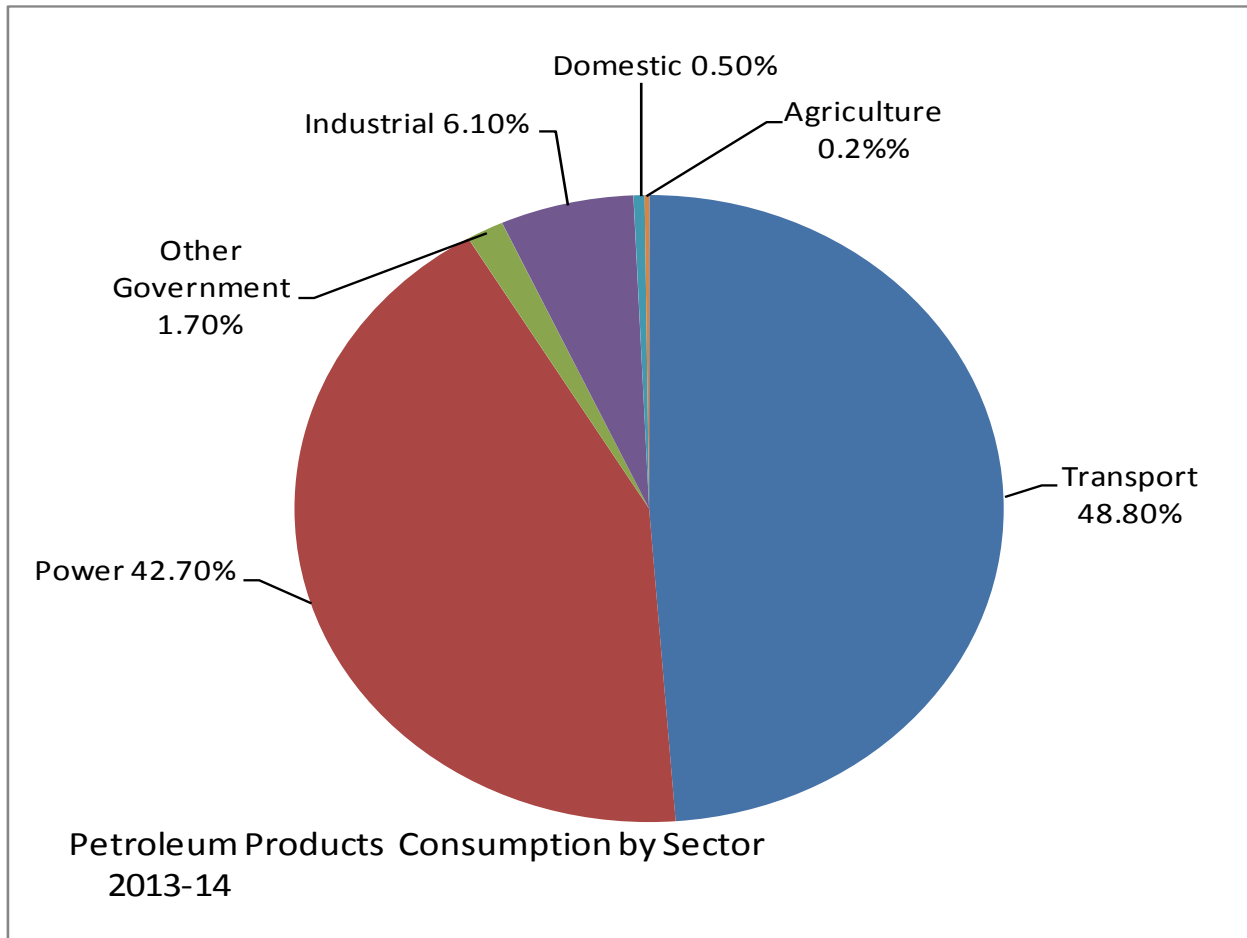
*Million tons*

	FY-10	FY-11	FY-12	FY-13	FY-14
Petroleum Energy Product Consumption	19.13	18.89	18.68	19.39	21.11
Petroleum Energy Product Imports	11.18	12.37	11.51	10.49	11.52
Domestic Energy Product Production	9.00	8.91	8.40	9.91	10.93



