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付属資料 A : Generating Plants

PLANT DATA SHEET

Sheet No.

Type: THS		Ref.No. : T-1		Source of Information: ENAR/CPA			
Name of Power Plant		Dibs TPS		Power Station ID:			
Items		Descriptions					
Location		Governorate	City	Coordinates			
		Tameem	Kirkuk	N:	E:		
	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.	
Unit Data	1	1959	15	5	44	①Due to the circulating water system pumps. ②The lack of spare parts for routine maintenance, choked condenser tubes, and the over-age for all the units. ③ only two generator transformers, 25 MVA each, in lieu of the original four.	
	2	1959	15	10	44		
	3	1959	15	10	44		
	4	1959	15	10	44		
Total of plant	4		60	35			
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)		
		40	156,057,000	12,255,000	At Gen.Term.	At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	
			NG				
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)		
		(17.Jambour South Gas)					
Boiler		Main stream press.(MPa)	Main/Reheat Steam Temp. (deg.C/deg/C)	Steam capacity (t/h)	Boiler Type	Manufact-urer	
					MAN		
Steam Turbine		Type (tandem or cross comp.)	Revolution (rpm)	Manufacturer	Cooling water	Steam Extract.	
				MAN			
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement		(ENAR) :It is unlikely that partial rehabilitation of this power station will be technically and economically justified. However, renovation and modernization or complete rehabilitation, which can extend the life of the plant by another fifteen to twenty years and reduce the operation and maintenance cost, will be beneficial.					

Note:

PLANT DATA SHEET

Sheet No.

Type: TPS		Ref. No. T-2		Source of Information: ENAR/CPA				
Name of Power Plant		Baji TPS		Power Station ID:				
Items		Descriptions						
Location		Governorate		City		Coordinates		
		Salah al-Din		Baji		N:	E:	
Unit Data	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity Peak (MW)	No. of years in operation	Reason of Derating. Records of Renewal, Rehabilitation and etc.		
	1	1983	220	110	20	(ENAR): Deteriorated turbine rotors, chimney firebricks (water leakage), lack of sufficient water treatment chemicals, especially hydrazine, and circumscribed output from the water treatment plant.		
	2	1983	220	110	20			
	3	1984	220	110	19			
	4	1984	220	110	19			
	5	1984	220	0	19			
6	1984	220	110	19				
Total of plant	6		1,320	550				
Production Record in 2002		Maximum power output (MW)		Annual energy production (kWh)		Station use energy (kWh)		
		765		4,644,673,000		383,247,020		
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	Fuel storage	
				Fuel Oil			Gas	
		Gas Content & Calory(Lower) (12.Salah Al-Den Refinery)				Oil Characteristics & Calory (Lower)		
Boiler		Main stream press.(MPa)	Main/Reheat Steam Temp. (deg.C/deg/C)	Steam capacity (t/h)	Boiler Type	Manufact-urer	Feed water treatment	
						Ansaldo		
Steam Turbine		Type (tandem or cross comp.)	Revolution (rpm)	Manufacturer		Cooling water	Steam Extract.	
				Ansaldo				
Electrical & Control		Generator				Electrical & Control		
		Capacity(MVA)		Power factor	Manufacturer		Electrical Manufacturer	Control System
		Main Transformer				Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)		
Main Problems, Action Plans for Restorations & Improvement		(ENAR) An explosion in Unit 5 boiler has put this unit out service since Mar. 2003.						
		CPA : under rehabilitation on Unit 1,2,3,4,&6: Realized additional power: 100MW: by USAID/Bechtel ,complete 01-Jun-04						

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: TPS		Ref. No. T-3		Source of Information: ENAR/CPA			
Name of Power Plant		Doura TPS		Power Station ID:			
Items		Descriptions					
Location		Governorate	City	Coordinates			
		Baghdad		N:	E:		
Unit Data	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc. (ENAR) the lack of spare parts for routine maintenance, defective boiler tubes and control and instrument system	
	3	1988	160	102	15		
	4	1988	160	102	15		
	5	1978	160	131	25		
	6	1983	160	131	20		
Total of plant	4		640	466			
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency (%)		
		528	2,060,656,000		At Gen.Term.	At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	
			Fuel Oil	HFO	Gas		
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)		
		(7.Fuel Oil/Middle Refinery Project)					
Boiler		Main stream press.(MPa)	Main/Reheat Steam Temp. (deg.C/deg/C)	Steam capacity (t/h)	Boiler Type	Manufact-urer	
		13.3	535/535			Ansaldo	
Steam Turbine		Type (tandem or cross comp.)	Revolution (rpm)	Manufacturer	Cooling water	Steam Extract.	
				Toshiba/Siemens			
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
				Ansaldo/Siemens			
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement		(ENAR): Condition assessment and life evaluation study and inventory checks of major spares parts will have to be conducted prior to any major investment decision.					
		CPA: under rehabilitation for Unit 5 & 6: Realized additional power: 256MW: by USAID/Bechtel Complete:02-Jun-04 :					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: TPS		Ref. No.:T-4		Source of Information: ENAR/CPA			
Name of Power Plant		Baghdad South TPS		Power Station ID:			
Items		Descriptions					
Location		Governorate	City	Coordinates			
		Baghdad		N:	E:		
Unit Data	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc. (ENAR) due to lack of spare parts for routine maintenance, problems in the super heaters, pre-heaters and combustion system and, over-age of thermal units 5 and 6.	
	1	1984	55	40	19		
	2	1984	55	40	19		
	3	1984	55	40	19		
	4	1984	55	30	19		
	5	1966	67.5	30	38		
Total of plant	6		355	210			
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)		
		230	1,489,957,000		At Gen.Term.	At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	
			Fuel Oil				
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)		
		(7.Fuel Oil/Middle Refinery Project)					
Boiler		Main stream press.(MPa)	Main/Reheat Steam Temp. (deg.C/deg/C)	Steam capacity (t/h)	Boiler Type	Manufact-urer	
		8.6	514			CE	
Steam Turbine		Type (tandem or cross comp.)	Revolution (rpm)	Manufacturer	Cooling water	Steam Extract.	
				GE			
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement		(ENAR) It is unlikely that partial rehabilitation of this power station will be technically and economically justified. It is recommended that minimum maintenance required to sustain the present level of generation should be carried out over next few years.					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

Type: TPS		Ref. No.:T-5		Source of Information: ENAR?CPA						
Name of Power Plant		Musayab TPS		Power Station ID:						
Items		Descriptions								
Location		Governorate		City		Coordinates				
		Babel		Musayab		N:	E:			
	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.				
Unit Data	1	1987	300	210	15	(ENAR) ① Defects in the turbine and control system ② Inadequate and incomplete maintenance and forced prolonged operation beyond the original manufacturer's recommendations.				
	2	1987	300	215	15					
	3	1991	300	220	12					
	4	1987	300	235	15					
Total of plant	4		1,200	880						
Production Record in 2002		Maximum power output (MW)		Annual energy production (kWh)		Station use energy (kWh)		Station total efficiency(%)		
		935		5,622,020,000				At Gen.Term. At Trans.Term.		
Fuel		Design	Type	Fuel Type		Alt. Fuel	Fuel treat.		Fuel storage	
			Crude and Fuel Oil			Gas				
		Gas Content & Calory (Lower)				Oil Characteristics & Calory (Lower)				
Boiler		Main stream press.(MPa)	Main/Reheat Steam Temp. (deg.C/deg/C)		Steam capacity (t/h)	Boiler Type		Manufact-urer	Feed water treatment	
		167	538/538		272			B-H		
Steam Turbine		Type (tandem or cross comp.)		Revolution (rpm)	Manufacturer		Cooling water		Steam Extract.	
					Persons					
Electrical & Control		Generator				Electrical & Control				
		Capacity(MVA)		Power factor	Manufacturer		Electrical Manufacturer		Control System	
		Main Transformer				Grid Connection				
		Capacity(MVA)		Voltage(kV)		Type		Switchgear		Voltage(kV)
Main Problems, Action Plans for Restorations & Improvement		(ENAR) Complete rehabilitation of the units and common rehabilitation of instrument and control system of Unit 1 and 4 will enhance the reliability of the units.								
		CPA: under rehabilitation Unit 2: Realized additional power : 112MW by USAID/Bechtel Complete:04-Oct.-04 Principally on the turbines and control system								

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: TPS		Ref. No.:T-6		Source of Information: ENAR			
Name of Power Plant		Nasiriyah TPS		Power Station ID:			
Items		Descriptions					
Location		Governorate	City	Coordinates			
		Thi-Qar	Nasiriya	N:		E:	
	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.	
Unit Data	1	1978	210	130	25	Rehabilitated June 2000,	
	2	1979	210	180	25	Rehabilitated July 2000,	
	3	1980	210	160	25		
	4	1980	210	130	25		
Total of plant	4		840	600			
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)		Station use energy (kWh)	Station total efficiency(%)	
		755	4,428,804,000			At Gen.Term. At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat. Fuel storage	
			Crude Oil		Oil		
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)		
		(1.Normal Crude oil/Basra)					
Boiler		Main stream press.(MPa)	Main/Reheat Steam Temp. (deg.C/deg/C)	Steam capacity (t/h)	Boiler Type	Manufact-urer Feed water treatment	
		12.8	540/540			TPE	
Steam Turbine		Type (tandem or cross comp.)	Revolution (rpm)	Manufacturer	Cooling water	Steam Extract.	
				LMZ			
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
				TPE			
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement		(ENAR) Output is restricted by the poor quality and quantity of demineralised water and clogging of condenser tubes and cooling water intake filters. Overhaul maintenance of this power station with Rehabilitation of instrument and control system of Unit 1 and 4 will enhance the reliability the units.					
		CPA: Rehabilitation Water Treatment(external): Realized additional power 70MW by USACE, Complete 01-Jun-04 Complete installation of Cooling Tower Water Intake was rehabilitated: add+108MW					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: TPS		Ref. No.:T-7		Source of Information: ENAR			
Name of Power Plant		Najibiyah TPS		Power Station ID:			
Items		Descriptions					
Location		Governorate	City	Coordinates			
		Basra		N:	E:		
Unit Data	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal Rehabilitation and etc.	
	5	1976	100	80	27	Restored Aug.2002 except I&C	
	6	1976	100	80	27	Restored Nov.2002 except I&C	
Total of plant	2		200	160			
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)		
		203 (?)	321,572,408		At Gen.Term.	At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	
			NG and Crude Oil		Oil		
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)		
		(1.normal Crude Oil) (3.natural Gas)					
Boiler		Main stream press.(MPa)	Main/Reheat Steam Temp. (deg.C/deg/C)	Steam capacity (t/h)	Boiler Type	Manufact-urer	
						TPE	
Steam Turbine		Type (tandem or cross comp.)	Revolution (rpm)	Manufacturer	Cooling water	Steam Extract.	
				TPE			
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
				TPE			
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement		(ENAR) overhaul maintenance of this power station will increase the reliability of this power station. Condition assessment and life evaluation study and inventory checks of major spares parts will have to be conducted prior to any major investment decision.					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: TPS		Ref. No.:T-8		Source of Information:ENAR/CPA			
Name of Power Plant		Hartha TPS		Power Station ID:			
Items		Descriptions					
Location		Governorate	City	Coordinates			
		Basra	Al-Hartha	N:	E:		
	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating. Records of Renewal , Rehabilitation and etc.	
Unit Data	1	1979	200	175	24		
	2	1979	200	0		Under Rehabilitation by Russia ?	
	3	1979	200	0		Under Rehabilitation by Russia ?	
	4	1979	200	175	24		
Total of plant	4		800	350			
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)		
		400	2,815,303,000		At Gen.Term.	At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	
			NG and Crude Oil				
		Gas Content & Calory(Lower)			Oil Characteristics & Calory(Lower)		
		(3.Natural Gas)	(1.Normal Crude Oil/Basrah)				
Boiler		Main stream press.(MPa)	Main/Reheat Steam Temp. (deg.C/deg/C)	Steam capacity (t/h)	Boiler Type	Manufact-urer	
				166		MHI	
Steam Turbine		Type (tandem or cross comp.)	Revolution (rpm)	Manufacturer	Cooling water	Steam Extract.	
				MHI			
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement		Rehabilitation of instrument and control system of Unit 1 and 4 will enhance its reliability. Unit 2 & 3: Rehabilitation from Jan.,2004, 12months.					
		Parts for rehabilitation of Unit 1 and 4 will be supplied under UNDP trust fund.					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: GPS		Ref. No.: G-1		Source of Information: FNAR			
Name of Power Plant		Mosul GPS		Power Station ID:			
Items		Descriptions					
Location		Governorate	City	Coordinates			
		Ninewa	Al Mosul	N:	E:		
Unit Data	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating. Records of Renewal, Rehabilitation and etc. 8 units out of 10 gas turbine units were rehabilitated, under the supervision of John Brown, with the materials procured during 1999 to 2001. Unit 1 and 3 replaced with non-original supply. Unit 1:roter damaged Unit 2:decreasing gear vibration Unit3 ,4: 10 MW operated	
	1	1974	20	20			
	2	1974	20	0	27		
	3	1974	20	20			
	4	1974	20	18	26		
	5	1981	20	18	22		
	6	1981	20	18	22		
	7	1981	20	18	22		
	8	1981	20	18	22		
	9	1981	20	0	22		
	10	1981	20	18	22		
	11	1981	20	18	22		
Total of plant	12		250	184			
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)		
		156	1,130,082,000		At Gen.Term.	At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	
			NG				
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)		
		(3.Natural Gas)					
Gas turbine		Unit	Type	Manufacturer	Installation	Turbine Controller	
		2,4	PG5341	Hitachi			
		5,6,7,8,9	5001	AEG			
		10,11,12		Alstom			
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement		CPA: Realized Additional 54MW USACE complete 01.Jun.04 ----Details are not available.					
		Two new units for No.1 & 3, each 25MW, will be installed under grant aid from GoJ.as phase 1. Two units to be replaced in Phase 2 by UNDP					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: GPS		Ref. No.: G-2		Source of Information: FNAR			
Name of Power Plant		Dibs GPS,		Power Station ID:			
Items		Descriptions					
Location		Governorate	City	Coordinates			
		Tameem	Kirkuk	N:	E:		
	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.	
Unit Data	4	1982	25	25	23	Rehabilitated by May 2004	
	5	1982	25	25	23	Rehabilitated by Mar. 2004	
	6	1982	25	25	23	Rehabilitated by Mar 2004	
Total of plant	3		75	75			
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)		
					At Gen.Term.	At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	
				NG			
		Gas Content & Calory(Lower)			Oil Characteristics & Calory(Lower)		
		(3.Natural Gas) Press.30kg/cm2					
Gas turbine		Unit	Type	Manufacturer	Installation	Turbine Controller	
				Fiat/Avio			
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement							

