添付資料－3　石炭輸送に関する検討概要

「石炭輸送に関する検討概要」

エネルギー鉱業省 資源エネルギー総局 石炭/地熱部

A. <u>中部—東部カリマンタン石炭輸送鉄道網の検討</u>

1. 中部—東部カリマンタン石炭輸送

➢ “カリマンタン石炭輸送計画 (KTCP ; Kalimantan Coal Transportation Program)” 調査は日本工営により 2005 年に実施された。これには BAPPENAS も参画した。
中央カリマンタンの Muaratuhup と東カリマンタンの Kalipapak の 127ｋｍを結ぶ第 1 期工事の経済性について検討した。このルートは後で述べる Kalipapak – Balikpapan 間にいくつかの案があり、127km の区間には、2 つの駅と 2 つの石炭の積載設備場を設ける予定である。

➢第 1 フェーズでは日々の列車運行計画は次のとおりである。

- 年間輸送量	; 18,5 mil ton/year
- 年間運行日数	; 330 day
- 1 日の輸送量	; 560,060 ton/day
- 貨車積載量	; 70 ton
- 1 編成	; : 80 台
- １列車輸送量	; 5,600 ton/train
- 列車運行本数	; : 10 train/day
- 列車速度	; 40 km/hour
- 1 日の往復回数	; 1 往復
- 必要列車数	; 10 編成

➢ 線路は Kalipapak.に至るまでに、中央カリマンタン、東カリマンタンの PKP2B や KP の採炭地域を通る。
➢ 建設費は USD 484,250,000,で政府出資 ; 65,9 %、民間投資 ; 34,1 %
➢ インフラ開発が、運用段階で人々が働く地方政府に貢献するのを、中央政府が、説明する必要がある。
➢ 日本工営の提言では、地方政府はこの検討結果をみて、地域振興と、石炭輸送計画によって生ずる環境影響が避けられることを期待しているといっている。また、政府(MEMR の石炭・地熱局)は、直ちにこの地域で採掘権を得ている鉱山企業に、カリマンタン石炭輸送計画の内容を通知し、参画を求める必要がある。

2. 中央カリマンタン鉄道建設に関する事前検討結果

➢ 日本の伊藤忠商事が検討した。（2007 年）
➢ 内容はＢarito 川沿いの Pelaci (Murung Raya District) – Bangkuang (South Barito District) 間の建設に関する経済性について
➢ 鉄道の利用者は 中央カリマンタンの PKP2B が 10 社と KP が 1 社
将来、石炭輸送以外にパームオイルや工業製品にも使用する。さらに先には、旅客輸送も行ない、県内、県間、国内をまたぐ鉄道とする。

- 建設は４ステージで行い、それぞれの投資は次のとおりである。
  - 第１ステージ
    - 運行開始　2013 年
    - 輸送能力　10 mill ton/year
    - 投資額　USD 610. 2 mill
  - 第２ステージ
    - 運行開始　2015 年
    - 輸送能力　15 mill ton/year
  - 第３ステージ
    - 運行開始　2017 年
    - 輸送能力　20 mill ton/year
    - 投資額　USD 57.6 mill
  - 第４ステージ
    - 運行開始　2019 年
    - 輸送能力　30 mill ton/year
    - 投資額　USD 99.5 mill

  資金の分担

  Public　USD 55 mill
  Private　USD 128 mill
  Loan　USD 427 mill from JBIC

B. 南スマトラ石炭輸送インフラ開発の現状

1. まえがき

南スマトラの Muara Enim 州 Tanjung Enim 地区で採掘権を得て操業中のＰＴ Bukit Asam Coal Mine は出炭量を 960 万トンから 2000 万トンに増産する計画をしている。
鉱山から Tarahan にある港まで石炭を輸送するには、石炭の増産に応じて鉄道を増強する必要がある。既設の鉄道には、これほど多量の石炭を輸送する能力はない。
PT Bukit Asam 社は、Tanjung Enim から石炭ターミナルと港のある Lampung 州の Tarahan まで鉄道を建設する計画である。
最近 PT Bukit Asam 社は China railway および PT Transpacific Ｓecurindo と、Tanjung Enim – Tarahan 間の、この鉄道建設に関するＦＳをおこなった。ＦＳは終了し、現在は Transportation Department と地方政府の認可待ちである。

２. 鉄道の石炭積込駅、石炭ターミナル、港の検討

PT Bukit Asam 社の事業パートナーである PT Transpacific Securindo 社は Tanjung Enim から Lampung 州の Tarahan まで鉄道を建設する計画である。鉄道は 20 年間にわたり、新しく採掘する炭田から、年間 2000～2400 万トンの石炭を輸送する計画である。
新しい鉄道と Tarahan の岸壁の建設計画は次のとおりである。

1 年目	:	600 万トン/年
2 年目	:	1000 万トン/年
3 年目	:	2000 万トン/年
4 年目	:	2200 万トン/年.

現在 PT Bukit Asam は Tanjung Enim.鉱区に大規模な炭田を運営しており、石炭は小規模の Kertapati, Palembang の２つの桟橋と Tarahan の大型の桟橋から積み出される。
将来は、Central Bangko 鉱区の石炭も鉄道輸送する計画で、現在 FS 中である。

オランダ統治時代に作られ、1980 年に改修された既設の単線の鉄道は、いくつかの分岐があり、石炭輸送能力が PT KAI 社と PT Bukit Asam 社の間で問題となっている。
PT Transpacific Securindo 社は旧石炭ターミナルの北東の Srengsem に 60ha の土地を確保し、貨車への石炭積込み設備と、159000 トンの船に対応した石炭ターミナル設備の建設を計画している。
設備の概要はつぎのとおりである。

1. 貨車への積載設備
   - 搭載能力 : 4,400 tons / hour (貨車への搭載は２系列で)
   - コンベアーの容量 : 2,200 tons per hour
2. 石炭ターミナル設備
   a. 石炭スタッカ、リクレーマ
      - Station I & II の残りを積み上げるスタッカーシステム；設計容量 4,400 tons/hr
      - 貯炭量 450,000 tons – 750,000 tons
   b. 混炭設備
      - Station I & II の残りを積み上げるスタッカーシステム；設計容量 4,400 tons/hr
      - 貯炭量 600,000 tons, （各 200,000 tons の stockpiles x ３）
   c. 船積みシステム；容量 6,000 tons /hr でスタッカー／レクレーマから受け入れる。

III. 鉄道の検討
   a. 既設の鉄道
      - 既設の鉄道は Lampung 州 Tarahan 港まで延長 411 km
      - PT Kereta Api Indonesia が運営
      - Tarahan への輸送量；725 万トン/年
      - Kertapati へ至るもう 1 つの 159 km の路線； 135 万トン/年
      - 現在の路線は十分でなく何度も改修している。2000～2400 万トン/年に増加すれば対応できない。
   b. 新設鉄道建設計画
      - Tanjung Enim (Central Bangko) から o Tarahan (Srengsem)へ設置
      - Tanjung Enim から Tarahan へ、Tanjung Enim から Baturaja へショートカットし時間短縮をはかる。
      - 鉱山からターミナルまで延長 312 km の単線で途中に 20 の駅をもうける。
      - 一日 24 往復、年間 295 日運行し 90 日は補修に当てる。
      - 24 編成（機関車 1 台、60 トン積み貨車 55 台で構成）
      - PT Bukit Asam, China Railway and PT Transpacific Securindo で実施
      - 土地収用を含む投資額 USD 644,150,250, （AMDAL と基本設計の費用を除く）
      - 投資総額 USD 1,061,519,000
      - 実施工程
         - 建設準備 (2008 年末まで 6 ヶ月)
         - 建設期間 36 ヶ月 次の 2 パッケージからなる 320 km
Srengsem-Negara Ratu 間、および Tanjung Enim-Negara Ratu 間
建設開始は 2009 年中からで 2012 年完成
         - 運行開始は 2012 年末
         - 保証期間 12 ヶ月

      - 鉄道建設に対する問題点
         - 土地収用が終わっていない Natar and Banjar baru を通る.
         - 住宅密集地の Kota Bumi and Martapura を通る
         - 土地収用時に社会問題が顕在化

- Lampung RUTRD によると、石炭ターミナルの予定地は森林保護区で、地方政府と交渉が必要

- 上記問題に大使 PT Bukit Asam は下記のとおり対応中:
  - Lampung 地方政府から情報を取得
    1. T 森林保護区の正確な境界
    2. Kota Baru Natar の開発計画
    3. Bakauheni 、Terbanggi Besar 間の高速道路計画
    4. Srengsem 地域の将来計画
    5. Bandar Lampung から Rejosari 、Bakauheni から Rejosar への鉄道計画

  その他、PT KAI, PT PLN, PT Telkom, PDAM などの機関と次の点を明確にするため詳細な検討が必要である。
    1. PT KAI と個人所有地の境
    2. 通信、電力、飲料水のネットワーク

添付資料－4　Coal Supply to PLN

PLNへの石炭供給について

PLTUへの石炭物流の問題点

- PLNの石炭のストックの現状は1ヶ月の運転に必要な量を確保できていない。
- 石炭価格は最近急上昇しており、市場価格に基づく標準購入価格は、これまでの長期契約額の倍に近くとなっている。
- PLNは独自の鉱山会社を持たないので、石炭市場での石炭調達に対するPLNの地位は低く、また石炭の物流については一般市場に依存せざるを得ない。
- 石炭にはDMO（Domestic Market Obligationun；国内市場配分義務）が課せられていないので、石炭調達にあたり、PLNは一般工業向けや海外向けと競争せねばならない。
- 南SumatraのTanjung Enim からTarakanまでの鉄道は単線なので、輸送量は約820万トン／年と制限されている。
- 全部で66社あるPKP2B（CCoW;；Coal Contract of Workで採掘認可された石炭採掘事業者）企業の中で PLNに石炭を供給するのは8社にすぎない。
- 国内向け、輸出向けのインドネシア国籍の石炭油輸送船は必要数13隻に対し11隻しかない。
- 国内向け以上に、必要度の高い輸出用の岸壁ですら不足している。
- 多量の石炭備蓄は会計監査院より、不良在庫とみなされる。

石 炭 物 流 の 現 状

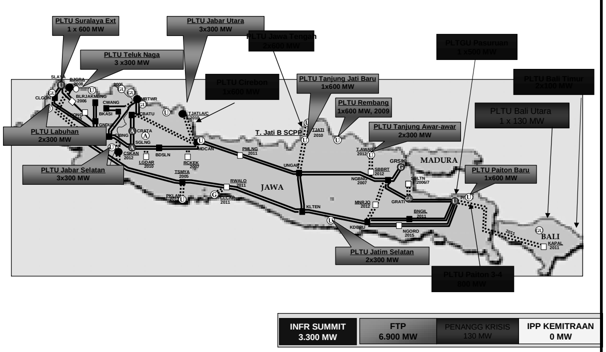
No.	PLTU	需要 HHV Kcal/kg (ar)	トン/年	供給 契約形態	年間 契約量	契約 期間 （[年）	CIF/ FOB	輸送方法
1	Suralaya	4225 - 5242	12,5 Jt	長期	6.1 百万トン	10	CIF	鉄道、船
				中期	5 百万トン	4	CIF	トラック、バージ
				短期	3.5 百万トン	< 1	CIF	トラック、バージ
				スポット				
2	Tanjung Jati B	5150 - 6100	4 Jt	長期	2 百万トン	10	FOB	船
				短期	2 百万トン	1	CIF	船
3	Paiton	5092 - 5242	3 Jt	中期	2.4 百万トン	4	CIF	バージ
4	Ombilin	6585 - 6876 (adb)	631Rb	長期	450 千トン	5	CIF	トラック
				中期	65 千トン	4	CIF	トラック
				スポット	120 千トン	< 1	CIF	トラック
5	Bukit Asam	5178	986 Rb	長期	986 千トン	10	CIF	コンベヤー
6	Tarahan # 3 & 4	5100	706Rb	長期	706 千トン	25	CIF	コンベヤー
7	Asam-asam	3820 - 4615	650 Rb	長期	446 千トン	20	CIF	トラック

発 電 設 備 と 石 炭 需 要

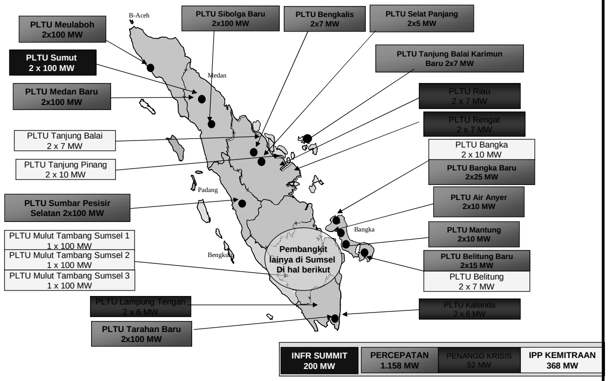
No	プロジェクト	年 2008 MW	2008 TON	2009 MW	2009 TON	2010 MW	2010 TON
1	Pertnership	-	-	1,142	4,401,725	1,142	4,401,725
2	Critical Area	-	-	648	1,873,238	648	1,873,238
3	New IPP	50	192,720	250	963,600	2,620	9,720,096
4	PLN-NON FTP	230	1,050,000	540	2,331,984	540	2,331,984
5	PLN-FTP (JAMALI & LUAR JAMALI)	-	-	-	-	9,530	**31,900,000**
6	EXISTING POWER PLANT (PLN & IPP)	9,550	33,231,936	9,550	33,231,936	9,550	33,231,936
	TOTAL	**9,830**	**34,474,656**	**12,130**	**42,802,483**	**24,030**	**83,458,979**

注 :1 ジャワのPLTU向けLRCは、Capacity Factor 60%、燃料消費率 0,52 Kwh/Kg(設備容量 600-700 MW）、0,55 Kwh/Kg （設備容量 300-400 MW）として計算した。
2 ジャワ以外のPLTU向けLRCはCapacity Factor 80%、燃料消費率 0,57 Kwh/Kgとして計算した。

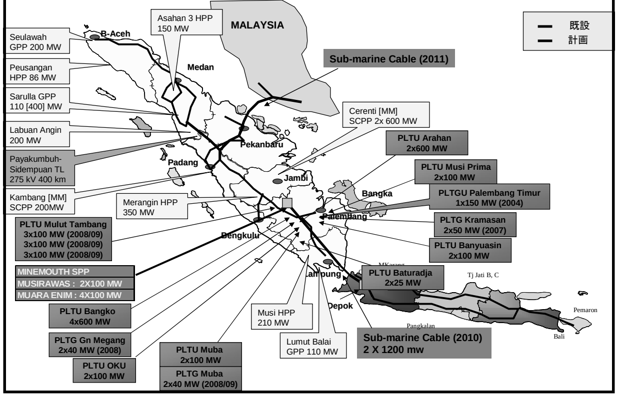
ジャワ、マドラ、バリの新設発電所



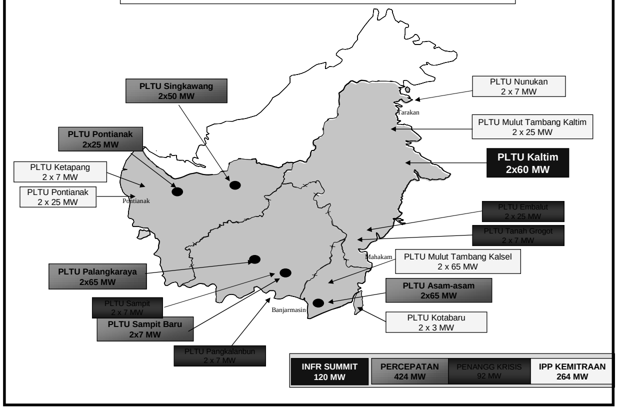
スマトラの新設発電所



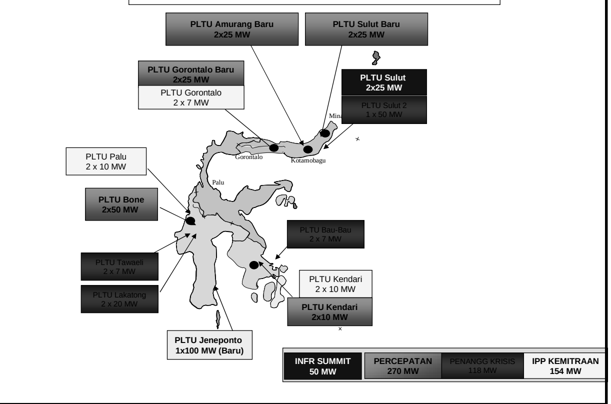
IPP プロジェクトと 送電系統



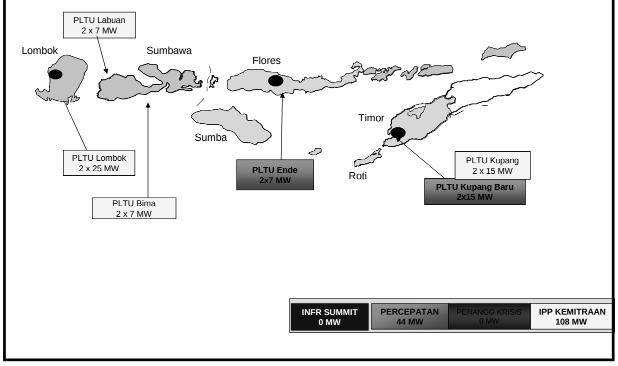
カリマンタンでの発電プロジェクト



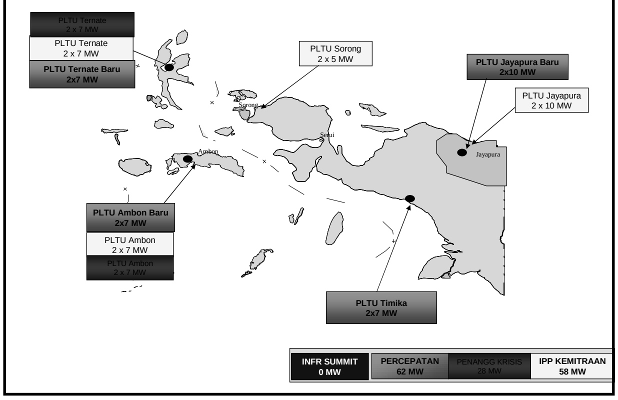
スラウェジでの発電プロジェクト



NTB, NTTでの発電プロジェクト



マルク、パプアでの発電プロジェクト



インドネシアの石炭埋蔵量

石炭ランク	総埋蔵量 百万 ton	確認埋蔵量 百万ton
低カロリー <5100 kcal/kg (adb)	14.95	6.962
中カロリー 5100 - 6100 kcal/kg (adb)	37.65	2.443
高カロリー >6100 kcal/kg (adb)	7.97	1.229
高々カロリー >7100 kcal/kg (adb)	0.672	0.124
合計	61.242	6.759

注;adb=As Received Base

Low Rank Coal の性状

ジャワのFTPのPLTU向け LRC

Uraian	Typical	Penolakan
• Gross Calorific Value kCal/kg (ar)	4200	< 4000 atau > 4500
• Hardgrove Grindability Index	60	< 45 atau > 65
• Total Moisture % (ar)	30	> 35
• Ash Content % (ar)	5	> 6
• Sodium Content % (in Ash)	1,5	> 4
• Sulphur Content % (daf)	0,33	> 0,35
• Nitrogen % (daf)	Max 1,2	> 1,2
• Slagging dan Fouling Index	Medium	> Medium
• Grain Size through 2,38 mm Sieve	Max 20 %	> 20%
• Grain Size through 32 mm sieve	Max 80 %	> 80%
• Grain Size through 50 mm Sieve	Min 95 %	< 95%
• Grain Size through 70 mm Sieve	100%	< 98% (Ukuran butiran Maximum 100 mm)
• Ash Fusion Temperature (IDT) °C	1150	< 1100

ジャワ以外のFPTのPLTU向け LRC

Uraian	Typical	Penolakan
• Gross Calorific Value kcal/kg (ar)	4200 4000 *)	< 4000 atau > 4700 < 3900 atau > 4700 *)
• Hardgrove Grindability Index	60 50 *)	< 50 atau > 65 < 40 atau > 65 *)
• Total Moisture % (ar)	30 35 *)	> 35 > 40 *)
• Ash Content % (ar)	5	> 6
• Sodium Content % (in Ash)	1,5	> 4
• Sulphur Content % (daf)	0,33 1,8 *)	> 0,35 > 2,2 *)
• Nitrogen % (daf)	Max 1,2	> 1,2
• Slagging dan Fouling Index	Medium	> Medium
• Grain Size through 2,38 mm Sieve	Max 20 %	> 20%
• Grain Size through 32 mm Sieve	Max 80 %	> 80%
• Grain Size through 50 mm Sieve	Min 95 %	< 95%
• Grain Size through 70 mm Sieve	100%	< 98% (Ukuran butiran Maximum 100 mm)
• Ash Fusion Temperature (IDT) °C	1150 1050*)	< 1100 < 1000*)

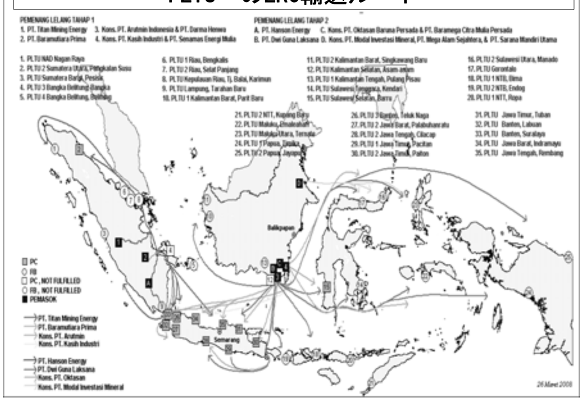
FTPで建設中のPLTUへのLRCの供給

- 総需要 (35 PLTU) = 31,90 百万 Ton/年
- 入札結果 = 28,49 百万 Ton/年
- 不足分 = 3.41 百万 Ton/年 (10.70%)
- 契約8社中：
  - 4 社は生産段階
  - 4 社は、現在探査段階
- 20年 の長期契約(CIFベース)
- 2009年はじめに供給開始することで価格のベースは決められており、必要ならばINDONESIAN COAL INDEX (ICI) に基づきみなおしすることもある。
- PLN は コンサルタントの PT ENERGY MANAGEMENT INDONESIA (EMI)、POKJA STONE SMOLDERASSESSMENTとともに6か月毎に評価が行われる

PLTU 10,000MWへのLRC供給者

NO	供給会社	区分	量(トン)	採炭状況
1	PT TITAN MINING ENERGY	PKP2B	3,205,000	探査中
2	PT BARAMUTIARA PRIMA	PKP2B	2,328,000	探査中
3	KONS. PT ARUTMIN INDONESIA	KP	8,493,000	生産段階
4	KONS. PT KASIH INDUSTRI	KP	3,810,000	生産段階
5	PT HANSON ENERGY	KP	4,372,000	探査中
6	PT DWI GUNA LAKSANA	KP	2,945,000	生産段階
7	KONS. OKTASAN BARUNA PERSADA	KP	3,056,000	生産段階
8	KONS. MODAL INVESTASI MINERAL	KP	279,000	探査中
合計			28,488,000	

PLTUへのLRC輸送ルート



インドネシアの石炭価格指標

PKP2Bの採炭業者

PKP2Bの業者数：66 社

現状：

- 31 社は生産段階
- 18 社はF/S段階
- 5 社は建設中
- 12 社は探査段階

PKP2B の業者でPLN に石炭を納入しているのは つぎの8 社：

1. PT Kaltim Prima Coal
2. PT Kideco Jaya Agung
3. PT Berau Coal
4. PT Indominco Mandiri
5. PT Anugerah Bara Kaltim
6. PT Arutmin Indonesia
7. PT Adaro Indonesia
8. PT Tambang Batubara Bukit Asam

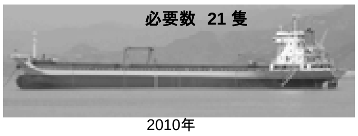
Sumber data : Indonesian Coal Book 2006/2007 dan kontrak2 PLN

石炭運搬船とバージの需給状況

石炭運搬船

-必要数 13 隻
-保有数 11 隻

2008年

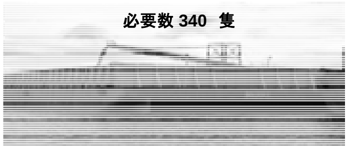


2010年

石炭運搬バージ

-必要数 29 隻
-保有数 160 隻

2008年



2010年

インドネシア船籍の石炭運搬船リスト

No	船 名	サイズ	積載量 (ton)	就航年	荷役設備	船 主
1	Dewi Umayi	Panamax	62.000	1981	有	Arpeni
2	Banowati	Panamax	64.000	1983	有	Arpeni
3	Urmilla	Panamax	63.000	1984	有	Arpeni
4	Suryawati	Panamax	70.000	1996	無	Arpeni
5	Citrawati	Panamax	70.000	1990	無	Arpeni
6	Indrani	Panamax	70.000	1986	無	Arpeni
7	Mustikawati	Panamax	75.000	1981	無	Arpeni
8	Victory Union	Panamax	65.000	1983	無	JSK
9	Zaleha Fitrat	Handymax	43.000	1986	有	GLS
10	Saraswati	Handymax	24.000	1981	無	Arpeni
11	Adhiguna Tarahan	Handymax	10.000	1981	無	Bahtera A.