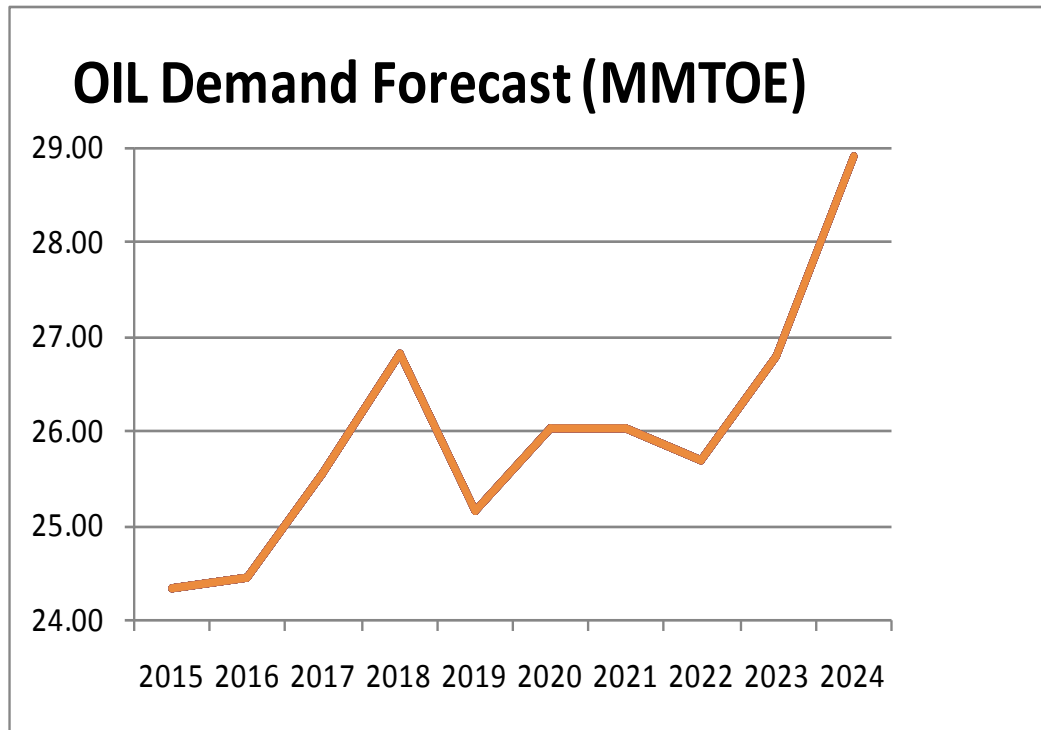
# SECTOR WISE OIL CONSUMPTION IN PAKISTAN

More than 91% of the oil consumption in FY-14 took place in two sectors: transport (48.8%) and power (42.7%).



# OIL DEMAND FORECAST

The steady increase in population, the changes in life style of the people and prices of the petroleum products will result in an increase in oil consumption in the coming years. If the local crude production and refining capacity do not increase then Pakistan has to increasingly rely on imports to meet its oil demand