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: GPS		Ref. No.: G-3		Source of Information: FNAR			
Name of Power Plant		Dibs Mobile GPS,		Power Station ID:			
Items		Descriptions					
Location		Governorate	City	Coordinates			
		Tameem	Kirkuk	N:	E:		
	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating. Records of Renewal, Rehabilitation and etc.	
Unit Data	1	1983	10	0		Shifted from initial Taji GPS ?	
	2	1983	10	8		Shifted from initial Taji GPS ?	
	3	1983	10	8		Shifted from initial Taji GPS ?	
	4	1983	10	8		Shifted from initial Taji GPS ?	
Total of plant	4		40	24			
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)		
		25	39,599,000		At Gen.Term.	At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	
			NG				
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)		
Gas turbine		Unit	Type	Manufacturer	Installation	Turbine Controller	
				IHI ?			
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement							

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: GPS		Ref. No.: G-4			Source of Information: FNAR/CPA			
Name of Power Plant		Al-Tameem(Old Abudulah) GPS			Mullah Power Station ID:			
Items		Descriptions						
Location		Governorate		City		Coordinates		
		Tameem		Kirkuk		N:	E:	
Unit Data	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating. Records of Renewal, Rehabilitation and etc.		
	1	1977	-	-	25	age and the lack of spare parts for routine maintenance		
	2	1977	20	15	25			
	3	1981	20	15	21			
	4	1981	20	15	21			
	5	1981	20	15	21			
	6	1981	20	15	21			
	7	1981	20	15	21			
	8	1981	20	15	21			
	9	1981	20	15	21			
	10	1981	20	15	21			
	11	1981	20	15	21			
	12	1981	20	15	21			
Total of plant	12		220	165				
Production Record in 2002		Maximum power output (MW)		Annual energy production (kWh)		Station use energy (kWh)	Station total efficiency(%)	
		169		1,050,290,000			At Gen.Term. At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	Fuel storage	
			NG					
		Gas Content & Calory(Lower)				Oil Characteristics & Calory(Lower)		
		440kg/cm2						
Gas turbine		Unit	Type	Manufacturer		Installation	Turbine Controller	
		2	5001	AEG,				
		3-7	5001	JBE				
		8-12	5001	JBE				
Electrical & Control		Generator				Electrical & Control		
		Capacity(MVA)		Power factor	Manufacturer	Electrical Manufacturer	Control System	
		Main Transformer				Grid Connection		
		Capacity(MVA)		Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement		ENAR) Complete rehabilitation of old units and major overhaul of new units will enhance the reliability of the units.						
		CPA: Rehabilitation of Unit 1,2,3,5,11,12 with rehabilitation of the main and auxiliary gas feeding system						

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: GPS		Ref. No.: G-5			Source of Information: FNAR		
Name of Power Plant		Al-Tameem (New Mullah Abdullah) GPS			Power Station ID:		
Items		Descriptions					
Location		Governorate		City	Coordinates		
		Tameem		Kirkuk	N:	E:	
Unit Data	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating. Records of Renewal, Rehabilitation and etc.	
	1	2000	37	30	4		
	2	2000	37	30	4		
	3	2000	37	30	4		
	4	2000	37	30	4		
	5	2000	37	30	4		
	6	2000	37	30	4		
	7						
	8						
	9						
	10						
	11						
	12						
Total of plant	6		222	180			
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)		
		222	1,485,902,000		At Gen.Term.	At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	
			NG				
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)		
Gas turbine		Unit	Type	Manufacturer	Installation	Turbine Controller	
				CCM(China)			
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement							
		CPA: Rehabilitation : Realized Additional 30MW by USACE, Complete 01.Jul.04					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: GPS		Ref. No.: G-6		Source of Information: FNAR			
Name of Power Plant		Baji GPS		Power Station ID:			
Items		Descriptions					
Location		Governorate	City	Coordinates			
		Salah al-Din	Baji	N:	E:		
	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.	
Unit Data	1	2003	159	159	1	Sep.03 started operation	
	2	2003	159	159	1	Sep.03 started operation	
	3	(2004)	(159)	(159)	-	May 04 start commissioning	
	4	(2004)	(159)	(159)	-	May 04 start commissioning	
	5						
	6						
	7						
	8						
	9						
	10						
	11						
	12						
Total of plant	4		636	280			
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)		
					At Gen.Term.	At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	
			Crude Oil /Gas Oil				
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)		
		(4.Gas Oil)					
Gas turbine		Unit	Type	Manufacturer	Installation	Turbine Controller	
				Ansaldo			
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement							
		CPA: Completion of Unit 3 & 4: Realized additional 219MW by TFRIE, complete 31.May.04 (Water treatment plant is included) Commissioning : Crude Oil Conversion Equipment :Realized Additional 125MW :Completed					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: GPS		Ref. No.: G-7		Source of Information: FNAR		
Name of Power Plant		Baji Mobile GPS		Power Station ID:		
Items		Descriptions				
Location		Governorate	City	Coordinates		
		Salah al-Din	Baji	N:	E:	
Unit Data	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating. Records of Renewal, Rehabilitation and etc.
	1	2004	23	20		
	2	2004	23	20		
	3	2004	23	20		
	4	2004	23	20		
	5	2004	23	20		
	6	2004	23	20		
	7	2004	23	20		
	8	2004	23	20		
Total of plant	8		184	160		
Production Record in 2002	Maximum power output (MW)		Annual energy production (kWh)		Station use energy (kWh)	Station total efficiency(%)
						At Gen.Term. At Trans.Term.
Fuel	Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	Fuel storage
Gas turbine	Unit	Type	Manufacturer	Installation	Turbine Controller	
Electrical & Control	Generator			Electrical & Control		
	Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
	Main Transformer			Grid Connection		
	Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement						
	CPA: Mobile new generation : Realized additional 129MW by TFRIE, Complete 01.Feb.04					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: GPS		Ref. No.: G-8		Source of Information: FNAR/CPA/JICA		
Name of Power Plant		Taji GPS		Power Station ID:		
Items		Descriptions				
Location		Governorate	City	Coordinates		
		Baghdad	Karkh	N:	E:	
	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating. Records of Renewal, Rehabilitation and etc.
Unit Data	1	1976	20	20		Only 10MW operational, cooling & control system not normal Same as above, roter damaged. Roter damaged. Out of order (to be replaced) Same as unit 1& 2 Roter damaged.
	2	1976	20	20		
	3	1976	20	17		
	4	1979	20	17	24	
	5	2004	20	20		
	6	1979	20	15	24	
	7	1976	20	16	27	
	8					
	9					
	10					
	11					
	12					
Total of plant	7		160	125		
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)	
		101	687,924,000		At Gen.Term.	At Trans.Term.
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.
			NG			
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)	
Gas turbine		Unit	Type	Manufacturer	Installation	Turbine Controller
			5001	Hitachi		
Electrical & Control		Generator			Electrical & Control	
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System
		Main Transformer			Grid Connection	
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)
Main Problems, Action Plans for Restorations & Improvement		CPA: Rehabilitation: GPS Realized Additional 74MW by USACE, Complete 01.Jun.04				
		Unit 1, 2, 3, 5: to be replaced under grant aid of GoJ. Unit 4, 6 & 7 to be rehabilitated under UNDP trust fund.				

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: GPS		Ref. No.: G-9		Source of Information: FNAR			
Name of Power Plant		Taji Mobile GPS		Power Station ID:			
Items		Descriptions					
Location		Governorate	City	Coordinates			
		Baghdad	Karkh	N:	E:		
Unit Data	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating. Records of Renewal, Rehabilitation and etc.	
	1	1983	10	10			
	2	1983	10	10			
	3		10	?			
	4		10	?			
	5		10	?			
	6		10	?			
	7						
	8						
	9						
	10						
	11						
	12						
Total of plant	2		60	20			
Production Record		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)		
					At Gen.Term.	At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	
			Gas Oil				
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)		
Gas turbine		Unit	Type	Manufacturer	Installation	Turbine Controller	
				IHI			
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement							

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

4 Type: GPS		Ref. No.: G-10		Source of Information: FNAR/CPA		
Name of Power Plant		Doura GPS		Power Station ID:		
Items		Descriptions				
Location		Governorate	City	Coordinates		
		Baghdad		N:	E:	
	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.
Unit Data	1	1981	25	25	22	The rehabilitation of Unit 1, 2 and 4 was completed. in 2000 and 2001.
	2	1981	25	25	22	
	3	1982	25	25	21	
	4	1982	25	25	21	
	5					The rehabilitation of Unit 3 to be completed by Jun.2004
	6					
	7					
	8					
	9					
	10					
	11					
	12					
Total of plant	4		100	100		
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)	
		113	543,191,000		At Gen.Term.	At Trans.Term.
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.
			NG			
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)	
		13kg/cm2				
Gas turbine		Unit	Type	Manufacturer	Installation	Turbine Controller
			TG20	Fiat/Avio		
Electrical & Control		Generator			Electrical & Control	
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System
		Main Transformer			Grid Connection	
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)
Main Problems, Action Plans for Restorations & Improvement						
		CPA: Rehabilitation Unit 3. realized Additional 20MW by USACE, Complete 01.Jun.04				

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTO

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

Type: GPS		Ref. No.: G-11		Source of Information: ENAR/CPA			
Name of Power Plant		Al-Quds GPS		Power Station ID:			
Items		Descriptions					
Location		Governorate	City	Coordinates			
		Baghdad		N:	E:		
	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.	
Unit Data	1	2002	123	110	2	Crude Oil Conversion Equipment added(+160MW)	
	2	2002	123	110	2		
	3	2004	125	96		(to be completed 31 May 04)	
	4	2004	125	96			
	5	2004	43	33			
	6	2004	43	33		(to be completed 22 Mar 04)	
	7	2004	43	33			
	8	2004	43	33			
	9					LM6000 :To be clarified	
	10						
	11						
	12						
Total of plant	8		668	544			
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)		
		254	534,504,300		At Gen.Term.	At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	
		Dual	Crude Oil		Gas Oil		
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)		
Gas turbine		Unit	Type	Manufacturer	Installation	Turbine Controller	
		1,2,3,4	Frame 9?		Dong Fang		
		5,6,7,8	Frame 6?				
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement							
		CPA: Completion of Unit 3 & 4 : Realized Additional 175MW by TFRIE, Complete 31.May 04. Quds No. 5-8 New Generation : Realized Additional 120MW by TFRIE , Complete 22.Mar.04					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: GPS		Ref. No.: G-12		Source of Information: FNAR/CPA			
Name of Power Plant		Hilla GPS		Power Station ID:			
Items		Descriptions					
Location		Governorate	City	Coordinates			
		Babel	Hilla	N:	E:		
	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.	
Unit Data	1	1972	20	18	31	Age of the units and generally poor condition. Unit 2 was replaced	
	2	2004	20	0			
	3	1972	20	18	31		
	4	1972	20	18	31		
	5						
	6						
	7						
	8						
	9						
	10						
	11						
	12						
Total of plant	4		80	54			
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)		
		81	511,047,000		At Gen.Term.	At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	
			NG				
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)		
		24kg/cm2					
Gas turbine		Unit	Type	Manufacturer	Installation	Turbine Controller	
			5001	Alstom			
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement		(ENAR) Complete rehabilitation, which can reduce the operation and maintenance cost, will be beneficial.					
		CPA: Replacement of Unit 2: Realized additional 17MW by TFRIE, Complete 13.Feb.04					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: GPS		Ref. No.: G-13		Source of Information: FNAR/CPA				
Name of Power Plant		Najaf GPS		Power Station ID:				
Items		Descriptions						
Location		Governorate		City		Coordinates		
		Najaf				N:	E:	
Unit Data	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.		
	1	1976	63	30	27	Age and the lack of spare parts for routine maintenance. Unit 2 rehabilitated Jan.04 Rehabilitated: Oct.2001 (New gas/oil system)		
	2	1976	63	52	27			
	3	1976	63	50	27			
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
Total of plant			189	132				
Production Record in 2002		Maximum power output (MW)		Annual energy production (kWh)		Station use energy (kWh)	Station total efficiency(%)	
		160		956,488,500			At Gen.Term. At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	Fuel storage	
			NG					
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)			
		21kg/cm2						
Gas turbine		Unit	Type	Manufacturer		Installation	Turbine Controller	
			13D	BBC				
Electrical & Control		Generator				Electrical & Control		
		Capacity(MVA)		Power factor	Manufacturer	Electrical Manufacturer	Control System	
		Main Transformer				Grid Connection		
		Capacity(MVA)		Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement								
		CPA: Rehabilitation Unit 2: Realized Additional 20MW by TFRIE, Complete 25.Jan.04						

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: GPS		Ref. No.: G-14		Source of Information: FNAR/CPA		
Name of Power Plant		Khor Al-Zuber GPS		Power Station ID:		
Items		Descriptions				
Location		Governorate	City	Coordinates		
		Basra	Al-Zuber	N:	E:	
	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.
Unit Data	1	1976	63	50	27	Rehabilitated Jun 02
	2	1976	63	52	27	Rehabilitated by Feb 04
	3	1976	63	50	27	Rehabilitated Aug.02
	4	1976	63	52	27	Rehabilitated by Feb 04
	5					
	6					
	7					
	8					
	9					
	10					
	11					
	12					
Total of plant			252	204		
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)	
		145	816,200,000		At Gen.Term.	At Trans.Term.
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.
			NG			
		Gas Content & Calory(Lower)			Oil Characteristics & Calory(Lower)	
Gas turbine		Unit	Type	Manufacturer	Installation	Turbine Controller
				ABB/Alstom		
Electrical & Control		Generator			Electrical & Control	
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System
		Main Transformer			Grid Connection	
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)
Main Problems, Action Plans for Restorations & Improvement						
		CPA: Rehabilitation or Replacement of Unit 2 & 4. Realized Additional 66MW by TFRIE, Complete 29.Feb.04				

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PLANT DATA SHEET

Sheet No.