インドネシアの石炭積出港

NO.	港 名	場 所	最大容量 (DWT)	ユーザ
1	Tarahan	Sumatera Selatan	55,000	PT BA
2	Tanjung Bara	Kalimantan Timur	180,000	Kaltim Prima Coal
3	Samarinda / Mahakam	Kalimantan Timur	70,000	Umum
4	IBT / Pulau Laut	Kalimantan Selatan	80,000	Adaro Indonesia
5	Kota Baru / Pulau Laut	Kalimantan Selatan	150,000	Arutmin Indonesia
6	Bontang	Kalimantan Timur	90,000	Indominco Mandiri
7	Berau Offshore	Kalimantan Timur	180,000	Berau Coal
8	Banjarmasin / Taboneo	Kalimantan Selatan	170,000	Adaro dan terbuka umum
9	Balikpapan	Kalimantan Timur	80,000	Terbuka Umum
10	Adang Bay	Kalimantan Timur	120,000	Kideco Jaya Agung

石炭インフラの整備状況

PT. BATUBARA PRIMA社
・現在インフラがない
・採掘鉱区が狭い
・Calik川は土砂が堆積
・バージ輸送契約が未締結

KONS. PT. ARUTMIN INDONESIA
・インフラがあり、順次増強中
・港までの輸送はコンベアーを使用
・現在、PT. CenkoとPT. BSから港をリースしており、2009年には自社の港を使用予定
・石炭粉砕プラントは現在2基あり、毎年1基増設の予定
・Asam鉱区の問題点；西Mulita地域はパーム油の植林地でAsamもそこにある。

PT. TITN MINING ENERGY
・インフラの恒久設備がない
・輸送道路は県道を利用
・バージ輸送契約が未締結

KONS. PT. KASIH INDUSTRY
・石炭はMuba地域のKPから供給の予定
・道路、港ともになし
・詳細な採掘計画なし

P L N か ら の 提 言

1. PLNは石炭の長期契約分を使って供給を増やし、発電所の安定操業に必要な30日分の備蓄に持って行く予定である。
2. PKP2Bが本気で参画するよう、監督機関の支援が必要である。
3. PLNは自社の鉱山を所有するか、活動中の企業との提携、または鉱山会社の株取得の必要がある。
4. 発電所での石炭備蓄は、低コストの燃料使用の基本方針を果たすためであり、会計処理上、無駄と見なすべきでない。
5. 供給を確保するための国内市場供給義務(DMO)、メカニズム、価格に対する法整備が必要である。国内向需要は、現在48.47～58.8百万トン(生産量の22.5～25%)であり、2010年には107.33百万トン(生産量の43%)となる。適切な価格で消費者に提供する必要がある。
6. 1983～1996年の間、石炭ロイヤリティ(生産額の13.5%)を"INKIND"(石炭振興基金？)として政府に納入していた。同様の制度を復活し、PLNの子会社の活動に当ててもらいたい。
7. 南スマトラのTanjun apiaiにかわる新石炭ターミナル、カリマンタンとジャワ(スララヤ、パイトン地区)の石炭ターミナルへの鉄道建設が必要である。
8. インドネシア籍の船が今でも不足しており、2隻のパナマックスサイズの船が至急必用である。
9. BUMN(国営企業庁)が、これに関わる企業の調整をして、石炭輸送と、外国船籍の船の使用許可をやってもらいたい。

おわり

添付資料－5　Operation Record

5.1 Operation Performance Record for the Existing Power Plants of PJB

5.2 Operation Performance Record for the Existing Power Plants of Indonesia Power

5.1 Operation Performance Record for the Existing Power Plants of PJB

Operation Performance Record for the Existing Power Plants of PJB

No.	Plant Name	Unit No.	Operation Year	Installed Capacity (MW)	Available Max. (kW)	Operation (Hours) 2005	Operation (Hours) 2006	Operation (Hours) 2007	Forced Outage (Hours) 2005	Forced Outage (Hours) 2006	Forced Outage (Hours) 2007	Planned Outage (Hours) 2005	Planned Outage (Hours) 2006	Planned Outage (Hours) 2007	Stand By (Hours) 2005	Stand By (Hours) 2006	Stand By (Hours) 2007	Production Energy (GWh) 2005	Production Energy (GWh) 2006	Production Energy (GWh) 2007	Gross Heat Rate (Kcal/kWh) 2005	Gross Heat Rate (Kcal/kWh) 2006	Gross Heat Rate (Kcal/kWh) 2007	Thermal Efficiency (%) 2005	Thermal Efficiency (%) 2006	Thermal Efficiency (%) 2007
	UP. BRANTAS																									
1.	SUTAMI	1	1973	35.00	34,333.00	6,096.07	6,595.11	5,289.89	0.00	0.00	6.22	81.83	122.00	55.73	2582.10	2042.89	3408.16	152.46	173.46	139.57	0	0	0	0	0	0
2.	SUTAMI	2	1973	35.00	34,333.00	6,463.70	6,089.87	6,032.50	0.00	0.00	3.55	74.57	260.05	32.45	2221.73	2410.08	2691.50	162.58	160.10	154.82	0	0	0	0	0	0
3.	SUTAMI	3	1974	35.00	34,333.00	3,626.21	3,642.88	3,281.93	0.00	0.00	0.00	104.90	0.00	51.63	5028.89	5117.12	5426.44	105.05	112.65	81.28	0	0	0	0	0	0
4.	WLINGI	1	1978	27.00	26,810.00	4,693.00	5,119.56	4,068.88	0.00	0.00	0.00	111.78	585.85	82.60	3955.22	3054.59	4608.52	71.83	75.38	65.78	0	0	0	0	0	0
5.	WLINGI	2	1980	27.00	26,810.00	5,208.25	4,770.14	3,605.55	0.00	0.00	0.00	104.30	0.00	33.43	3447.45	3989.86	5121.02	72.92	71.25	60.60	0	0	0	0	0	0
6.	LODOYO	1	1983	4.50	4,460.00	8,132.76	8,525.71	8,164.19	1.27	14.59	0.00	509.45	139.25	59.85	116.52	80.45	535.96	35.92	38.27	38.81	0	0	0	0	0	0
7.	SENGGURUH	1	1988	14.50	14,230.00	3,743.52	4,179.51	3,837.70	0.00	0.63	126.42	209.92	85.90	0.00	4806.56	4493.96	4795.88	37.77	40.50	36.30	0	0	0	0	0	0
8.	SENGGURUH	2	1988	14.50	14,230.00	3,468.69	3,715.07	2,623.59	0.00	0.63	0.00	0.00	105.13	1527.27	5291.31	4939.17	4609.14	34.89	35.10	23.69	0	0	0	0	0	0
9.	TULUNG AGUNG	1	1993	18.00	17,860.00	4,250.51	3,721.91	3,781.29	1.51	7.23	61.07	40.58	80.75	0.00	4467.40	4950.11	4917.64	64.92	60.27	60.47	0	0	0	0	0	0
10.	TULUNG AGUNG	2	1993	18.00	17,860.00	4,269.63	3,582.61	3,780.13	3.13	0.00	0.00	0.00	80.02	0.00	4487.24	5097.37	4979.87	65.39	59.00	64.79	0	0	0	0	0	0
11.	MENDALAN	1	1930	5.60	4,200.00	1,257.48	387.09	755.44	0.00	0.00	0.00	0.00	0.00	0.00	7502.52	8372.91	8004.56	4.38	1.51	2.59	0	0	0	0	0	0
12.	MENDALAN	2	1955	5.80	5,500.00	6,328.41	7,908.34	5,913.17	0.58	0.00	0.00	559.45	0.00	0.00	1871.56	851.66	2846.83	28.69	36.59	26.50	0	0	0	0	0	0
13.	MENDALAN	3	1955	5.80	5,500.00	5,078.56	4,208.90	4,582.89	0.50	0.00	0.00	216.00	0.00	0.00	3464.94	4551.10	4177.11	21.35	20.36	24.75	0	0	0	0	0	0
14.	MENDALAN	4	1955	5.80	5,500.00	4,350.56	4,853.34	5,198.73	0.25	0.00	0.00	0.00	0.00	0.00	4409.19	3906.66	3561.27	21.87	23.67	24.90	0	0	0	0	0	0
15.	SIMAN	1	1955	3.6	3,400.00	6,440.12	4,439.18	10.00	0.97	2.55	0.00	0.00	3026.00	8750.00	2318.91	1292.27	0.00	17.68	11.21	0.02	0	0	0	0	0	0
16.	SIMAN	2	1931	3.6	3,400.00	6,587.87	8,530.29	7,905.28	3.72	2.23	0.00	0.00	0.00	364.32	2168.41	227.48	490.40	17.94	24.93	22.90	0	0	0	0	0	0
17.	SIMAN	3	1955	3.6	3,400.00	7,593.96	8,356.17	7,449.67	3.88	3.17	0.00	24.00	0.00	80.47	1138.16	400.66	1229.86	20.43	23.85	26.87	0	0	0	0	0	0
18.	SELOREJO	1	1973	4.48	4,430.00	7,622.31	8,491.52	7,657.86	0.00	0.63	0.00	716.02	97.20	244.05	421.67	170.65	858.09	17.56	23.20	21.65	0	0	0	0	0	0
19.	WONOREJO	1	2002	6.5	6,500.00	4,587.98	3,518.52	4,287.27	0.56	0.39	0.00	0.00	80.75	103.33	4171.46	5160.34	4369.40	16.89	18.37	20.72	0	0	0	0	0	0
20	GIRINGAN	1	1955	0.90	880.00	5,142.82	6,015.41	5,199.72	0.00	8.75	0.00	0.00	0.00	0.00	3617.18	2735.84	3560.28	3.66	4.38	4.10	0	0	0	0	0	0
21	GIRINGAN	2	1955	0.90	880.00	5,289.25	5,832.31	5,261.23	10.07	9.08	0.00	0.00	0.00	0.00	3460.68	2918.61	3498.77	3.79	4.26	3.81	0	0	0	0	0	0
22	GIRINGAN	3	1937	1.40	1,370.00	5,901.42	5,532.93	5,608.81	6.25	9.34	0.00	0.00	0.00	0.00	2852.33	3217.73	3151.19	5.53	5.04	5.08	0	0	0	0	0	0
23	GOLANG	1	1959	0.90	890.00	5,662.88	6,573.51	5,625.51	15.56	5.75	0.00	0.00	0.00	0.00	3081.56	2180.74	3134.49	4.11	4.51	4.10	0	0	0	0	0	0
24	GOLANG	2	1959	0.90	890.00	5,238.27	5,351.01	5,441.53	0.00	6.00	0.00	0.00	0.00	0.00	3521.73	3402.99	3318.47	3.86	3.94	4.49	0	0	0	0	0	0
25	GOLANG	3	1959	0.90	890.00	5,575.93	5,693.62	4,616.12	0.00	6.17	0.00	0.00	0.00	0.00	3184.07	3060.21	4143.88	3.87	3.92	3.42	0	0	0	0	0	0
26	NGEBEL	1	1968	2.20	2,160.00	4,603.00	5,304.42	4,503.24	17.52	0.00	640.75	0.00	0.00	700.92	4139.48	3455.58	2915.09	7.94	9.06	6.84	0	0	0	0	0	0
	UP. CIRATA																									
27	CIRATA	1	1988	126.00	118,500.00	2,441.23	1,825.17	2,197.79	37.10	0.18	3.96	224.67	875.25	0.00	6057.00	6059.40	6558.25	170.62	97.12	153.22	0	0	0	0	0	0
28	CIRATA	2	1988	126.00	118,500.00	2,358.70	2,088.99	1,853.28	9.91	5.05	3.85	202.03	894.08	0.00	6189.36	5771.88	6902.87	171.10	92.43	139.95	0	0	0	0	0	0
29	CIRATA	3	1988	126.00	118,500.00	2,268.35	2,640.84	8,760.00	26.39	105.12	0.00	509.21	706.00	0.00	5956.05	5308.04	0.00	168.60	93.41	92.81	0	0	0	0	0	0
30	CIRATA	4	1988	126.00	118,500.00	2,329.49	2,405.10	1,919.31	0.22	4.45	0.25	561.18	802.92	0.00	5869.11	5547.53	6840.44	163.09	142.14	147.14	0	0	0	0	0	0
31	CIRATA	5	1997	126.00	118,500.00	2,806.37	2,173.89	1,414.40	0.37	15.07	0.82	202.25	395.25	906.55	5751.01	6175.79	6438.23	209.43	100.26	112.53	0	0	0	0	0	0
32	CIRATA	6	1997	126.00	118,500.00	2,591.38	2,398.61	1,869.67	1.25	8.02	0.38	201.08	229.00	398.58	5966.29	6124.37	6491.37	189.77	127.90	141.92	0	0	0	0	0	0
33	CIRATA	7	1998	126.00	118,500.00	2,311.40	2,590.41	1,955.80	20.07	0.00	4.13	417.12	205.92	443.07	6011.41	5963.67	6357.00	173.17	122.82	149.13	0	0	0	0	0	0
34	CIRATA	8	1998	126.00	118,500.00	5,300.57	2,603.52	3,079.78	0.23	77.27	4.03	0.00	186.92	0.00	3459.20	5892.29	5676.19	131.24	118.04	173.04	0	0	0	0	0	0
	UP. GRESIK																									
35	PLTU GRESIK	1	1981	100.00	80,000.00	7,322.95	8,010.55	7,249.00	96.00	10.20	0.25	1173.90	365.98	1344.00	167.15	373.27	166.75	567.28	606.30	589.21	2,833.26	2,771.63	2,875.76	30.35	31.03	29.91
36	PLTU GRESIK	2	1981	100.00	80,000.00	8,252.97	7,642.72	8,371.06	21.05	8.31	49.12	364.11	1078.13	339.66	121.87	30.84	0.16	641.73	599.02	654.80	2,802.70	2,769.40	2,793.46	30.68	31.05	30.79
37	PLTU GRESIK	3	1988	200.00	166,500.00	6,735.33	8,373.87	8,019.86	0.00	10.43	19.80	2024.67	375.70	720.34	0.00	0.00	0.00	874.42	1244.23	1315.40	2,486.88	2,403.94	2,343.98	34.58	35.77	36.69
38	PLTU GRESIK	4	1988	200.00	166,500.00	6,466.41	8,274.06	7,877.71	0.00	23.47	52.60	2293.59	462.47	749.95	0.00	0.00	79.74	902.84	1257.03	1255.82	2,543.70	2,437.13	2,540.89	33.81	35.29	33.85
39	PLTG GRESIK	1	1978	20.10	16,000.00	1,215.62	1,279.83	251.85	525.19	56.42	304.43	1042.85	0.00	1143.92	5976.34	7423.75	7059.80	16.66	8.58	3.86	4,314.79	4,845.43	4,705.18	19.93	17.75	18.28
40	PLTG GRESIK	2	1978	20.10	16,000.00	1,422.55	1,067.63	258.65	117.94	140.29	144.95	0.00	3713.03	246.47	7219.51	3839.05	8109.93	23.05	5.27	4.34	4,244.43	4,381.94	4,299.12	20.26	19.63	20.00
41	PLTG GRESIK (GILITIMUR)	1	1993	20.10	16,500.00	1,801.68	1,905.02	195.21	64.12	0.00	0.00	0.00	27.00	2363.17	6894.20	6827.98	6201.62	28.06	18.73	3.27	4,276.87	4,393.61	5,169.27	20.11	19.57	16.64
42	PLTG GRESIK (GILITIMUR)	2	1993	20.10	16,500.00	1,932.14	1,031.30	391.89	189.98	106.42	323.70	0.00	1552.67	0.00	6637.88	6069.61	8044.41	25.03	15.49	3.51	4,489.30	4,742.97	5,758.53	19.16	18.13	14.93
43	PLTGU GRESIK	GT 11	1992	112.45	90,000.00	7,756.84	6,924.58	7,932.93	13.35	106.48	77.69	837.03	1258.39	214.05	152.78	470.55	535.33	557.56	460.94	644.75	3,515.56	3,625.77	3,419.48	24.46	23.72	25.15
44	PLTGU GRESIK	GT 12	1992	112.45	90,000.00	7,432.50	7,223.41	7,942.70	153.68	182.87	26.75	1090.83	627.75	415.33	82.99	725.97	375.22	503.01	493.96	631.86	3,531.00	3,556.81	3,444.85	24.36	24.18	24.96
45	PLTGU GRESIK	GT 13	1992	112.45	90,000.00	7,703.73	8,378.23	7,192.95	7.15	100.02	161.16	1047.18	215.25	551.27	1.93	66.50	854.62	694.12	740.37	542.50	3,278.34	3,235.78	3,428.75	26.23	26.58	25.08
46	PLTGU GRESIK	ST10	1993	188.91	170,000.00	8,748.86	7,641.98	8,175.98	3.14	24.65	235.19	8.00	1083.34	348.83	0.00	10.03	0.00	1037.48	926.41	975.76	0.00	0.00	0.00	-	-	-
47	PLTGU GRESIK	GT 21	1992	112.45	90,000.00	7,431.02	5,303.95	5,408.85	4.95	25.33	18.02	992.88	254.98	574.32	331.15	3175.74	2758.81	495.18	328.56	391.67	3,638.49	3,718.06	3,441.39	23.64	23.13	24.99
48	PLTGU GRESIK	GT 22	1992	112.45	90,000.00	7,288.55	5,247.07	3,729.88	55.60	6.35	18.85	996.86	0.00	966.78	418.99	3506.58	4044.49	468.20	327.67	248.28	3,626.41	3,709.95	3,536.65	23.71	23.18	24.32
49	PLTGU GRESIK	GT 23	1992	112.45	90,000.00	7,238.58	5,192.60	4,379.09	15.22	8.43	14.21	705.45	1258.83	645.88	800.75	2300.12	3720.82	278.32	307.95	319.68	4,602.70	3,877.32	3,476.57	18.68	22.18	24.74
50	PLTGU GRESIK	ST 20	1993	188.91	170,000.00	8,210.36	5,807.02	6,822.64	0.50	22.85	2.98	283.28	1116.15	274.00	265.86	1813.98	1660.38	719.46	539.37	521.88	0.00	0.00	0.00	-	-	-
51	PLTGU GRESIK	GT 31	1993	112.45	100,000.00	8,401.51	7,421.86	7,806.19	62.44	1.52	0.57	237.63	1056.32	202.25	58.42	280.30	750.99	609.70	567.18	715.30	3,594.87	3,509.60	3,311.05	23.92	24.50	25.97
52	PLTGU GRESIK	GT 32	1993	112.45	100,000.00	8,475.50	8,075.19	7,915.92	9.79	2.79	9.30	191.72	616.79	187.58	82.99	65.23	647.20	624.50	631.16	739.21	3,555.26	3,477.18	3,290.18	24.19	24.73	26.14
53	PLTGU GRESIK	GT 33	1993	112.45	100,000.00	8,362.18	7,895.79	8,474.31	6.32	0.85	0.00	241.65	521.22	192.07	149.85	342.14	93.62	623.62	623.77	797.34	3,524.19	3,462.82	3,275.18	24.40	24.84	26.26
54	PLTGU GRESIK	ST 30	1993	188.91	180,000.00	8,373.10	7,662.01	8,755.28	1.58	2.13	4.70	375.10	1072.08	0.00	10.22	23.78	0.02	1168.71	1046.75	1320.21	0.00	0.00	0.00	-	-	-
	UP. PAITON																									
55	PLTU PAITON	1	1993	400.00	370,000.00	5,964.99	7,916.72	8,437.30	95.43	173.86	322.70	2698.47	669.32	0.00	1.11	0.10	0.00	1913.17	2899.22	3170.91	2,777.57	2,761.07	2,729.02	30.96	31.15	31.51
56	PLTU PAITON	2	1993	400.00	370,000.00	8,413.88	6,804.96	7,720.36	346.12	0.00	311.46	0.00	1727.35	689.60	0.00	227.69	38.58	3010.80	2433.18	2933.50	2,747.08	2,843.98	2,675.69	31.31	30.24	32.14
	UP. MUARA KARANG																									
57	PLTU M.KARANG	1	1979	100.00	80,667.00	7,148.11	8,444.93	6,510.87	397.85	315.07	496.13	1205.95	0.00	1751.00	8.09	0.00	2.00	564.01	665.01	518.62	3,068.89	3,070.97	3,136.28	28.02	28.00	27.42
58	PLTU M.KARANG	2	1979	100.00	80,667.00	5,568.49	6,608.57	7,911.91	206.17	478.71	476.62	2966.79	1672.72	371.47	18.55	0.00	0.00	415.22	441.21	630.44	3,078.27	3,203.01	3,206.88	27.94	26.85	26.82
59	PLTU M.KARANG	3	1979	100.00	80,667.00	8,187.97	7,095.11	7,051.23	505.73	89.45	195.29	4.25	1575.43	1513.48	62.05	0.01	0.00	588.21	568.93	542.66	3,056.52	3,105.55	3,180.22	28.14	27.69	27.04
60	PLTU M.KARANG	4	1981	200.00	162,000.00	7,083.14	7,207.93	5,078.23	300.11	406.69	2566.30	1347.03	1131.67	1114.55	29.72	13.71	0.92	514.59	782.49	585.32	3,228.07	2,938.83	3,078.97	26.64	29.26	27.93
61	PLTU M.KARANG	5	1982	200.00	162,000.00	7,712.56	7,058.75	6,813.68	364.79	363.77	432.89	682.65	1326.58	1503.18	0.00	10.90	10.25	792.92	549.20	984.24	2,891.65	3,085.42	2,876.56	29.74	27.87	29.90
62	PLTGU M.KARANG	GT 11	1992	107.86	90,000.00	8,209.40	7,528.24	8,212.38	197.76	128.96	55.22	352.84	1090.35	470.87	0.00	12.45	21.53	624.97	659.42	721.45	3,245.24	3,332.28	3,393.34	26.50	25.81	25.34
63	PLTGU M.KARANG	GT 12	1992	107.86	90,000.00	8,172.85	6,946.38	7,969.45	42.15	46.06	76.33	447.28	1767.56	714.22	97.72	0.00	0.00	707.05	640.49	726.82	3,164.29	3,228.03	3,392.24	27.18	26.64	25.35
64	PLTGU M.KARANG	GT 13	1992	107.86	90,000.00	6,529.75	8,558.85	5,618.40	85.58	49.73	52.08	2144.30	150.25	3072.37	0.37	1.17	17.15	586.50	797.26	517.76	3,123.83	3,168.24	3,205.63	27.53	27.14	26.83
65	PLTGU M.KARANG	ST10	1995	185.00	150,000.00	5,141.80	8,387.41	7,919.82	241.38	315.12	294.58	3376.82	0.00	544.08	0.00	57.47	1.52	454.31	984.29	832.14	0.00	0.00	0.00	-	-	-
	UP. MUARA TAWAR																									
66	PLTGU M.TAWAR	GT 11	1997	145.00	135,000.00	4,905.24	5,971.96	5,245.54	199.84	193.36	119.28	3466.65	465.90	1605.50	188.27	2128.78	1789.68	481.83	588.97	481.87	3,104.61	3,178.92	3,137.73	27.70	27.05	27.41
67	PLTGU M.TAWAR	GT 12	1997	145.00	135,000.00	6,844.48	6,585.62	5,875.95	35.05	200.81	81.42	1547.28	351.76	1007.38	333.18	1621.81	1795.25	689.05	665.96	582.06	3,070.69	3,134.39	3,116.41	28.01	27.44	27.60
68	PLTGU M.TAWAR	GT 13	1997	145.00	135,000.00	7,941.72	5,534.97	5,921.38	99.82	150.79	73.83	470.47	1849.33	1039.17	248.00	1224.91	1725.62	803.05	551.70	548.43	3,107.15	3,149.98	3,148.92	27.68	27.30	27.31
69	PLTGU M.TAWAR	ST10	1997	220.00	180,000.00	8,503.12	7,129.06	7,245.66	50.62	156.31	33.06	0.00	951.05	0.00	206.26	523.58	1481.28	1038.34	899.30	828.10	0.00	0.00	0.00	-	-	-
70	PLTG M.TAWAR	GT 21	1997	145.00	135,000.00	3,986.73	2,355.30	1,314.28	298.12	116.80	59.98	1712.37	347.72	1230.12	2762.78	5940.18	6155.62	276.35	212.37	98.96	3,234.28	3,273.18	3,334.45	26.59	26.27	25.79
71	PLTG M.TAWAR	GT 22	1997	145.00	135,000.00	4,282.89	1,960.85	856.65	325.31	23.72	58.04	1006.37	3580.70	1853.50	3145.43	3194.73	5991.81	332.62	178.03	70.81	3,264.31	3,228.58	3,366.23	26.35	26.64	25.55

