



NATIONAL ENERGY NEEDS

Presentation to

Pakistan Development Forum

BY

**SECRETARY,
PLANNING & DEVELOPMENT DIVISION
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Objectives

- **Availability of energy on sustainable basis to achieve planned GDP targets**
- **Reliance on indigenous resources – shift of energy mix towards local resources**
- **Construction of new Dams**
- **Accelerated exploration of Oil and Gas**
- **Development of Nuclear, renewable and alternate energy resources**
- **Development of energy infrastructure compatible with energy growth**
- **Suitable human resource development to fulfill the energy growth requirements**

Energy Consumption Profile

(Year 2004, 1995 USD)

	World	Pakistan
Population (Million)	6393	159
Per Capita GDP (PPP)	8200	2100
Per Capita Primary Energy Supply (TOE)	1.55	0.30
Per Capita Electricity Generation (kWh)	2657	581
Import Dependence	N.A.	24%

Source: 1. British Petroleum – Statistical Review of the World Energy
2. World Fact Book 2004

Profile of Energy Mix

Pakistan		Source of Energy	World
MTOE	%		
15.20	30	• Oil	45.93
3.30	6.5	• Coal	27.70
25.45	50	• Gas	18.07
6.43	12.7	• Hydro-electricity	6.04
0.42	0.8	• Nuclear	2.22

Indigenous Energy Resource Potential (As of June 2004)

Resource Category	Ultimate/Proved estimates
Oil (barrels)	27bill/300 mill
Natural Gas	8.0/0.8 TCM
Coal	185/3.3 billion tons
Power (Hydel)	46,000/6,459 MW

Energy Balance Sheet (Position as on June 2004)

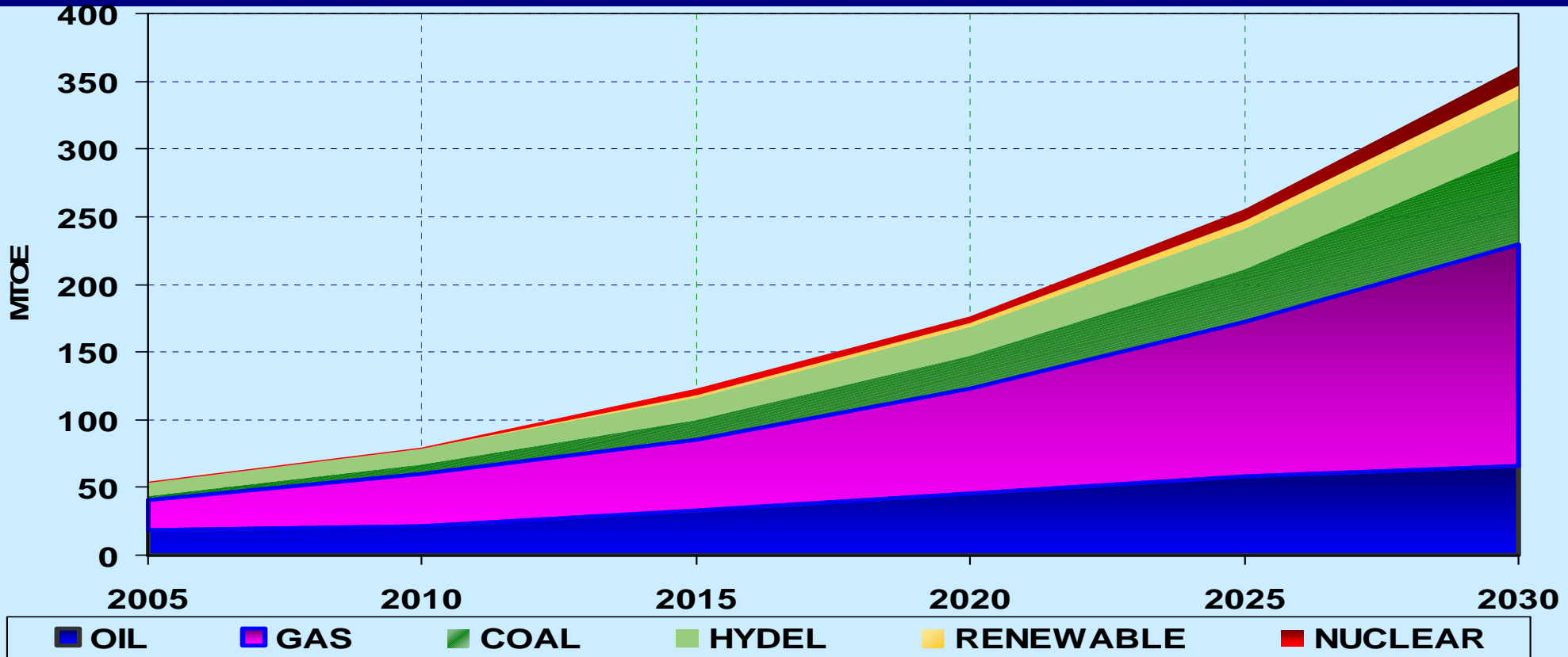
	Demand	Supply	Import	
OIL (MT)	15.7	2.7	Crude oil	7.8
			POL Products	5.2
GAS (MMCFD)	2,880	3,086	-----	
COAL (Million Tone)	6.1	3.3		2.8
Electricity			Peak Demand	13,021
(Mega Watts)			Firm Capability	13,850