Type: GPS		Ref. No.: G-15		Source of Information: FNAR			
Name of Power Plant		Shua'yba GPS		Power Station ID:			
Items		Descriptions					
Location		Governorate	City	Coordinates			
		Basra	Shua'yba	N:	E:		
	Unit No.	Year of Commissioning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating. Records of Renewal, Rehabilitation and etc.	
Unit Data	1	1973	20	12	31		
	2	1973	20	12	31		
	3						
	4						
	5						
	6						
	7						
	8						
	9						
	10						
	11						
	12						
Total of plant			40	24			
Production Record in 2002		Maximum power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency(%)		
		34	207,048,000		At Gen.Term.	At Trans.Term.	
Fuel		Design	Type	Fuel Type	Alt. Fuel	Fuel treat.	
			NG				
		Gas Content & Calory (Lower)			Oil Characteristics & Calory (Lower)		
Gas turbine		Unit	Type	Manufacturer	Installation	Turbine Controller	
			5001	Alstom			
Electrical & Control		Generator			Electrical & Control		
		Capacity(MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
		Main Transformer			Grid Connection		
		Capacity(MVA)	Voltage(kV)	Type	Switchgear	Voltage(kV)	
Main Problems, Action Plans for Restorations & Improvement		The station was designed for peak load service, Overhaul of units is recommended.					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

Type: HPS				Source of Information: ENAR			
Ref. No.:		H1					
Name of Power Plant		Derban Dikhan HPS		Power Station ID:			
Location		Governorate	City		Coordinates		
		Sulaimaniyah	Derban Dikhan	N:		E:	
Type of Hydropower		Erthfill dam (Ab e- Sirwan River)					
Reservoir volume (M m3)		Full supply water level (EL.m)		High water level (EL.m)		Low water level (EL.m)	Minimum oper- ating level (EL.m)
2,500		495.19					
Unit Data	Unit No.	Year of Commissio ning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.	
	1	1991	83				
	2	1991	83				
	3	1991	83				
Total of plant	3		249	165		Due to the limitations in the transmission and distribution systems in the Governorates of Suleimaniyah and Erbil.	
Production Record of Plant		Max. power output (MW)	Annual energy production (GWh)		Station use energy (kWh)	Station total efficiency (%)	
			606 (ave. 1991-2000)			At Gen.Term.	At Trans.Term.
Head (m)		Max. (m)	Rated (design) (m)		Min. (m)		
		103	80		53		
Hydraulic Turbine	Unit No.	Type of turbine	Turbine discharge (m3/s) at Rated head		Revolution (rpm)	Manufacturer	
	1					Mitsubishi, Japan	
	2						
	3						
Electrical & Control	Unit No.	Generator			Electrical & Control		
		Capacity (MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
	1	95			Mitsubishi, Japan		
	2	95					
	3	95					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

	Unit No.	Main Transformer			Grid Connection	
		Capacity (MVA)	Voltage (kV)	Type	Switchgear	Voltage (kV)
Main Problems, Action Plans for Restorations & Improvement		<ul style="list-style-type: none"> • Not connected to the national grid. • Based on the reports by Colenco Power Engineering Ltd, Coyne and Bellier, and a reconnaissance geological report about possible landslides on the left bank of Derbandikhan Reservoir, the structural integrity of the dam is questionable. A detailed study, consistent with the recommendations made in the Mission Report of Kurt Wermelinger, is required as part of long term planning for this plant. • Condition Assessment and life evaluation study and inventory checks of major spares parts will have to be conducted prior any major investment decision. 				

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

Type: HPS				Source of Information: ENAR		
Ref. No.:		H2				
Name of Power Plant		Dokan HPS		Power Station ID:		
Location		Governorate	City	Coordinates		
		Sulaimaniyah	Dokan	N:	E:	
Type of Hydropower		Concrete arch dam (Zab as-Saghir River)				
Reservoir volume (M m3)		Full supply water level (EL.m)	High water level (EL.m)	Low water level (EL.m)	Minimum oper- ating level (EL.m)	
6,140		516				
Unit Data	Unit No.	Year of Commissio ning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.
	1	1978	82			
	2	1978	82			
	3	1978	82			
	4	1978	82			
	5	1978	82			
Total of plant	5		410	240	Due to the limitations in the transmission and distribution system in the Governorates of Sulaimaniyah and Erbil	
Production Record of Plant		Max. power output (MW)	Annual energy production (GWh)	Station use energy (kWh)	Station total efficiency (%)	
			947 (ave. 1978-2000)		At Gen.Term.	At Trans.Term.
Head (m)		Max. (m)	Rated (design) (m)	Min. (m)		
		95	82	50		
Hydraulic Turbine	Unit No.	Type of turbine	Turbine discharge (m3/s) at Rated head	Revolution (rpm)	Manufacturer	
	1	Francis			Litostroj (LMZ), Russia	
	2	Francis				
	3	Francis				
	4	Francis				
	5	Francis				
Electrical & Control	Unit No.	Generator			Electrical & Control	
		Capacity (MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System
	1	94		Catharienburg , Russia		
	2	94				
	3	94				
	4	94				
5	94					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

	Unit No.	Main Transformer			Grid Connection	
		Capacity (MVA)	Voltage (kV)	Type	Switchgear	Voltage (kV)
Main Problems, Action Plans for Restorations & Improvement	<ul style="list-style-type: none"> • Not connected to the national grid. • All the units were in operable condition. • The overhaul of 3 units was completed and the other 2 units were scheduled for completion by 2001. However, this was not executed because of contractual and administration problems. • Assessment needs to be carried out to determine outstanding rehabilitation/refurbishment work. • Detailed structural integrity study of the dam can be part of long term planning. • Condition Assessment and life evaluation study and inventory (stock) check of major spares parts will have to be conducted prior any major investment decision. 					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

Type: HPS				Source of Information: ENAR				
Ref. No.:		H3						
Name of Power Plant		Himreem HPS		Power Station ID:				
Location		Governorate	City		Coordinates			
		Diyala			N:	E:		
Type of Hydropower								
Reservoir volume (M m3)		Full supply water level (EL.m)		High water level (EL.m)		Low water level (EL.m)	Minimum oper- ating level (EL.m)	
				104.5				
Unit Data	Unit No.	Year of Commissio ning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.		
	1	1981	25		13	Due to limitation in the flow of water		
	2	1981	25		13			
Total of plant	2		50	10				
Production Record of Plant		Max. power output (MW)	Annual energy production (GWh)	Station use energy (kWh)		Station total efficiency (%)		
						At Gen.Term.	At Trans.Term.	
Head (m)		Max. (m)	Rated (design) (m)	Min. (m)				
Hydraulic Turbine	Unit No.	Type of turbine	Turbine discharge (m3/s) at Rated head	Revolution (rpm)		Manufacturer		
	1	Kaplan	98.5	166.7		LITOSTRJ (Yogslavia)		
	2	Kaplan	98.5	166.7				
Electrical & Control	Unit No.	Generator			Electrical & Control			
		Capacity (MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System		
		27.8						
	Unit No.	Main Transformer			Grid Connection			
		Capacity (MVA)	Voltage (kV)	Type	Switchgear	Voltage (kV)		

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

Main Problems, Action Plans for Restorations & Improvement	<ul style="list-style-type: none">• Overhaul of units will be beneficial.• Inventory (stock) check of major spares parts will have to be conducted prior any major investment decision.• The details of goods that are expected to arrive to this power station under SCR1472/1476 and 1483.				

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

Type: HPS				Source of Information: ENAR			
Ref. No.:		H4 (1/2)					
Name of Power Plant		Mosul HPS		Power Station ID:			
Location		Governorate	City	Coordinates			
		Ninewa	Mosul	N:		E:	
Type of Hydropower							
Reservoir volume (M m3)		Full supply water level (EL.m)		High water level (EL.m)		Low water level (EL.m)	Minimum oper- ating level (EL.m)
Unit Data	Unit No.	Year of Commissio ning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.	
	M1	1986 (MU)	187.5			MU: Main Unit Replacement is under discussion.	
	M2	1986 (MU)	187.5				
	M3	1986 (MU)	187.5				
	M4	1986 (MU)	187.5				
	RD1	1985 (RDU)	15			RDU: Regulating Dam Unit	
	RD2	1985 (RDU)	15				
	RD3	1985 (RDU)	15				
RD4	1985 (RDU)	15					
Total of plant	8		810	400		Output is restricted due to limitation in water flow.	
Production Record of Plant in 2002		Max. power output (MW)	Annual energy production (GWh)	Station use energy (kWh)	Station total efficiency (%)		
		750	2,713,888		At Gen.Term.	At Trans.Term.	
Head (m)		Max. (m)	Rated (design) (m)	Min. (m)			
Hydraulic Turbine	Unit No.	Type of turbine	Turbine discharge (m3/s) at Rated head	Revolution (rpm)	Manufacturer		
	M1	Francis			Toshiba		
	M2	Francis			Toshiba		
	M3	Francis			Toshiba		
	M4	Francis			Toshiba		
Electrical & Control	Unit No.	Generator			Electrical & Control		
		Capacity (MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
 LIST OF GENERATION

Sheet No.

	Unit No.	Main Transformer			Grid Connection	
		Capacity (MVA)	Voltage (kV)	Type	Switchgear	Voltage (kV)
Main Problems, Action Plans for Restorations & Improvement		<ul style="list-style-type: none"> • Output was determined by water flow. • Overhaul of units will be beneficial. • Inventory checks of major spares parts will have to be conducted prior any major investment decision. • Discussion underway for rehabilitation by grant aid of GoJ. 				

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

Type: HPS			Source of Information: ENAR			
Ref. No.:		H4 (2/2)				
Name of Power Plant		Mosul HPS (PSU)		Power Station ID:		
Location		Governorate	City	Coordinates		
		Ninewa	Mosul	N:	E:	
Type of Hydropower		Pumped storage				
Reservoir volume (M m3)		Full supply water level (EL.m)	High water level (EL.m)	Low water level (EL.m)	Minimum oper- ating level (EL.m)	
Unit Data	Unit No.	Year of Commissio ning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.
	PS1	1990 (PSU)	120			PSU: Pumped Storage Unit
	PS2	1990 (PSU)	120			
Total of plant		2	240			
Production Record of Plant		Max. power output (MW)	Annual energy production (GWh)	Station use energy (kWh)	Station total efficiency (%)	
					At Gen.Term.	At Trans.Term.
Head (m)		Max. (m)	Rated (design) (m)	Min. (m)		
Hydraulic Turbine	Unit No.	Type of turbine	Turbine discharge (m3/s) at Rated head	Revolution (rpm)	Manufacturer	
Electrical & Control	Unit No.	Generator			Electrical & Control	
		Capacity (MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System
	Unit No.	Main Transformer			Grid Connection	
		Capacity (MVA)	Voltage (kV)	Type	Switchgear	Voltage (kV)

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

Main Problems, Action Plans for Restorations & Improvement	<ul style="list-style-type: none">• All the units were in operable condition.• Output was determined by water flow.• Overhaul of units will be beneficial.• Inventory checks of major spares parts will have to be conducted prior any major investment decision.					

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

Type: HPS				Source of Information: ENAR			
Ref. No.:		H5					
Name of Power Plant		Sadat Al Hindia HPS		Power Station ID:			
Location		Governorate	City		Coordinates		
		Babel	Musaiyab		N:	E:	
Type of Hydropower							
Reservoir volume (M m3)		Full supply water level (EL.m)		High water level (EL.m)		Low water level (EL.m)	Minimum oper- ating level (EL.m)
Unit Data	Unit No.	Year of Commissio ning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.	
	1	1988	3.75				
	2	1988	3.75				
	3	1988	3.75				
	4	1988	3.75				
Total of plant	4		15	5.0		Output is restricted due to limitation in water flow	
Production Record of Plant		Max. power output (MW)	Annual energy production (GWh)	Station use energy (kWh)	Station total efficiency (%)		
					At Gen.Term.	At Trans.Term.	
Head (m)		Max. (m)	Rated (design) (m)	Min. (m)			
Hydraulic Turbine	Unit No.	Type of turbine	Turbine discharge (m3/s) at Rated head	Revolution (rpm)	Manufacturer		
	1				Sulzer-Escher Wyss		
	2						
	3						
	4						
Electrical & Control	Unit No.	Generator			Electrical & Control		
		Capacity (MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
	1				BULB		
	2						
	3						
4							
	Unit No.	Main Transformer			Grid Connection		
		Capacity (MVA)	Voltage (kV)	Type	Switchgear	Voltage (kV)	

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

Main Problems, Action Plans for Restorations & Improvement	<ul style="list-style-type: none">• Due to limitation in water flow, only 2 units operated at about 5 MW and other units were kept in stand by mode.• Overhaul of units will be beneficial.• Condition Assessment and life evaluation study and inventory checks of major spares parts will have to be conducted prior to any major investment decision.• The details of goods that are expected to arrive to this power station under SCR1472/1476 and 1483.
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Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

Type: HPS				Source of Information: ENAR			
Ref. No.:		H6					
Name of Power Plant		Samara HPS		Power Station ID:			
Location		Governorate	City	Coordinates			
		Salah al-Din	Samara	N:		E:	
Type of Hydropower							
Reservoir volume (M m3)		Full supply water level (EL.m)		High water level (EL.m)		Low water level (EL.m)	Minimum oper- ating level (EL.m)
Unit Data	Unit No.	Year of Commissio ning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.	
	1	1972	28				
	2	1972	28				
	3	1972	28				
Total of plant	3		84	38		Output is restricted due to limitation in water flow.	
Production Record of Plant		Max. power output (MW)	Annual energy production (GWh)	Station use energy (kWh)	Station total efficiency (%)		
						At Gen.Term.	At Trans.Term.
Head (m)		Max. (m)	Rated (design) (m)	Min. (m)			
Hydraulic Turbine	Unit No.	Type of turbine	Turbine discharge (m3/s) at Rated head	Revolution (rpm)	Manufacturer		
	1	Kaplan		79	Franco Tossi		
	2	Kaplan		79			
	3	Kaplan		79			
Electrical & Control	Unit No.	Generator			Electrical & Control		
		Capacity (MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
	1	33		Ansaldo			
	2	33					
	3	33					
	Unit No.	Main Transformer			Grid Connection		
		Capacity (MVA)	Voltage (kV)	Type	Switchgear	Voltage (kV)	
	1			Ansaldo			
	2						
	3						

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
 LIST OF GENERATION

Sheet No.

Main Problems, Action Plans for Restorations & Improvement	<ul style="list-style-type: none"> • Due to limitation in water flow, two units operated at about 20MW, each, at any given time and the third unit was kept in stand by mode. Given the prevailing water level, major investment to enhance the station output would not be rewarding. • Overhaul of units will be beneficial. • Inventory checks of major spares parts will have to be conducted prior to any major investment decision. • The details of goods that are expected to arrive to this power station under SCR1472/1476 and 1483. 				

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR

LIST OF GENERATION

Sheet No.

Type: HPS				Source of Information: ENAR			
Ref. No.:		H7					
Name of Power Plant		Qadissiya HPS (Haditha Dam)		Power Station ID:			
Location		Governorate	City		Coordinates		
		Al-Anbar	Haditha	N:		E:	
Type of Hydropower							
Reservoir volume (M m3)		Full supply water level (EL.m)		High water level (EL.m)		Low water level (EL.m)	Minimum oper- ating level (EL.m)
Unit Data	Unit No.	Year of Commissio ning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.	
	1	1986	110				
	2	1986	110				
	3	1986	110				
	4	1986	110				
	5	1986	110				
	6	1986	110				
Total of plant	6		660	110		Output is restricted due to limitation in water flow.	
Production Record of Plant in 2002		Max. power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency (%)		
		310	704,881,000		At Gen.Term.	At Trans.Term.	
Head (m)		Max. (m)	Rated (design) (m)	Min. (m)			
Hydraulic Turbine	Unit No.	Type of turbine	Turbine discharge (m3/s) at Rated head	Revolution (rpm)	Manufacturer		
	1	Kaplan	335		CKD/LIT		
	2	Kaplan	335				
	3	Kaplan	335				
	4	Kaplan	335				
	5	Kaplan	335				
	6	Kaplan	335				
Electrical & Control	Unit No.	Generator			Electrical & Control		
		Capacity (MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
	1			KONCAR			
	2						
	3						
	4						
	5						
6							

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
 LIST OF GENERATION

Sheet No.