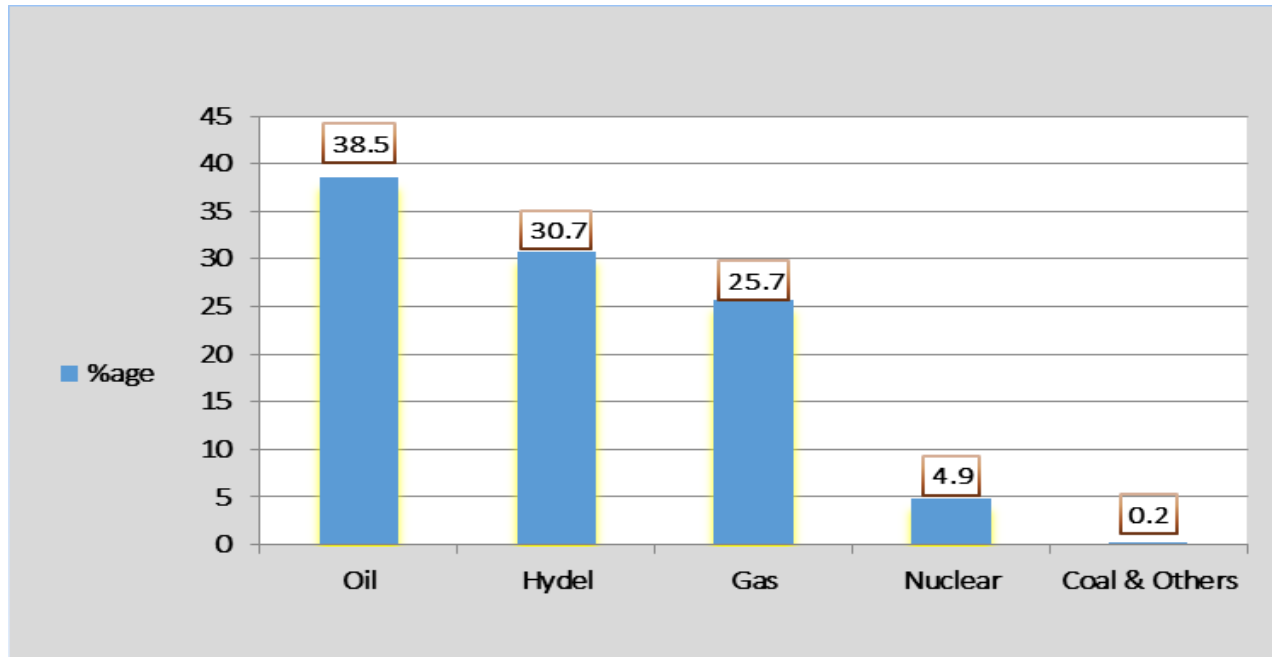


Year	MMTOE
2015	24.33
2016	24.45
2017	25.54
2018	26.81
2019	25.14
2020	26.02
2021	26.04
2022	25.68
2023	26.79
2024	28.92

## ROLE OF ELECTRICITY/POWER IN PRIMARY ENERGY SUPPLY

Pakistan is facing serious electricity demand shortfall of around 5000-5500 MW since 2007 leading to long hours of load shedding. This shortfall is primarily due to the lack of fuel availability. As the power system with the installed capacity of 24,198 MW can cater the peak demand of 24,107 MW for FY-2015. However, the available capacity stands around 18,482 MW, thus leaving a persistent shortfall

### Electricity Generation by Fuel Source in Pakistan (FY 2013-14)



## GAP BETWEEN INSTALLED CAPACITY & PEAK HOUR DEMAND

The installed capacity can produce enough power to meet the demand, however, due to various reasons the actual production has been lower than the demand for a number of years as tabulated below,

Year	Installed Capacity	Generation Capability	Peak Hour Demand	<i>MW</i>
				Shortfall/ (Surplus)
	A	B	C	C-B
2010-11	23,342	15,430	21,086	5,656
2011-12	23,487	14,483	21,536	7,053
2012-13	23,725	16,846	21,605	4,759
2013-14	23,702	18,121	23,505	5,384
2014-15	24,198	18,482	24,757	6,275

### REASONS FOR THE SHORTFALL

- Lower dependable capacity i.e lower production due to degradation of some plants.
- Reduced natural gas supply to power sector from 10.3 MMTOE in 2005 to 6.6 MMTOE in 2014.
- Liquidity constraint due to circular debt and poor bill collection.
- Huge system inefficiencies in generation, transmission and distribution network.
- Failure to construct new dams

## FORECAST OF SUPPLY & DEMAND

The installed capacity is expected to reach 48,000 MW in 2024. The largest addition is likely to come from hydro power which shall be nearly 35% (8,400 MW) of the cumulative addition. Hydro is likely to be followed by coal (6,900 MW) and LNG (3,000 MW). The remaining 25% of the pie shall be shared among other sources. The expected demand and planned generation for the next five years are tabulated below,

*MW*

Year	Planned Generation	Projected Peak Hour Demand	Shortfall / (Surpluses)
	A	B	B-A
2015-16	20,303	25,666	5,363
2016-17	23,445	27,185	3,740
2017-18	28,751	28,678	(73)
2018-19	33,545	30,154	(3,391)
2019-20	35,590	31,625	(3,965)