Operation Performance Record for the Existing Power Plants of PJB

No.	Plant Name	Unit No.	Type Fuel	Fuel Consumption (2005) MFO (Ltr)	IDO (Ltr)	HSD (Ltr)	Gas (MMBTU)	Coal (Kg)	Fuel Consumption (2006) MFO (Ltr)	IDO (Ltr)	HSD (Ltr)	Gas (MMBTU)	Coal (Kg)	Fuel Consumption (2007) MFO (Ltr)	IDO (Ltr)	HSD (Ltr)	Gas (MMBTU)	Coal (Kg)
	UP. BRANTAS																	
1.	SUTAMI	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.	SUTAMI	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.	SUTAMI	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.	WLINGI	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.	WLINGI	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.	LODOYO	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.	SENGGURUH	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.	SENGGURUH	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.	TULUNG AGUNG	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10.	TULUNG AGUNG	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11.	MENDALAN	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12.	MENDALAN	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13.	MENDALAN	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14.	MENDALAN	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15.	SIMAN	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16.	SIMAN	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17.	SIMAN	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18.	SELOREJO	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19.	WONOREJO	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	GIRINGAN	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	GIRINGAN	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	GIRINGAN	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	GOLANG	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	GOLANG	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	GOLANG	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	NGEBEL	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	UP. CIRATA																	
27	CIRATA	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	CIRATA	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	CIRATA	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	CIRATA	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	CIRATA	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	CIRATA	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	CIRATA	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	CIRATA	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	UP. GRESIK																	
35	PLTU GRESIK	1	MFO & HSD	154,132,742	-	17,019	-	-	161,687,911	-	42,219	-	-	161,558,215	-	23,583	-	-
36	PLTU GRESIK	2	MFO & HSD	173,083,910	-	47,077	-	-	159,977,893	-	27,799	-	-	174,296,786	-	47,747	-	-
37	PLTU GRESIK	3	MFO, HSD & Gas	168,488,509	-	42,406	1,538,519	-	253,624,614	-	137,575	1,302,972	-	224,531,856	-	114,093	2,707,660	-
38	PLTU GRESIK	4	MFO, HSD & Gas	181,914,169	-	237,207	1,495,996	-	245,628,184	-	86,980	1,903,978	-	253,275,043	-	140,415	1,940,630	-
39	PLTG GRESIK	1	HSD	-	-	7,764,018	-	-	-	-	4,404,548	-	-	-	-	1,871,519	-	-
40	PLTG GRESIK	2	HSD	-	-	10,612,430	-	-	-	-	2,443,458	-	-	-	-	2,011,461	-	-
41	PLTG GRESIK (GILITIMUR)	1	HSD	-	-	12,964,164	-	-	-	-	8,736,593	-	-	-	-	1,714,424	-	-
42	PLTG GRESIK (GILITIMUR)	2	HSD	-	-	12,132,610	-	-	-	-	7,823,790	-	-	-	-	2,049,673	-	-
43	PLTGU GRESIK	GT 11	HSD & Gas	-	-	173,881,117	1,410,620	-	-	-	149,888,114	1,091,387	-	-	-	131,544,125	3,876,307	-
44	PLTGU GRESIK	GT 12	HSD & Gas	-	-	186,811,609	234,933	-	-	-	136,500,467	1,963,402	-	-	-	127,496,207	3,945,448	-
45	PLTGU GRESIK	GT 13	HSD & Gas	-	-	-	8,956,119	-	-	-	-	9,433,983	-	-	-	157,236,832	1,627,007	-
46	PLTGU GRESIK	ST10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	PLTGU GRESIK	GT 21	HSD & Gas	-	-	196,025,608	-	-	-	-	131,434,777	5,593	-	-	-	81,521,068	2,347,717	-
48	PLTGU GRESIK	GT 22	HSD & Gas	-	-	184,898,225	-	-	-	-	130,803,391	-	-	-	-	87,412,128	291,293	-
49	PLTGU GRESIK	GT 23	HSD & Gas	-	-	24,293,539	4,150,192	-	-	-	126,358,619	57,395	-	-	-	105,124,037	563,753	-
50	PLTGU GRESIK	ST 20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	PLTGU GRESIK	GT 31	Gas	-	-	-	8,614,169	-	-	-	-	7,818,981	-	-	-	-	9,314,674	-
52	PLTGU GRESIK	GT 32	Gas	-	-	-	8,748,717	-	-	-	-	8,643,612	-	-	-	-	9,591,507	-
53	PLTGU GRESIK	GT 33	Gas	-	-	-	8,639,994	-	-	-	-	8,500,112	-	-	-	-	10,283,750	-
54	PLTGU GRESIK	ST 30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	UP. PAITON																	
55	PLTU PAITON	1	HSD & Coal	-	-	975,498	-	971,765,818	-	-	921,626	-	1,494,149,306	-	-	1,333,233	-	1,587,827,946
56	PLTU PAITON	2	HSD & Coal	-	-	1,140,605	-	1,534,260,238	-	-	1,557,556	-	1,258,609,914	-	-	1,168,703	-	1,452,590,592
	UP. MUARA KARANG																	
57	PLTU M.KARANG	1	MFO & IDO	160,853,257	2,693,634	-	-	-	192,764,443	1,404,967	-	-	-	150,202,799	778,165	655,693	-	-
58	PLTU M.KARANG	2	MFO & IDO	116,630,328	2,751,937	-	-	-	132,056,755	778,067	-	-	-	191,041,786	781,850	594,228	-	-
59	PLTU M.KARANG	3	MFO & IDO	169,419,817	937,189	-	-	-	168,424,149	955,452	-	-	-	163,190,966	627,421	307,698	-	-
60	PLTU M.KARANG	4	MFO, IDO, HSD & Gas	105,992,316	574,481	825,380	1,910,564	-	145,130,515	574,584	1,186,635	2,791,702	-	111,740,621	374,410	1,291,244	2,145,299	-
61	PLTU M.KARANG	5	MFO, IDO, HSD & Gas	156,478,423	3,257,302	2,781,233	2,163,453	-	129,254,877	783,712	729,781	1,205,663	-	181,778,609	700,532	1,710,480	3,250,493	-
62	PLTGU M.KARANG	GT 11	HSD & Gas	-	-	185,298	7,942,972	-	-	-	-	8,488,727	-	-	-	-	9,265,549	-
63	PLTGU M.KARANG	GT 12	HSD & Gas	-	-	28,753	8,732,577	-	-	-	-	7,999,192	-	-	-	6,390	9,280,861	-
64	PLTGU M.KARANG	GT 13	HSD & Gas	-	-	18,782,229	6,567,381	-	-	-	-	9,953,378	-	-	-	-	6,432,903	-
65	PLTGU M.KARANG	ST10	HSD & Gas	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	UP. MUARA TAWAR																	
66	PLTGU M.TAWAR	GT 11	HSD	-	-	162,536,371	-	-	-	-	201,423,048	-	-	-	-	163,313,148	-	-
67	PLTGU M.TAWAR	GT 12	HSD	-	-	229,347,701	-	-	-	-	224,865,448	-	-	-	-	196,010,214	-	-
68	PLTGU M.TAWAR	GT 13	HSD	-	-	270,717,227	-	-	-	-	187,024,851	-	-	-	-	186,687,181	-	-
69	PLTGU M.TAWAR	ST10	HSD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	PLTG M.TAWAR	GT 21	HSD	-	-	96,479,137	-	-	-	-	74,463,880	-	-	-	-	35,126,811	-	-
71	PLTG M.TAWAR	GT 22	HSD	-	-	117,197,406	-	-	-	-	61,817,783	-	-	-	-	25,315,268	-	-

Operation Performance Record for the Existing Power Plants of PJB

No.	Plant Name	Unit No.	Heat Content of Fuel (2005) MFO (kcal/Ltr)	IDO (kcal/Ltr)	HSD (kcal/Ltr)	Gas (Btu/SCF)	Coal (kcal/Kg)	Heat Content of Fuel (2006) MFO (kcal/Ltr)	IDO (kcal/Ltr)	HSD (kcal/Ltr)	Gas (Btu/SCF)	Coal (kcal/Kg)	Heat Content of Fuel (2007) MFO (kcal/Ltr)	IDO (kcal/Ltr)	HSD (kcal/Ltr)	Gas (Btu/SCF)	Coal (kcal/Kg)	Kcal Consumption (2005) MFO (M.kcal)	IDO (M.kcal)	HSD (M.kcal)
	UP. BRANTAS																			
1.	SUTAMI	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.	SUTAMI	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3.	SUTAMI	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4.	WLINGI	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5.	WLINGI	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6.	LODOYO	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7.	SENGGURUH	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.	SENGGURUH	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9.	TULUNG AGUNG	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10.	TULUNG AGUNG	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11.	MENDALAN	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12.	MENDALAN	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13.	MENDALAN	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14.	MENDALAN	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15.	SIMAN	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16.	SIMAN	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17.	SIMAN	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18.	SELOREJO	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19.	WONOREJO	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	GIRINGAN	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	GIRINGAN	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	GIRINGAN	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	GOLANG	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	GOLANG	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	GOLANG	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	NGEBEL	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	UP. CIRATA																			
27	CIRATA	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	CIRATA	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	CIRATA	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	CIRATA	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	CIRATA	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	CIRATA	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	CIRATA	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	CIRATA	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	UP. GRESIK																			
35	PLTU GRESIK	1	10,365	-	10,802	-	-	10,140	-	10,727	-	-	10,335	-	10,865	-	-	1,597,586	-	184
36	PLTU GRESIK	2	10,365	-	10,802	-	-	10,140	-	10,727	-	-	10,335	-	10,865	-	-	1,794,015	-	509
37	PLTU GRESIK	3	10,365	-	10,802	-	-	10,140	-	10,727	1,224	-	10,335	-	10,865	1,214	-	1,746,383	-	458
38	PLTU GRESIK	4	10,365	-	10,802	1,235	-	10,140	-	10,727	1,224	-	10,335	-	10,865	1,214	-	1,885,540	-	2,562
39	PLTG GRESIK	1	-	-	10,802	-	-	-	-	10,727	-	-	-	-	10,865	-	-	-	-	83,867
40	PLTG GRESIK	2	-	-	10,802	-	-	-	-	10,727	-	-	-	-	10,865	-	-	-	-	114,635
41	PLTG GRESIK (GILITIMUR)	1	-	-	10,802	-	-	-	-	10,727	-	-	-	-	10,865	-	-	-	-	140,039
42	PLTG GRESIK (GILITIMUR)	2	-	-	10,802	-	-	-	-	10,727	-	-	-	-	10,865	-	-	-	-	131,056
43	PLTGU GRESIK	GT 11	-	-	10,802	1,235	-	-	-	10,727	1,224	-	-	-	10,865	1,144	-	-	-	1,878,264
44	PLTGU GRESIK	GT 12	-	-	10,802	1,235	-	-	-	10,727	1,224	-	-	-	10,865	1,144	-	-	-	2,017,939
45	PLTGU GRESIK	GT 13	-	-	10,802	1,235	-	-	-	10,727	1,224	-	-	-	10,865	1,144	-	-	-	-
46	PLTGU GRESIK	ST10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	PLTGU GRESIK	GT 21	-	-	10,802	1,235	-	-	-	10,727	1,224	-	-	-	10,865	1,144	-	-	-	2,117,469
48	PLTGU GRESIK	GT 22	-	-	10,802	1,235	-	-	-	10,727	1,224	-	-	-	10,865	1,144	-	-	-	1,997,271
49	PLTGU GRESIK	GT 23	-	-	10,802	1,235	-	-	-	10,727	1,224	-	-	-	10,865	1,144	-	-	-	262,419
50	PLTGU GRESIK	ST 20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
51	PLTGU GRESIK	GT 31	-	-	-	1,235	-	-	-	-	1,224	-	-	-	-	1,144	-	-	-	-
52	PLTGU GRESIK	GT 32	-	-	-	1,235	-	-	-	-	1,224	-	-	-	-	1,144	-	-	-	-
53	PLTGU GRESIK	GT 33	-	-	-	1,235	-	-	-	-	1,224	-	-	-	-	1,144	-	-	-	-
54	PLTGU GRESIK	ST 30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	UP. PAITON																			
55	PLTU PAITON	1	-	-	-	-	5,035	-	-	9,102	-	5,077	-	-	9,147	-	4,916	-	-	-
56	PLTU PAITON	2	-	-	-	-	5,041	-	-	9,102	-	4,989	-	-	-	-	4,916	-	-	-
	UP. MUARA KARANG																			
57	PLTU M.KARANG	1	10,336	10,783	-	-	-	10,425	10,698	-	-	-	10,242	10,684	-	-	-	1,662,597	29,045	-
58	PLTU M.KARANG	2	10,336	10,783	-	-	-	10,425	10,698	-	-	-	10,242	10,684	-	-	-	1,205,504	29,674	-
59	PLTU M.KARANG	3	10,336	10,783	-	-	-	10,425	10,698	-	-	-	10,242	10,684	-	-	-	1,751,142	10,106	-
60	PLTU M.KARANG	4	10,336	10,783	10,752	1,106	-	10,425	10,698	11,022	1,086	-	10,242	10,684	10,907	1,049	-	1,095,548	6,195	8,874
61	PLTU M.KARANG	5	10,336	10,783	10,752	1,106	-	10,425	10,698	11,022	1,086	-	10,242	10,684	10,907	1,049	-	1,617,378	35,123	29,903
62	PLTGU M.KARANG	GT 11	-	-	10,752	1,106	-	-	-	11,022	1,086	-	-	-	10,907	1,049	-	-	-	1,992
63	PLTGU M.KARANG	GT 12	-	-	10,752	1,106	-	-	-	11,022	1,086	-	-	-	10,907	1,049	-	-	-	309
64	PLTGU M.KARANG	GT 13	-	-	10,752	1,106	-	-	-	11,022	1,086	-	-	-	10,907	1,049	-	-	-	201,940
65	PLTGU M.KARANG	ST10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	UP. MUARA TAWAR																			
66	PLTGU M.TAWAR	GT 11	-	-	10,941	-	-	-	-	9,207	-	-	-	-	9,147	-	-	-	-	1,778,246
67	PLTGU M.TAWAR	GT 12	-	-	10,941	-	-	-	-	9,207	-	-	-	-	9,147	-	-	-	-	2,509,203
68	PLTGU M.TAWAR	GT 13	-	-	10,941	-	-	-	-	9,207	-	-	-	-	9,147	-	-	-	-	2,961,811
69	PLTGU M.TAWAR	ST10	-	-	-	-	-	-	-	9,207	-	-	-	-	9,147	-	-	-	-	-
70	PLTG M.TAWAR	GT 21	-	-	10,941	-	-	-	-	9,207	-	-	-	-	9,147	-	-	-	-	1,055,540
71	PLTG M.TAWAR	GT 22	-	-	10,941	-	-	-	-	9,207	-	-	-	-	9,147	-	-	-	-	1,282,211

Operation Performance Record for the Existing Power Plants of PJB

No.	Plant Name	Unit No.	Kcal Consumption (2005) Gas (M.kcal)	Kcal Consumption (2005) Coal (M.kcal)	Kcal Consumption (2005) Total (M.kcal)	Kcal Consumption (2006) MFO (M.kcal)	Kcal Consumption (2006) IDO (M.kcal)	Kcal Consumption (2006) HSD (M.kcal)	Kcal Consumption (2006) Gas (M.kcal)	Kcal Consumption (2006) Coal (M.kcal)	Kcal Consumption (2006) Total (M.kcal)	Kcal Consumption (2007) MFO (M.kcal)	Kcal Consumption (2007) IDO (M.kcal)	Kcal Consumption (2007) HSD (M.kcal)	Kcal Consumption (2007) Gas (M.kcal)	Kcal Consumption (2007) Coal (M.kcal)	Kcal Consumption (2007) Total (M.kcal)	Selling Price (2005) (M.Rp) K.B	Selling Price (2005) (M.Rp) K.C	Selling Price (2005) (M.Rp) K.D	Selling Price (2006) s/d Nop.(M.Rp) K.B	Selling Price (2006) s/d Nop.(M.Rp) K.C	Selling Price (2006) s/d Nop.(M.Rp) K.D
	UP. BRANTAS																						
1.	SUTAMI	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				18,352	16,828	-
2.	SUTAMI	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
3.	SUTAMI	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
4.	WLINGI	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				30,735	15,058	-
5.	WLINGI	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
6.	LODOYO	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
7.	SENGGURUH	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
8.	SENGGURUH	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
9.	TULUNG AGUNG	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
10.	TULUNG AGUNG	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
11.	MENDALAN	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
12.	MENDALAN	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
13.	MENDALAN	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
14.	MENDALAN	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
15.	SIMAN	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
16.	SIMAN	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
17.	SIMAN	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
18.	SELOREJO	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
19.	WONOREJO	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
20	GIRINGAN	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				13,280	3,217	-
21	GIRINGAN	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
22	GIRINGAN	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
23	GOLANG	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
24	GOLANG	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
25	GOLANG	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
26	NGEBEL	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
	UP. CIRATA																						
27	CIRATA	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				54,789	7,124	-
28	CIRATA	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
29	CIRATA	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
30	CIRATA	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
31	CIRATA	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
32	CIRATA	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
33	CIRATA	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
34	CIRATA	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
	UP. GRESIK																						
35	PLTU GRESIK	1	-	-	1,597,770	1,639,515	-	453	-	-	1,639,968	1,669,704	-	256	-	-	1,669,960				30,444	1,168,445	1,390
36	PLTU GRESIK	2	-	-	1,794,524	1,622,176	-	298	-	-	1,622,474	1,801,357	-	519	-	-	1,801,876						
37	PLTU GRESIK	3	387,707	-	2,134,548	2,571,754	-	1,476	328,349	-	2,901,579	2,320,537	-	1,240	682,330	-	3,004,107				69,001	2,152,901	2,857
38	PLTU GRESIK	4	376,991	-	2,265,093	2,490,670	-	933	479,803	-	2,971,406	2,617,598	-	1,526	489,039	-	3,108,163						
39	PLTG GRESIK	1	-	-	83,867	-	-	47,248	-	-	47,248	-	-	20,334	-	-	20,334				1,513	35,237	21
40	PLTG GRESIK	2	-	-	114,635	-	-	26,211	-	-	26,211	-	-	21,855	-	-	21,855						
41	PLTG GRESIK (GILITIMUR)	1	-	-	140,039	-	-	93,718	-	-	93,718	-	-	18,627	-	-	18,627				6,041	84,687	52
42	PLTG GRESIK (GILITIMUR)	2	-	-	131,056	-	-	83,927	-	-	83,927	-	-	22,270	-	-	22,270						
43	PLTGU GRESIK	GT 11	355,476	-	2,233,740	-	-	1,607,865	275,030	-	1,882,895	-	-	1,429,227	976,829	-	2,406,056				237,226	4,304,291	9,306
44	PLTGU GRESIK	GT 12	59,203	-	2,077,142	-	-	1,464,254	494,777	-	1,959,031	-	-	1,385,246	994,253	-	2,379,499						
45	PLTGU GRESIK	GT 13	2,256,942	-	2,256,942	-	-	-	2,377,364	-	2,377,364	-	-	1,708,378	410,006	-	2,118,384						
46	PLTGU GRESIK	ST10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
47	PLTGU GRESIK	GT 21	-	-	2,117,469	-	-	1,409,914	1,409	-	1,411,323	-	-	885,726	591,625	-	1,477,351						
48	PLTGU GRESIK	GT 22	-	-	1,997,271	-	-	1,403,141	-	-	1,403,141	-	-	949,733	73,406	-	1,023,139						
49	PLTGU GRESIK	GT 23	1,045,848	-	1,308,267	-	-	1,355,462	14,463	-	1,369,925	-	-	1,142,173	142,066	-	1,284,239						
50	PLTGU GRESIK	ST 20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
51	PLTGU GRESIK	GT 31	2,170,770	-	2,170,770	-	-	-	1,970,383	-	1,970,383	-	-	-	2,347,298	-	2,347,298						
52	PLTGU GRESIK	GT 32	2,204,677	-	2,204,677	-	-	-	2,178,190	-	2,178,190	-	-	-	2,417,060	-	2,417,060						
53	PLTGU GRESIK	GT 33	2,177,279	-	2,177,279	-	-	-	2,142,028	-	2,142,028	-	-	-	2,591,505	-	2,591,505						
54	PLTGU GRESIK	ST 30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
	UP. PAITON																						
55	PLTU PAITON	1	-	4,892,948	4,892,948	-	-	8,389	-	7,586,364	7,594,753	-	-	12,196	-	7,805,476	7,817,672				221,427	576,942	8,185
56	PLTU PAITON	2	-	7,734,774	7,734,774	-	-	14,178	-	6,278,840	6,293,018	-	-	-	-	7,140,674	7,140,674						
	UP. MUARA KARANG																						
57	PLTU M.KARANG	1	-	-	1,691,642	2,009,656	15,031	-	-	-	2,024,687	1,538,328	8,314	-	-	-	1,546,642				26,249	1,634,175	1,891
58	PLTU M.KARANG	2	-	-	1,235,178	1,376,751	8,324	-	-	-	1,385,075	1,956,587	8,354	-	-	-	1,964,941						
59	PLTU M.KARANG	3	-	-	1,761,248	1,755,898	10,222	-	-	-	1,766,120	1,671,348	6,704	-	-	-	1,678,052						
60	PLTU M.KARANG	4	481,462	-	1,592,079	1,513,051	6,147	13,079	703,509	-	2,235,786	1,144,411	4,000	14,083	540,615	-	1,703,109				34,868	987,369	1,447
61	PLTU M.KARANG	5	545,190	-	2,227,594	1,347,540	8,385	8,043	303,827	-	1,667,795	1,861,717	7,485	18,656	819,124	-	2,706,982						
62	PLTGU M.KARANG	GT 11	2,001,629	-	2,003,621	-	-	-	2,139,159	-	2,139,159	-	-	-	2,334,918	-	2,334,918				224,829	681,774	4,078
63	PLTGU M.KARANG	GT 12	2,200,609	-	2,200,918	-	-	-	2,015,796	-	2,015,796	-	-	70	2,338,777	-	2,338,847						
64	PLTGU M.KARANG	GT 13	1,654,980	-	1,856,920	-	-	-	2,508,251	-	2,508,251	-	-	-	1,621,092	-	1,621,092						
65	PLTGU M.KARANG	ST10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
	UP. MUARA TAWAR																						
66	PLTGU M.TAWAR	GT 11	-	-	1,778,246	-	-	1,854,502	-	-	1,854,502	-	-	1,493,825	-	-	1,493,825				140,791	3,659,909	3,531
67	PLTGU M.TAWAR	GT 12	-	-	2,509,203	-	-	2,070,336	-	-	2,070,336	-	-	1,792,905	-	-	1,792,905						
68	PLTGU M.TAWAR	GT 13	-	-	2,961,811	-	-	1,721,938	-	-	1,721,938	-	-	1,707,628	-	-	1,707,628						
69	PLTGU M.TAWAR	ST10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
70	PLTG M.TAWAR	GT 21	-	-	1,055,540	-	-	685,589	-	-	685,589	-	-	321,305	-	-	321,305				167,197	822,449	584
71	PLTG M.TAWAR	GT 22	-	-	1,282,211	-	-	569,156	-	-	569,156	-	-	231,559	-	-	231,559						