Energy Mix Plan Projections

	Current		Short Term		Medium Term				Long Term			
	2004		2010		2015		2020		2025		2030	
Total MTOE	50.8		79.39		120.18		177.35		255.37		361.31	
Oil	15.20	30%	20.69	26%	32.51	27%	45.47	25.7%	57.93	22.7%	66.84	18.5%
Natural Gas	25.45	50%	38.99	49%	52.98	44%	77.85	44%	114.84	45%	162.58	45%
Coal	3.30	6.5%	7.16	9%	14.45	12%	24.77	14.0%	38.28	15%	68.65	19%
Hydro	6.43	12.7%	11.03	13.9%	16.40	13.6%	21.44	12.1%	30.50	12%	38.93	10.8%
Renewable	0.00	0.0%	0.84	1.1%	1.60	1.3%	3.00	1.7%	5.58	2.2%	9.20	2.5%
Nuclear	0.42	0.8%	0.69	0.9%	2.23	1.9%	4.81	2.7%	8.24	3.2%	15.11	4.2%

Energy Demand Projections by Fuel

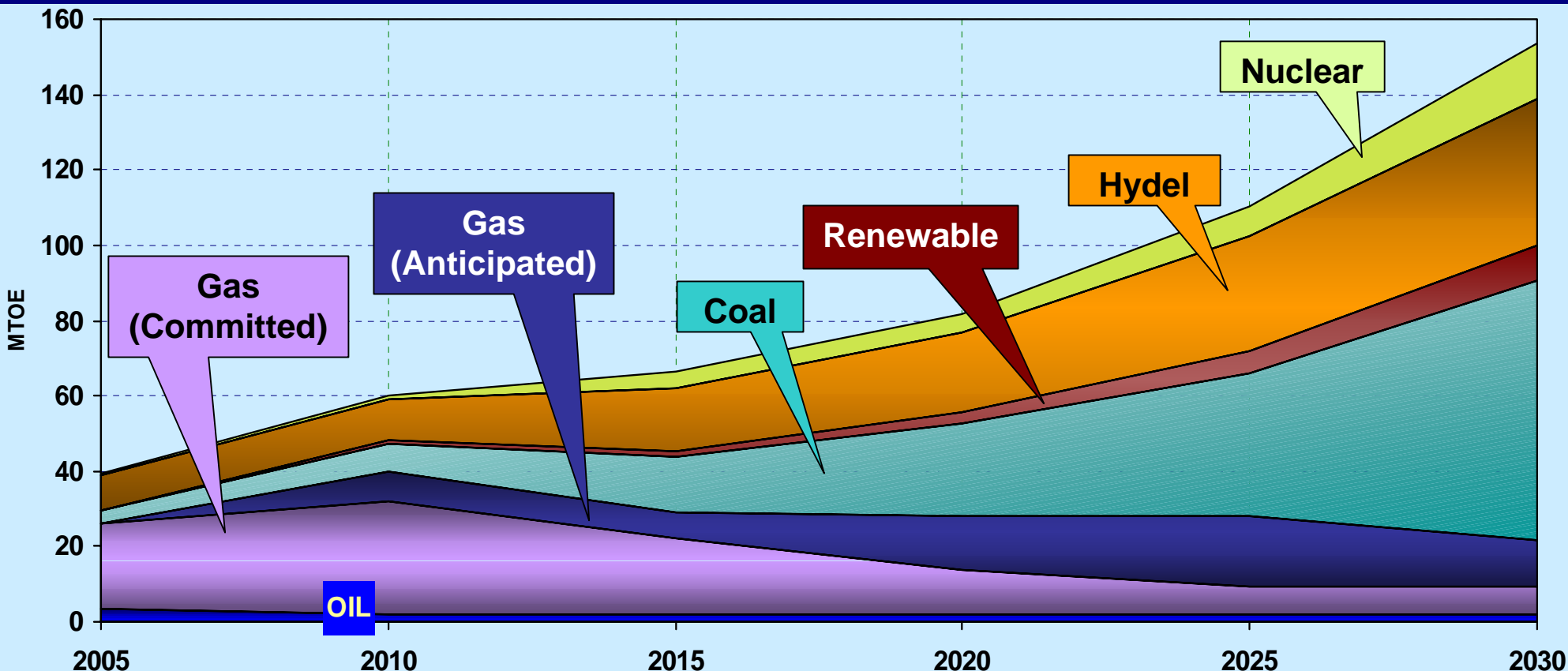
MTOE



	2005	2010	2015	2020	2025	2030
OIL	16.80	20.69	32.51	45.47	57.93	66.84
GAS	27.10	38.99	52.98	77.85	114.84	162.58
COAL	3.30	7.16	14.45	24.77	38.28	68.65
HYDEL	6.43	11.03	16.40	21.44	30.50	38.93
RENEWABLE	--	0.84	1.60	3.00	5.58	9.20
NUCLEAR	0.42	0.69	2.23	4.81	8.24	15.11
TOTAL	54.05	79.40	120.17	177.34	255.37	361.31