# ROLE OF NUCLEAR ENERGY IN PRIMARY ENERGY SUPPLY

Nuclear energy contributed 1.8% of Pakistan's primary energy supply in 2014. Commissioning of 325 MW Chasma-II in 2011 raised Pakistan's nuclear electricity generation by 75% from 2010 levels. The electricity produced by nuclear power plants over the last few years are tabulated below

*MTOE*

	FY-10	FY-11	FY-12	FY-13	FY-14
Nuclear Electricity	0.69	0.82	1.26	1.09	1.22

The existing and upcoming nuclear power plants are

<b>Nuclear power reactors</b>	<b>Location</b>	<b>Net Capacity (Mwe)</b>	<b>Connected to grid</b>
CHASNUPP-I	Chasma, Punjab Province	300	6/13/2000
CHASNUPP-II		300	40616
CHASNUPP-III		340	2016
CHASNUPP-IV		340	2017
CHASNUPP- V		1,000	2020
KANUPP-I	Karachi, Sindh Province	90	18-Oct-71
KANUPP-II		1,100	2020
KANUPP-III		1,100	2020
Muzaffargarh Nuclear Power Complex	Muzaffargarh, Punjab	1,000	2020

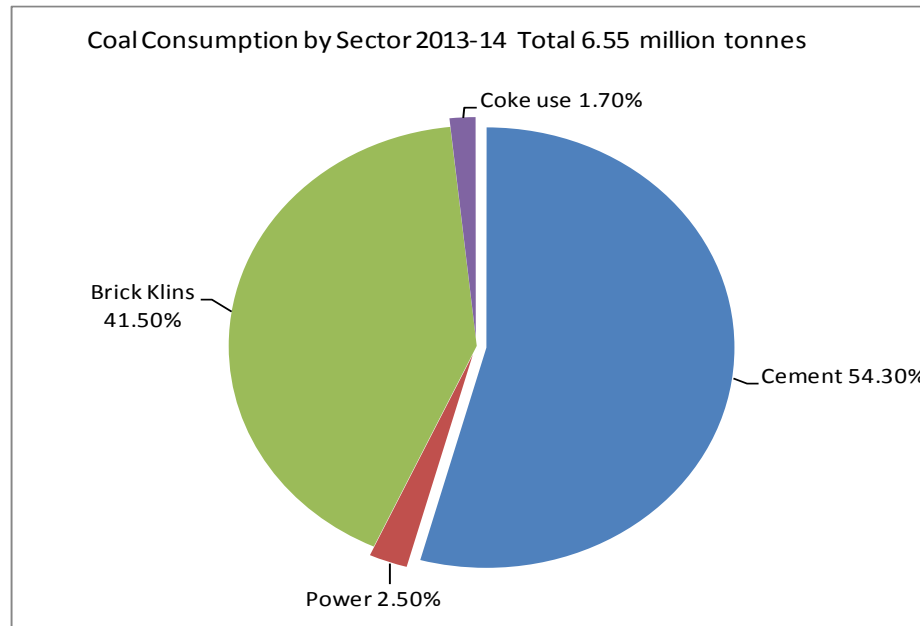
## ROLE OF COAL IN PRIMARY ENERGY SUPPLY

The estimated total coal reserves of the country as on June 30<sup>th</sup>, 2014, were about 186 billion tonnes, however, coal has a relatively small share in Pakistan's energy mix accounting for only 5% of total primary energy supply in 2014.