Operation Performance Record for the Existing Power Plants of PJB

No.	Plant Name	Unit No.	Selling Price (2007) (M.Rp) K.B	K.C	K.D	Av. F.O %	Av. P.O Days	Av. Prod. GWh	Av. Kcal Consump M.kcal	Av. H.R kcal/kWh	Average Fuel Consumption (kl,MMBTU,ton) MOF	IDO	HSD	Gas	Coal	Av. F.O by Entity %	Av. P.O by Entity Days	Prod. By Entity GWh	Av. H.R kcal/kWh	Ava. Max by Entity MW	F. Cost by Entity Rp/kw-m	V. Cost by Entity Rp/kwh	F. Cost by Entity $/kw-m	V. Cost by Entity $/Mwh
	UP. BRANTAS																							
1.	SUTAMI	1	28,942	16,582	-	2.07	0.01	155.16	-	-	-	-	-	-	-	1.09	0.01	414	-	103.0	23,416	-	2.60	-
2.	SUTAMI	2				1.18	0.01	159.17	-	-	-	-	-	-	-									
3.	SUTAMI	3				0.00	0.01	99.66	-	-	-	-	-	-	-									
4.	WLINGI	1	27,138	21,182	-	0.00	0.03	70.99	-	-	-	-	-	-	-	4.91	12.46	545	-	164.1	13,781	-	1.53	-
5.	WLINGI	2				0.00	0.01	68.26	-	-	-	-	-	-	-									
6.	LODOYO	1				5.29	0.03	37.67	-	-	-	-	-	-	-									
7.	SENGGURUH	1				42.35	0.01	38.19	-	-	-	-	-	-	-									
8.	SENGGURUH	2				0.21	0.06	31.23	-	-	-	-	-	-	-									
9.	TULUNG AGUNG	1				23.27	0.00	61.89	-	-	-	-	-	-	-									
10.	TULUNG AGUNG	2				1.04	1.11	63.06	-	-	-	-	-	-	-									
11.	MENDALAN	1				0.00	0.00	2.83	-	-	-	-	-	-	-									
12.	MENDALAN	2				0.19	7.77	30.59	-	-	-	-	-	-	-									
13.	MENDALAN	3				0.17	3.00	22.15	-	-	-	-	-	-	-									
14.	MENDALAN	4				0.08	0.00	23.48	-	-	-	-	-	-	-									
15.	SIMAN	1				1.17	163.56	9.64	-	-	-	-	-	-	-									
16.	SIMAN	2				1.98	5.06	21.92	-	-	-	-	-	-	-									
17.	SIMAN	3				2.35	1.45	23.72	-	-	-	-	-	-	-									
18.	SELOREJO	1				0.21	14.68	20.80	-	-	-	-	-	-	-									
19.	WONOREJO	1				0.32	2.56	18.66	-	-	-	-	-	-	-									
20	GIRINGAN	1	2,237	2,261	-	2.92	0.00	4.05	-	-	-	-	-	-	-	3.73	1.39	33	-	8.0	23,302	-	2.59	-
21	GIRINGAN	2				6.38	0.00	3.95	-	-	-	-	-	-	-									
22	GIRINGAN	3				5.20	0.00	5.22	-	-	-	-	-	-	-									
23	GOLANG	1				7.10	0.00	4.24	-	-	-	-	-	-	-									
24	GOLANG	2				2.00	0.00	4.10	-	-	-	-	-	-	-									
25	GOLANG	3				0.00	0.00	3.74	-	-	-	-	-	-	-									
26	NGEBEL	1				2.50	9.74	7.95	-	-	-	-	-	-	-									
	UP. CIRATA																							
27	CIRATA	1	83,679	6,481	-	0.20	15.28	140.32	-	-	-	-	-	-	-	0.16	14.52	1,127	-	948.0	7,356	-	0.82	-
28	CIRATA	2				0.10	15.22	134.49	-	-	-	-	-	-	-									
29	CIRATA	3				0.50	16.88	118.27	-	-	-	-	-	-	-									
30	CIRATA	4				0.00	18.95	150.79	-	-	-	-	-	-	-									
31	CIRATA	5				0.10	20.89	140.74	-	-	-	-	-	-	-									
32	CIRATA	6				0.00	11.51	153.20	-	-	-	-	-	-	-									
33	CIRATA	7				0.10	14.81	148.38	-	-	-	-	-	-	-									
34	CIRATA	8				0.30	2.60	140.77	-	-	-	-	-	-	-									
	UP. GRESIK																							
35	PLTU GRESIK	1	28,374	1,310,102	1,727	0.40	40.05	587.60	1,635,899	2,784	159,126	0	28	0	0	0.35	32.40	610	2,768	80.0	29,556	1.4	3.28	0.16
36	PLTU GRESIK	2				0.30	24.75	631.85	1,739,625	2,753	169,120	0	41	0	0									
37	PLTU GRESIK	3	55,622	1,891,566	3,550	0.10	43.34	1144.68	2,680,078	2,341	215,548	0	98	1,849,717	0	0.20	46.02	1,142	2,392	166.5	27,839	1.6	3.09	0.18
38	PLTU GRESIK	4				0.30	48.69	1138.56	2,781,554	2,443	226,939	0	155	1,780,201	0									
39	PLTG GRESIK	1	4,224	25,173	14	3.40	30.37	9.70	50,483	5,203	0	0	4,680	0	0	1.50	54.99	10	5,085	16.0	22,000	0.7	2.44	0.08
40	PLTG GRESIK	2				1.50	54.99	10.89	54,234	4,980	0	0	5,022	0	0									
41	PLTG GRESIK (GILITIMUR)	1	4,123	17,936	12	0.20	33.20	16.69	84,128	5,041	0	0	7,805	0	0	1.30	27.38	16	5,204	16.5	20,823	0.4	2.31	0.04
42	PLTG GRESIK (GILITIMUR)	2				2.40	21.56	14.68	79,084	5,388	0	0	7,335	0	0									
43	PLTGU GRESIK	GT 11	263,799	5,095,154	12,500	0.80	32.08	554.42	2,174,230	3,922	0	0	151,771	2,126,105	0	0.43	23.91	2,514	2,355	453.3	16,164	1.7	1.80	0.19
44	PLTGU GRESIK	GT 12				1.40	29.64	542.94	2,138,557	3,939	0	0	150,269	2,047,928	0									
45	PLTGU GRESIK	GT 13				1.00	25.19	659.00	2,250,897	3,416	0	0	52,412	6,672,369	0									
46	PLTGU GRESIK	ST10				1.00	20.00	979.88	-	-	0	0	0	0	0									
47	PLTGU GRESIK	GT 21				0.20	25.31	405.14	1,668,714	4,119	0	0	136,327	784,437	0									
48	PLTGU GRESIK	GT 22				0.30	27.27	348.05	1,474,517	4,237	0	0	134,371	97,098	0									
49	PLTGU GRESIK	GT 23				0.10	36.25	301.98	1,320,810	4,374	0	0	85,259	1,590,446	0									
50	PLTGU GRESIK	ST 20				0.10	23.24	593.57	-	-	0	0	0	0	0									
51	PLTGU GRESIK	GT 31				0.20	20.78	630.73	2,162,817	3,429	0	0	0	8,582,608	0									
52	PLTGU GRESIK	GT 32				0.10	13.83	664.96	2,266,642	3,409	0	0	0	8,994,612	0									
53	PLTGU GRESIK	GT 33				0.00	13.26	681.58	2,303,604	3,380	0	0	0	9,141,286	0									
54	PLTGU GRESIK	ST 30				0.00	20.10	1178.56	-	-	0	0	0	0	0									
	UP. PAITON																							
55	PLTU PAITON	1	199,959	915,122	11,009	2.30	46.77	2661.10	6,768,458	2,543	0	0	1,077	0	1,351,248	2.40	40.17	2,727	2,535	370.00	22,518	2.0	2.50	0.22
56	PLTU PAITON	2				2.50	33.57	2792.50	7,056,155	2,527	0	0	1,289	0	1,415,154									
	UP. MUARA KARANG																							
57	PLTU M.KARANG	1	59,790	1,932,024	2,327	4.60	41.07	582.55	1,754,324	3,011	167,940	1,626	219	0	0	4.00	51.21	548	3,051	80.7	20,589	1.4	2.29	0.16
58	PLTU M.KARANG	2				4.40	69.60	495.63	1,528,398	3,084	146,576	1,437	198	0	0									
59	PLTU M.KARANG	3				3.00	42.96	566.60	1,735,140	3,062	167,012	840	103	0	0									
60	PLTU M.KARANG	4	84,375	1,244,448	2,148	12.50	49.91	627.47	1,843,658	2,938	120,954	508	1,101	2,282,522	0	8.45	49.35	701	2,883	162.0	21,701	1.5	2.41	0.17
61	PLTU M.KARANG	5				4.40	48.78	775.45	2,200,790	2,838	155,837	1,581	1,740	2,206,536	0									
62	PLTGU M.KARANG	GT 11	110,685	607,699	4,340	1.50	26.58	668.61	2,159,233	3,229	0	0	62	8,565,749	0	1.50	49.07	688	2,305	420.0	21,961	1.6	0.24	0.18
63	PLTGU M.KARANG	GT 12				0.60	40.68	691.45	2,185,187	3,160	0	0	12	8,670,877	0									
64	PLTGU M.KARANG	GT 13				0.70	74.54	633.84	1,995,421	3,148	0	0	6,261	7,651,221	0									
65	PLTGU M.KARANG	ST10				3.20	54.46	756.91	-	-	0	0	0	0	0									
	UP. MUARA TAWAR																							
66	PLTGU M.TAWAR	GT 11	284,655	3,266,922	3,820	2.00	76.92	517.56	1,708,858	3,302	0	0	175,758	0	0	1.33	44.29	2,720	2,193	585.0	40,549	1.4	4.51	0.16
67	PLTGU M.TAWAR	GT 12				1.20	40.37	645.69	2,124,148	3,290	0	0	216,741	0	0									
68	PLTGU M.TAWAR	GT 13				1.20	46.65	634.39	2,130,459	3,358	0	0	214,810	0	0									
69	PLTGU M.TAWAR	ST10				0.90	13.21	921.91	-	-	0	0	0	0	0									
70	PLTG M.TAWAR	GT 21	118,751	371,383	295	1.80	45.70	195.89	687,478	3,509	0	0	68,690	0	0	1.65	67.58	195	3,546	135.0	36,652	0.8	4.07	0.09
71	PLTG M.TAWAR	GT 22				1.50	89.45	193.82	694,309	3,582	0	0	68,110	0	0									

5.2 Operation Performance Record for the Existing Power Plants of Indonesia Power

Operation Performance Record for the Existing Power Plants of Indonesia Power

No.	Plant Name	Unit	Operation	Installed Capacity	Available Max.	Operation (Hours)			Forced Outage (Hours) (Dalam)			Production Energy (GWh)			Gross Heat Rate (Kcal/kWh)			Thermal Efficiency (%)			Fuel Consumption (2005)					Fuel Consumption (2006)				
		No.	Year	(MW)	(MW)	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	2005	2006	2007	MFO (Ltr)	IDO (Ltr)	HSD (Ltr)	Gas (MMBTU)	Coal (Kg)	MFO (Ltr)	IDO (Ltr)	HSD (Ltr)	Gas (MMBTU)	Coal (Kg)
	UBP SAGULING																													
1.	SAGULING	1	1985	175.18	174.60	5,312	3,984	5,240	33	49	21	681.84	466.47	634.40							-	-	-	-	-	-	-	-	-	-
2.	SAGULING	2	1985	175.18	174.60	5,220	3,225	4,509	27	89	47	626.62	367.68	539.21							-	-	-	-	-	-	-	-	-	-
3.	SAGULING	3	1986	175.18	174.60	3,481	2,007	4,903	45	-	19	471.86	246.54	600.75							-	-	-	-	-	-	-	-	-	-
4.	SAGULING	4	1986	175.18	174.60	6,018	4,146	4,638	8	5	87	740.38	470.55	547.91							-	-	-	-	-	-	-	-	-	-
5.	PRK. KONDANG	1	1955	2.49	2.49	7,220	5,507	7,041	-	-	-	11.68	8.92	11.53							-	-	-	-	-	-	-	-	-	-
6.	PRK. KONDANG	2	1955	2.49	2.49	6,739	6,693	5,806	390	-	-	12.09	11.04	10.00							-	-	-	-	-	-	-	-	-	-
7.	PRK. KONDANG	3	1955	2.46	2.46	7,945	5,716	6,623	-	4	-	13.88	10.76	11.85							-	-	-	-	-	-	-	-	-	-
8.	PRK. KONDANG	4	1955	2.46	2.46	6,592	6,198	5,666	-	5	-	11.46	10.58	8.53							-	-	-	-	-	-	-	-	-	-
9.	BENGKOK	1	1923	1.05	1.05	4,887	3,783	4,647	-	-	-	2.99	2.30	3.23							-	-	-	-	-	-	-	-	-	-
10.	BENGKOK	2	1923	1.05	1.05	5,317	4,195	4,906	-	-	-	4.24	3.24	3.87							-	-	-	-	-	-	-	-	-	-
11.	BENGKOK	3	1923	1.05	1.05	5,173	3,985	5,062	-	-	-	3.38	2.29	3.35							-	-	-	-	-	-	-	-	-	-
12.	BENGKOK (DAGO)	4	1923	0.70	0.70	8,155	6,420	7,591	-	274	-	3.55	2.20	2.16							-	-	-	-	-	-	-	-	-	-
13.	PLENGAN	1	1962	1.08	1.08	5,256	5,476	5,071	2	-	-	4.13	4.27	3.76							-	-	-	-	-	-	-	-	-	-
14.	PLENGAN	2	1962	1.08	1.08	3,437	3,419	5,838	-	-	-	2.76	2.60	4.56							-	-	-	-	-	-	-	-	-	-
15.	PLENGAN	3	1962	1.08	1.08	5,358	5,937	6,992	-	-	-	4.23	4.56	5.36							-	-	-	-	-	-	-	-	-	-
16.	PLENGAN	4	1962	2.02	2.02	7,300	6,937	6,881	2	-	-	10.16	8.44	8.46							-	-	-	-	-	-	-	-	-	-
17.	PLENGAN	5	1962	1.61	1.61	6,156	5,236	3,357	-	-	-	6.08	4.62	2.85							-	-	-	-	-	-	-	-	-	-
18.	LAMAJAN	1	1934	6.52	6.51	6,339	5,471	4,441	-	-	-	30.98	27.53	21.46							-	-	-	-	-	-	-	-	-	-
19.	LAMAJAN	2	1934	6.52	6.51	5,793	5,293	6,535	191	-	-	28.68	25.79	33.54							-	-	-	-	-	-	-	-	-	-
20	LAMAJAN	3	1934	6.52	6.51	6,172	4,635	4,498	2	1	-	30.18	22.04	22.93							-	-	-	-	-	-	-	-	-	-
21	CIKALONG	1	1960	6.40	6.00	5,211	4,422	4,199	-	-	221	25.47	18.24	17.28							-	-	-	-	-	-	-	-	-	-
22	CIKALONG	2	1960	6.40	6.00	4,240	4,416	4,452	-	-	-	19.18	18.11	19.28							-	-	-	-	-	-	-	-	-	-
23	CIKALONG	3	1960	6.40	6.00	3,795	3,409	3,653	-	-	-	17.77	14.11	15.26							-	-	-	-	-	-	-	-	-	-
24	UBRUG	1	1939	5.94	5.94	5,568	4,460	3,895	-	-	-	22.18	17.37	14.63							-	-	-	-	-	-	-	-	-	-
25	UBRUG	2	1939	5.94	5.94	5,596	4,661	4,735	-	-	-	22.07	17.90	17.64							-	-	-	-	-	-	-	-	-	-
26	UBRUG	3	1939	6.48	5.94	4,876	5,017	4,910	-	-	-	19.66	20.37	19.60							-	-	-	-	-	-	-	-	-	-
27	KRACAK	1	1958	6.30	6.30	6,439	4,726	4,660	-	-	-	29.08	21.50	23.29							-	-	-	-	-	-	-	-	-	-
28	KRACAK	2	1958	6.30	6.30	3,287	1,727	4,048	-	-	-	15.97	7.81	16.76							-	-	-	-	-	-	-	-	-	-
29	KRACAK	3	1958	6.30	6.30	6,048	5,078	4,686	-	-	-	29.96	23.44	22.05							-	-	-	-	-	-	-	-	-	-
	UBP MRICA																													
29	PB SUDIRMAN	1	1989	60.30	59.80	3,879	2,690	2,841	-	1	-	173.64	129.37								-	-	-	-	-	-	-	-	-	-
30	PB SUDIRMAN	2	1989	60.30	59.80	3,441	2,755	2,941	-	1	-	151.44	129.22								-	-	-	-	-	-	-	-	-	-
31	PB SUDIRMAN	3	1988	60.30	59.80	3,688	2,987	3,113	2	-	2	164.70	139.72								-	-	-	-	-	-	-	-	-	-
32	KETENGER	1	1939	3.52	3.50	8,490	8,469	8,628	142	23	16	22.54	18.58								-	-	-	-	-	-	-	-	-	-
33	KETENGER	2	1939	3.52	3.50	8,596	8,515	8,525	6	20	17	22.69	18.66								-	-	-	-	-	-	-	-	-	-
34	KETENGER	3	1999	1.00	0.98	8,001	6,152	6,835	6	11	12	4.51	3.09								-	-	-	-	-	-	-	-	-	-
35	GARUNG	1	1982	13.20	13.18	1,252	1,201	1,080	1	5	29	16.37	15.87								-	-	-	-	-	-	-	-	-	-
36	GARUNG	2	1982	13.20	13.18	1,199	1,208	1,096	-	7	1	15.87	15.86								-	-	-	-	-	-	-	-	-	-
37	WADASLINTANG	1	1988	9.00	8.98	5,764	7,536	5,793	3	29	19	43.69	59.95								-	-	-	-	-	-	-	-	-	-
38	WADASLINTANG	2	1988	9.00	8.98	6,612	6,199	5,885	-	32	15	49.16	49.37								-	-	-	-	-	-	-	-	-	-
39	JELOK	1	1938	5.12	5.10	7,754	6,843	6,135	3	17	9	27.43	25.72								-	-	-	-	-	-	-	-	-	-
40	JELOK	2	1938	5.12	5.10	7,334	5,697	4,491	3	905	12	26.16	21.45								-	-	-	-	-	-	-	-	-	-
41	JELOK	3	1938	5.12	5.10	7,327	5,820	5,934	4	17	12	26.63	21.75								-	-	-	-	-	-	-	-	-	-
42	JELOK	4	1962	5.12	5.10	7,278	6,064	5,694	4	14	6	26.66	23.30								-	-	-	-	-	-	-	-	-	-
43	TIM	1	1962	4.00	3.98	7,870	6,398	6,124	20	33	23	25.21	20.37								-	-	-	-	-	-	-	-	-	-
44	TIM	2	1962	4.00	3.98	8,285	6,606	7,173	10	1,164	14	27.43	21.34								-	-	-	-	-	-	-	-	-	-
45	TIM	3	1962	4.00	3.98	6,536	6,080	5,620	-	26	9	22.11	20.46								-	-	-	-	-	-	-	-	-	-
46	WONOGIRI	1	1983	6.20	6.18	3,617	4,518	4,189	-	-	7	19.22	25.97								-	-	-	-	-	-	-	-	-	-
47	WONOGIRI	2	1983	6.20	6.18	3,686	3,992	3,769	-	-	11	20.04	22.91								-	-	-	-	-	-	-	-	-	-
48	KEDUNG OMBO	1	1992	22.50	22.33	3,020	3,491	2,163	-	6	1	53.53	70.69								-	-	-	-	-	-	-	-	-	-
49	TAPEN	1	1997	0.75	0.73	7,764	8,032	7,632	10	-	2	4.43	4.90								-	-	-	-	-	-	-	-	-	-
50	SEMPOR	1	1980	1.00	0.98	6,310	5,409	3,919	4	11	760	6.02	4.62								-	-	-	-	-	-	-	-	-	-
51	PEJENGKOLAN	1	1992	1.40	1.38	4,319	6,441	6,317	153	-	16	4.89	7.66								-	-	-	-	-	-	-	-	-	-
52	KELAMBU	1	1992	1.17	1.15	1,645	1,553	1,265	-	-	-	1.61	1.41								-	-	-	-	-	-	-	-	-	-
53	SIDOREJO	1	1992	1.40	1.38	3,032	3,744	2,092	-	4	-	4.05	5.00								-	-	-	-	-	-	-	-	-	-
	UBP PRIOK																													
54	PLTU PRIOK	3	1972	50.00	45.00	-	-	5,070	-	-	3,403	-	-	183.29	-	-	Keandalan Total (2007)	-	-		-	-	-	-	-	-	-	-	-	-
55	PLTU PRIOK	4	1972	50.00	45.00	-	-	4,960	-	-	3,682	-	-	79.56	-	-		-	-		-	-	-	-	-	-	-	-	-	-
56	PLTG PRIOK	1	1976	26.00	17.00	965	80	-	1,316	6,861	8,760	15.84	1.40	-	4,432	4,515		19.40	19.05		-	-	8,184,734	-	-	-	-	735,664	-	-
57	PLTG PRIOK	3	1976	26.00	17.00	219	179	387	4,994	3,183	72	3.46	3.29	7.14	4,863	4,434		17.69	19.40		-	-	1,983,817	-	-	-	-	1,682,813	-	-
58	PLTGU PRIOK	GT 11	1993	130.00	121.56	7,624	7,887	6,920	64	595	68	823.05	895.58	751.01	3,007	3,025		28.60	28.43		-	-	36,156,052	8,592,815	-	-	-	3,474,073	10,631,509	-
59	PLTGU PRIOK	GT 12	1994	130.00	120.15	8,250	7,216	8,586	212	334	31	873.15	799.59	919.81	3,005	3,021		28.62	28.47		-	-	66,816,171	8,138,014	-	-	-	35,668,170	8,386,881	-
60	PLTGU PRIOK	GT 13	1994	130.00	118.90	8,208	8,267	6,905	56	177	673	846.64	919.18	732.91	2,958	3,014		29.07	28.54		-	-	143,921,936	5,094,535	-	-	-	38,046,176	9,696,583	-
61	PLTGU PRIOK	ST 10	1994	200.00	167.68	8,681	8,657	8,701	73	103	48	1,187.69	1,207.49	1,096.35				-	-		-	-	-	-	-	-	-	-	-	-
62	PLTGU PRIOK	GT 21	1994	130.00	122.74	7,411	7,969	8,117	66	127	213	783.58	864.40	861.54	3,022	2,975		28.45	28.91		-	-	19,749,715	8,745,697	-	-	-	119,370,751	6,127,469	-
63	PLTGU PRIOK	GT 22	1994	130.00	121.27	8,179	6,068	8,132	328	709	228	882.27	673.59	830.07	2,963	2,959		29.02	29.07		-	-	106,678,909	6,778,596	-	-	-	66,773,627	5,629,767	-
64	PLTGU PRIOK	GT 23	1994	130.00	120.12	5,094	8,071	3,840	94	169	4,202	505.00	816.02	425.94	3,015	2,888		28.52	29.78		-	-	62,901,738	3,911,918	-	-	-	91,393,163	6,527,541	-
65	PLTGU PRIOK	ST 20	1995	200.00	169.32	8,723	7,418	8,685	27	200	70	1,039.43	998.29	1,005.20				-	-		-	-	-	-	-	-	-	-	-	-
66	PLTD KEBAYORAN	1	1961	2.52	1.27	81	46	51	-	-	-	0.10	0.06	0.07	2,750	2,929		31.27	29.37		-	-	31,064	-	-	-	-	20,445	-	-
67	PLTD KEBAYORAN	2	1991	3.00	2.25	80	40	38	-	29	-	0.10	0.07	0.07	2,452	2,440		35.08	35.25		-	-	28,393	-	-	-	-	20,184	-	-
68	PLTD KEBAYORAN	3	1962	2.52	1.27	106	48	80	-	-	-	0.13	0.06	0.07	2,836	2,887		30.33	29.79		-	-	43,788	-	-	-	-	20,239	-	-
69	PLTD KEBAYORAN	4	1962	2.52	1.27	95	36	41	-	-	-	0.13	0.05	0.06	2,760	2,771		31.16	31.04		-	-	40,270	-	-	-	-	16,046	-	-
70	PLTD KEBAYORAN	5	1962	2.52	1.27	100	55	33	-	-	-	0.13	0.07	0.05	2,772	2,728		31.02	31.53		-	-	41,548	-	-	-	-	21,796	-	-
71	PLTD KEBAYORAN	6	1993	3.00	2.25	66	35	50	-	-	-	0.12	0.06	0.09	2,459	2,643		34.98	32.54		-	-	35,574	-	-	-	-	19,246	-	-
	UBP SURALAYA																													
72	PLTU SURALAYA	1	1985	400.00	371.50	7,225	8,172	8,487	321	481	167	2,726.48	3,029.15	1,601.10	2,536	2,509		33.91	34.27		1,197,186	-	1,683,000	-	1,439,221,242	-	-	1,426,400	-	1,610,570,169
73	PLTU SURALAYA	2	1986	400.00	371.50	6,752	8,526	7,436	386	1	367	2,487.81	3,180.38	1,252.93	2,450	2,494		35.10	34.49		1,050,033	-	2,297,800	-	1,275,029,601	-	275,924	701,060	-	1,683,203,035
74	PLTU SURALAYA	3	1989	400.00	371.50	8,403	7,547	8,671	325	581	89	3,025.55	2,817.04	1,583.44	2,422	2,401		35.51	35.81		444,079	-	1,558,700	-	1,531,050,883	-	-	961,950	-	1,441,909,468
75	PLTU SURALAYA	4	1989	400.00	371.50	8,273	7,832	7,742	401	222	324	3,080.92	2,908.43	1,192.04	2,422	2,364		35.50	36.39		1,277,797	-	1,074,920	-	1,559,223,889	-	44,175	640,267	-	1,450,541,523
76	PLTU SURALAYA	5	1997	600.00	575.20	8,319	7,350	2,976	427	13	5,784	4,673.10	4,164.02	1,690.06	2,326	2,431		36.97	35.37		-	-	1,316,100	-	2,336,201,472	-	-	583,000	-	2,221,893,858
77	PLTU SURALAYA	6	1997	600.00	575.20	8,134	7,862	8,546	376	136	214	4,452.29	4,413.55	2,344.70	2,439	2,435		35.26	35.32		-	-	1,399,900	-	2,334,747,560	-	-	805,700	-	2,330,565,103
78	PLTU SURALAYA	7	1998	600.00	575.20	7,127	8,202	8,680	376	80	80	4,073.76	4,733.64	2,418.81	2,328	2,354		36.94	36.53		-	-	1,408,100	-	2,032,932,538	-	-	514,800	-	2,426,090,146
	UBP SEMARANG																													
79	PLTU TAMBAK LOROK	1	1978	50.00	41.00	7,654	7,907	7,572	46	197	329	305.72	314.27	292.60	2,813	2,713		30.57	31.69		92,027,243	776,479	92,255	-	-	91,148,694	977,414	158,816	-	-
80	PLTU TAMBAK LOROK	2	1978	50.00	41.00	7,907	7,367	7,263	124	238	86	304.18	281.69	277.08	2,799	2,712		30.73	31.71		91,181,416	777,028	16,981	-	-	81,746,388	754,617	157,449	-	-
81	PLTU TAMBAK LOROK	3	1983	200.00	185.00	6,551	6,433	5,343	1,062	2,287	228	920.80	669.52	678.68	2,383	2,499		36.09	34.41		234,153,529	2,520,491	68,935	-	-	180,010,186	611,163	340,477	-	-
82	PLTGU TAMBAK LOROK	GT 11	1993	109.65	100.00	5,750	4,144	4,647	117	145	1	462.10	339.15	381.99	3,024	2,969		28.44	28.97		-	-	161,961,817	-	-	-	-	117,190,686	-	-
83	PLTGU TAMBAK LOROK	GT 12	1993	109.65	100.00	6,668	6,291	5,070	69	11	64	538.33	510.12	414.39	3,044	2,984		28.25	28.82		-	-	189,859,521	-	-	-	-	177,167,921	-	-
84	PLTGU TAMBAK LOROK	GT 13	1993	109.65	100.00	5,050	5,464	4,203	14	98	134	420.50	458.88	347.82	3,004	2,979		28.62	28.87		-	-	146,364,122	-	-	-	-	159,100,951	-	-
85	PLTGU TAMBAK LOROK	ST 10	1997	188.00	150.00	7,386	7,291	6,202	269	188	79	654.89	601.86	540.79				-	-		-	-	-	-	-	-	-		-	-
86	PLTGU TAMBAK LOROK	GT 21	1996	109.65	100.00	4,241	4,189	4,019	85	248	214	349.38	340.99	334.97	2,982	2,992		28.84	28.75		-	-	120,636,262	-	-	-	-	118,573,759	-	-
87	PLTGU TAMBAK LOROK	GT 22	1996	109.65	100.00	6,336	5,221	3,515	37	211	143	518.85	421.94	286.15	3,031	3,015		28.37	28.52		-	-	182,346,269	-	-	-	-	147,936,896	-	-
88	PLTGU TAMBAK LOROK	GT 23	1996	109.65	100.00	5,708	4,034	4,611	7	79	6	456.73	319.92	381.41	3,069	3,059		28.02	28.11		-	-	162,305,094	-	-	-	-	113,707,920	-	-
89	PLTGU TAMBAK LOROK	ST 20	1997	188.00	150.00	8,092	5,735	5,540	95	62	59	601.52	427.26	440.62				-	-		-	-	-	-	-	-	-	-	-	-
90	PLTG CILACAP	1	1996	29.00	20.00	1,350	707	190	56	384	38	23.72	12.48	3.36	4,545	4,565		18.92	18.84		-	-	12,435,956	-	-	-	-	6,577,254	-	-
91	PLTG CILACAP	2	1996	26.00	20.00	1,731	687	202	263	47	35	24.44	10.01	3.60	4,692	4,941		18.33	17.40		-	-	13,261,320	-	-	-	-	5,713,606	-	-
92	PLTG SUNYARAGI	1	1976	20.03	18.00	5,381	805	178	33	38	1,400	83.15	12.90	2.99	3,412	3,671		25.20	23.43		-	-	5,451,900	939,305	-	-	-	4,812,093	23,378	-
93	PLTG SUNYARAGI	2	1976	20.03	18.00	1,607	1,500	254	28	91	15	27.15	24.55	4.36	3,805	3,535		22.60	24.33		-	-	11,984,800	-	-	-	-	6,407,165	125,021	-
94	PLTG SUNYARAGI	3	1980	20.10	18.00	4,721	3,141	4,167	14	17	6	76.08	43.66	58.28	3,315	3,366		25.94	25.55		-	-	5,313,600	819,008	-	-	-	2,803,458	487,353	-
95	PLTG SUNYARAGI	4	1980	20.10	18.00	922	4,120	4,322	3,409	1,821	5	14.94	60.73	57.63	3,795	3,267		22.66	26.33		-	-	6,575,000	-	-	-	-	3,636,184	662,856	-
	UBP PERAK GRATI																													
95	PLTU PERAK	3	1978	50.00	40.00	6,825	6,617	5,059	691	1,360	951	206.95	205.04	197.72	2,940	2,623		29.26	32.79		62,737,710	-	111,842	-	-	61,144,600	-	110,481	-	-
96	PLTU PERAK	4	1978	50.00	40.00	6,556	4,849	7,577	684	1,508	539	199.21	149.82	281.32	3,013	2,762		28.54	31.14		62,865,253	-	155,270	-	-	46,948,733	-	156,016	-	-
97	PLTGU GRATI	GT 11	1996	100.75	99.50	7,207	3,955	4,034	459	190	237	455.84	265.93	286.53	3,630	3,547		23.69	24.25		-	-	181,255,873	-	-	-	-	103,686,657	-	-
98	PLTGU GRATI	GT 12	1996	100.75	99.50	7,205	3,180	5,010	69	145	29	446.55	211.88	355.68	3,652	3,518		23.55	24.45		-	-	178,696,107	-	-	-	-	81,837,157	-	-
99	PLTGU GRATI	GT 13	1996	100.75	99.50	6,626	4,645	4,926	540	4	13	419.41	317.04	341.96	3,630	3,532		23.69	24.35		-	-	166,682,677	-	-	-	-	123,047,890	-	-
100	PLTGU GRATI	ST 10	1997	159.58	151.48	8,202	5,080	5,152	168	33	7	755.25	372.26	500.13				-	-		-	-	-	-	-	-	-	-	-	-
101	PLTG GRATI	2.1	2002	100.75	100.00	2,507	1,820	2,078	26	353	13	162.45	118.93	140.24	3,591	3,523		23.95	24.41		-	-	63,972,168	-	-	-	-	46,171,175	-	-
102	PLTG GRATI	2.2	2002	100.75	100.00	2,615	1,889	1,240	376	250	7	173.78	127.03	100.70	3,512	3,493		24.49	24.62		-	-	66,893,829	-	-	-	-	48,976,981	-	-
103	PLTG GRATI	2.3	2002	100.75	100.00	2,063	1,287	1,499	259	372	14	139.27	86.47	85.06	3,488	3,460		24.65	24.86		-	-	53,235,033	-	-	-	-	32,994,331	-	-
	UBP BALI																													
104	PLTD PESANGGARAN	2	1974	5.08	3.92	4,573	2,850	2,935	-	-	413	20.10	11.75	6.68	2,546	2,545		33.78	33.80		-	-	5,594,639	-	-	-	-	3,269,452	-	-
105	PLTD PESANGGARAN	3	1974	5.08	3.92	4,131	3,174	2,151	-	405	3,594	16.11	13.74	4.29	2,592	2,559		33.17	33.61		-	-	4,554,365	-	-	-	-	3,846,187	-	-
106	PLTD PESANGGARAN	4	1974	5.08	3.92	4,400	2,150	1,025	5	4,648	-	18.87	9.43	-	2,624	2,588		32.77	33.23		-	-	5,411,638	-	-	-	-	2,663,217	-	-
107	PLTD PESANGGARAN	5	1980	4.14	3.03	2,221	1,588	2,188	-	225	-	6.54	4.77	3.31	2,593	2,551		33.17	33.71		-	-	1,852,252	-	-	-	-	1,329,502	-	-
108	PLTD PESANGGARAN	6	1982	6.77	5.34	4,388	3,806	2,475	6	1,503	505	21.59	19.17	4.71	2,488	2,531		34.57	33.97		-	-	5,868,065	-	-	-	-	5,366,164	-	-
109	PLTD PESANGGARAN	7	1982	6.77	5.34	3,629	3,503	2,017	-	-	-	17.87	17.75	1.29	2,502	2,530		34.37	33.99		-	-	4,891,951	-	-	-	-	4,908,527	-	-
110	PLTD PESANGGARAN	8	1983	6.52	3.99	1,256	650	1,161	3	5	723	5.24	2.76	2.86	2,641	2,549		32.56	33.73		-	-	1,509,483	-	-	-	-	772,582	-	-
111	PLTD PESANGGARAN	9	1983	6.20	3.99	1,036	26	-	-	7,526	-	3.05	0.83	-	2,742	2,390		31.36	35.99		-	-	912,939	-	-	-	-	21,534	-	-
112	PLTD PESANGGARAN	10	1989	12.40	9.00	1,429	1,547	1,912	78	-	-	11.64	12.86	7.96	2,279	2,359		37.73	36.45		-	-	2,900,265	-	-	-	-	3,320,212	-	-
113	PLTD PESANGGARAN	11	1989	12.40	9.00	1,757	1,680	1,883	36	409	1	14.46	15.25	8.63	2,370	2,358		36.29	36.47		-	-	3,739,768	-	-	-	-	3,929,933	-	-
114	PLTG PESANGGARAN	1	1985	21.35	17.65	4,572	3,103	2,321	7	236	82	79.96	52.78	10.51	3,871	4,019		22.22	21.40		-	-	33,819,575	-	-	-	-	23,169,679	-	-
115	PLTG PESANGGARAN	2	1993	20.10	18.30	3,191	2,795	2,936	82	1	-	56.96	45.08	25.53	3,928	4,153		21.89	20.71		-	-	24,478,998	-	-	-	-	20,454,821	-	-
116	PLTG PESANGGARAN	3	1994	42.00	36.15	3,551	6,457	7,948	4,806	86	416	115.65	235.02	133.34	3,463	3,241		24.84	26.53		-	-	43,765,563	-	-	-	-	83,343,411	-	-
117	PLTG PESANGGARAN	4	1994	42.00	36.15	8,487	6,304	8,356	12	6	37	275.80	215.88	141.21	3,485	3,334		24.68	25.80		-	-	105,017,834	-	-	-	-	78,670,093	-	-
118	PLTG GILIMANUK	1	1997	133.80	130.44	7,128	7,225	7,337	10	88	167	564.88	618.02	352.71	3,460	3,330		24.86	25.83		-	-	212,699,124	-	-	-	-	224,876,224	-	-
119	PLTG PEMARON	1	2004	48.80	40.00	2,954	1,719	2,016	482	85	56	104.01	62.26	20.63	3,667	3,682		23.46	23.35		-	-	41,728,720	-	-	-	-	25,153,713	-	-
120	PLTG PEMARON	2	2005	48.80	40.00	1,131	1,492	2,372	42	6	5	34.71	54.84	20.07	3,796	3,556		22.66	24.18		-	-	14,335,432	-	-	-	-	21,396,710	-	-
	UBP KAMOJANG																													
121	PLTP KAMOJANG	1	1982	30.00	27.40	8,138	8,709	8,721	49	-	31	246.60	263.45	130.15							-	-	-	-	-	-	-	-	-	-
122	PLTP KAMOJANG	2	1987	55.00	52.30	8,342	8,677	7,293	6	44	1,454	461.54	479.35	236.99							-	-	-	-	-	-	-	-	-	-
123	PLTP KAMOJANG	3	1987	55.00	52.30	4,594	5,507	6,918	4	10	679	253.37	304.05	138.73							-	-	-	-	-	-	-	-	-	-
124	PLTP GN. SALAK	1	1994	60.00	56.50	7,771	8,622	8,364	281	107	5	462.66	493.37	227.86							-	-	-	-	-	-	-	-	-	-
125	PLTP GN. SALAK	2	1994	60.00	56.50	7,730	8,449	8,380	91	222	3	460.21	499.43	258.94							-	-	-	-	-	-	-	-	-	-
126	PLTP GN. SALAK	3	1997	60.00	57.00	8,552	8,427	8,581	1	106	164	500.21	473.43	241.83							-	-	-	-	-	-	-	-	-	-
127	PLTP DARAJAT	1	1994	55.00	52.00	8,756	8,368	8,671	-	7	82	485.66	462.35	230.06							-	-	-	-	-	-	-	-	-	-