	Unit No.	Main Transformer			Grid Connection	
		Capacity (MVA)	Voltage (kV)	Type	Switchgear	Voltage (kV)
Main Problems, Action Plans for Restorations & Improvement		<ul style="list-style-type: none"> • Due to limitations in water flow, only one unit operated at about 40 MW at any given time, and other units were kept in stand by mode. • All the units are in good condition, except Unit 2. The output from this unit is limited to 80 MW because of vibration problems. • Overhaul of units will be beneficial. • Condition Assessment and life evaluation study and inventory checks of major spares parts will have to be conducted prior any major investment decision. • The details of goods that are expected to arrive to this power station under SCR1472/1476 and 1483 • 				
		CPA: rehabilitation of 350 MW by USACE finished on April 2004.(US\$56 m\$), with 223 km T/L Increase a capacity to 550MW from the previous 100 ~200MW and 660 MW at June 2004.				

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

Type: HPS				Source of Information: ENAR			
Ref. No.:		H8					
Name of Power Plant		Al-Adhim HPS		Power Station ID:			
Location		Governorate	City	Coordinates			
		Diyala	Al-Khalis	N:		E:	
Type of Hydropower							
Reservoir volume (M m3)		Full supply water level (EL.m)		High water level (EL.m)		Low water level (EL.m)	Minimum oper- ating level (EL.m)
Unit Data	Unit No.	Year of Commissio ning	Nameplate capacity (MW)	Derated capacity (MW)	No. of years in operation	Reason of Derating, Records of Renewal, Rehabilitation and etc.	
	1	(under const- ruction)	13				
	2		13				
Total of plant	2		26				
Production Record of Plant		Max. power output (MW)	Annual energy production (kWh)	Station use energy (kWh)	Station total efficiency (%)		
					At Gen.Term.	At Trans.Term.	
Head (m)		Max. (m)	Rated (design) (m)	Min. (m)			
Hydraulic Turbine	Unit No.	Type of turbine	Turbine discharge (m3/s) at Rated head	Revolution (rpm)	Manufacturer		
Electrical & Control	Unit No.	Generator			Electrical & Control		
		Capacity (MVA)	Power factor	Manufacturer	Electrical Manufacturer	Control System	
	Unit No.	Main Transformer			Grid Connection		
		Capacity (MVA)	Voltage (kV)	Type	Switchgear	Voltage (kV)	

Note:

PREPARATORY WORK FOR THE MASTER PLAN OF ELECTRICITY SECTOR
LIST OF GENERATION

Sheet No.

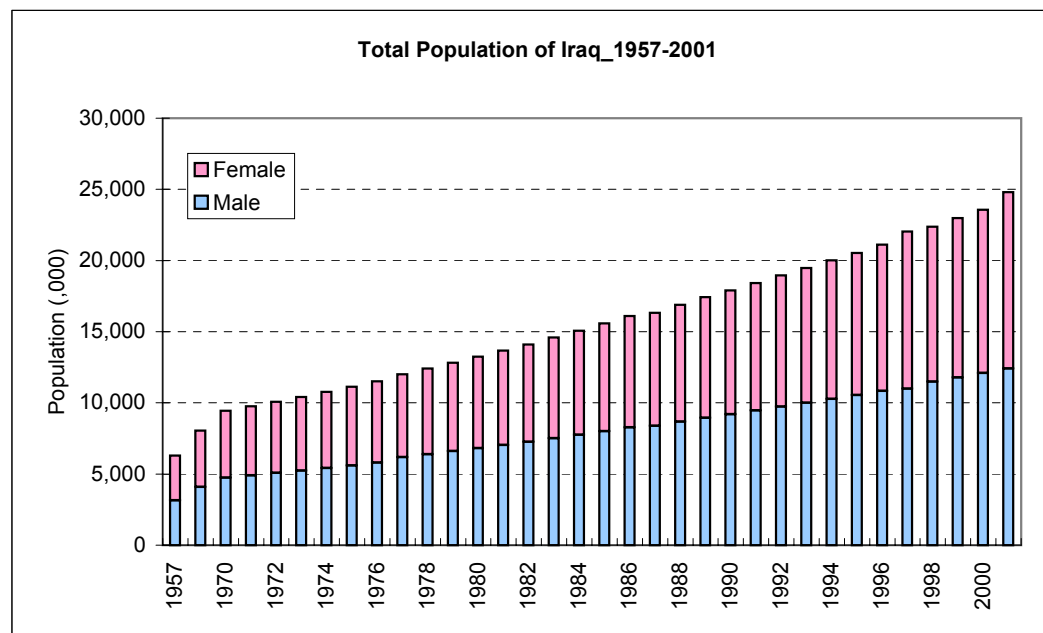
Main Problems, Action Plans for Restorations & Improvement						<ul style="list-style-type: none">• The units were scheduled for commissioning in May 2002 but have been delayed due to the non-availability of materials ordered under MoU.

Note:

付属資料 B : Demand Forecast

Appendix B.1 Total Population

Unit : ,000			
Year	Male	Female	Total
1957	3,155	3,144	6,299
1965	4,102	3,945	8,047
1970	4,754	4,686	9,440
1971	4,910	4,840	9,750
1972	5,074	5,000	10,074
1973	5,244	5,169	10,413
1974	5,422	5,343	10,765
1975	5,603	5,521	11,124
1976	5,795	5,710	11,505
1977	6,183	5,817	12,000
1978	6,389	6,016	12,405
1979	6,603	6,218	12,821
1980	6,815	6,423	13,238
1981	7,035	6,634	13,669
1982	7,260	6,850	14,110
1983	7,504	7,082	14,586
1984	7,756	7,321	15,077
1985	8,015	7,570	15,585
1986	8,283	7,827	16,110
1987	8,396	7,939	16,335
1988	8,675	8,207	16,882
1989	8,953	8,475	17,428
1990	9,190	8,700	17,890
1991	9,460	8,959	18,419
1992	9,731	9,218	18,949
1993	10,001	9,477	19,478
1994	10,271	9,736	20,007
1995	10,541	9,995	20,536
1996	10,843	10,281	21,124
1997	10,987	11,059	22,046
1998	11,484	10,895	22,379
1999	11,795	11,194	22,989
2000	12,096	11,481	23,577
2001	12,425	12,388	24,813



Source)
Iraq Population Census 1957, 1965, 1977, 1987, 1997

Appendix B.2 Regional Population

	Governorate & Region	Population				Annual Increase Ratio				
		1977	1987	1997	2002	2003	77-87	87-97	97-03	77-03
1	Baghdad Region	3,189,700	3,841,268	5,423,964	6,054,355	6,024,300	1.9%	3.5%	1.8%	2.5%
	<i>Middle Region</i>									
2	Diyala	587,754	961,073	1,135,223	1,195,530	1,224,357	5.0%	1.7%	1.3%	2.9%
3	Anbar	466,059	820,690	1,023,736	1,193,343	1,230,139	5.8%	2.2%	3.1%	3.8%
4	Najaf	389,680	590,078	775,042	898,733	929,995	4.2%	2.8%	3.1%	3.4%
5	Kerbela	269,822	469,282	594,235	700,063	723,840	5.7%	2.4%	3.3%	3.9%
6	Qadissiya	423,006	559,805	751,331	865,171	886,594	2.8%	3.0%	2.8%	2.9%
7	Wassit	415,140	564,670	783,614	883,839	913,386	3.1%	3.3%	2.6%	3.1%
8	Babylon	592,016	1,109,574	1,181,751	1,336,826	1,385,783	6.5%	0.6%	2.7%	3.3%
	Total Middle Region	3,143,477	5,075,172	6,244,932	7,073,503	7,294,094	4.9%	2.1%	2.6%	3.3%
	<i>North Region</i>									
9	Tameem	495,425	601,219	753,171	829,757	848,007	2.0%	2.3%	2.0%	2.1%
10	Salah al-Din	363,819	726,138	904,432	917,169	942,314	7.2%	2.2%	0.7%	3.7%
11	Ninewa	1,105,671	1,479,430	2,042,852	2,382,348	2,453,116	3.0%	3.3%	3.1%	3.1%
	Total North Region	1,964,915	2,806,787	3,700,455	4,129,274	4,243,437	3.6%	2.8%	2.3%	3.0%
	<i>South Region</i>									
12	Basrah	1,008,626	872,176	1,556,445	1,823,017	1,880,178	-1.4%	6.0%	3.2%	2.4%
13	Muthanna	215,637	315,816	436,825	521,472	537,658	3.9%	3.3%	3.5%	3.6%
14	Thi-Qar	622,979	921,066	1,184,796	1,435,866	1,472,097	4.0%	2.5%	3.7%	3.4%
15	Missan	372,575	487,448	637,126	783,288	803,225	2.7%	2.7%	3.9%	3.0%
	Total South Region	2,219,817	2,596,506	3,815,192	4,563,644	4,693,158	1.6%	3.9%	3.5%	2.9%
	Total the above 4 regions	10,517,909	14,319,733	19,184,543	21,820,776	22,254,989	3.1%	3.0%	2.5%	2.9%
	<i>3 Northern Governorates</i>									
16	Sulaymaniyah	690,557	951,723	1,362,739	1,548,064	1,546,652	3.3%	3.7%	2.1%	3.1%
17	Erbil	541,456	770,439	1,095,992	1,298,499	1,313,718	3.6%	3.6%	3.1%	3.5%
18	Dahuk	250,575	293,304	402,970	785,409	782,490	1.6%	3.2%	11.7%	4.5%
	Total 3 Northern Governorates	1,482,588	2,015,466	2,861,701	3,631,972	3,642,860	3.1%	3.6%	4.1%	3.5%
	Grand Total	12,000,497	16,335,199	22,046,244	25,452,749	25,897,849	3.1%	3.0%	2.7%	3.0%

Appendix B.3 Number of CoE Consumers in 2001

Category	Baghdad		Middle		North + Dahuk		South		Total	
	Nos.	%	Nos.	%	Nos.	%	Nos.	%	Nos.	%
Household	609,617	73.2	640,998	83.5	411,161	82.5	355,295	85.5	2,017,071	80.2
Commercial	211,687	25.4	86,265	11.2	62,606	12.6	45,917	11.1	406,475	16.2
Industrial	2,530	0.3	3,684	0.5	2,774	0.6	1,843	0.4	10,831	0.4
Governmental	7,356	0.9	10,074	1.3	10,335	2.1	5,508	1.3	33,273	1.3
Agricultural	1,776	0.2	26,963	3.5	11,687	2.3	6,844	1.6	47,270	1.9
Total	832,966	100.0	767,984	100.0	498,563	100.0	415,407	100.0	2,514,920	100.0
	33.1%		30.5%		19.8%		16.5%		100.0%	

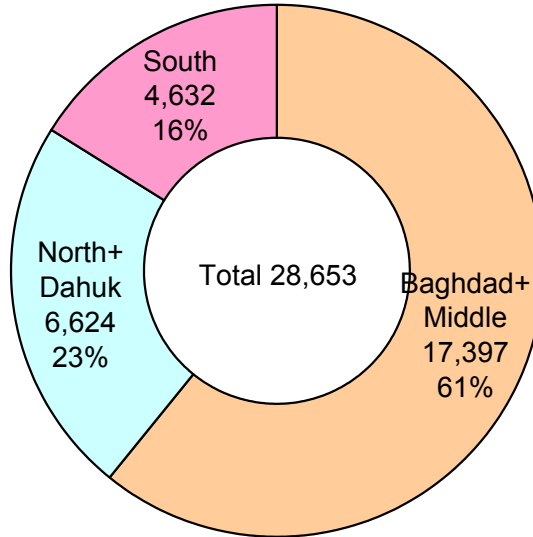
Appendix B.4 Regional Energy Consumption at Consumers' Ends in 1990

Unit : Gwh

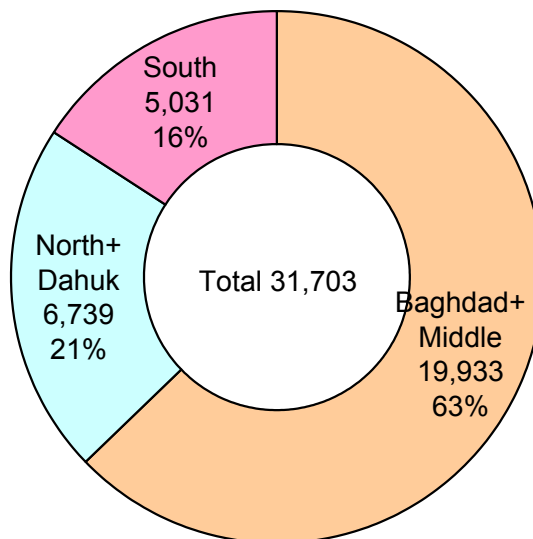
Governorate & Region	Resident	Shops	Gov. offices	Industry	Street lighting	Distributed free	Losses	Total	%
Baghdad Region	2,294	352	2,198	480	116	33	2,437	7,910	39%
<i>Middle Region</i>									
Diyala	378	19	142	74	18	4	168	803	4%
Anbar	386	24	238	85	11	58	136	938	5%
Najaf	278	17	27	212	30	8	115	687	3%
Kerbela	212	18	86	32	19	6	83	456	2%
Qadissiya	215	11	172	92	5	3	109	607	3%
Wassit	212	12	169	94	5	3	218	713	3%
Babylon	363	26	177	50	9	6	90	721	4%
Total Middle Region	2,044	127	1,011	639	97	88	919	4,925	24%
<i>North Region</i>									
Tameem	309	19	60	64	17	2	151	622	3%
Salah al-Din	302	12	103	203	1	0	250	871	4%
Ninewa	739	68	363	186	71	11	124	1,562	8%
Total North Region	1,350	99	526	453	89	13	525	3,055	15%
<i>South Region</i>									
Basrah	457	27	329	79	24	7	318	1,241	6%
Muthanna	122	6	58	36	22	3	29	276	1%
Thi-Qar	275	6	80	-28	7	2	263	605	3%
Missan	153	10	93	36	53	9	94	448	2%
Total South Region	1,007	49	560	123	106	21	704	2,570	13%
Total the above 4 regions	6,695	627	4,295	1,695	408	155	4,585	18,460	90%
<i>3 Northern Governorates</i>									
Sulaymaniyah	339	26	97	44	10	4	164	684	3%
Erbil	387	25	133	94	11	10	319	979	5%
Dahuk	116	8	74	30	13	4	76	321	2%
Total 3 Northern Governorates	842	59	304	168	34	18	559	1,984	10%
Grand Total	7,537	686	4,599	1,863	442	173	5,144	20,444	100%