Indigenous Supply Projections

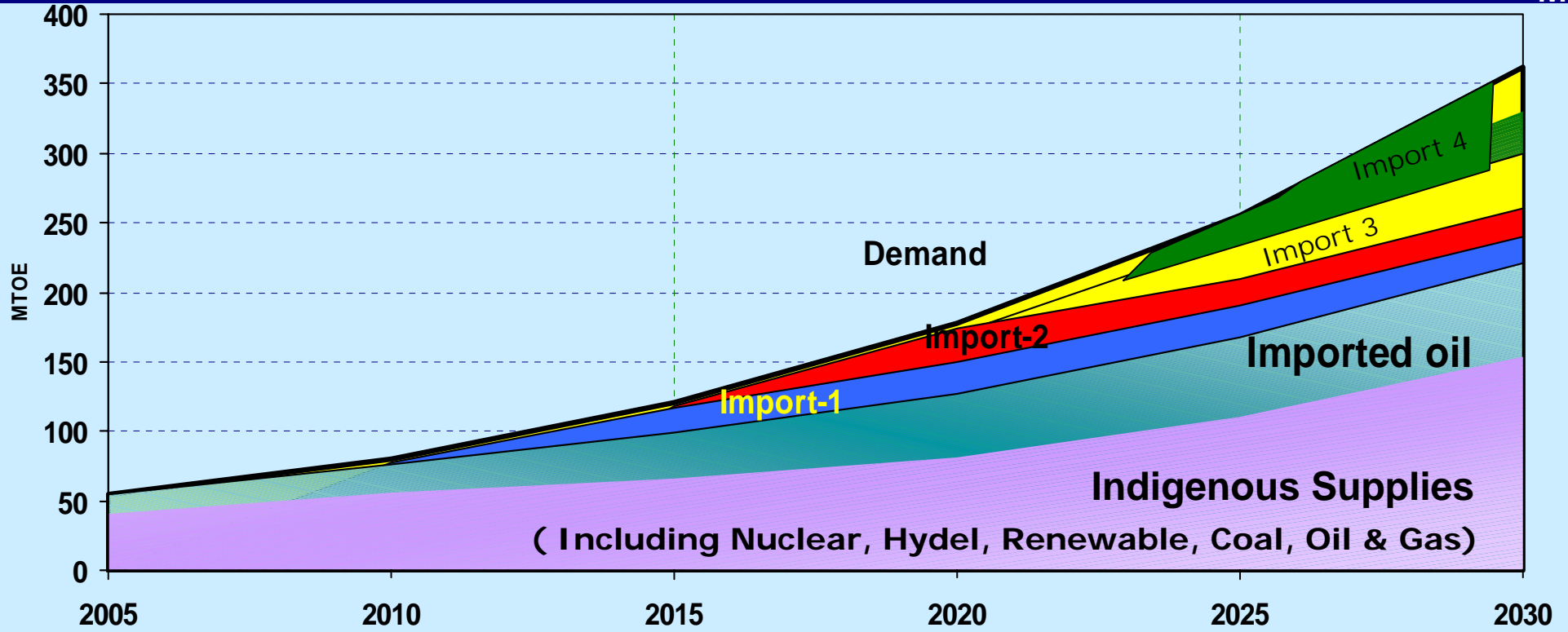
MTOE



	2005	2010	2015	2020	2025	2030
OIL	3.62	2.20	2.18	2.20	2.20	2.20 (1.4%)
GAS (Committed)	22.30	29.93	20.22	11.81	7.29	7.29 (4.7%)
GAS (Anticipated)	1.00	7.85	6.68	13.82	18.34	12.35 (8.0%)
COAL	2.30	7.40	14.81	24.77	38.28	68.65 (44.6%)
RENEWABLE	0.00	0.84	1.60	3.00	5.58	9.25 (6.0%)
HYDEL	9.24	11.03	16.40	21.44	30.5	38.93 (25.3%)
NUCLEAR	0.73	0.69	4.81	4.81	8.24	15.11 (9.8%)
TOTAL	39.29	59.94	66.70	81.85	110.43	153.78 (100%)

Energy Gap Coverage Through Imported Gas

MTOE



	2005	2010	2015	2020	2025	2030
SUPPLY	54.04	76.19	98.66	127.11	168.16	220.37
DEMAND	54.05	79.40	120.17	177.34	255.37	361.31
GAP		(3.21)	(21.51)	(50.23)	(87.21)	(140.94)
Gas Import-1	--	3.0	15.6	15.6	15.6	15.6
Gas Import-2	--	--	5.0	27.0	27.0	27.0
Gas Import-3	--	--	--	5.0	27.0	27.0
Gas Import-4	--	--	--	--	15.0	27.0

Power Generation Plan

								M.W
	Nuclear	Hydel	Coal	Renewable	Oil	Gas	Total	Cumulative
Existing (2005)	400	6460	160	180	6400	5940	19540	
Addition	-	-	-	-				
2010	-	1260	900	700	160	4860	7880	27420
2015	900	7570	3000	800	300	7550	20120	47540
2020	1500	4700	4200	1470	300	12560	24730	72270
2025	2000	5600	5400	2700	300	22490	38490	110760
2030	4000	7070	6250	3850	300	30360	51830	162590
Total:	8800	32660	19910	9700	7760	83760	162590	

Note: KANNUP to be retired in 2019

Drilling Targets

Description	1999-04	2005-10	2010-15	2015-20	2020-25	2025-30
Total Wells (Public+Private)						
Exploratory	109	300	450	630	810	990
Appraisal/Development	149	200	300	420	540	660