Operation Performance Record for the Existing Power Plants of Indonesia Power

No.	Plant Name	Unit No.	Fuel Consumption (2007)					Heat Content of Fuel (2005)					Heat Content of Fuel (2006)					Heat Content of Fuel (2007)					Kcal Consumption (2005)					
			MFO (Ltr)	IDO (Ltr)	HSD (Ltr)	Gas (MMBTU)	Coal (Kg)	MFO (kcal/Ltr)	IDO (kcal/Ltr)	HSD (kcal/Ltr)	Gas (kcal/MMBTU)	Coal (kcal/Kg)	MFO (kcal/Ltr)	IDO (kcal/Ltr)	HSD (kcal/Ltr)	Gas (kcal/MMBTU)	Coal (kcal/Kg)	MFO (kcal/Ltr)	IDO (kcal/Ltr)	HSD (kcal/Ltr)	Gas (kcal/MMBTU)	Coal (kcal/Kg)	MFO (M.kcal)	IDO (M.kcal)	HSD (M.kcal)	Gas (M.kcal)	Coal (M.kcal)	Total (M.kcal)
	UBP SAGULING																											
1.	SAGULING	1	-	-	-	-	-																-	-	-	-	-	-
2.	SAGULING	2	-	-	-	-	-																-	-	-	-	-	-
3.	SAGULING	3	-	-	-	-	-																-	-	-	-	-	-
4.	SAGULING	4	-	-	-	-	-																-	-	-	-	-	-
5.	PRK. KONDANG	1	-	-	-	-	-																-	-	-	-	-	-
6.	PRK. KONDANG	2	-	-	-	-	-																-	-	-	-	-	-
7.	PRK. KONDANG	3	-	-	-	-	-																-	-	-	-	-	-
8.	PRK. KONDANG	4	-	-	-	-	-																-	-	-	-	-	-
9.	BENGKOK	1	-	-	-	-	-																-	-	-	-	-	-
10.	BENGKOK	2	-	-	-	-	-																-	-	-	-	-	-
11.	BENGKOK	3	-	-	-	-	-																-	-	-	-	-	-
12.	BENGKOK (DAGO)	4	-	-	-	-	-																-	-	-	-	-	-
13.	PLENGAN	1	-	-	-	-	-																-	-	-	-	-	-
14.	PLENGAN	2	-	-	-	-	-																-	-	-	-	-	-
15.	PLENGAN	3	-	-	-	-	-																-	-	-	-	-	-
16.	PLENGAN	4	-	-	-	-	-																-	-	-	-	-	-
17.	PLENGAN	5	-	-	-	-	-																-	-	-	-	-	-
18.	LAMAJAN	1	-	-	-	-	-																-	-	-	-	-	-
19.	LAMAJAN	2	-	-	-	-	-																-	-	-	-	-	-
20	LAMAJAN	3	-	-	-	-	-																-	-	-	-	-	-
21	CIKALONG	1	-	-	-	-	-																-	-	-	-	-	-
22	CIKALONG	2	-	-	-	-	-																-	-	-	-	-	-
23	CIKALONG	3	-	-	-	-	-																-	-	-	-	-	-
24	UBRUG	1	-	-	-	-	-																-	-	-	-	-	-
25	UBRUG	2	-	-	-	-	-																-	-	-	-	-	-
26	UBRUG	3	-	-	-	-	-																-	-	-	-	-	-
27	KRACAK	1	-	-	-	-	-																-	-	-	-	-	-
28	KRACAK	2	-	-	-	-	-																-	-	-	-	-	-
29	KRACAK	3	-	-	-	-	-																-	-	-	-	-	-
	UBP MRICA																											
29	PB SUDIRMAN	1	-	-	-	-	-																-	-	-	-	-	-
30	PB SUDIRMAN	2	-	-	-	-	-																-	-	-	-	-	-
31	PB SUDIRMAN	3	-	-	-	-	-																-	-	-	-	-	-
32	KETENGER	1	-	-	-	-	-																-	-	-	-	-	-
33	KETENGER	2	-	-	-	-	-																-	-	-	-	-	-
34	KETENGER	3	-	-	-	-	-																-	-	-	-	-	-
35	GARUNG	1	-	-	-	-	-																-	-	-	-	-	-
36	GARUNG	2	-	-	-	-	-																-	-	-	-	-	-
37	WADASLINTANG	1	-	-	-	-	-																-	-	-	-	-	-
38	WADASLINTANG	2	-	-	-	-	-																-	-	-	-	-	-
39	JELOK	1	-	-	-	-	-																-	-	-	-	-	-
40	JELOK	2	-	-	-	-	-																-	-	-	-	-	-
41	JELOK	3	-	-	-	-	-																-	-	-	-	-	-
42	JELOK	4	-	-	-	-	-																-	-	-	-	-	-
43	TIM	1	-	-	-	-	-																-	-	-	-	-	-
44	TIM	2	-	-	-	-	-																-	-	-	-	-	-
45	TIM	3	-	-	-	-	-																-	-	-	-	-	-
46	WONOGIRI	1	-	-	-	-	-																-	-	-	-	-	-
47	WONOGIRI	2	-	-	-	-	-																-	-	-	-	-	-
48	KEDUNG OMBO	1	-	-	-	-	-																-	-	-	-	-	-
49	TAPEN	1	-	-	-	-	-																-	-	-	-	-	-
50	SEMPOR	1	-	-	-	-	-																-	-	-	-	-	-
51	PEJENGKOLAN	1	-	-	-	-	-																-	-	-	-	-	-
52	KELAMBU	1	-	-	-	-	-																-	-	-	-	-	-
53	SIDOREJO	1	-	-	-	-	-																-	-	-	-	-	-
	UBP PRIOK																											
54	PLTU PRIOK	3	62,280,699	-	39,605	-	-																-	-	-	-	-	-
55	PLTU PRIOK	4	57,675,438	-	68,640	-	-																-	-	-	-	-	-
56	PLTG PRIOK	1	-	-	-	-	-			8,579					8,565			Bahan Bakar komulatif (2007)					-	-	70,217	-	-	70,217
57	PLTG PRIOK	3	-	-	3,409,215	-	-			8,487					8,667								-	-	16,837	-	-	16,837
58	PLTGU PRIOK	GT 11	-	-	-	9,095,668	-			8,550	252,000				8,534	252,000							-	-	309,134	2,165,389	-	2,474,523
59	PLTGU PRIOK	GT 12	-	-	42,747,330	9,581,957	-			8,570	252,000				8,468	252,000							-	-	572,615	2,050,780	-	2,623,395
60	PLTGU PRIOK	GT 13	-	-	81,888,707	5,912,169	-			8,481	252,000				8,583	252,000							-	-	1,220,602	1,283,823	-	2,504,425
61	PLTGU PRIOK	ST 10	-	-	-	-	-																-	-	-	-	-	-
62	PLTGU PRIOK	GT 21	-	-	54,883,198	8,460,129	-			8,326	252,000				8,609	252,000							-	-	164,436	2,203,916	-	2,368,352
63	PLTGU PRIOK	GT 22	-	-	148,248,484	4,916,717	-			8,496	252,000				8,559	252,000							-	-	906,344	1,708,206	-	2,614,550
64	PLTGU PRIOK	GT 23	-	-	10,354,334	4,743,562	-			8,535	252,000				7,790	252,000							-	-	536,866	985,803	-	1,522,669
65	PLTGU PRIOK	ST 20	-	-	-	-	-																-	-	-	-	-	-
66	PLTD KEBAYORAN	1	-	-	21,925	-	-			8,603					8,570								-	-	267	-	-	267
67	PLTD KEBAYORAN	2	-	-	19,593	-	-			8,625					8,571								-	-	245	-	-	245
68	PLTD KEBAYORAN	3	-	-	22,994	-	-			8,610					8,561								-	-	377	-	-	377
69	PLTD KEBAYORAN	4	-	-	19,688	-	-			8,612					8,535								-	-	347	-	-	347
70	PLTD KEBAYORAN	5	-	-	13,068	-	-			8,611					8,561								-	-	358	-	-	358
71	PLTD KEBAYORAN	6	-	-	25,901	-	-			8,600					8,552								-	-	306	-	-	306
	UBP SURALAYA																											
72	PLTU SURALAYA	1	-	-	-	-	1,747,675,652	10,399		9,277		4,785			9,194		4,711						12,450	-	15,613	-	6,886,674	6,914,737
73	PLTU SURALAYA	2	-	-	-	-	1,509,227,658	10,399		9,508		4,754	9,816		9,202		4,706						10,919	-	21,847	-	6,061,491	6,094,257
74	PLTU SURALAYA	3	-	-	-	-	1,689,176,772	10,399		9,241		4,774			9,199		4,685						4,618	-	14,404	-	7,309,237	7,328,259
75	PLTU SURALAYA	4	-	-	-	-	1,443,024,939	10,399		9,240		4,772	9,818		9,186		4,735						13,288	-	9,932	-	7,440,616	7,463,836
76	PLTU SURALAYA	5	-	-	-	-	934,488,447			9,552		4,648			9,191		4,554						-	-	12,571	-	10,858,664	10,871,235
77	PLTU SURALAYA	6	-	-	-	-	2,548,545,846			9,316		4,646			9,202		4,608						-	-	13,041	-	10,847,237	10,860,278
78	PLTU SURALAYA	7	-	-	-	-	2,576,286,643			9,233		4,659			9,200		4,591						-	-	13,001	-	9,471,433	9,484,434
	UBP SEMARANG																											
79	PLTU TAMBAK LOROK	1	88,802,498	868,603	2,669	-	-	9,262	8,665	8,605			9,248	8,654	8,620								852,356	6,728	794	-	-	859,878
80	PLTU TAMBAK LOROK	2	83,170,569	868,606	-	-	-	9,261	8,675	8,631			9,248	8,644	8,651								844,431	6,741	147	-	-	851,319
81	PLTU TAMBAK LOROK	3	177,139,965	568,415	12,165	-	-	9,273	8,837	8,629			9,249	8,651	8,614								2,171,306	22,274	595	-	-	2,194,175
82	PLTGU TAMBAK LOROK	GT 11	-	-	133,492,445	-	-	-	-	8,628					8,592								-	-	1,397,407	-	-	1,397,407
83	PLTGU TAMBAK LOROK	GT 12	-	-	146,354,498	-	-	-	-	8,631					8,591								-	-	1,638,678	-	-	1,638,678
84	PLTGU TAMBAK LOROK	GT 13	-	-	127,408,141	-	-	-	-	8,632					8,592								-	-	1,263,415	-	-	1,263,415
85	PLTGU TAMBAK LOROK	ST 10	-	-	-	-	-	-	-	-													-	-	-	-	-	-
86	PLTGU TAMBAK LOROK	GT 21	-	-	116,491,146	-	-	-	-	8,636					8,603								-	-	1,041,815	-	-	1,041,815
87	PLTGU TAMBAK LOROK	GT 22	-	-	100,013,804	-	-	-	-	8,625					8,600								-	-	1,572,737	-	-	1,572,737
88	PLTGU TAMBAK LOROK	GT 23	-	-	132,499,698	-	-	-	-	8,630					8,606								-	-	1,400,693	-	-	1,400,693
89	PLTGU TAMBAK LOROK	ST 20	-	-	-	-	-	-	-	-													-	-	-	-	-	-
90	PLTG CILACAP	1	-	-	-	-	-	-	-	8,669					8,661								-	-	107,807	-	-	107,807
91	PLTG CILACAP	2	-	-	-	-	-	-	-	8,646					8,656								-	-	114,657	-	-	114,657
92	PLTG SUNYARAGI	1	-	-	1,318,940	-	-	-	-	8,622	252,000				8,616	252,000							-	-	47,006	236,705	-	283,711
93	PLTG SUNYARAGI	2	-	-	1,886,130	-	-	-	-	8,619					8,628	252,000							-	-	103,297	-	-	103,297
94	PLTG SUNYARAGI	3	-	-	781,100	694,550	-	-	-	8,621	252,000				8,612	252,000							-	-	45,809	206,390	-	252,199
95	PLTG SUNYARAGI	4	-	-	1,141,630	710,606	-	-	-	8,624					8,621	252,000							-	-	56,703	-	-	56,703
	UBP PERAK GRATI																											
95	PLTU PERAK	3	59,340,593	-	213,190	-	-	9,681	-	8,690			8,781		7,311								607,364	-	972	-	-	608,336
96	PLTU PERAK	4	82,028,320	-	107,491	-	-	9,528	-	8,741			8,780		9,781								598,980	-	1,357	-	-	600,337
97	PLTGU GRATI	GT 11	-	-	109,990,867	-	-	-	-	9,130					9,096								-	-	1,654,866	-	-	1,654,866
98	PLTGU GRATI	GT 12	-	-	135,849,142	-	-	-	-	9,127					9,107								-	-	1,630,959	-	-	1,630,959
99	PLTGU GRATI	GT 13	-	-	132,646,608	-	-	-	-	9,134					9,101								-	-	1,522,480	-	-	1,522,480
100	PLTGU GRATI	ST 10	-	-	-	-	-	-	-	-													-	-	-	-	-	-
101	PLTG GRATI	2.1	-	-	54,747,148	-	-	-	-	9,118					9,074								-	-	583,298	-	-	583,298
102	PLTG GRATI	2.2	-	-	39,280,596	-	-	-	-	9,124					9,060								-	-	610,339	-	-	610,339
103	PLTG GRATI	2.3	-	-	32,957,302	-	-	-	-	9,126					9,067								-	-	485,823	-	-	485,823
	UBP BALI																											
104	PLTD PESANGGARAN	2	-	-	3,290,122	-	-	-	-	9,148					9,147								-	-	51,180	-	-	51,180
105	PLTD PESANGGARAN	3	-	-	2,535,188	-	-	-	-	9,169					9,140								-	-	41,759	-	-	41,759
106	PLTD PESANGGARAN	4	-	-	1,178,585	-	-	-	-	9,150					9,163								-	-	49,516	-	-	49,516
107	PLTD PESANGGARAN	5	-	-	1,906,073	-	-	-	-	9,150					9,152								-	-	16,948	-	-	16,948
108	PLTD PESANGGARAN	6	-	-	3,379,080	-	-	-	-	9,153					9,148								-	-	53,710	-	-	53,710
109	PLTD PESANGGARAN	7	-	-	2,830,704	-	-	-	-	9,144					9,149								-	-	44,732	-	-	44,732
110	PLTD PESANGGARAN	8	-	-	1,501,942	-	-	-	-	9,171					9,108								-	-	13,843	-	-	13,843
111	PLTD PESANGGARAN	9	-	-	591	-	-	-	-	9,170					9,184								-	-	8,372	-	-	8,372
112	PLTD PESANGGARAN	10	-	-	4,450,332	-	-	-	-	9,147					9,140								-	-	26,529	-	-	26,529
113	PLTD PESANGGARAN	11	-	-	4,467,412	-	-	-	-	9,164					9,149								-	-	34,271	-	-	34,271
114	PLTG PESANGGARAN	1	-	-	17,384,553	-	-	-	-	9,152					9,154								-	-	309,517	-	-	309,517
115	PLTG PESANGGARAN	2	-	-	22,416,306	-	-	-	-	9,140					9,151								-	-	223,738	-	-	223,738
116	PLTG PESANGGARAN	3	-	-	100,880,525	-	-	-	-	9,150					9,139								-	-	400,455	-	-	400,455
117	PLTG PESANGGARAN	4	-	-	104,854,723	-	-	-	-	9,152					9,149								-	-	961,123	-	-	961,123
118	PLTG GILIMANUK	1	-	-	233,538,158	-	-	-	-	9,188					9,152								-	-	1,954,280	-	-	1,954,280
119	PLTG PEMARON	1	-	-	30,935,410	-	-	-	-	9,139					9,115								-	-	381,359	-	-	381,359
120	PLTG PEMARON	2	-	-	35,799,175	-	-	-	-	9,192					9,115								-	-	131,771	-	-	131,771
	UBP KAMOJANG																											
121	PLTP KAMOJANG	1	-	-	-	-	-	-	-	-													-	-	-	-	-	-
122	PLTP KAMOJANG	2	-	-	-	-	-	-	-	-													-	-	-	-	-	-
123	PLTP KAMOJANG	3	-	-	-	-	-	-	-	-													-	-	-	-	-	-
124	PLTP GN. SALAK	1	-	-	-	-	-	-	-	-													-	-	-	-	-	-
125	PLTP GN. SALAK	2	-	-	-	-	-	-	-	-													-	-	-	-	-	-
126	PLTP GN. SALAK	3	-	-	-	-	-	-	-	-													-	-	-	-	-	-
127	PLTP DARAJAT	1	-	-	-	-	-	-	-	-													-	-	-	-	-	-