Appendix B.5 Energy Consumption at MoE Network Ends in 2001 and 2002

2001	Baghdad+ Middle	North+ Dahuk	South	Total
Total	17,397	6,624	4,632	28,653
	61%	23%	16%	100%



2002	Baghdad+ Middle	North+ Dahuk	South	Total
Total	19,933	6,739	5,031	31,703
	63%	21%	16%	100%



Appendix B.6 Energy Consumption per Capita at Consumers' Ends in 1990

Governorate & Region	1990 Population (Estimate)	1990 Energy Consumption at Consumers' Ends (GWh)	1990 kWh/capita at Consumers' Ends (kWh/capita)
Baghdad Region	4,269,317	7,910	1,853
<i>Middle Region</i>			
Diyala	1,012,476	803	793
Anbar	878,846	938	1,067
Najaf	641,749	687	1,071
Kerbela	504,803	456	903
Qaddisiya	612,782	607	991
Wasit	624,336	713	1,142
Babylon	1,133,178	721	636
Total Middle Region	5,408,171	4,925	911
<i>North Region</i>			
Al-Tameem	644,647	622	965
Salah-Al-Din	777,244	871	1,121
Ninewa	1,633,309	1,562	956
Total North Region	3,055,200	3,055	1,000
<i>South Region</i>			
Basra	1,039,906	1,241	1,193
Muthanna	348,841	276	791
Thi Qar	995,469	605	608
Missan	529,357	448	846
Total South Region	2,913,573	2,570	882
Total the above regions	15,646,260	18,460	1,180
<i>3 Northern Governorates</i>			
Sulaimaniya	1,062,215	684	644
Erbil	858,203	979	1,141
Dohuk	323,322	321	993
Total 3 Northern Governorates	2,243,740	1,984	884
Grand Total	17,890,000	20,444	1,143

Appendix B.7 Energy Consumption per Capita at MoE Network Ends in 2001 and 2002¹

Regions	Population ² (x 1,000)		Energy Consumption at MoE Network Ends (GWh)		kWh/capita at MoE Network Ends (kWh/capita)	
	2001	2002	2001	2002	2001	2002
Baghdad + Middle	12,842	13,128	17,397	19,933	1,355	1,518
North + Dahuk	4,738	4,915	6,624	6,739	1,398	1,371
South	4,409	4,564	4,632	5,031	1,051	1,102
Total	21,989	22,606	28,653	31,703	1,303	1,402

¹ Sulaymaniyah and Erbil are not included in the data.

² The population in 2001 is estimated from the population by Governorate in 2002 and the annual increase ratio from 1997 to 2003 in Appendix C.2.

Appendix B.8 Energy Consumption per Categorized Consumer in 2001¹

Category	Baghdad kWh/Nos.	Middle kWh/Nos.	North kWh/Nos.	South kWh/Nos.	Total kWh/Nos.
Household	9,811	2,866	4,285	3,928	5,441
Commercial	4,743	1,215	1,725	2,254	3,248
Industrial	452,964	388,190	698,991	1,140,341	610,908
Governmental	192,224	49,003	66,086	61,873	88,103
Agricultural	73,198	15,666	22,589	16,280	19,628
Total	11,615	5,584	9,539	9,756	9,055

¹“North” includes Tameem, Salah al-Din, Ninewa and Dahuk. Sulaymaniyah and Erbil are not included in the data.

Appendix B.9 Regional Peak Demand for 2002 Estimated by UNDP

Governorate & Region	Summer	Winter
<i>Baghdad Region</i>		
Rasafa & Suburbs	1,150	1,055
Karkh & Suburbs	1,100	1,000
Total Baghdad Region	2,250	2,055
<i>Middle Region</i>		
Diyala	177	177
Anbar	317	317
Najaf	240	150
Kerbela	135	135
Qadissiya	147	145
Wassit	170	170
Babylon	188	188
Total Middle Region	1,374	1,282
<i>North Region</i>		
Tameem	160	180
Salah al-Din	320	350
Ninewa	600	600
Total North Region	1,080	1,130
<i>South Region</i>		
Basrah	580	550
Muthanna	109	109
Thi-Qar	165	165
Missan	125	125
Total South Region	979	949
Total the above 4 regions	5,683	5,416
<i>3 Northern Governorates</i>		
Sulaymaniyah	150	148
Erbil	230	287
Dahuk	290	335
Total 3 Northern Governorates	670	770
Grand Total	6,353	6,186

Appendix B.10 Annual Load Factors for Peak Demand Estimated by UNDP

UNDP (ObR) data

Governorate & Region	2002 Population	July 2002 Peak Demand in Summer at Distribution facilities (MW)	1990 kWh/capita at Consumers' Ends (kWh/capita)	2002 Energy Demand at Consumers' Ends (GWh)	2002 Energy Demand at T/L Network Ends (GWh)	2002 L.F.
Baghdad Region	6,054,355	2,250	1,853	11,217	13,777	70%
<i>Middle Region</i>						
Diyala	1,195,530	177	793	948	1,165	75%
Anbar	1,193,343	317	1,067	1,274	1,564	56%
Najaf	898,733	240	1,071	962	1,182	56%
Kerbela	700,063	135	903	632	777	66%
Qaddisiya	865,171	147	991	857	1,053	82%
Wasit	883,839	170	1,142	1,009	1,240	83%
Babylon	1,336,826	188	636	851	1,045	64%
Total Middle Region	7,073,503	1,374	911	6,533	8,024	67%
<i>North Region</i>						
Al-Tameem	829,757	160	965	801	983	70%
Salah-Al-Din	917,169	320	1,121	1,028	1,262	45%
Ninewa	2,382,348	600	956	2,278	2,798	53%
Total North Region	4,129,274	1,080	1,000	4,107	5,044	53%
<i>South Region</i>						
Basra	1,823,017	580	1,193	2,176	2,672	53%
Muthanna	521,472	109	791	413	507	53%
Thi Qar	1,435,866	165	608	873	1,072	74%
Missan	783,288	125	846	663	814	74%
Total South Region	4,563,644	979	882	4,124	5,065	59%
Total the above regions	21,820,776	5,683	1,180	25,981	31,910	64%
<i>3 Northern Governorates</i>						
Sulaimaniya	1,548,064	150	644	997	1,224	93%
Erbil	1,298,499	230	1,141	1,481	1,819	90%
Dohuk	785,409	290	993	780	958	38%
Total 3 Northern Governorates	3,631,972	670	884	3,258	4,001	68%
Grand Total	25,452,749	6,353	1,143	29,239	35,911	65%

Appendix B.11 Actual and Demand Peak Load for 15 May 2004

CPA Reporting Peak for 15 MAY 2004 / Report Date - 16 MAY 2004

Power transferred from North to Middle 750 MW.

Power transferred from South to Middle 100 MW.

Governorate	Peak Load MW	MWH	Average Load MW	Demand Load MW
Baghdad	1,553	30,108	1,255	1,537
Duhok	80	1,910	80	114
Naynawa	355	8,280	345	494
Tamim	139	3,107	129	182
Salah Aldeen	210	4,712	196	248
Anbar	212	4,613	192	236
Dyala	91	2,249	94	140
Babil	95	2,249	94	137
Karbala	80	1,775	74	107
Najaf	95	2,116	88	125
Kadsya	58	1,303	54	85
Wasit	89	229	85	119
Muthana	65	1,253	52	74
Nasirya	135	2,605	109	124
Misan	69	1,463	61	78
Basra	320	6,913	288	342
	3,646	74,885		4,142

Appendix B.12 Result of Demand Forecast

Governorate & Region	2004 Population	2004 Energy Demand at Consumers' Ends (GWh)	2004 Peak Demand at Consumers' Ends (MW)	2004 Energy Demand at 132kV S/S Ends (GWh)	2004 Peak Demand at 132kV S/S Ends (MW)	2004 Energy Demand at P/S Sent-out Points (GWh)	2004 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>			L.F.=81.3%	LV Nw Loss=18.2%	L.F.=81%	HV+LV Nw Loss=33.1%	L.F.=81%
Baghdad Region	6,168,782	11,429	1,605	14,539	2,041	17,084	2,399
<i>Middle Region</i>			L.F.=78%	LV Nw Loss=18%	L.F.=78%	HV+LV Nw Loss=33%	L.F.=78%
Diyala	1,258,455	998	147	1,270	187	1,492	220
Anbar	1,275,962	1,362	200	1,732	255	2,036	300
Najaf	960,908	1,029	151	1,309	193	1,538	226
Kerbela	751,272	679	100	863	127	1,014	149
Qaddisiya	911,500	903	133	1,149	169	1,350	199
Wasit	940,800	1,074	158	1,367	201	1,606	236
Babylon	1,430,780	910	134	1,158	170	1,361	200
Total Middle Region	7,529,677	6,955	1,024	8,847	1,302	10,396	1,530
<i>North Region</i>			L.F.=62%	LV Nw Loss=28%	L.F.=62%	HV+LV Nw Loss=37%	L.F.=62%
Al-Tameem	865,065	835	154	1,203	221	1,327	244
Salah-Al-Din	976,705	1,095	201	1,577	290	1,740	320
Ninewa	2,527,556	2,417	445	3,484	641	3,842	707
Total North Region	4,369,326	4,346	800	6,264	1,153	6,908	1,272
<i>South Region</i>			L.F.=69%	LV Nw Loss=12%	L.F.=69%	HV+LV Nw Loss=23%	L.F.=69%
Basra	1,924,301	2,296	382	2,648	440	2,997	498
Muthanna	556,466	440	73	508	84	575	95
Thi Qar	1,520,449	924	154	1,066	177	1,206	200
Missan	826,685	700	116	807	134	913	152
Total South Region	4,827,901	4,360	725	5,028	836	5,690	946
Total the above regions	22,895,685	27,091	4,153	34,677	5,332	40,078	6,146
<i>3 Northern Governorates</i>			L.F.=79%	LV Nw Loss=28%	L.F.=79%	HV+LV Nw Loss=37%	L.F.=79%
Sulaymaniyah	1,594,164	1,027	148	1,479	213	1,632	235
Erbil	1,358,247	1,549	223	2,233	321	2,463	355
Dohuk	816,904	811	117	1,169	168	1,289	186
Total 3 Northern Governorates	3,769,315	3,387	488	4,881	703	5,383	775
Grand Total	26,665,000	30,478	4,641	39,559	6,035	45,461	6,921

Target (Nation wide data)→

Difference→

75%

0.0%

20%

0.0%

33%

0.0%

adjusting data for calibration
calculated data from coefficient
calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2005 Energy Demand at Consumers' Ends (GWh)	2005 Peak Demand at Consumers' Ends (MW)	2005 Energy Demand at 132kV S/S Ends (GWh)	2005 Peak Demand at 132kV S/S Ends (MW)	2005 Energy Demand at P/S Sent-out Points (GWh)	2005 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=81.3%	LV Nw Loss=18.2%	L.F.=81%	HV+LV Nw Loss=32.1%	L.F.=81%
Baghdad Region	11,772	1,653	14,928	2,096	17,337	2,434
<i>Middle Region</i>		L.F.=78%	LV Nw Loss=18%	L.F.=78%	HV+LV Nw Loss=32%	L.F.=78%
Diyala	1,028	151	1,304	192	1,514	223
Anbar	1,403	206	1,779	262	2,066	304
Najaf	1,060	156	1,344	198	1,560	230
Kerbela	699	103	886	130	1,029	152
Qaddisiya	930	137	1,179	174	1,370	202
Wasit	1,107	163	1,403	207	1,630	240
Babylon	938	138	1,189	175	1,381	203
Total Middle Region	7,164	1,054	9,084	1,337	10,550	1,553
<i>North Region</i>		L.F.=62%	LV Nw Loss=28%	L.F.=62%	HV+LV Nw Loss=36%	L.F.=62%
Al-Tameem	860	158	1,232	227	1,343	247
Salah-Al-Din	1,127	208	1,616	297	1,760	324
Ninewa	2,490	458	3,569	657	3,888	716
Total North Region	4,477	824	6,417	1,181	6,991	1,287
<i>South Region</i>		L.F.=69%	LV Nw Loss=12%	L.F.=69%	HV+LV Nw Loss=23%	L.F.=69%
Basra	2,365	393	2,724	453	3,058	508
Muthanna	453	75	522	87	586	97
Thi Qar	952	158	1,096	182	1,231	205
Missan	721	120	830	138	932	155
Total South Region	4,491	746	5,173	860	5,807	965
Total the above regions	27,904	4,278	35,601	5,474	40,686	6,239
<i>3 Northern Governorates</i>		L.F.=79%	LV Nw Loss=28%	L.F.=79%	HV+LV Nw Loss=36%	L.F.=79%
Sulaymaniyah	1,057	152	1,516	218	1,651	238
Erbil	1,596	230	2,288	329	2,492	359
Dohuk	835	120	1,197	172	1,304	188
Total 3 Northern Governorates	3,489	502	5,001	720	5,448	784
Grand Total	31,392	4,780	40,602	6,194	46,133	7,023

Target (Nation wide data)→

Difference→

75%

20%

0.0%

0.0%

0.0%

32%

0.0%

0.0%

Annual Increase Ratios :