Total	258	500	750	1050	1350	1650
<u>OGDCL:</u>						
Exploratory	40	175	200	280	360	440
Appraisal/Development	19	100	125	175	225	275
SubTotal	59	275	325	455	585	715
<u>PRIVATE</u>						
Exploratory	69	125	250	350	450	550
Appraisal/Development	130	100	175	245	315	385
SubTotal	199	225	425	595	765	935

Installed Capacity and Projected Demand during MTFD

(POWER)

SI #		Benchmark 2004-05	Targets					Addition during MTFD
			2005-06	2006-07	2007-08	2008-09	2009-10	
1	Installed Capacity MW	20289	20753	21401	22594	24899	27389	7880
	hydro	6459	6540	6638	7021	7476	7719	1260
	Gas	5940	6230	6680	7130	8630	10620	4680
	Oil	6400	6400	6400	6560	6560	6560	160
	Coal	150	150	150	150	600	1050	900
	Nuclear	462	462	462	462	462	462	0
	Renewable		180	280	480	680	880	880
	Growth Rate (%)		2.3	3.1	5.6	10.2	10.0	6.2
2	Maximum Demand MW	14621	15511	16526	17904	19534	21426	21426
	Growth Rate (%)	3.4	6.1	6.5	8.3	9.1	9.7	7.9

Power Generation and Distribution Profile during MTFD

SI #		Benchmark 2004-05	Targets				
			2005-06	2006-07	2007-08	2008-09	2009-10
3	Energy Generation GWh	87992	93257	99247	107484	117351	128673
	Growth Rate (%)	3.2	6.0	6.4	8.3	9.2	9.6
4	Energy Sale GWH	66094	71520	77905	85352	93800	103516
	Growth Rate (%)	6.1	6.0	6.0	6.0	6.0	6.0
5	System Losses (%)	26.5	25.5	24.5	23.5	22.5	21.5
6	Consumers Million	0.5	0.6	0.6	0.6	0.6	0.6
	Cumulative	16.6	17.2	17.8	18.4	19.0	19.6
7	Electrification of Nos	4000	2517	2517	2517	2517	2517
	Villages/Abadies Cumulative	84988	87505	90022	92539	95056	97573