Operation Performance Record for the Existing Power Plants of Indonesia Power

No.	Plant Name	Unit	Kcal Consumption (2006)						Kcal Consumption (2007)						Selling Price (2005) (M.Rp)			Selling Price (2006) (M.Rp)			Selling Price (2007) (M.Rp)			Av.F.O	Av.P.O	Av.Prod. 2005 & 06	Av. Kcal Consup	Av. H.R	Average Fuel Consumption (kL, MMBTU, ton) from 2005 to 2006				
		No.	MFO (M.kcal)	IDO (M.kcal)	HSD (M.kcal)	Gas (M.kcal)	Coal (M.kcal)	Total (M.kcal)	MFO (M.kcal)	IDO (M.kcal)	HSD (M.kcal)	Gas (M.kcal)	Coal (M.kcal)	Total (M.kcal)	K.B	K.C	K.D	K.B	K.C	K.D	K.B	K.C	K.D	%	days	GWh	M.kcal	kca/kWh	MFO	IDO	HSD	Gas	Coal
	UBP SAGULING																																
1.	SAGULING	1	-	-	-	-	-	-	-	-	-	-	-	-										0.39	16.82	574.16	-	-	-	-	-	-	-
2.	SAGULING	2	-	-	-	-	-	-	-	-	-	-	-	-	88,498	12,568	1,257	88,302	7,730	774				0.62	20.84	497.15	-	-	-	-	-	-	-
3.	SAGULING	3	-	-	-	-	-	-	-	-	-	-	-	-										0.24	13.47	359.20	-	-	-	-	-	-	-
4.	SAGULING	4	-	-	-	-	-	-	-	-	-	-	-	-										0.38	12.02	605.47	-	-	-	-	-	-	-
5.	PRK. KONDANG	1	-	-	-	-	-	-	-	-	-	-	-	-										0	7.73	10.30	-	-	-	-	-	-	-
6.	PRK. KONDANG	2	-	-	-	-	-	-	-	-	-	-	-	-										1.49	16.27	11.57	-	-	-	-	-	-	-
7.	PRK. KONDANG	3	-	-	-	-	-	-	-	-	-	-	-	-										0.02	8.54	12.32	-	-	-	-	-	-	-
8.	PRK. KONDANG	4	-	-	-	-	-	-	-	-	-	-	-	-										0.02	18.52	11.02	-	-	-	-	-	-	-
9.	BENGKOK	1	-	-	-	-	-	-	-	-	-	-	-	-										0	9.96	2.65	-	-	-	-	-	-	-
10.	BENGKOK	2	-	-	-	-	-	-	-	-	-	-	-	-										0	0.35	3.74	-	-	-	-	-	-	-
11.	BENGKOK	3	-	-	-	-	-	-	-	-	-	-	-	-										0	1.64	2.84	-	-	-	-	-	-	-
12.	BENGKOK (DAGO)	4	-	-	-	-	-	-	-	-	-	-	-	-										1.04	3.03	2.88	-	-	-	-	-	-	-
13.	PLENGAN	1	-	-	-	-	-	-	-	-	-	-	-	-										0.01	2.78	4.20	-	-	-	-	-	-	-
14.	PLENGAN	2	-	-	-	-	-	-	-	-	-	-	-	-	8,906	688	69	8,906	540	55				0	2.71	2.68	-	-	-	-	-	-	-
15.	PLENGAN	3	-	-	-	-	-	-	-	-	-	-	-	-										0	10.82	4.40	-	-	-	-	-	-	-
16.	PLENGAN	4	-	-	-	-	-	-	-	-	-	-	-	-										0.01	3.47	9.30	-	-	-	-	-	-	-
17.	PLENGAN	5	-	-	-	-	-	-	-	-	-	-	-	-										0	3.31	5.35	-	-	-	-	-	-	-
18.	LAMAJAN	1	-	-	-	-	-	-	-	-	-	-	-	-										0	4.56	29.26	-	-	-	-	-	-	-
19.	LAMAJAN	2	-	-	-	-	-	-	-	-	-	-	-	-										0.73	2.12	27.24	-	-	-	-	-	-	-
20	LAMAJAN	3	-	-	-	-	-	-	-	-	-	-	-	-										0.01	2.69	26.11	-	-	-	-	-	-	-
21	CIKALONG	1	-	-	-	-	-	-	-	-	-	-	-	-										0.84	2.97	21.86	-	-	-	-	-	-	-
22	CIKALONG	2	-	-	-	-	-	-	-	-	-	-	-	-										0	5.67	18.65	-	-	-	-	-	-	-
23	CIKALONG	3	-	-	-	-	-	-	-	-	-	-	-	-										0	0.86	15.94	-	-	-	-	-	-	-
24	UBRUG	1	-	-	-	-	-	-	-	-	-	-	-	-										0	13.98	19.78	-	-	-	-	-	-	-
25	UBRUG	2	-	-	-	-	-	-	-	-	-	-	-	-										0	11.49	19.99	-	-	-	-	-	-	-
26	UBRUG	3	-	-	-	-	-	-	-	-	-	-	-	-	19,498	1,200	120	19,498	1,005	101				0	13.56	20.02	-	-	-	-	-	-	-
27	KRACAK	1	-	-	-	-	-	-	-	-	-	-	-	-										0	1.74	25.29	-	-	-	-	-	-	-
28	KRACAK	2	-	-	-	-	-	-	-	-	-	-	-	-										0	1.43	11.89	-	-	-	-	-	-	-
29	KRACAK	3	-	-	-	-	-	-	-	-	-	-	-	-										0	10.91	26.70	-	-	-	-	-	-	-
	UBP MRICA																																
29	PB SUDIRMAN	1	-	-	-	-	-	-	-	-	-	-	-	-										0.01	6.46	151.51	-	-	-	-	-	-	-
30	PB SUDIRMAN	2	-	-	-	-	-	-	-	-	-	-	-	-	34,942	2,427	244	34,762	1,969	198				0.00	7.13	140.33	-	-	-	-	-	-	-
31	PB SUDIRMAN	3	-	-	-	-	-	-	-	-	-	-	-	-										0.02	5.87	152.21	-	-	-	-	-	-	-
32	KETENGER	1	-	-	-	-	-	-	-	-	-	-	-	-										0.69	4	20.56	-	-	-	-	-	-	-
33	KETENGER	2	-	-	-	-	-	-	-	-	-	-	-	-										0.16	4.45	20.68	-	-	-	-	-	-	-
34	KETENGER	3	-	-	-	-	-	-	-	-	-	-	-	-										0.11	4.05	3.80	-	-	-	-	-	-	-
35	GARUNG	1	-	-	-	-	-	-	-	-	-	-	-	-										0.13	6.17	16.12	-	-	-	-	-	-	-
36	GARUNG	2	-	-	-	-	-	-	-	-	-	-	-	-										0.03	4.47	15.87	-	-	-	-	-	-	-
37	WADASLINTANG	1	-	-	-	-	-	-	-	-	-	-	-	-										0.19	4.17	51.82	-	-	-	-	-	-	-
38	WADASLINTANG	2	-	-	-	-	-	-	-	-	-	-	-	-										0.18	5.89	49.27	-	-	-	-	-	-	-
39	JELOK	1	-	-	-	-	-	-	-	-	-	-	-	-										0.11	4.69	26.58	-	-	-	-	-	-	-
40	JELOK	2	-	-	-	-	-	-	-	-	-	-	-	-										3.50	5.42	23.81	-	-	-	-	-	-	-
41	JELOK	3	-	-	-	-	-	-	-	-	-	-	-	-										0.13	3.97	24.19	-	-	-	-	-	-	-
42	JELOK	4	-	-	-	-	-	-	-	-	-	-	-	-	45,435	1,999	201	45,435	1,999	200				0.09	6.59	24.98	-	-	-	-	-	-	-
43	TIM	1	-	-	-	-	-	-	-	-	-	-	-	-										0.29	7.47	22.79	-	-	-	-	-	-	-
44	TIM	2	-	-	-	-	-	-	-	-	-	-	-	-										4.52	5.67	24.39	-	-	-	-	-	-	-
45	TIM	3	-	-	-	-	-	-	-	-	-	-	-	-										0.13	6.97	21.29	-	-	-	-	-	-	-
46	WONOGIRI	1	-	-	-	-	-	-	-	-	-	-	-	-										0.03	4.01	22.60	-	-	-	-	-	-	-
47	WONOGIRI	2	-	-	-	-	-	-	-	-	-	-	-	-										0.04	6.25	21.48	-	-	-	-	-	-	-
48	KEDUNG OMBO	1	-	-	-	-	-	-	-	-	-	-	-	-										0.03	4.9	62.11	-	-	-	-	-	-	-
49	TAPEN	1	-	-	-	-	-	-	-	-	-	-	-	-										0.05	2.92	4.67	-	-	-	-	-	-	-
50	SEMPOR	1	-	-	-	-	-	-	-	-	-	-	-	-										2.95	4.74	5.32	-	-	-	-	-	-	-
51	PEJENGKOLAN	1	-	-	-	-	-	-	-	-	-	-	-	-										0.64	20.83	6.28	-	-	-	-	-	-	-
52	KELAMBU	1	-	-	-	-	-	-	-	-	-	-	-	-										0.00	2.98	1.51	-	-	-	-	-	-	-
53	SIDOREJO	1	-	-	-	-	-	-	-	-	-	-	-	-										0.02	2.96	4.53	-	-	-	-	-	-	-
	UBP PRIOK																																
54	PLTU PRIOK	3	-	-	-	-	-	-	#VALUE!	-	-	-	-	#VALUE!	-	-	-	1,203	87,572	97				12.95	0	-	-	#DIV/0!	-	-	-	-	-
55	PLTU PRIOK	4	-	-	-	-	-	-	-	-	-	-	-	-										14.01	0	-	-	#DIV/0!	-	-	-	-	-
56	PLTG PRIOK	1	-	-	6,301	-	-	6,301	-	-	-	-	-	-	17,666	22,177	23	13,855	9,867	5				64.45	24.46	8.62	38,259	4,438	-	-	4,460	-	-
57	PLTG PRIOK	3	-	-	14,585	-	-	14,585	-	-	-	-	-	-										31.39	30.52	3.38	15,711	4,648	-	-	1,833	-	-
58	PLTGU PRIOK	GT 11	-	-	29,648	2,679,140	-	2,708,788	-	-	-	-	-	-										2.76	36.92	859.32	2,591,656	3,016	-	-	19,815	9,612	-
59	PLTGU PRIOK	GT 12	-	-	302,038	2,113,494	-	2,415,532	-	-	-	-	-	-	216,367	1,076,011	7,519	206,013	1,130,631	7,802				2.19	7.44	836.37	2,519,464	3,012	-	-	51,242	8,262	-
60	PLTGU PRIOK	GT 13	-	-	326,550	2,443,539	-	2,770,089	-	-	-	-	-	-										3.45	21.46	882.91	2,637,257	2,987	-	-	90,984	7,396	-
61	PLTGU PRIOK	ST 10	-	-	-	-	-	-	-	-	-	-	-	-										0.86	0	1,197.59	-	-	-	-	-	-	-
62	PLTGU PRIOK	GT 21	-	-	1,027,663	1,544,122	-	2,571,785	-	-	-	-	-	-										1.54	22.55	823.99	2,470,069	2,998	-	-	69,560	7,437	-
63	PLTGU PRIOK	GT 22	-	-	571,515	1,418,701	-	1,990,216	-	-	-	-	-	-	186,613	1,439,010	-	202,634	2,631,872	-				4.81	19.75	777.93	2,302,383	2,960	-	-	86,726	6,204	-
64	PLTGU PRIOK	GT 23	-	-	711,953	1,644,940	-	2,356,893	-	-	-	-	-	-										16.99	51.18	660.51	1,939,781	2,937	-	-	77,147	5,220	-
65	PLTGU PRIOK	ST 20	-	-	-	-	-	-	-	-	-	-	-	-										1.13	15.86	1,018.86	-	-	-	-	-	-	-
66	PLTD KEBAYORAN	1	-	-	175	-	-	175	-	-	-	-	-	-										0.00	1.77	0.08	221	2,763	-	-	26	-	-
67	PLTD KEBAYORAN	2	-	-	173	-	-	173	-	-	-	-	-	-										0.11	1.77	0.09	209	2,322	-	-	24	-	-
68	PLTD KEBAYORAN	3	-	-	173	-	-	173	-	-	-	-	-	-										0.00	1.77	0.10	275	2,750	-	-	32	-	-
69	PLTD KEBAYORAN	4	-	-	137	-	-	137	-	-	-	-	-	-										0.00	1.77	0.09	242	2,689	-	-	28	-	-
70	PLTD KEBAYORAN	5	-	-	187	-	-	187	-	-	-	-	-	-										0.00	1.77	0.10	273	2,730	-	-	32	-	-
71	PLTD KEBAYORAN	6	-	-	165	-	-	165	-	-	-	-	-	-										0.00	1.77	0.09	236	2,622	-	-	27	-	-
	UBP SURALAYA																																
72	PLTU SURALAYA	1	-	-	13,114	-	7,587,396	7,600,510	-	-	-	-	-	-										3.69	17.13	2,877.82	7,257,624	2,522	599	-	1,555	-	1,524,896
73	PLTU SURALAYA	2	-	-	6,451	-	7,921,153	7,927,604	-	-	-	-	-	-	315,649	1,332,998	8,491	334,117	1,401,447	8,929				2.87	32.99	2,834.10	7,010,931	2,474	525	138	1,499	-	1,479,116
74	PLTU SURALAYA	3	-	-	8,849	-	6,755,346	6,764,195	-	-	-	-	-	-										3.79	8.77	2,921.30	7,046,227	2,412	222	-	1,260	-	1,486,480
75	PLTU SURALAYA	4	-	-	5,881	-	6,868,314	6,874,195	-	-	-	-	-	-										3.60	19.89	2,994.68	7,169,016	2,394	639	22	858	-	1,504,883
76	PLTU SURALAYA	5	-	-	5,358	-	10,118,505	10,123,863	-	-	-	-	-	-										23.68	18.1	4,418.56	10,497,549	2,376	-	-	950	-	2,279,048
77	PLTU SURALAYA	6	-	-	7,414	-	10,739,244	10,746,658	-	-	-	-	-	-	186,510	1,487,775	10,180	187,118	1,494,988	10,248				2.76	11.27	4,432.92	10,803,468	2,437	-	-	1,103	-	2,332,656
78	PLTU SURALAYA	7	-	-	4,736	-	11,138,180	11,142,916	-	-	-	-	-	-										2.04	23.9	4,403.70	10,313,675	2,342	-	-	961	-	2,229,511
	UBP SEMARANG																																
79	PLTU TAMBAK LOROK	1	842,943	8,459	1,369	-	-	852,771	-	-	-	-	-	-										2.18	34.6	310.00	856,325	2,762	91,588	877	126	-	-
80	PLTU TAMBAK LOROK	2	755,991	6,523	1,362	-	-	763,876	-	-	-	-	-	-	58,038	1,104,429	1,434	42,689	1,428,681	1,175				1.71	39.77	292.94	807,598	2,757	86,464	766	87	-	-
81	PLTU TAMBAK LOROK	3	1,664,914	5,287	2,933	-	-	1,673,134	-	-	-	-	-	-										13.61	57.88	795.16	1,933,655	2,432	207,082	1,566	205	-	-
82	PLTGU TAMBAK LOROK	GT 11	-	-	1,006,902	-	-	1,006,902	-	-	-	-	-	-										1.00	34.35	400.63	1,202,155	3,001	-	-	139,576	-	-
83	PLTGU TAMBAK LOROK	GT 12	-	-	1,522,050	-	-	1,522,050	-	-	-	-	-	-	162,890	1,584,286	2,211	156,894	2,903,073	2,026				0.55	10.85	524.23	1,580,364	3,015	-	-	183,514	-	-
84	PLTGU TAMBAK LOROK	GT 13	-	-	1,366,995	-	-	1,366,995	-	-	-	-	-	-										0.93	12.87	439.69	1,315,205	2,991	-	-	152,733	-	-
85	PLTGU TAMBAK LOROK	ST 10	-	-	-	-	-	-	-	-	-	-	-	-										2.04	20.82	628.38	-	-	-	-	-	-	-
86	PLTGU TAMBAK LOROK	GT 21	-	-	1,020,090	-	-	1,020,090	-	-	-	-	-	-										2.08	43.88	345.19	1,030,953	2,987	-	-	119,605	-	-
87	PLTGU TAMBAK LOROK	GT 22	-	-	1,272,257	-	-	1,272,257	-	-	-	-	-	-	154,085	1,550,953	2,081	149,505	2,296,761	1,644				1.49	31.91	470.40	1,422,497	3,024	-	-	165,142	-	-
88	PLTGU TAMBAK LOROK	GT 23	-	-	978,570	-	-	978,570	-	-	-	-	-	-										0.35	25.61	388.33	1,189,632	3,063	-	-	138,007	-	-
89	PLTGU TAMBAK LOROK	ST 20	-	-	-	-	-	-	-	-	-	-	-	-										0.82	31.41	514.39	-	-	-	-	-	-	-
90	PLTG CILACAP	1	-	-	56,966	-	-	56,966	-	-	-	-	-	-	14,741	62,077	58	15,302	53,734	27				1.82	19.38	18.10	82,387	4,552	-	-	9,507	-	-
91	PLTG CILACAP	2	-	-	49,457	-	-	49,457	-	-	-	-	-	-										1.31	10.24	17.23	82,057	4,762	-	-	9,487	-	-
92	PLTG SUNYARAGI	1	-	-	41,461	5,891	-	47,352	-	-	-	-	-	-	40,696	44,250	238	44,773	41,212	167				5.59	14.39	48.03	165,532	3,446	-	-	5,132	481	-
93	PLTG SUNYARAGI	2	-	-	55,281	31,505	-	86,786	-	-	-	-	-	-										0.51	11.56	25.85	95,042	3,677	-	-	9,196	63	-
94	PLTG SUNYARAGI	3	-	-	24,143	122,813	-	146,956	-	-	-	-	-	-	-	128,524	-	-	96,006	-				0.14	19.9	59.87	199,578	3,334	-	-	4,059	653	-
95	PLTG SUNYARAGI	4	-	-	31,348	167,040	-	198,388	-	-	-	-	-	-										19.92	18.66	37.84	127,546	3,371	-	-	5,106	331	-
	UBP PERAK GRATI																																
95	PLTU PERAK	3	536,911	-	808	-	-	537,719	-	-	-	-	-	-	125,702	381,418	348	108,555	484,631	304				11.42	65.33	206.00	573,028	2,782	61,941	-	111	-	-
96	PLTU PERAK	4	412,210	-	1,526	-	-	413,736	-	-	-	-	-	-										10.39	60.35	174.52	507,037	2,905	54,907	-	156	-	-
97	PLTGU GRATI	GT 11	-	-	943,134	-	-	943,134	-	-	-	-	-	-										3.37	12.89	360.89	1,299,000	3,599	-	-	142,471	-	-
98	PLTGU GRATI	GT 12	-	-	745,291	-	-	745,291	-	-	-	-	-	-	121,053	1,532,096	2,241	111,089	1,771,019	1,264				0.92	36.61	329.22	1,188,125	3,609	-	-	130,267	-	-
99	PLTGU GRATI	GT 13	-	-	1,119,859	-	-	1,119,859	-	-	-	-	-	-										2.12	12.81	368.23	1,321,170	3,588	-	-	144,865	-	-
100	PLTGU GRATI	ST 10	-	-	-	-	-	-	-	-	-	-	-	-										0.79	9.04	563.76	-	-	-	-	-	-	-
101	PLTG GRATI	2.1	-	-	418,957	-	-	418,957	-	-	-	-	-	-										1.49	12.89	140.69	501,128	3,562	-	-	55,072	-	-
102	PLTG GRATI	2.2	-	-	443,731	-	-	443,731	-	-	-	-	-	-	14,055	562,665	566	13,718	823,988	397				2.41	8.9	150.41	527,035	3,504	-	-	57,935	-	-
103	PLTG GRATI	2.3	-	-	299,160	-	-	299,160	-	-	-	-	-	-										2.45	7.57	112.87	392,492	3,477	-	-	43,115	-	-
	UBP BALI																																
104	PLTD PESANGGARAN	2	-	-	29,906	-	-	29,906	-	-	-	-	-	-										1.57	6.29	15.93	40,543	2,545	-	-	4,432	-	-
105	PLTD PESANGGARAN	3	-	-	35,154	-	-	35,154	-	-	-	-	-	-										15.22	2.07	14.93	38,457	2,576	-	-	4,200	-	-
106	PLTD PESANGGARAN	4	-	-	24,403	-	-	24,403	-	-	-	-	-	-										17.71	87.91	14.15	36,960	2,612	-	-	4,037	-	-
107	PLTD PESANGGARAN	5	-	-	12,168	-	-	12,168	-	-	-	-	-	-										0.85	3.71	5.66	14,558	2,572	-	-	1,591	-	-
108	PLTD PESANGGARAN	6	-	-	49,090	-	-	49,090	-	-	-	-	-	-	49,575	157,162	179	49,575	236,937	143				7.66	13.41	20.38	51,400	2,522	-	-	5,617	-	-
109	PLTD PESANGGARAN	7	-	-	44,908	-	-	44,908	-	-	-	-	-	-										0.00	12.5	17.81	44,820	2,517	-	-	4,900	-	-
110	PLTD PESANGGARAN	8	-	-	7,037	-	-	7,037	-	-	-	-	-	-										2.78	0	4.00	10,440	2,610	-	-	1,141	-	-
111	PLTD PESANGGARAN	9	-	-	198	-	-	198	-	-	-	-	-	-										28.64	121.78	1.94	4,285	2,209	-	-	467	-	-
112	PLTD PESANGGARAN	10	-	-	30,347	-	-	30,347	-	-	-	-	-	-										0.30	17.46	12.25	28,438	2,321	-	-	3,110	-	-
113	PLTD PESANGGARAN	11	-	-	35,955	-	-	35,955	-	-	-	-	-	-										1.70	18.47	14.86	35,113	2,363	-	-	3,835	-	-
114	PLTG PESANGGARAN	1	-	-	212,095	-	-	212,095	-	-	-	-	-	-										1.24	6.86	66.37	260,806	3,930	-	-	28,495	-	-
115	PLTG PESANGGARAN	2	-	-	187,182	-	-	187,182	-	-	-	-	-	-	77,632	647,289	624	97,156	1,363,917	645				0.32	48.89	51.02	205,460	4,027	-	-	22,467	-	-
116	PLTG PESANGGARAN	3	-	-	761,675	-	-	761,675	-	-	-	-	-	-										20.20	22.5	175.34	581,065	3,314	-	-	63,554	-	-
117	PLTG PESANGGARAN	4	-	-	719,753	-	-	719,753	-	-	-	-	-	-										0.21	20.09	245.84	840,438	3,419	-	-	91,844	-	-
118	PLTG GILIMANUK	1	-	-	2,058,067	-	-	2,058,067	-	-	-	-	-	-	24,321	558,218	672	24,453	1,320,353	735				1.01	56.48	591.45	2,006,174	3,392	-	-	218,788	-	-
119	PLTG PEMARON	1	-	-	229,276	-	-	229,276	-	-	-	-	-	-	3,336	235,583	167	6,804	315,866	141				2.37	31.72	83.14	305,318	3,672	-	-	33,441	-	-
120	PLTG PEMARON	2	-	-	195,031	-	-	195,031	-	-	-	-	-	-										0.20	13.86	44.78	163,401	3,649	-	-	17,866	-	-
	UBP KAMOJANG																																
121	PLTP KAMOJANG	1	-	-	-	-	-	-	-	-	-	-	-	-										0.30	6.46	255.03	-	-	-	-	-	-	-
122	PLTP KAMOJANG	2	-	-	-	-	-	-	-	-	-	-	-	-	32,794	504,961	914	35,572	822,024	999				5.72	5.66	470.45	-	-	-	-	-	-	-
123	PLTP KAMOJANG	3	-	-	-	-	-	-	-	-	-	-	-	-										2.63	118.91	278.71	-	-	-	-	-	-	-
124	PLTP GN. SALAK	1	-	-	-	-	-	-	-	-	-	-	-	-										1.49	14.73	478.02	-	-	-	-	-	-	-
125	PLTP GN. SALAK	2	-	-	-	-	-	-	-	-	-	-	-	-	43,205	630,928	1,345	45,456	592,332	1,385				1.20	17.75	479.82	-	-	-	-	-	-	-
126	PLTP GN. SALAK	3	-	-	-	-	-	-	-	-	-	-	-	-										1.03	2.4	486.82	-	-	-	-	-	-	-
127	PLTP DARAJAT	1	-	-	-	-	-	-	-	-	-	-	-	-	11,978	141,494	1,266	11,434	133,829	1,206				0.34	5.21	474.01	-	-	-	-	-	-	-