2004 to 2005 3%

2005 to 2007 6%

2007 to 2010 8%

2010 to 2015 7%

2015 to 2020 6%

adjusting data for calibration

calculated data from coefficient

calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2006 Energy Demand at Consumers' Ends (GWh)	2006 Peak Demand at Consumers' Ends (MW)	2006 Energy Demand at 132kV S/S Ends (GWh)	2006 Peak Demand at 132kV S/S Ends (MW)	2006 Energy Demand at P/S Sent-out Points (GWh)	2006 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=78.1%	LV Nw Loss=17.3%	L.F.=78%	HV+LV Nw Loss=30.2%	L.F.=78%
Baghdad Region	12,478	1,824	15,571	2,276	17,877	2,613
<i>Middle Region</i>		L.F.=75%	LV Nw Loss=17%	L.F.=75%	HV+LV Nw Loss=30%	L.F.=75%
Diyala	1,090	167	1,360	208	1,561	239
Anbar	1,487	228	1,855	284	2,130	326
Najaf	1,123	172	1,401	215	1,609	246
Karbela	741	114	925	142	1,062	163
Qaddisiya	986	151	1,230	188	1,412	216
Wasit	1,173	180	1,464	224	1,681	257
Babylon	994	152	1,240	190	1,424	218
Total Middle Region	7,593	1,163	9,475	1,452	10,879	1,667
<i>North Region</i>		L.F.=60%	LV Nw Loss=26%	L.F.=60%	HV+LV Nw Loss=34%	L.F.=60%
Al-Tameem	911	175	1,275	244	1,377	264
Salah-Al-Din	1,195	229	1,672	320	1,806	346
Ninewa	2,639	506	3,691	707	3,989	764
Total North Region	4,745	909	6,638	1,272	7,172	1,374
<i>South Region</i>		L.F.=66%	LV Nw Loss=11%	L.F.=66%	HV+LV Nw Loss=21%	L.F.=66%
Basra	2,507	434	2,863	495	3,187	551
Muthanna	481	83	549	95	611	106
Thi Qar	1,009	175	1,152	199	1,282	222
Missan	764	132	872	151	971	168
Total South Region	4,761	824	5,436	940	6,051	1,047
Total the above regions	29,578	4,720	37,120	5,940	41,979	6,701
<i>3 Northern Governorates</i>		L.F.=76%	LV Nw Loss=26%	L.F.=76%	HV+LV Nw Loss=34%	L.F.=76%
Sulaymaniyah	1,121	168	1,568	235	1,694	254
Erbil	1,692	254	2,366	355	2,557	383
Dohuk	885	133	1,239	186	1,338	201
Total 3 Northern Governorates	3,698	554	5,173	775	5,589	838
Grand Total	33,276	5,274	42,292	6,715	47,568	7,538
		L.F.=72.0%	LV Nw Loss=19%	L.F.=72%	HV+LV Nw Loss=30.0%	L.F.=72%

Target (Nation wide data)→

Difference→

72%

0.0%

0.0%

30%

0.0%

Annual Increase Ratios :

2004 to 2005 3%

2005 to 2007 6%

2007 to 2010 8%

2010 to 2015 7%

2015 to 2020 6%

adjusting data for calibration

calculated data from coefficient

calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2007 Energy Demand at Consumers' Ends (GWh)	2007 Peak Demand at Consumers' Ends (MW)	2007 Energy Demand at 132kV S/S Ends (GWh)	2007 Peak Demand at 132kV S/S Ends (MW)	2007 Energy Demand at P/S Sent-out Points (GWh)	2007 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=78.1%	LV Nw Loss=16.4%	L.F.=78%	HV+LV Nw Loss=28.2%	L.F.=78%
Baghdad Region	13,227	1,933	16,248	2,375	18,422	2,693
<i>Middle Region</i>		L.F.=75%	LV Nw Loss=16%	L.F.=75%	HV+LV Nw Loss=28%	L.F.=75%
Diyala	1,155	177	1,419	217	1,609	246
Anbar	1,576	241	1,936	297	2,195	336
Najaf	1,190	182	1,462	224	1,658	254
Karbela	785	120	965	148	1,094	168
Qaddisiya	1,045	160	1,284	197	1,455	223
Wasit	1,243	190	1,527	234	1,732	265
Babylon	1,054	161	1,294	198	1,467	225
Total Middle Region	8,049	1,233	9,887	1,515	11,210	1,717
<i>North Region</i>		L.F.=60%	LV Nw Loss=25%	L.F.=60%	HV+LV Nw Loss=32%	L.F.=60%
Al-Tameem	966	185	1,319	253	1,412	271
Salah-Al-Din	1,267	243	1,730	331	1,852	355
Ninewa	2,797	536	3,820	732	4,089	784
Total North Region	5,030	964	6,869	1,316	7,353	1,409
<i>South Region</i>		L.F.=66%	LV Nw Loss=11%	L.F.=66%	HV+LV Nw Loss=20%	L.F.=66%
Basra	2,658	460	3,008	520	3,318	574
Muthanna	510	88	577	100	636	110
Thi Qar	1,069	185	1,211	209	1,335	231
Missan	810	140	917	159	1,011	175
Total South Region	5,046	873	5,712	988	6,301	1,090
Total the above regions	31,353	5,003	38,718	6,194	43,286	6,909
<i>3 Northern Governorates</i>		L.F.=76%	LV Nw Loss=25%	L.F.=76%	HV+LV Nw Loss=32%	L.F.=76%
Sulaymaniyah	1,188	178	1,622	243	1,737	260
Erbil	1,793	269	2,449	367	2,621	393
Dohuk	939	141	1,282	192	1,372	206
Total 3 Northern Governorates	3,920	587	5,353	802	5,730	859
Grand Total	35,272	5,591	44,071	6,997	49,016	7,768
		L.F.=72%	LV Nw Loss=18%	L.F.=72%	HV+LV Nw Loss=28%	L.F.=72%

Target (Nation wide data)→

Difference→

72%

18%

28%

0.0%

-0.1%

0.0%

Annual Increase Ratios :

2004 to 2005 3%

2005 to 2007 6%

2007 to 2010 8%

2010 to 2015 7%

2015 to 2020 6%

adjusting data for calibration

calculated data from coefficient

calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2008 Energy Demand at Consumers' Ends (GWh)	2008 Peak Demand at Consumers' Ends (MW)	2008 Energy Demand at 132kV S/S Ends (GWh)	2008 Peak Demand at 132kV S/S Ends (MW)	2008 Energy Demand at P/S Sent-out Points (GWh)	2008 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=75.9%	LV Nw Loss=16.0%	L.F.=76%	HV+LV Nw Loss=27.2%	L.F.=76%
Baghdad Region	14,285	2,149	17,425	2,621	19,623	2,951
<i>Middle Region</i>		L.F.=72%	LV Nw Loss=16%	L.F.=72%	HV+LV Nw Loss=27%	L.F.=72%
Diyala	1,248	197	1,522	240	1,714	270
Anbar	1,702	268	2,076	327	2,338	369
Najaf	1,286	203	1,568	247	1,766	278
Karbela	848	134	1,035	163	1,165	184
Qaddisiya	1,129	178	1,377	217	1,550	244
Wasit	1,343	212	1,638	258	1,845	291
Babylon	1,138	179	1,388	219	1,563	246
Total Middle Region	8,693	1,370	10,603	1,671	11,941	1,882
<i>North Region</i>		L.F.=58%	LV Nw Loss=24%	L.F.=58%	HV+LV Nw Loss=30%	L.F.=58%
Al-Tameem	1,043	206	1,409	278	1,500	296
Salah-Al-Din	1,368	270	1,848	364	1,968	388
Ninewa	3,021	596	4,082	805	4,345	857
Total North Region	5,433	1,071	7,339	1,447	7,814	1,541
<i>South Region</i>		L.F.=64%	LV Nw Loss=10%	L.F.=64%	HV+LV Nw Loss=19%	L.F.=64%
Basra	2,870	511	3,237	576	3,552	632
Muthanna	550	98	621	110	681	121
Thi Qar	1,155	206	1,302	232	1,429	254
Missan	874	156	986	176	1,082	193
Total South Region	5,450	970	6,146	1,094	6,745	1,201
Total the above regions	33,861	5,560	41,513	6,833	46,122	7,575
<i>3 Northern Governorates</i>		L.F.=74%	LV Nw Loss=24%	L.F.=74%	HV+LV Nw Loss=30%	L.F.=74%
Sulaymaniyah	1,283	198	1,733	267	1,845	285
Erbil	1,937	299	2,616	403	2,785	430
Dohuk	1,014	156	1,369	211	1,458	225
Total 3 Northern Governorates	4,233	653	5,719	882	6,089	939
Grand Total	38,094	6,213	47,232	7,715	52,211	8,514
		L.F.=70%	LV Nw Loss=17.5%	L.F.=70%	HV+LV Nw Loss=27%	L.F.=70%

Target (Nation wide data)→

70%

17.5%

27%

Difference→

0.0%

0.0%

0.0%

Annual Increase Ratios :

2004 to 2005 3%

2005 to 2007 6%

2007 to 2010 8%

2010 to 2015 7%

2015 to 2020 6%

adjusting data for calibration
calculated data from coefficient
calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2009 Energy Demand at Consumers' Ends (GWh)	2009 Peak Demand at Consumers' Ends (MW)	2009 Energy Demand at 132kV S/S Ends (GWh)	2009 Peak Demand at 132kV S/S Ends (MW)	2009 Energy Demand at P/S Sent-out Points (GWh)	2009 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=75.9%	LV Nw Loss=16.0%	L.F.=76%	HV+LV Nw Loss=27.2%	L.F.=76%
Baghdad Region	15,428	2,320	18,819	2,830	21,193	3,187
<i>Middle Region</i>		L.F.=72%	LV Nw Loss=16%	L.F.=72%	HV+LV Nw Loss=27%	L.F.=72%
Diyala	1,347	212	1,643	259	1,851	292
Anbar	1,838	290	2,242	353	2,525	398
Najaf	1,389	219	1,694	267	1,907	301
Karbela	916	144	1,117	176	1,258	198
Qaddisiya	1,219	192	1,487	234	1,674	264
Wasit	1,450	229	1,769	279	1,992	314
Babylon	1,229	194	1,499	236	1,688	266
Total Middle Region	9,388	1,480	11,452	1,805	12,896	2,033
<i>North Region</i>		L.F.=58%	LV Nw Loss=24%	L.F.=58%	HV+LV Nw Loss=30%	L.F.=58%
Al-Tameem	1,127	222	1,522	300	1,621	320
Salah-Al-Din	1,477	291	1,996	394	2,125	419
Ninewa	3,263	643	4,408	869	4,693	925
Total North Region	5,867	1,157	7,926	1,563	8,439	1,664
<i>South Region</i>		L.F.=64%	LV Nw Loss=10%	L.F.=64%	HV+LV Nw Loss=19%	L.F.=64%
Basra	3,100	552	3,496	622	3,837	683
Muthanna	594	106	670	119	736	131
Thi Qar	1,247	222	1,407	250	1,544	275
Missan	944	168	1,065	190	1,169	208
Total South Region	5,886	1,048	6,637	1,182	7,285	1,297
Total the above regions	36,570	6,005	44,834	7,380	49,812	8,181
<i>3 Northern Governorates</i>		L.F.=74%	LV Nw Loss=24%	L.F.=74%	HV+LV Nw Loss=30%	L.F.=74%
Sulaymaniyah	1,386	214	1,872	289	1,993	307
Erbil	2,092	323	2,826	436	3,008	464
Dohuk	1,095	169	1,479	228	1,575	243
Total 3 Northern Governorates	4,572	705	6,177	952	6,576	1,014
Grand Total	41,142	6,710	51,011	8,333	56,388	9,195
		L.F.=70%	LV Nw Loss=17.5%	L.F.=70%	HV+LV Nw Loss=27%	L.F.=70%

Target (Nation wide data)→

70%

17.5%

27%

Difference→

0.0%

0.0%

0.0%

Annual Increase Ratios :

2004 to 2005 3%

2005 to 2007 6%

2007 to 2010 8%

2010 to 2015 7%

2015 to 2020 6%

adjusting data for calibration
calculated data from coefficient
calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2010 Energy Demand at Consumers' Ends (GWh)	2010 Peak Demand at Consumers' Ends (MW)	2010 Energy Demand at 132kV S/S Ends (GWh)	2010 Peak Demand at 132kV S/S Ends (MW)	2010 Energy Demand at P/S Sent-out Points (GWh)	2010 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=75.9%	LV Nw Loss=15.5%	L.F.=76%	HV+LV Nw Loss=26.2%	L.F.=76%
Baghdad Region	16,662	2,506	20,162	3,032	22,578	3,396
<i>Middle Region</i>		L.F.=72%	LV Nw Loss=16%	L.F.=72%	HV+LV Nw Loss=26%	L.F.=72%
Diyala	1,455	229	1,761	278	1,972	311
Anbar	1,985	313	2,402	379	2,690	424
Najaf	1,500	236	1,815	286	2,032	320
Kerbela	989	156	1,197	189	1,341	211
Qaddisiya	1,316	207	1,593	251	1,784	281
Wasit	1,566	247	1,895	299	2,122	335
Babylon	1,327	209	1,606	253	1,798	283
Total Middle Region	10,139	1,598	12,269	1,934	13,739	2,166
<i>North Region</i>		L.F.=58%	LV Nw Loss=24%	L.F.=58%	HV+LV Nw Loss=29%	L.F.=58%
Al-Tameem	1,217	240	1,624	320	1,722	340
Salah-Al-Din	1,596	315	2,130	420	2,259	445
Ninewa	3,524	695	4,703	927	4,988	984
Total North Region	6,337	1,249	8,457	1,668	8,969	1,769
<i>South Region</i>		L.F.=64%	LV Nw Loss=10%	L.F.=64%	HV+LV Nw Loss=18%	L.F.=64%
Basra	3,348	596	3,758	669	4,108	731
Muthanna	642	114	721	128	788	140
Thi Qar	1,347	240	1,512	269	1,653	294
Missan	1,020	182	1,145	204	1,251	223
Total South Region	6,357	1,132	7,136	1,270	7,799	1,388
Total the above regions	39,495	6,485	48,024	7,904	53,085	8,719
<i>3 Northern Governorates</i>		L.F.=74%	LV Nw Loss=24%	L.F.=74%	HV+LV Nw Loss=29%	L.F.=74%
Sulaymaniyah	1,497	231	1,997	308	2,118	327
Erbil	2,259	348	3,015	465	3,197	493
Dohuk	1,182	182	1,578	243	1,674	258
Total 3 Northern Governorates	4,938	761	6,590	1,016	6,989	1,078
Grand Total	44,433	7,247	54,614	8,921	60,075	9,796

Target (Nation wide data)→

70%

17%

26%

0.0%

Difference→

0.0%

-0.1%

0.0%

Annual Increase Ratios :