million tonnes

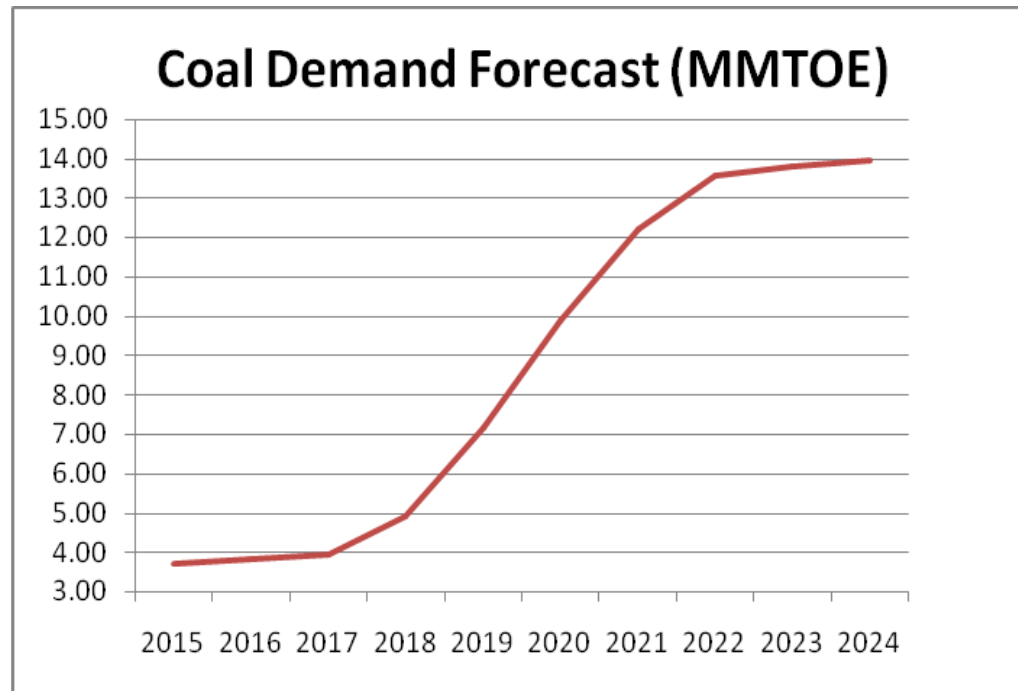
	FY-10	FY-11	FY-12	FY-13	FY-14
Coal Consumption	8.14	7.72	7.67	6.89	6.56
Coal Imports	4.66	4.27	4.06	3.71	3.12
Domestic Coal Production	3.48	3.45	3.61	3.18	3.44

## SECTOR WISE CONSUMPTION OF COAL



## FORECAST OF COAL CONSUMPTION

Coal consumption is estimated to increase sharply in the coming years on account of increased use of coal in power generation. Total coal consumption is expected to increase almost four folds from 6.6 MMT in 2014 to 24.0 MMT in 2024. Development of Thar coalfield is expected to produce about 4.8 MMT coal by 2024. However, the share of imported coal shall continue to increase and jump from 28% in 2014 to 62% by 2024



Year	MMTOE
2015	3.71
2016	3.83
2017	3.96
2018	4.92
2019	7.15
2020	9.89
2021	12.20
2022	13.56
2023	13.81
2024	13.97



# **ROLE OF RENEWABLE ENERGY IN PRIMARY ENERGY SUPPLY**

The GoP is promoting the use of Alternative and Renewable Energy (ARE) technologies in order to diversify its energy mix so as to ensure Energy Security, Economic Benefits, Social Equity and Environmental Protection

## **ARE ON-PROJECTS**

### **Wind**

- 05 wind power projects of 255.9 MW operational.
- 09 wind power projects of 477 MW are under construction.
- 15 wind power projects of 634 MW in different stages of development.
- 17 wind power projects of 950 MW are at initial stage.

### **Solar**

- 01 solar PV project of 100 MW installed.
- 03 solar PV projects of 300 MW under construction.
- 35 solar PV projects of 1393.44 MW in different stages of development.
- 18 solar PV projects of 852 MW are at initial stages.

### **Biomass**

- 03 biomass projects of 82.7 MW operational.
- 10 biomass projects of 333.4 MW in development stages.
- 07 biomass projects of 240 MW are at initial stages.

## **OFF-GRID APPLICATIONS**

AEDB is also promoting the use of RE technologies for distributed generation and off-grid applications. These include:

- Solar PV based systems for domestic, commercial and industrial sectors.
- Solar water pumping.
- Solar water heating.
- Solar street lights.
- Biogas plants.
- Mini/micro hydel power for distribution generation.

## **AREAS OF INTEREST**

- The response of different countries to the availability or scarcity of energy resources and how they are reflected in their policies.
- The impact of prices on policy choices.
- The impact of politics on energy policy.
- Forecasting