Operation Performance Record for the Existing Power Plants of Indonesia Power

No.	Plant Name	Unit No.	Av. F.O by Entity %	Av. P.O by Entity days	Prod. by Entity GWh	Av. H.R by Entity kcal/kWh	Ava.Max by Entity MW	F.C by Entity Rp/kW-m	V.C by Entity Rp/kWh	F.C by Entity $/kW-m	V.C by Entity $/MWh
	UBP SAGULING										
1.	SAGULING	1	0.41	15.79	2,036	-	698.4	10,548	0.5	1.17	0.06
2.	SAGULING	2									
3.	SAGULING	3									
4.	SAGULING	4									
5.	PRK. KONDANG	1	0.22	5.68	222	-	59.4	12,773	0.3	1.42	0.03
6.	PRK. KONDANG	2									
7.	PRK. KONDANG	3									
8.	PRK. KONDANG	4									
9.	BENGKOK	1									
10.	BENGKOK	2									
11.	BENGKOK	3									
12.	BENGKOK (DAGO)	4									
13.	PLENGAN	1									
14.	PLENGAN	2									
15.	PLENGAN	3									
16.	PLENGAN	4									
17.	PLENGAN	5									
18.	LAMAJAN	1									
19.	LAMAJAN	2									
20	LAMAJAN	3									
21	CIKALONG	1									
22	CIKALONG	2									
23	CIKALONG	3									
24	UBRUG	1	-	8.85	124	-	37.3	44,257	0.9	4.92	0.10
25	UBRUG	2									
26	UBRUG	3									
27	KRACAK	1									
28	KRACAK	2									
29	KRACAK	3									
	UBP MRICA										
29	PB SUDIRMAN	1	0.01	6.49	444	-	179.4	16,189	0.5	1.80	0.06
30	PB SUDIRMAN	2									
31	PB SUDIRMAN	3									
32	KETENGER	1	0.64	5.62	475	-	125.0	30,302	0.4	3.37	0.04
33	KETENGER	2									
34	KETENGER	3									
35	GARUNG	1									
36	GARUNG	2									
37	WADASLINTANG	1									
38	WADASLINTANG	2									
39	JELOK	1									
40	JELOK	2									
41	JELOK	3									
42	JELOK	4									
43	TIM	1									
44	TIM	2									
45	TIM	3									
46	WONOGIRI	1									
47	WONOGIRI	2									
48	KEDUNG OMBO	1									
49	TAPEN	1									
50	SEMPOR	1									
51	PEJENGKOLAN	1									
52	KELAMBU	1									
53	SIDOREJO	1									
	UBP PRIOK										
54	PLTU PRIOK	3	13.48	-	-	-	45.0	1,114	-	0.12	-
55	PLTU PRIOK	4									
56	PLTG PRIOK	1	47.92	27.49	6	4,498	17.0	38,629	1.2	4.29	0.13
57	PLTG PRIOK	3									
58	PLTGU PRIOK	GT 11	2.32	16.46	3,776	2,052	528.3	33,313	2.0	3.70	0.22
59	PLTGU PRIOK	GT 12									
60	PLTGU PRIOK	GT 13									
61	PLTGU PRIOK	ST 10									
62	PLTGU PRIOK	GT 21	6.12	27.34	3,281	2,046	533.5	30,403	-	3.38	-
63	PLTGU PRIOK	GT 22									
64	PLTGU PRIOK	GT 23									
65	PLTGU PRIOK	ST 20									
66	PLTD KEBAYORAN	1									
67	PLTD KEBAYORAN	2									
68	PLTD KEBAYORAN	3									
69	PLTD KEBAYORAN	4									
70	PLTD KEBAYORAN	5									
71	PLTD KEBAYORAN	6									
	UBP SURALAYA										
72	PLTU SURALAYA	1	3.49	19.70	2,907	2,450	371.5	18,219	0.7	2.02	0.08
73	PLTU SURALAYA	2									
74	PLTU SURALAYA	3									
75	PLTU SURALAYA	4									
76	PLTU SURALAYA	5	9.49	17.76	4,418	2,385	575.2	9,022	0.8	1.00	0.09
77	PLTU SURALAYA	6									
78	PLTU SURALAYA	7									
	UBP SEMARANG										
79	PLTU TAMBAK LOROK	1	5.83	44.08	466	2,573	89.0	15,719	0.9	1.8	0.10
80	PLTU TAMBAK LOROK	2									
81	PLTU TAMBAK LOROK	3									
82	PLTGU TAMBAK LOROK	GT 11	1.13	19.72	1,993	2,056	450.0	29,610	1.1	3.3	0.12
83	PLTGU TAMBAK LOROK	GT 12									
84	PLTGU TAMBAK LOROK	GT 13									
85	PLTGU TAMBAK LOROK	ST 10									
86	PLTGU TAMBAK LOROK	GT 21	1.19	33.20	1,718	2,120	450.0	28,110	1.1	3.1	0.12
87	PLTGU TAMBAK LOROK	GT 22									
88	PLTGU TAMBAK LOROK	GT 23									
89	PLTGU TAMBAK LOROK	ST 20									
90	PLTG CILACAP	1	1.57	14.81	18	4,655	20.0	31,295	1.2	3.5	0.13
91	PLTG CILACAP	2									
92	PLTG SUNYARAGI	1	3.05	12.98	37	3,527	18.0	98,922	2.7	11.0	0.30
93	PLTG SUNYARAGI	2									
94	PLTG SUNYARAGI	3	10.03	19.28	49	3,348	18.0	-	-	-	-
95	PLTG SUNYARAGI	4									
	UBP PERAK GRATI										
95	PLTU PERAK	3	10.91	62.84	190	2,838	40.0	122,009	0.9	13.56	0.10
96	PLTU PERAK	4									
97	PLTGU GRATI	GT 11	1.80	17.84	1,622	2,348	450.0	21,496	1.1	2.39	0.12
98	PLTGU GRATI	GT 12									
99	PLTGU GRATI	GT 13									
100	PLTGU GRATI	ST 10									
101	PLTG GRATI	2.1	2.12	9.79	135	3,517	100.0	3,857	1.2	0.43	0.13
102	PLTG GRATI	2.2									
103	PLTG GRATI	2.3									
	UBP BALI										
104	PLTD PESANGGARAN	2	7.64	28.36	12	2,502	5.1	80,362	1.3	8.93	0.14
105	PLTD PESANGGARAN	3									
106	PLTD PESANGGARAN	4									
107	PLTD PESANGGARAN	5									
108	PLTD PESANGGARAN	6									
109	PLTD PESANGGARAN	7									
110	PLTD PESANGGARAN	8									
111	PLTD PESANGGARAN	9									
112	PLTD PESANGGARAN	10									
113	PLTD PESANGGARAN	11									
114	PLTG PESANGGARAN	1	5.49	24.59	135	3,505	27.1	67,278	1.2	7.48	0.13
115	PLTG PESANGGARAN	2									
116	PLTG PESANGGARAN	3									
117	PLTG PESANGGARAN	4									
118	PLTG GILIMANUK	1	1.01	56.48	591	3,392	130.4	15,580	1.2	1.73	0.13
119	PLTG PEMARON	1	1.29	22.79	64	3,664	40.0	5,281	1.1	0.59	0.12
120	PLTG PEMARON	2									
	UBP KAMOJANG										
121	PLTP KAMOJANG	1	2.88	43.68	335	-	44.0	21,580	1.0	2.40	0.11
122	PLTP KAMOJANG	2									
123	PLTP KAMOJANG	3									
124	PLTP GN. SALAK	1	1.24	11.63	482	-	56.7	21,731	0.9	2.41	0.10
125	PLTP GN. SALAK	2									
126	PLTP GN. SALAK	3									
127	PLTP DARAJAT	1	0.34	5.21	474	-	52.0	18,760	2.6	2.08	0.29

添付資料－6　WASP IVシミュレーションデータ

6.1　入力データ

6.2　出力データ

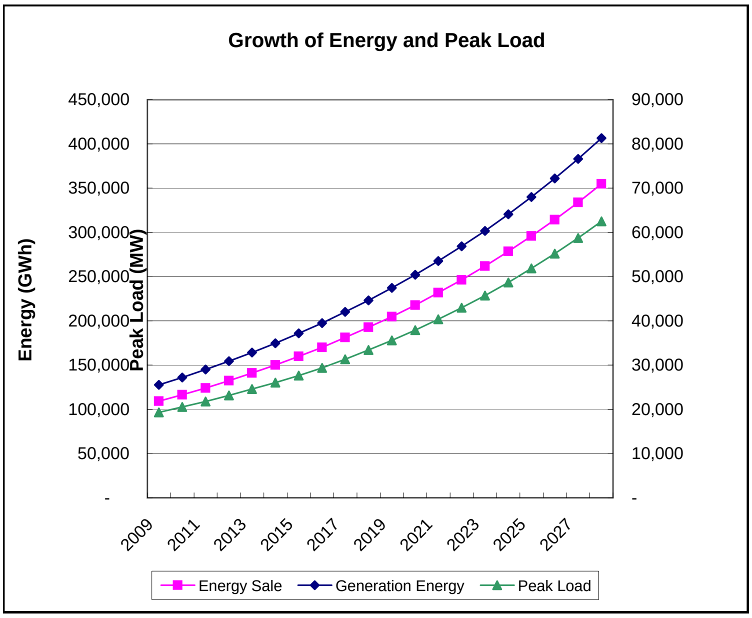
6.1　入力データ

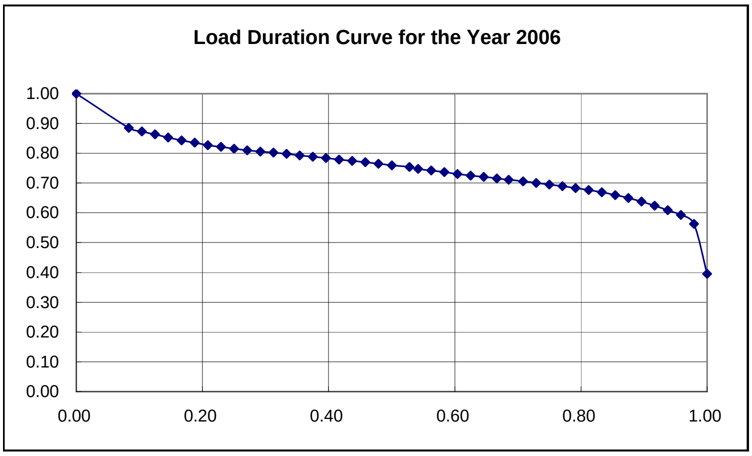
Peak Load Ratio

Period	Peak Load Ratio

Generation Energy and Peak Load

Year	Energy Sale	Station Use	T & D Loss	Generation Energy	Load Factor	Peak Load	Growth Rate of P.L.
	GWh	% of Generation Energy		GWh		MW	%
2009	109,227	4%	11.00%	127,841	75.5%	19,329	
2010	116,480	4%	10.90%	136,177	75.7%	20,535	6.2%
2011	124,169	4%	10.80%	145,003	75.9%	21,809	6.2%
2012	132,320	4%	10.70%	154,349	76.1%	23,153	6.2%
2013	140,962	4%	10.60%	164,245	76.3%	24,573	6.1%
2014	150,124	4%	10.50%	174,725	76.5%	26,073	6.1%
2015	159,838	4%	10.40%	185,824	76.7%	27,657	6.1%
2016	170,137	4%	10.30%	197,576	76.7%	29,406	6.3%
2017	181,057	4%	10.20%	210,023	76.5%	31,340	6.6%
2018	192,636	4%	10.10%	223,206	76.3%	33,395	6.6%
2019	204,913	4%	10.00%	237,168	76.1%	35,577	6.5%
2020	217,933	4%	9.90%	251,957	75.9%	37,895	6.5%
2021	231,738	4%	9.80%	267,621	75.7%	40,357	6.5%
2022	246,379	4%	9.70%	284,214	75.5%	42,973	6.5%
2023	261,905	4%	9.60%	301,790	75.3%	45,751	6.5%
2024	278,371	4%	9.50%	320,409	75.1%	48,703	6.5%
2025	295,834	4%	9.40%	340,133	74.9%	51,840	6.4%
2026	314,355	4%	9.30%	361,029	74.7%	55,172	6.4%
2027	333,999	4%	9.20%	383,167	74.5%	58,712	6.4%
2028	354,835	4%	9.10%	406,622	74.3%	62,474	6.4%





LDC for the Year 2006
(Based on P3B 2006 Data)

No.	Load	Duration	Area
1	1.0000	0.00000	
5	0.8855	0.08333	0.0186
6	0.8736	0.10417	0.0183
7	0.8632	0.12500	0.0181
8	0.8532	0.14583	0.0179
9	0.8437	0.16667	0.0177
10	0.8357	0.18750	0.0175
11	0.8275	0.20833	0.0173
12	0.8213	0.22917	0.0172
13	0.8155	0.25000	0.0170
14	0.8102	0.27083	0.0169
15	0.8060	0.29167	0.0168
16	0.8019	0.31250	0.0167
17	0.7977	0.33333	0.0167
18	0.7930	0.35417	0.0166
19	0.7889	0.37500	0.0165
20	0.7839	0.39583	0.0164
21	0.7790	0.41667	0.0163
22	0.7744	0.43750	0.0162
23	0.7697	0.45833	0.0161
24	0.7646	0.47917	0.0160
25	0.7593	0.50000	0.0159
26	0.7535	0.52803	0.0212
27	0.7479	0.54167	0.0102
28	0.7425	0.56250	0.0155
29	0.7367	0.58333	0.0154
30	0.7309	0.60417	0.0153
31	0.7255	0.62500	0.0152
32	0.7203	0.64583	0.0151
33	0.7154	0.66667	0.0150
34	0.7112	0.68522	0.0132
35	0.7058	0.70833	0.0164
36	0.7006	0.72917	0.0147
37	0.6949	0.75000	0.0145
38	0.6893	0.77083	0.0144
39	0.6830	0.79167	0.0143
40	0.6770	0.81250	0.0142
41	0.6694	0.83333	0.0140
42	0.6599	0.85417	0.0139
43	0.6499	0.87500	0.0136
44	0.6380	0.89583	0.0134
45	0.6242	0.91667	0.0132
46	0.6086	0.93750	0.0128
47	0.5932	0.95833	0.0125
48	0.5631	0.97917	0.0120
49	0.3957	1.00000	0.0100
50			
51			
52			
Area (Load Factor) =			0.7551

Addition/Retirements

No.	Name	No. of Sets	Available Capacity MW	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028

Supply Balance Information		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Available capacity of thermal		18,816																					
installed capacity of hydro		2,573																					
Gross available capacity		21,389	21,389	21,389	24,389	28,305	29,988	30,955	30,955	30,955	31,065	31,065	29,512	28,811	27,813	27,813	27,813	27,208	27,208	27,208	27,208	27,208	27,208
Addition/Retirement				3,000	3,916	1,683	967			110		(1,553)	(701)	(998)			(605)						
Gross available capacity(year end)		21,389	21,389	24,389	28,305	29,988	30,955	30,955	30,955	31,065	31,065	29,512	28,811	27,813	27,813	27,813	27,208	27,208	27,208	27,208	27,208	27,208	27,208
Peak Load at Power Station		-	-	19,329	20,535	21,809	23,153	24,573	26,073	27,657	29,406	31,340	33,395	35,577	37,895	40,357	42,973	45,751	48,703	51,840	55,172	58,712	62,474
Shortage/surplus of power supply		21,389	21,389	5,060	7,770	8,179	7,802	6,382	4,882	3,408	1,659	-1,828	-4,584	-7,764	-10,082	-12,544	-15,765	-18,543	-21,495	-24,632	-27,964	-31,504	-35,266
Required available capacity																							
Min. reserve margin of	10%	-	-	21,262	22,589	23,990	25,468	27,030	28,680	30,423	32,347	34,474	36,735	39,135	41,685	44,393	47,270	50,326	53,573	57,024	60,689	64,583	68,721
Max. reserve margin of	35%	-	-	26,094	27,722	29,442	31,257	33,174	35,199	37,337	39,698	42,309	45,083	48,029	51,158	54,482	58,014	61,764	65,749	69,984	74,482	79,261	84,340
Required mini. additional capacity		-	-	-	-	-	-	-	-	-	1,282	4,962	7,924	11,322	13,872	16,580	20,062	23,118	26,365	29,816	33,481	37,375	41,513

				2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
C6H	PLTU	600																							
C10H	PLTU	1000							1	1	1	1	1	5	5	8	10	12	15	17	18	21	24	27	31
LNG	PLTG	750										1	2	3	4	4	4	4	4	6	6	8	8	10	10
N10H	PLTN	1000													1	1	1	2	2	2	3	3	4	4	5
GE55	PLTP	55						6	6	6	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38
G150	PLTG	150																							
PS	Pumped S.	500										1	2	2	4	6	6	6	6	6	6	6	6	6	6
CIB3	PLTA	172															1	1	1	1	1	1	1	1	1
CPSG	PLTA	400															1	1	1	1	1	1	1	1	1
CMD3	PLTA	238															1	1	1	1	1	1	1	1	1
MANG	PLTA	360															1	1	1	1	1	1	1	1	1
PLTA	PLTA	300																	3	3	6	6	6	7	7
Java-Sumatra I.C.		600									4	5	5	5	5	5	5	5	5	5	5	5	5	5	5
C6H	PLTU	600																							
C10H	PLTU	1000							1,000	1,000	1,000	1,000	1,000	5,000	5,000	8,000	10,000	12,000	15,000	17,000	18,000	21,000	24,000	27,000	31,000
LNG	PLTG	750										750	1,500	2,250	3,000	3,000	3,000	3,000	3,000	4,500	4,500	6,000	6,000	7,500	7,500
N10H	PLTN	1000													1,000	1,000	1,000	2,000	2,000	2,000	3,000	3,000	4,000	4,000	5,000
GE55	PLTP	55						330	330	330	550	660	770	880	990	1,100	1,210	1,320	1,430	1,540	1,650	1,760	1,870	1,980	2,090
G150	PLTG	150																							
PS	Pumped S.	500										500	1,000	1,000	2,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
CIB3	PLTA	172															172	172	172	172	172	172	172	172	172
CPSG	PLTA	400															400	400	400	400	400	400	400	400	400
CMD3	PLTA	238															238	238	238	238	238	238	238	238	238
MANG	PLTA	360															360	360	360	360	360	360	360	360	360
PLTA	PLTA	300																	900	900	1,800	1,800	1,800	2,100	2,100
Java-Sumatera I.C.		600									2,400	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Total Additional Capacity						-	-	330	1,330	1,330	3,950	5,910	7,270	12,130	14,990	19,100	22,380	25,490	29,500	33,110	36,120	40,730	44,840	49,750	54,860
Total Supply Capacity at year end						24,389	28,305	30,318	32,285	32,285	34,905	36,975	38,335	41,642	43,801	46,913	50,193	53,303	56,708	60,318	63,328	67,938	72,048	76,958	82,068
Reserve Margin		%				26.2%	37.8%	39.0%	39.4%	31.4%	33.9%	33.7%	30.4%	32.9%	31.2%	31.9%	32.5%	32.1%	32.0%	31.8%	30.0%	31.1%	30.6%	31.1%	31.4%

FIXSYS HYDRO

PLTA	Index	Installed Cap. [MW]	Energy Storage (GWh)	Inflow Energy				Min. Generation				Average Capacity			
				I(Wet) [GWh]	II(Dry) [GWh]	III [GWh]	IV [GWh]	I(Wet) [GWh]	II(Dry) [GWh]	III [GWh]	IV [GWh]	I(Wet) [MW]	II(Dry) [MW]	III [MW]	IV [MW]
Jatiluhur #1-6	JTLH	180	842.6	315.8	376.9			204.3	298			180	180		
Saguling	SAGL	700.7	2,520.7	1292	680.8			999.2	400.6			701	701		
IP- Area I	IPA1	37.26	-	70.5	53.9			61.8	37.8			37	37		
IP- Area II	IPA2	59.38	-	143.1	78.9			112.3	56.7			59	59		
Sudirman	MRTC	180.9	489.8	356.9	79.7			277.3	18			181	181		
IP-Area III	APA3	125.54	-	264.1	199			235.8	166.3			126	126		
Sutami	STMI	105	451.1	263.2	155.5			164.6	127.5			105	105		
EP Non Suami	EPNS	134.5	563.5	312.3	175.8			223	115.8			135	135		
Brantas Non EP	BNEP	41.9	-	47.3	41.2			17.1	11.3			42	42		
Cirata	CRI2	1008	1,377.0	648.2	444.9			487.8	256			1008	1008		
Rajamandala	RJMD	47	90.0	82.0	61.8			70.0	52.5			47	47		
Jatigede	JTGD	110	620.0	216.8	72.3			184.3	61.4			110	110		

INPUT VARSYS

No.	Name	No. of Sets	Min. Load MW	Capacity MW	Heat Rates Kcal/kWh Base Load	Heat Rates Kcal/kWh Average Incremental	Fuel Costs Cents/Million Kcal Domestic	Fuel Costs Cents/Million Kcal Foreign	Fuel Type	Spinning Reserveas	FOR	Days Scheduled Maintenance Days	Maintenance Class Size MW	O&M (FIX) $/kWm	O&M (VAR) $/MWh	FLD HEAT RT KCAL/KWH	UNIT GENERATION COSTS ($/MWH) BASE DOM	BASE FRGN	FLD DOM	FLD FRGN	FLD TOT
1	C6H	0	300	600	2510	2389	1509	0	0	5	7	42	600	2.61	2.00	2450	39.9	0.0	39.0	0.0	39.0
2	C10H	0	500	1000	2510	2389	1509	0	0	5	7	42	1000	2.61	2.00	2450	39.9	0.0	39.0	0.0	39.0
3	LNG	0	375	750	1911	1741	0	3968	2	7	7	42	750	1.60	1.00	1826	1.0	75.8	1.0	72.5	73.5
4	N10H	0	1000	1000	2606	2606	0	250	6	0	7	28	1000	4.66	0.41	2606	0.4	6.5	0.4	6.5	6.9
5	GE55	0	44	55	1000	1000	6430	0	5	0	7	28	55	2.50	1.00	1000	65.3	0.0	65.3	0.0	65.3
6	G150	0	75	150	3150	2625	9222	0	4	10	7	28	150	0.97	2.00	2888	292.5	0.0	268.3	0.0	268.3
7	J-SIC	5	300	600	2510	2389	1509	0	7	5	8	45	600	2.64	2.00	2450	39.9	0.0	39.0	0.0	39.0

PUMP STORAGE (Upper Cisokan)

PS1

Installed Capacity 500 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2015

Period	Pump Cap. MW	Gen. Cap. MW	Max. Energy GWh
1	530	500	600
2	530	500	600

PS2

Installed Capacity 500 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2016

Period	Pump Cap. MW	Gen. Cap. MW	Max. Energy GWh
1	530	500	600
2	530	500	600

Hydropower Project

		MANG (Maung)		CIB3 (Cibuni-3)		CPSG (Cipasang)		CMD3(Cimandiri-3)	
Construction Cost	$/kW	1872	Inc.IDC	2,865	Inc.IDC	1,636	Inc.IDC	1,998	Inc.IDC
Installed Caapcity	MW	360		172		400		238	
Reservoir Energy	GWh	535		568		751		600	
Inflow Energy wet	GWh	430		450		600		480	
dry	GWh	160		170		230		180	
Minimum Generation wet	GWh	320		340		450		360	
dry	GWh	80		90		110		90	
Average Capacity wet	MW	360		172		400		238	
dry	MW	360		172		400		238	
Construction Period	year	5		5		5		5	
	I.D.C (%)	22.6		22.6		22.6		22.6	

Source: Hydro Inventory and Pre-feasibility Studies, June 1999, Nippon Koei Co., Ltd.