2004 to 2005 3%

2005 to 2007 6%

2007 to 2010 8%

2010 to 2015 7%

2015 to 2020 6%

adjusting data for calibration

calculated data from coefficient

calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2011 Energy Demand at Consumers' Ends (GWh)	2011 Peak Demand at Consumers' Ends (MW)	2011 Energy Demand at 132kV S/S Ends (GWh)	2011 Peak Demand at 132kV S/S Ends (MW)	2011 Energy Demand at P/S Sent-out Points (GWh)	2011 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=74.8%	LV Nw Loss=15.1%	L.F.=75%	HV+LV Nw Loss=25.2%	L.F.=75%
Baghdad Region	17,829	2,721	21,428	3,270	23,835	3,638
<i>Middle Region</i>		L.F.=71%	LV Nw Loss=15%	L.F.=71%	HV+LV Nw Loss=25%	L.F.=71%
Diyala	1,557	249	1,871	299	2,081	333
Anbar	2,124	340	2,553	408	2,840	454
Najaf	1,605	257	1,929	308	2,145	343
Kerbela	1,059	169	1,272	204	1,415	226
Qaddisiya	1,408	225	1,693	271	1,883	301
Wasit	1,676	268	2,014	322	2,241	358
Babylon	1,420	227	1,707	273	1,899	304
Total Middle Region	10,849	1,735	13,039	2,086	14,504	2,320
<i>North Region</i>		L.F.=57%	LV Nw Loss=23%	L.F.=57%	HV+LV Nw Loss=28%	L.F.=57%
Al-Tameem	1,302	261	1,720	344	1,814	363
Salah-Al-Din	1,707	342	2,255	451	2,379	476
Ninewa	3,771	754	4,981	997	5,254	1,051
Total North Region	6,780	1,357	8,956	1,792	9,447	1,890
<i>South Region</i>		L.F.=63%	LV Nw Loss=10%	L.F.=63%	HV+LV Nw Loss=18%	L.F.=63%
Basra	3,582	647	4,006	724	4,357	787
Muthanna	687	124	768	139	835	151
Thi Qar	1,441	260	1,612	291	1,753	317
Missan	1,091	197	1,221	220	1,328	240
Total South Region	6,802	1,229	7,607	1,374	8,274	1,494
Total the above regions	42,260	7,042	51,030	8,522	56,060	9,342
<i>3 Northern Governorates</i>		L.F.=73%	LV Nw Loss=23%	L.F.=73%	HV+LV Nw Loss=28%	L.F.=73%
Sulaymaniyah	1,601	251	2,115	331	2,231	349
Erbil	2,417	378	3,193	500	3,368	527
Dohuk	1,265	198	1,671	261	1,763	276
Total 3 Northern Governorates	5,283	827	6,979	1,092	7,362	1,152
Grand Total	47,543	7,868	58,009	9,614	63,422	10,494

Target (Nation wide data)→ 69% 16.5% 25%
Difference→ 0.0% 0.0% 0.0%

Annual Increase Ratios :

- 2004 to 2005 3%
- 2005 to 2007 6%
- 2007 to 2010 8%
- 2010 to 2015 7%
- 2015 to 2020 6%

adjusting data for calibration
calculated data from coefficient
calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2012 Energy Demand at Consumers' Ends (GWh)	2012 Peak Demand at Consumers' Ends (MW)	2012 Energy Demand at 132kV S/S Ends (GWh)	2012 Peak Demand at 132kV S/S Ends (MW)	2012 Energy Demand at P/S Sent-out Points (GWh)	2012 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=73.7%	LV Nw Loss=15.1%	L.F.=74%	HV+LV Nw Loss=25.2%	L.F.=74%
Baghdad Region	19,077	2,955	22,928	3,551	25,504	3,950
<i>Middle Region</i>		L.F.=70%	LV Nw Loss=15%	L.F.=70%	HV+LV Nw Loss=25%	L.F.=70%
Diyala	1,666	270	2,002	325	2,227	362
Anbar	2,273	369	2,732	444	3,039	493
Najaf	1,717	279	2,064	335	2,295	373
Kerbela	1,133	184	1,361	221	1,514	246
Qaddisiya	1,507	245	1,811	294	2,015	327
Wasit	1,793	291	2,155	350	2,397	389
Babylon	1,519	247	1,826	296	2,031	330
Total Middle Region	11,609	1,885	13,952	2,265	15,519	2,519
<i>North Region</i>		L.F.=56%	LV Nw Loss=23%	L.F.=56%	HV+LV Nw Loss=28%	L.F.=56%
Al-Tameem	1,393	283	1,840	374	1,941	394
Salah-Al-Din	1,827	371	2,413	490	2,546	517
Ninewa	4,035	819	5,329	1,082	5,622	1,142
Total North Region	7,255	1,473	9,583	1,946	10,109	2,053
<i>South Region</i>		L.F.=62%	LV Nw Loss=10%	L.F.=62%	HV+LV Nw Loss=18%	L.F.=62%
Basra	3,833	703	4,287	786	4,662	855
Muthanna	735	135	822	151	894	164
Thi Qar	1,542	283	1,725	316	1,876	344
Missan	1,168	214	1,306	239	1,420	260
Total South Region	7,278	1,334	8,140	1,492	8,853	1,623
Total the above regions	45,218	7,647	54,602	9,255	59,985	10,146
<i>3 Northern Governorates</i>		L.F.=72%	LV Nw Loss=23%	L.F.=72%	HV+LV Nw Loss=28%	L.F.=72%
Sulaymaniyah	1,713	272	2,263	359	2,387	379
Erbil	2,586	411	3,416	542	3,604	572
Dohuk	1,354	215	1,788	284	1,886	300
Total 3 Northern Governorates	5,653	898	7,467	1,186	7,877	1,251
Grand Total	50,871	8,545	62,070	10,440	67,862	11,397
		L.F.=68%	LV Nw Loss=16.5%	L.F.=68%	HV+LV Nw Loss=25%	L.F.=68%

Target (Nation wide data)→

Difference→

68%

0.0%

0.0%

25%

0.0%

Annual Increase Ratios :

2004 to 2005 3%

2005 to 2007 6%

2007 to 2010 8%

2010 to 2015 7%

2015 to 2020 6%

adjusting data for calibration

calculated data from coefficient

calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2013 Energy Demand at Consumers' Ends (GWh)	2013 Peak Demand at Consumers' Ends (MW)	2013 Energy Demand at 132kV S/S Ends (GWh)	2013 Peak Demand at 132kV S/S Ends (MW)	2013 Energy Demand at P/S Sent-out Points (GWh)	2013 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=72.7%	LV Nw Loss=14.6%	L.F.=73%	HV+LV Nw Loss=24.2%	L.F.=73%
Baghdad Region	20,412	3,205	24,344	3,823	26,929	4,228
<i>Middle Region</i>		L.F.=69%	LV Nw Loss=15%	L.F.=69%	HV+LV Nw Loss=24%	L.F.=69%
Diyala	1,783	293	2,126	350	2,352	387
Anbar	2,432	400	2,901	477	3,209	528
Najaf	1,837	302	2,191	361	2,424	399
Kerbela	1,212	199	1,445	238	1,599	263
Qaddisiya	1,613	265	1,923	316	2,127	350
Wasit	1,919	316	2,288	377	2,531	417
Babylon	1,626	268	1,939	319	2,145	353
Total Middle Region	12,421	2,044	14,814	2,438	16,387	2,697
<i>North Region</i>		L.F.=55%	LV Nw Loss=22%	L.F.=55%	HV+LV Nw Loss=27%	L.F.=55%
Al-Tameem	1,491	307	1,946	401	2,045	421
Salah-Al-Din	1,955	402	2,552	525	2,682	552
Ninewa	4,317	889	5,636	1,160	5,923	1,219
Total North Region	7,762	1,598	10,134	2,086	10,650	2,192
<i>South Region</i>		L.F.=61%	LV Nw Loss=9%	L.F.=61%	HV+LV Nw Loss=17%	L.F.=61%
Basra	4,101	762	4,567	849	4,946	919
Muthanna	786	146	876	163	948	176
Thi Qar	1,650	307	1,838	342	1,990	370
Missan	1,250	232	1,391	259	1,507	280
Total South Region	7,787	1,447	8,671	1,612	9,392	1,745
Total the above regions	48,383	8,295	57,963	9,958	63,357	10,863
<i>3 Northern Governorates</i>		L.F.=71%	LV Nw Loss=22%	L.F.=71%	HV+LV Nw Loss=27%	L.F.=71%
Sulaymaniyah	1,833	295	2,393	385	2,515	405
Erbil	2,767	445	3,613	582	3,797	611
Dohuk	1,448	233	1,891	304	1,987	320
Total 3 Northern Governorates	6,049	974	7,897	1,271	8,299	1,336
Grand Total	54,432	9,269	65,860	11,230	71,657	12,199

Target (Nation wide data)→

Difference→

67%

0.0%

-0.1%

24%

0.0%

Annual Increase Ratios :

2004 to 2005 3%

2005 to 2007 6%

2007 to 2010 8%

2010 to 2015 7%

2015 to 2020 6%

adjusting data for calibration

calculated data from coefficient

calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2014 Energy Demand at Consumers' Ends (GWh)	2014 Peak Demand at Consumers' Ends (MW)	2014 Energy Demand at 132kV S/S Ends (GWh)	2014 Peak Demand at 132kV S/S Ends (MW)	2014 Energy Demand at P/S Sent-out Points (GWh)	2014 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=71.6%	LV Nw Loss=14.6%	L.F.=72%	HV+LV Nw Loss=24.2%	L.F.=72%
Baghdad Region	21,841	3,482	26,048	4,153	28,814	4,594
<i>Middle Region</i>		L.F.=68%	LV Nw Loss=15%	L.F.=68%	HV+LV Nw Loss=24%	L.F.=68%
Diyala	1,907	319	2,275	380	2,516	420
Anbar	2,602	435	3,104	519	3,433	574
Najaf	1,966	328	2,344	392	2,593	433
Kerbela	1,297	217	1,547	258	1,711	286
Qaddisiya	1,725	288	2,058	344	2,276	380
Wasit	2,053	343	2,449	409	2,709	453
Babylon	1,740	291	2,075	347	2,295	384
Total Middle Region	13,291	2,221	15,851	2,649	17,534	2,930
<i>North Region</i>		L.F.=55%	LV Nw Loss=22%	L.F.=55%	HV+LV Nw Loss=27%	L.F.=55%
Al-Tameem	1,595	333	2,082	435	2,188	457
Salah-Al-Din	2,092	437	2,731	571	2,870	600
Ninewa	4,619	966	6,030	1,261	6,337	1,325
Total North Region	8,306	1,736	10,843	2,267	11,395	2,382
<i>South Region</i>		L.F.=60%	LV Nw Loss=9%	L.F.=60%	HV+LV Nw Loss=17%	L.F.=60%
Basra	4,388	828	4,887	922	5,293	999
Muthanna	841	159	937	177	1,015	191
Thi Qar	1,766	333	1,966	371	2,130	402
Missan	1,337	252	1,489	281	1,612	304
Total South Region	8,333	1,572	9,278	1,751	10,049	1,896
Total the above regions	51,770	9,012	62,020	10,819	67,793	11,802
<i>3 Northern Governorates</i>		L.F.=70%	LV Nw Loss=22%	L.F.=70%	HV+LV Nw Loss=27%	L.F.=70%
Sulaymaniyah	1,962	321	2,561	419	2,691	440
Erbil	2,961	484	3,865	632	4,062	664
Dohuk	1,550	253	2,023	331	2,126	348
Total 3 Northern Governorates	6,472	1,058	8,450	1,381	8,880	1,452
Grand Total	58,243	10,070	70,470	12,200	76,673	13,254
		L.F.=66%	LV Nw Loss=16%	L.F.=66%	HV+LV Nw Loss=24%	L.F.=66%
Target (Nation wide data)→		66%	16%		24%	
Difference→		0.0%	-0.1%		0.0%	

Annual Increase Ratios :

2004 to 2005 3%
2005 to 2007 6%
2007 to 2010 8%
2010 to 2015 7%
2015 to 2020 6%

adjusting data for calibration
calculated data from coefficient
calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2015 Energy Demand at Consumers' Ends (GWh)	2015 Peak Demand at Consumers' Ends (MW)	2015 Energy Demand at 132kV S/S Ends (GWh)	2015 Peak Demand at 132kV S/S Ends (MW)	2015 Energy Demand at P/S Sent-out Points (GWh)	2015 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=70.5%	LV Nw Loss=13.7%	L.F.=71%	HV+LV Nw Loss=23.2%	L.F.=71%
Baghdad Region	23,370	3,784	27,539	4,459	30,430	4,927
<i>Middle Region</i>		L.F.=67%	LV Nw Loss=14%	L.F.=67%	HV+LV Nw Loss=23%	L.F.=67%
Diyala	2,041	346	2,405	408	2,657	451
Anbar	2,785	473	3,281	557	3,626	615
Najaf	2,103	357	2,479	421	2,739	465
Kerbela	1,388	235	1,635	278	1,807	307
Qaddisiya	1,846	313	2,176	369	2,404	408
Wasit	2,197	373	2,589	439	2,861	485
Babylon	1,861	316	2,193	372	2,424	411
Total Middle Region	14,221	2,413	16,758	2,844	18,517	3,143
<i>North Region</i>		L.F.=54%	LV Nw Loss=21%	L.F.=54%	HV+LV Nw Loss=26%	L.F.=54%
Al-Tameem	1,707	362	2,189	465	2,306	490
Salah-Al-Din	2,238	475	2,870	609	3,024	642
Ninewa	4,943	1,049	6,338	1,346	6,678	1,418
Total North Region	8,887	1,887	11,396	2,419	12,008	2,549
<i>South Region</i>		L.F.=60%	LV Nw Loss=9%	L.F.=60%	HV+LV Nw Loss=16%	L.F.=60%
Basra	4,696	900	5,192	995	5,615	1,076
Muthanna	900	173	995	191	1,077	206
Thi Qar	1,889	362	2,089	400	2,260	433
Missan	1,431	274	1,582	303	1,711	328
Total South Region	8,916	1,709	9,858	1,889	10,662	2,043
Total the above regions	55,394	9,793	65,550	11,612	71,617	12,662
<i>3 Northern Governorates</i>		L.F.=69%	LV Nw Loss=21%	L.F.=69%	HV+LV Nw Loss=26%	L.F.=69%
Sulaymaniyah	2,099	348	2,692	447	2,836	471
Erbil	3,168	526	4,063	674	4,281	711
Dohuk	1,658	275	2,127	353	2,241	372
Total 3 Northern Governorates	6,926	1,150	8,881	1,474	9,358	1,554
Grand Total	62,320	10,943	74,431	13,086	80,975	14,216

Target (Nation wide data)→

65%

15%

23%

Difference→

0.0%

0.0%

0.0%

Annual Increase Ratios :