Fuel Sector Demand/Supply during MTDf

S.No	Item	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
1	POL Products Demand (Million Tonnes)	16.8	17	17.9	19.4	19.6	20.69
	Growth Rate (%)		1.19	5.29	8.38	1.03	5.56
2	Locally Refined POL (Million Tonnes)	12.0	12.0	12.0	12.0	12.0	12.0
	Growth Rate (%)		0.00	0.00	0.00	0.00	0.00
3	Imported POL (Million Tonnes)	4.8	5.0	5.9	7.4	7.6	8.7
	Growth Rate (%)		4.17	18.00	25.42	2.70	14.34
4	Crude Production (Barrels Per Day)	73917	71635	64791	55955	47586	40060
	Growth Rate (%)		-3.09	-9.55	-13.64	-14.96	-15.82
5	Gas Demand (MMCFD)	3,173	3,379	3,598	3,853	4,173	4,565
	Growth Rate (%)		6.49	6.48	7.09	8.31	9.39
6	Local Gas Supply (MMCFD)	4033	4189	4386	4555	4503	4424
	Growth Rate (%)		3.87	4.70	3.85	-1.14	-1.75

Fuel Sector Demand/Supply during MTFD (contd.)

S.No	Item	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
7	Gas Consumers (Addition) (Million)		0.2	0.2	0.2	0.2	0.2
	Cumulative (Million)	4.2	4.4	4.6	4.8	5	5.2
	Growth Rate (%)		4.76	4.55	4.35	4.17	4.00
8	LPG Supply (Tonnes/day)	1450	1600	1600	1600	1600	1800
	Growth Rate (%)		10.34	0.00	0.00	0.00	12.50
9	Coal Demand (Million Tonnes)	7.4	7.4	8.2	8.2	13.6	16.0
	Growth Rate (%)		0.00	10.81	0.00	65.85	17.65
10	Local Coal Supply (Million Tonnes)	3.9	3.9	5.0	5.1	10.6	13
11	Imported Coal (Million Tonnes)	3.5	3.5	3.2	3.1	3.0	3.0

Measures to cope with the requirement

- **Fast track development of hydel power generation dams**
- **Development of BOT regime for installation of oil and gas fired power stations**
- **Private- Public partnership for exploitation of coal reserves for power generation. An investor friendly regime is to be placed shortly**
- **Development of nuclear power plant on sustainable basis to increase the share of nuclear mix in the power generation in line with international standards**
- **Harnessing of wind and solar resources into power generation. Maximum encouragement to private sector in terms of credit facilities and fiscal incentives**
- **Targeted and compatible human resource development in line with energy generation profile**

Measures to cope with the requirement (Contd.)

- **Energy Conservation**
 - **Enactment of laws for:**
 - **Energy efficient building designs.**
 - **Use and manufacturing of energy efficient appliances.**
 - **Development of monitoring mechanism for compliance of energy conservation laws**
 - **Promote co-generation technologies to conserve energy.**
- **Demand side management in power sector for optimum utilization of installed capacity.**
 - **Time of day metering.**
 - **Shifting load to non-peak hours.**
- **Encourage renewable energy like solar heating, solar geyser for use in domestic sector to save natural gas for industries.**
- **Early finalization of formal negotiations to arrive at the best and most economical solution out of three alternatives (Iran, Qatar and Turkmenistan). Pipeline gas should be available by 2010.**

Measures to cope with the requirement (Contd.)

- **Gas utilities be allowed and facilitated to import LNG through private sector on BOO, BOT basis to meet the gap up to 2010 and continue to fill the gap thereafter. No government guarantees proposed.**
- **Captive power for industries and new industrial estates be facilitated.**
- **Pakistan has done well using CNG for cars. We need to fast track the introduction of CNG for the entire public transport to reduce our dependence on imported oil.**
- **Sugar mills have 2000 MW of available capacity during off-crushing season. This capacity with some modification of boilers can and should be made available on national grid Transmission and distribution system needs to be properly planned and put in place in time enabling full capacity utilization and insuring uninterrupted energy needs to the end users.**
- **Augmentation of transmission and grid stations facilities to meet growing demand**

THANK YOU