2004 to 2005 3%

2005 to 2007 6%

2007 to 2010 8%

2010 to 2015 7%

2015 to 2020 6%

adjusting data for calibration

calculated data from coefficient

calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2016 Energy Demand at Consumers' Ends (GWh)	2016 Peak Demand at Consumers' Ends (MW)	2016 Energy Demand at 132kV S/S Ends (GWh)	2016 Peak Demand at 132kV S/S Ends (MW)	2016 Energy Demand at P/S Sent-out Points (GWh)	2016 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=71.6%	LV Nw Loss=13.3%	L.F.=72%	HV+LV Nw Loss=22.2%	L.F.=72%
Baghdad Region	24,772	3,950	29,007	4,625	31,841	5,077
<i>Middle Region</i>		L.F.=68%	LV Nw Loss=13%	L.F.=68%	HV+LV Nw Loss=22%	L.F.=68%
Diyala	2,163	361	2,533	423	2,781	465
Anbar	2,952	493	3,456	578	3,794	634
Najaf	2,230	373	2,611	436	2,866	479
Karbela	1,471	246	1,722	288	1,891	316
Qaddisiya	1,957	327	2,292	383	2,515	420
Wasit	2,329	389	2,727	456	2,993	500
Babylon	1,973	330	2,310	386	2,536	424
Total Middle Region	15,074	2,519	17,651	2,950	19,376	3,238
<i>North Region</i>		L.F.=55%	LV Nw Loss=20%	L.F.=55%	HV+LV Nw Loss=25%	L.F.=55%
Al-Tameem	1,809	378	2,298	480	2,408	503
Salah-Al-Din	2,372	496	3,013	630	3,158	660
Ninewa	5,239	1,095	6,654	1,391	6,974	1,458
Total North Region	9,421	1,969	11,964	2,501	12,539	2,621
<i>South Region</i>		L.F.=60%	LV Nw Loss=9%	L.F.=60%	HV+LV Nw Loss=16%	L.F.=60%
Basra	4,977	939	5,483	1,035	5,902	1,114
Muthanna	954	180	1,051	198	1,132	214
Thi Qar	2,003	378	2,206	416	2,375	448
Missan	1,516	286	1,671	315	1,798	339
Total South Region	9,451	1,783	10,412	1,965	11,207	2,115
Total the above regions	58,718	10,221	69,034	12,040	74,963	13,050
<i>3 Northern Governorates</i>		L.F.=70%	LV Nw Loss=20%	L.F.=70%	HV+LV Nw Loss=25%	L.F.=70%
Sulaymaniyah	2,225	364	2,826	462	2,962	484
Erbil	3,358	549	4,265	697	4,470	731
Dohuk	1,758	287	2,232	365	2,340	382
Total 3 Northern Governorates	7,341	1,200	9,323	1,524	9,771	1,597
Grand Total	66,059	11,421	78,357	13,564	84,734	14,647
		L.F.=66%	LV Nw Loss=14.5%	L.F.=66%	HV+LV Nw Loss=22%	L.F.=66%

Target (Nation wide data)→ 66% 14.5% 22%
 Difference→ 0.0% 0.0% 0.0%

Annual Increase Ratios :
 2004 to 2005 3%
 2005 to 2007 6%
 2007 to 2010 8%
 2010 to 2015 7%
 2015 to 2020 6%

adjusting data for calibration
calculated data from coefficient
calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2017 Energy Demand at Consumers' Ends (GWh)	2017 Peak Demand at Consumers' Ends (MW)	2017 Energy Demand at 132kV S/S Ends (GWh)	2017 Peak Demand at 132kV S/S Ends (MW)	2017 Energy Demand at P/S Sent-out Points (GWh)	2017 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=72.7%	LV Nw Loss=13.3%	L.F.=73%	HV+LV Nw Loss=22.2%	L.F.=73%
Baghdad Region	26,258	4,123	30,747	4,828	33,751	5,300
<i>Middle Region</i>		L.F.=69%	LV Nw Loss=13%	L.F.=69%	HV+LV Nw Loss=22%	L.F.=69%
Diyala	2,293	377	2,685	442	2,947	485
Anbar	3,129	515	3,664	603	4,022	662
Najaf	2,363	389	2,767	455	3,038	500
Kerbela	1,559	257	1,826	300	2,004	330
Qaddisiya	2,074	341	2,429	400	2,666	439
Wasit	2,468	406	2,890	476	3,173	522
Babylon	2,092	344	2,449	403	2,688	442
Total Middle Region	15,979	2,630	18,710	3,079	20,538	3,380
<i>North Region</i>		L.F.=55%	LV Nw Loss=20%	L.F.=55%	HV+LV Nw Loss=25%	L.F.=55%
Al-Tameem	1,918	395	2,435	501	2,552	525
Salah-Al-Din	2,515	518	3,194	657	3,347	689
Ninewa	5,553	1,143	7,053	1,452	7,392	1,522
Total North Region	9,986	2,056	12,682	2,611	13,292	2,736
<i>South Region</i>		L.F.=61%	LV Nw Loss=9%	L.F.=61%	HV+LV Nw Loss=16%	L.F.=61%
Basra	5,276	981	5,812	1,080	6,256	1,163
Muthanna	1,012	188	1,114	207	1,199	223
Thi Qar	2,123	395	2,339	435	2,518	468
Missan	1,607	299	1,771	329	1,906	354
Total South Region	10,018	1,862	11,036	2,051	11,880	2,208
Total the above regions	62,241	10,670	73,176	12,569	79,460	13,624
<i>3 Northern Governorates</i>		L.F.=71%	LV Nw Loss=20%	L.F.=71%	HV+LV Nw Loss=25%	L.F.=71%
Sulaymaniyah	2,358	380	2,995	482	3,139	505
Erbil	3,560	573	4,521	728	4,738	763
Dohuk	1,863	300	2,366	381	2,480	399
Total 3 Northern Governorates	7,782	1,253	9,882	1,591	10,358	1,667
Grand Total	70,022	11,923	83,058	14,160	89,818	15,291
		L.F.=67%	LV Nw Loss=14.5%	L.F.=67%	HV+LV Nw Loss=22%	L.F.=67%

Target (Nation wide data)→

Difference→

67%

14.5%

22%

0.0%

Annual Increase Ratios :

2004 to 2005 3%

2005 to 2007 6%

2007 to 2010 8%

2010 to 2015 7%

2015 to 2020 6%

adjusting data for calibration

calculated data from coefficient

calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2018		2018		2018	
	Energy Demand at Consumers' Ends (GWh)	Peak Demand at Consumers' Ends (MW)	Energy Demand at 132kV S/S Ends (GWh)	Peak Demand at 132kV S/S Ends (MW)	Energy Demand at P/S Sent-out Points (GWh)	Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=73.7%	LV Nw Loss=12.8%	L.F.=74%	HV+LV Nw Loss=21.2%	L.F.=74%
Baghdad Region	27,834	4,311	32,355	5,012	35,322	5,471
<i>Middle Region</i>		L.F.=70%	LV Nw Loss=13%	L.F.=70%	HV+LV Nw Loss=21%	L.F.=70%
Diyala	2,431	395	2,825	459	3,085	501
Anbar	3,317	538	3,855	626	4,209	683
Najaf	2,505	407	2,912	473	3,179	516
Kerbela	1,653	268	1,921	312	2,097	340
Qaddisiya	2,199	357	2,556	415	2,790	453
Wasit	2,617	425	3,042	494	3,320	539
Babylon	2,217	360	2,577	418	2,813	457
Total Middle Region	16,937	2,750	19,689	3,196	21,494	3,489
<i>North Region</i>		L.F.=56%	LV Nw Loss=20%	L.F.=56%	HV+LV Nw Loss=24%	L.F.=56%
Al-Tameem	2,033	413	2,553	518	2,666	541
Salah-Al-Din	2,666	541	3,348	680	3,496	710
Ninewa	5,887	1,195	7,394	1,501	7,720	1,568
Total North Region	10,585	2,150	13,295	2,700	13,882	2,819
<i>South Region</i>		L.F.=62%	LV Nw Loss=8%	L.F.=62%	HV+LV Nw Loss=15%	L.F.=62%
Basra	5,593	1,025	6,135	1,125	6,577	1,206
Muthanna	1,072	197	1,176	216	1,261	231
Thi Qar	2,250	413	2,469	453	2,646	485
Missan	1,704	312	1,869	343	2,004	367
Total South Region	10,619	1,947	11,649	2,136	12,488	2,289
Total the above regions	65,975	11,157	76,988	13,043	83,186	14,069
<i>3 Northern Governorates</i>		L.F.=72%	LV Nw Loss=20%	L.F.=72%	HV+LV Nw Loss=24%	L.F.=72%
Sulaymaniyah	2,500	397	3,140	499	3,279	521
Erbil	3,773	599	4,739	753	4,949	786
Dohuk	1,975	314	2,481	394	2,590	411
Total 3 Northern Governorates	8,248	1,310	10,360	1,645	10,818	1,718
Grand Total	74,224	12,467	87,348	14,689	94,004	15,787
		L.F.=68%	LV Nw Loss=14%	L.F.=68%	HV+LV Nw Loss=21%	L.F.=68%

Target (Nation wide data) → 68% 14% 21%
 Difference → 0.0% 0.0% 0.0%

Annual Increase Ratios :
 2004 to 2005 3%
 2005 to 2007 6%
 2007 to 2010 8%
 2010 to 2015 7%
 2015 to 2020 6%

adjusting data for calibration
 calculated data from coefficient
 calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2019 Energy Demand at Consumers' Ends (GWh)	2019 Peak Demand at Consumers' Ends (MW)	2019 Energy Demand at 132kV S/S Ends (GWh)	2019 Peak Demand at 132kV S/S Ends (MW)	2019 Energy Demand at P/S Sent-out Points (GWh)	2019 Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=74.8%	LV Nw Loss=12.8%	L.F.=75%	HV+LV Nw Loss=21.2%	L.F.=75%
Baghdad Region	29,504	4,503	34,296	5,234	37,442	5,714
<i>Middle Region</i>		L.F.=71%	LV Nw Loss=13%	L.F.=71%	HV+LV Nw Loss=21%	L.F.=71%
Diyala	2,577	412	2,995	479	3,270	523
Anbar	3,516	562	4,087	654	4,461	714
Najaf	2,655	425	3,087	494	3,370	539
Kerbela	1,752	280	2,036	326	2,223	356
Qaddisiya	2,331	373	2,709	433	2,958	473
Wasit	2,774	444	3,224	516	3,520	563
Babylon	2,350	376	2,732	437	2,982	477
Total Middle Region	17,954	2,872	20,870	3,338	22,784	3,644
<i>North Region</i>		L.F.=57%	LV Nw Loss=20%	L.F.=57%	HV+LV Nw Loss=24%	L.F.=57%
Al-Tameem	2,155	431	2,706	542	2,826	565
Salah-Al-Din	2,625	565	3,549	710	3,706	741
Ninewa	6,240	1,249	7,837	1,568	8,184	1,637
Total North Region	11,220	2,245	14,093	2,820	14,715	2,944
<i>South Region</i>		L.F.=63%	LV Nw Loss=8%	L.F.=63%	HV+LV Nw Loss=15%	L.F.=63%
Basra	5,928	1,071	6,503	1,175	6,971	1,259
Muthanna	1,137	205	1,247	225	1,337	241
Thi Qar	2,385	431	2,617	473	2,805	507
Missan	1,806	326	1,981	358	2,124	384
Total South Region	11,256	2,033	12,348	2,231	13,237	2,391
Total the above regions	69,934	11,653	81,607	13,623	88,177	14,694
<i>3 Northern Governorates</i>		L.F.=73%	LV Nw Loss=20%	L.F.=73%	HV+LV Nw Loss=24%	L.F.=73%
Sulaymaniyah	2,650	415	3,328	521	3,475	544
Erbil	4,000	626	5,024	786	5,246	821
Dohuk	2,094	328	2,630	411	2,746	430
Total 3 Northern Governorates	8,743	1,368	10,982	1,718	11,467	1,794
Grand Total	78,677	13,021	92,589	15,341	99,644	16,488
		L.F.=69%	LV Nw Loss=14%	L.F.=69%	HV+LV Nw Loss=21%	L.F.=69%

Target (Nation wide data)→

Difference→

0.0%

0.0%

21%

0.0%

Annual Increase Ratios :

2004 to 2005 3%

2005 to 2007 6%

2007 to 2010 8%

2010 to 2015 7%

2015 to 2020 6%

adjusting data for calibration
calculated data from coefficient
calculated data

Appendix B.12 Result of Demand Forecast

Governorate & Region	2020		2020		2020		2020	
	Energy Demand at Consumers' Ends (GWh)	Peak Demand at Consumers' Ends (MW)	Energy Demand at 132kV S/S Ends (GWh)	Peak Demand at 132kV S/S Ends (MW)	Energy Demand at P/S Sent-out Points (GWh)	Peak Demand at P/S Sent-out Points (MW)	Energy Demand at P/S Sent-out Points (GWh)	Peak Demand at P/S Sent-out Points (MW)
<i>Baghdad Region</i>		L.F.=75.9%	LV Nw Loss=11.9%	L.F.=76%	HV+LV Nw Loss=20.2%	L.F.=76%		
Baghdad Region	31,274	4,704	35,938	5,405	39,191	5,894		
<i>Middle Region</i>		L.F.=72%	LV Nw Loss=12%	L.F.=72%	HV+LV Nw Loss=20%	L.F.=72%		
Diyala	2,731	431	3,138	495	3,422	539		
Anbar	3,726	587	4,282	675	4,670	736		
Najaf	2,815	444	3,235	510	3,527	556		
Karbela	1,857	293	2,134	336	2,327	367		
Qaddisiya	2,471	389	2,839	448	3,096	488		
Wasit	2,940	463	3,378	533	3,684	581		
Babylon	2,491	393	2,862	451	3,122	492		
Total Middle Region	19,031	3,000	21,869	3,447	23,848	3,759		
<i>North Region</i>		L.F.=58%	LV Nw Loss=18%	L.F.=58%	HV+LV Nw Loss=23%	L.F.=58%		
Al-Tameem	2,284	450	2,820	556	2,952	582		
Salah-Al-Din	2,995	591	3,698	729	3,871	763		
Ninewa	6,614	1,304	8,166	1,610	8,549	1,686		
Total North Region	11,893	2,345	14,683	2,895	15,372	3,031		
<i>South Region</i>		L.F.=64%	LV Nw Loss=8%	L.F.=64%	HV+LV Nw Loss=14%	L.F.=64%		
Basra	6,284	1,119	6,846	1,219	7,329	1,305		
Muthanna	1,205	214	1,313	234	1,405	250		
Thi Qar	2,529	450	2,755	490	2,949	525		
Missan	1,914	341	2,086	371	2,233	397		
Total South Region	11,931	2,124	12,999	2,314	13,916	2,477		
Total the above regions	74,130	12,173	85,489	14,062	92,327	15,162		
<i>3 Northern Governorates</i>		L.F.=74%	LV Nw Loss=18%	L.F.=74%	HV+LV Nw Loss=23%	L.F.=74%		
Sulaymaniyah	2,809	433	3,468	535	3,631	560		
Erbil	4,240	654	5,234	807	5,480	845		
Dohuk	2,219	342	2,740	422	2,868	442		
Total 3 Northern Governorates	9,268	1,429	11,442	1,764	11,979	1,847		
Grand Total	83,398	13,602	96,931	15,826	104,305	17,009		
		L.F.=70%	LV Nw Loss=13%	L.F.=70%	HV+LV Nw Loss=20%	L.F.=70%		

Target (Nation wide data)→

Difference→

0.0%

0.0%

0.0%

Annual Increase Ratios :

2004 to 2005 3%

2005 to 2007 6%

2007 to 2010 8%

2010 to 2015 7%

2015 to 2020 6%

adjusting data for calibration
calculated data from coefficient
calculated data