PUMP STORAGE (Matenggeng)

PS3

Installed Capacity 1000 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2019

Period	Pump Cap. MW	Gen. Cap. MW	Max. Energy GWh
1	530	500	450
2	530	500	450

PUMP STORAGE (Grindulu)

PS4

Installed Capacity 1000 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2019

Period	Pump Cap. MW	Gen. Cap. MW	Max. Energy GWh
1	530	500	450
2	530	500	450

Construction Cost inc. IDC

PLANT	CAPITAL COSTS ($/kW) DEPRECIABLE PART DOMESTIC	DEPRECIABLE PART FOREIGN	NON-DEPRECIABLE PART DOMESTIC	NON-DEPRECIABLE PART FOREIGN	PLANT LIFE YEARS	D.R=12% I.D.C. (%)	CONSTR. TIME (YEARS)
C6H	444	1,037	0	0	30	18.46	4
C10H	611	1,425	0	0	30	18.46	4
LNG	300	699	0	0	25	14.13	3
N10H	659	2,637	0	0	40	26.6	6
G150	82	466	0	0	20	9.6	2
PS 1&2	271	584	0	0	50	22.6	5
PS 3	252	541	0	0	50	22.6	5
PS 4	268	579	0	0	50	22.6	5
GE55	444	1,776	0	0	30	14.13	3
J-SIC	308	2,051	0	0	30	18.46	4

Java - Sumatra Interconnection (HVDC)

			Note
1. Investment Cost for HVDC			
EPC Cost	1,370	M.US$	
Land Acquisition + ROW	160	M.US$	
Total Investment Cost	**1,530**	**M.US$**	
2. Construction Cost for HVDC	510	$/kW	Divided by 3000 MW
3. Construction Cost of C6H	1,481	$/kW	Referred to P3B Data
4. Total Investment Cost	**1,991**	**$/kW**	

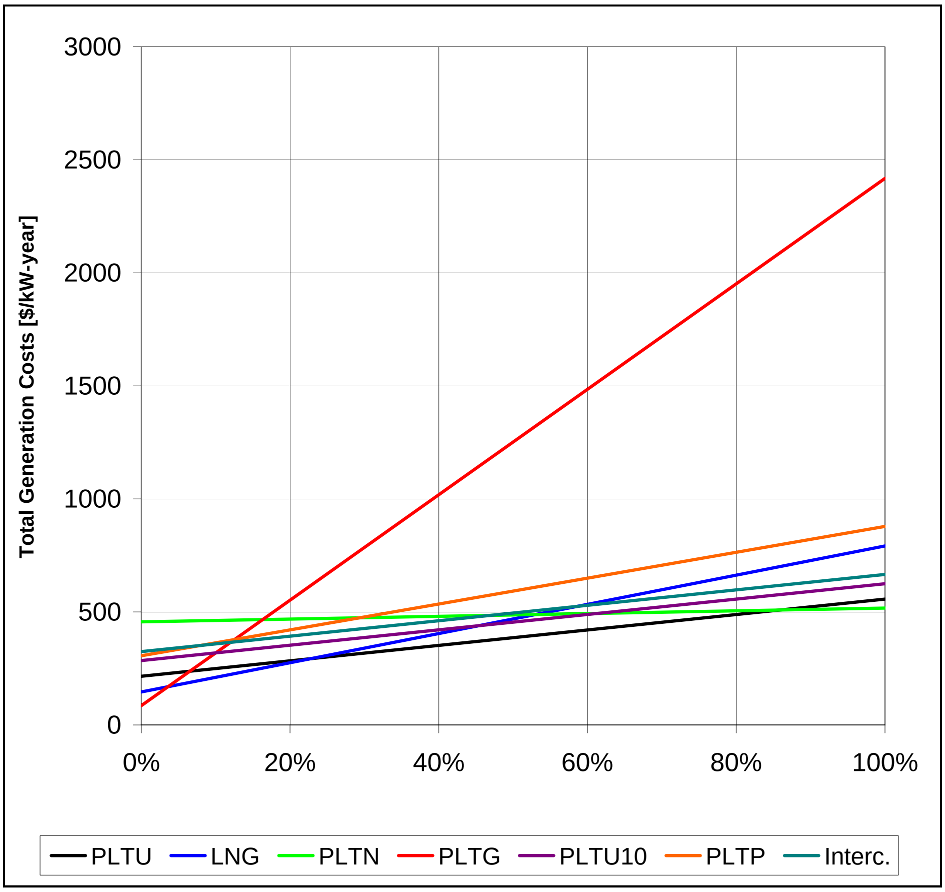
Source: Updated Feasibility Study Jawa - Sumatera Interconnection, Sep. 2007

WASP IV Screening Curve

Fuel Prices Scenario Index	2	Medium Scenario						
		PLTU	LNG	PLTN	PLTG	PLTU10	PLTP	Interc.
Installed Capacity	MW	600	750	1000	150	1000	55	3000
Fuel Type		coal	LNG	nuclear	HSD	coal	Geothermal	HVDC T/L
Fuel Price	$/MMBTU	3.80	10.00	0.63	23.24	3.80	16.20	3.80
Thermal Efficiency	%	35%	47%	33%	30%	35%	86%	35%
Variabel O&M	$/MWh	2.0	1.0	0.4	2.0	2.0	1.0	2.0
Fixed O&M	$/KW.year	31.32	19.2	55.92	11.64	31.32	30.00	31.68
Investment Cost inc. IDC	$/KW	1,481	999	3,296	548	2,036	2,220	2,359
Construction Period	Years	4	3	6	2	4	3	4
Book Life	Years	30	25	40	20	30	30	30
Discount Rate		12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%
Capital Recovery Factor (CRF)		12.41%	12.75%	12.13%	13.39%	12.41%	12.41%	12.41%
Interest During Construction (IDC)		18.46%	14.13%	26.60%	9.60%	18.46%	14.13%	14.13%
Annual Investment cost	$/KW.year	183.86	127.37	399.82	73.37	252.76	275.60	292.75
Annual Fixed Cost	**$/KW.year**	**215.18**	**146.57**	**455.74**	**85.01**	**284.08**	**305.60**	**324.43**
Annual Fuel Cost	$/KW.year	324.58	636.07	57.07	2315.88	323.65	563.14	323.65
Annual Variable O&M	$/KW.year	17.52	8.76	3.59	17.52	17.52	8.76	17.52
Annual Variable Cost	**$/KW.year**	**342.10**	**644.83**	**60.66**	**2333.40**	**341.17**	**571.90**	**341.17**
Annual Fixed Cost	$/KW.year	215.18	146.57	455.74	85.01	284.08	305.60	324.43
Total	**$/KW.year**	**557.28**	**791.40**	**516.40**	**2418.41**	**625.25**	**877.50**	**665.60**
CF	0%	215.18	146.57	455.74	85.01	284.08	305.60	324.43
	100%	557.28	791.40	516.40	2418.41	625.25	877.50	665.60

	Fuel Prices $/MMBTU		
	Low	Medium	High
Index	**1**	**2**	**3**
Coal	3.33	3.80	4.28
LNG	8.00	10.00	12.00
N.Gas	4.00	5.00	6.00
Nuclear	0.57	0.63	0.69
HSD	19.57	23.24	26.91
MFO	11.50	13.70	15.90
Geothemal	14.58	16.20	17.82

Note: $/MMBTU is referred to "Fuel Price Sheet" except Nuclear.



INPUT REMERSIM (Fuel Comsumption per GWh)

No.	Name	Type	No. of Sets	Min. Load MW	Capacity MW	Heat Rates (kcal/kWh) Base Load	Heat Rates (kcal/kWh) Average Incremental	Heat Rates (kcal/kWh) At FLD	Fuel Type	Heat Value kcal/kg 100kcal/MMBTU kcal/liter	Fuel Consumption (unit/GWh) at FLD 1,000 ton	1,000 MMBTU	1,000 KL	Geo
1	SRL1	PLTU	4	240	381	2,622	2,452	2,559	0	5,100	0.502			
2	SRL2	PLTU	3	340	579	2,560	2,309	2,456	0	5,100	0.482			
3	MKR1	PLTU	3	44	84	3,273	3,194	3,235	3	9,598			0.337	
4	MKR2	PLTG	2	90	165	2,948	2,884	2,919	1	2,520		11.58		
5	MKR3	PLTGU	1	300	465	2,433	2,018	2,286	1	2,520		9.07		
6	MKRR	PLTGU	-	500	750	2,433	2,018	2,295	1	2,520		9.11		
7	PRK1	PLTU	2	25	48	3,229	2,957	3,099	3	9,598			0.323	
8	PRK2	PLTGU	2	315	560	2,319	1,994	2,177	4	9,095			0.239	
9	PRK3	PLTG	2	10	20	4,711	3,930	4,321	4	9,095			0.475	
10	PRKE	PLTGU	-	500	750	2,433	2,018	2,295	1	2,520		9.11		
11	MTR1	PLTGU	1	315	605	2,555	2,246	2,407	4	9,095			0.265	
12	MTR2	PLTG	2	72	138	3,376	3,204	3,294	4	9,095			0.362	
13	MTR3	PLTG	6	72	143	3,376	3,204	3,291	4	9,095			0.362	
14	MTRR	PLTGU	-	150	225	2,433	2,018	2,295	1	2,520		9.11		
15	SLK1	PLTP	3	52	52	1,000	1,000	1,000	5	7,308				-
16	SLK2	PLTP	3	52	52	1,000	1,000	1,000	5	7,308				-
17	CLND	PLTG	1	50	150	4,465	3,200	3,622	1	2,520		14.37		
18	CLGN	PLTGU	1	240	740	2,175	1,800	1,922	1	2,520		7.63		
19	SRL3	PLTU	-	340	600	2,560	2,309	2,451	0	4,200	0.584			
20	LBHN	PLTU	-	150	300	2,622	2,452	2,537	0	4,200	0.604			
21	TLNG	PLTU	-	150	300	2,622	2,452	2,537	0	4,200	0.604			
22	KMJ1	PLTP	1	26	26	1,000	1,000	1,000	5	7,308				-
23	KMJ2	PLTP	2	47	47	1,000	1,000	1,000	5	7,308				-
24	KMJ3	PLTP	1	60	60	1,000	1,000	1,000	5	7,308				-
25	DRJ1	PLTP	1	44	44	1,000	1,000	1,000	5	7,308				-
26	DRJ2	PLTP	1	70	70	1,000	1,000	1,000	5	5,300				-
27	DRJ3	PLTP	1	110	110	1,000	1,000	1,000	5	7,308				-
28	WW1	PLTP	1	110	110	1,000	1,000	1,000	5	7,308				-
29	SRG1	PLTG	2	8	18	4,700	4,084	4,358	1	2,520		17.29		
30	SRG2	PLTG	2	8	20	4,700	4,084	4,330	4	9,095			0.476	
31	PTH1	PLTP	-	60	60	1,000	1,000	1,000	5	7,308				-
32	JBSL	PLTU	-	150	300	2,590	2,115	2,353	0	4,200	0.560			
33	JBUT	PLTU	-	150	300	2,590	2,115	2,353	0	4,200	0.560			
34	CRBN	PLTU	-	360	600	2,560	2,160	2,400	0	5,300	0.453			
35	TBK1	PLTGU	2	297	496	2,632	2,015	2,384	4	9,095			0.262	
36	TBK2	PLTU	2	25	41	3,229	3,127	3,189	3	9,598			0.332	
37	TBK3	PLTU	1	125	192	3,229	3,127	3,193	3	9,598			0.333	
38	CLC1	PLTG	2	10	22	4,700	4,079	4,361	4	9,095			0.479	
39	CLC2	PLTU	2	150	300	2,772	2,285	2,529	0	5,215	0.485			
40	TJB1	PLTU	2	330	660	2,772	2,285	2,529	0	5,215	0.485			
41	TJB2	PLTU	-	360	600	2,560	2,160	2,400	0	4,500	0.533			
42	DIEN	PLTP	1	60	60	1,000	1,000	1,000	5	7,308				-
43	RMBG	PLTU	-	150	300	2,590	2,115	2,353	0	4,500	0.523			
44	PTN1	PLTU	2	225	370	2,579	2,412	2,514	0	5,100	0.493			
45	PTN2	PLTU	-	340	600	2,560	2,309	2,451	0	4,500	0.545			
46	PEC	PLTU	2	368	615	2,772	2,285	2,576	0	5,215	0.494			
47	JPOW	PLTU	2	355	610	2,700	2,310	2,537	0	5,500	0.461			
48	GSK1	PLGU	3	250	480	2,318	1,990	2,161	1	2,520		8.58		
49	GSK2	PLTG	2	5	16	4,456	4,284	4,338	1	2,520		17.21		
50	GSK3	PLTU	2	43	85	2,882	2,709	2,797	1	2,520		11.10		
51	GSK4	PLTU	2	90	175	2,826	2,601	2,717	1	2,520		10.78		
52	PRAK	PLTU	2	25	48	4,323	3,517	3,937	3	9,598			0.410	
53	GRT1	PLTGU	1	270	462	2,632	2,083	2,404	4	9,095			0.264	
54	GRT2	PLTG	3	40	100	3,376	3,310	3,336	4	9,095			0.367	
55	PMRN	PLTG	2	12	48	4,439	4,035	4,136	4	9,095			0.455	
56	GLMR	PLTG	2	5	16	4,456	4,284	4,338	4	9,095			0.477	
57	GLMK	PLTG	1	56	133	4,439	4,035	4,205	4	9,095			0.462	
58	BLI1	PLTG	4	6	20	4,700	4,131	4,302	4	9,095			0.473	
59	BLI2	PLTD	10	2	5	3,880	3,576	3,698	4	9,095			0.407	
60	BLUT	PLTU	-	65	130	2,590	2,115	2,353	0	5,300	0.444			
61	BDGL	PLTP	-	10	10	1,000	1,000	1,000	5	7,308				-
62	TJAW	PLTU	-	150	300	2,590	2,115	2,353	0	4,500	0.523			
63	JTSL	PLTU	-	150	300	2,590	2,115	2,353	0	4,500	0.523			

No.	Name	Type	No. of Sets	Min. Load MW	Capacity MW	Heat Rates (kcal/kWh) Base Load	Heat Rates (kcal/kWh) Average Incremental	Heat Rates (kcal/kWh) At FLD	Fuel Type	Heat Value kcal/kg 100kcal/MMBTU kcal/liter	Fuel Consumption (unit/GWh) a FLD 1,000 ton	1,000 MMBTU	1,000 KL	Geo Nuclear
1	C6H	PLTU	0	300	600	2510	2389	2,450	0	4,766	0.514			
2	C10H	PLTU	0	500	1000	2510	2389	2,450	0	4,766	0.514			
3	LNG	PLTG	0	375	750	1911	1741	1,826	2	2,520		7.25		
4	N10H	PLTN	0	1000	1000	2606	2606	2,606	6	0				-
5	GE55	PLTP	0	44	55	1000	1000	1,000	5	0				-
6	G150	PLTG	0	75	150	3150	2625	2,888	4	9,095			0.318	
7	J-SIC	J-SI	5	300	600	2510	2389	2,450	7	0				-

Assumption of Fuel Prices (Medium Scenario)

Kind of Fuel	Price			Heat Content	
	USD		Cents/mKcal		
Coal	80.0	per Ton	1,509	5,300	Kcal/kg
LNG	10.0	per MMBTU	3,968	252,000	Kcal/mmbtu
Gas	5.0	per MMBTU	1,984	252,000	Kcal/mmbtu
HSD	133.0	per Barrel	9,222	9,070	Kcal/l
MFO	81.0	per Barrel	5,437	9,370	Kcal/l
Geothermal	0.0553	per kWh	6,430		
Nuclear			250		

Price	Crude Oil	95	$/barrel		
	HSD	133	$/barrel	23.24	$/mmbtu
	MFO	81	$/barrel	13.70	$/mmbtu
	LNG+transport	10.0	$/mmbtu		
	transport	0.7	$/mmbtu		
	LNG	9.3	$/mmbtu	9.30	$/mmbtu
	Gas	5.0	$/mmbtu	5.00	$/mmbtu
	Coal+transport	80	$/ton	3.80	$/mmbtu
	transport	18	$/ton	Note: Coal price at P/S is CIF Price.	
	Coal	74	$/ton	6,300	Kcal/kg
		62	$/ton	5,300	Kcal/kg

Heat (	HSD	19,500	btu/lb	1 kg =	2.2 lb
		10,811	Kcal/kg	berat jenis =	0.839 kg/l
		9,070	Kcal/l		
	MFO	18,000	btu/lb	1 kg =	2.2 lb
		9,979	Kcal/kg	berat jenis =	0.939 kg/l
		9,370	Kcal/l		

Reference 2: Relationship between MOPS and Domestic Prices

MOPS (2008/03/31 ~ 2008/04/04)	$/barrel
High Speed Diesel Oil (0.05%)	132.02
Kerosene	128.36
Crude Oil	**104.30**

Note: HSD and Kerosene are FOB at Singapore
MOPS means Mean of Platts Singapore
Source://www.gu-goon.com/

PERTAMINA Price	$/barrel	Price Index (IP)
HSD	**145.93**	**1.40**
MFO	**89.14**	**0.85**
Crude Oil	**104.30**	**1.00**

Note : 1 barrel = 159 liter

New Fuel Prices for Industry in April 2008 released by PERTAMINA on March 31, 2008

Fuel Type	Economical Selling Fuel Price - Non Tax (Base Price)					
	Region 1		Region 2		Region 3	
	Rp/KL	US$/KL	Rp/KL	US$/KL	Rp/KL	US$/KL
Gasoline	7080.13	768.17	7352.107	797.68	7508.057	814.60
Kerosene	8532.07	925.76	8718.104	945.94	8903.029	966.01
High Speed Diesel	8458.78	**917.77**	8819.464	956.91	9006.539	977.20
Marine Diesel Fuel	8284.08	898.88	8464.705	918.48	8644.250	937.97
Marine Fuel Oil	5166.53	**560.60**	5278.949	572.80	5390.924	584.95
Pertamina DEX	8757.37	950.14	-	-	-	-

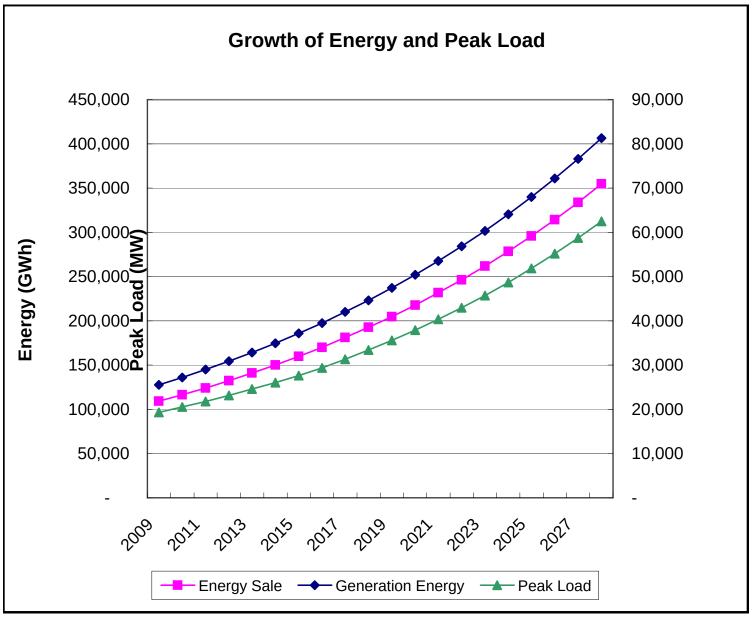
Source: www.pertamina.com/
Note : Fuel prices released by PERTAMINA depend on MOPS.

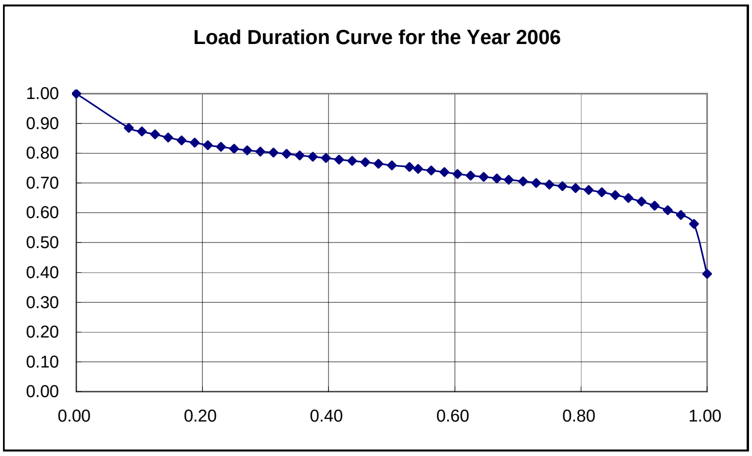
Peak Load Ratio

Period	Peak Load Ratio

Generation Energy and Peak Load

Year	Energy Sale	Station Use	T & D Loss	Generation Energy	Load Factor	Peak Load	Growth Rate of P.L.
	GWh	% of Generation Energy		GWh		MW	%
2009	109,227	4%	11.00%	127,841	75.5%	19,329	
2010	116,480	4%	10.90%	136,177	75.7%	20,535	6.2%
2011	124,169	4%	10.80%	145,003	75.9%	21,809	6.2%
2012	132,320	4%	10.70%	154,349	76.1%	23,153	6.2%
2013	140,962	4%	10.60%	164,245	76.3%	24,573	6.1%
2014	150,124	4%	10.50%	174,725	76.5%	26,073	6.1%
2015	159,838	4%	10.40%	185,824	76.7%	27,657	6.1%
2016	170,137	4%	10.30%	197,576	76.7%	29,406	6.3%
2017	181,057	4%	10.20%	210,023	76.5%	31,340	6.6%
2018	192,636	4%	10.10%	223,206	76.3%	33,395	6.6%
2019	204,913	4%	10.00%	237,168	76.1%	35,577	6.5%
2020	217,933	4%	9.90%	251,957	75.9%	37,895	6.5%
2021	231,738	4%	9.80%	267,621	75.7%	40,357	6.5%
2022	246,379	4%	9.70%	284,214	75.5%	42,973	6.5%
2023	261,905	4%	9.60%	301,790	75.3%	45,751	6.5%
2024	278,371	4%	9.50%	320,409	75.1%	48,703	6.5%
2025	295,834	4%	9.40%	340,133	74.9%	51,840	6.4%
2026	314,355	4%	9.30%	361,029	74.7%	55,172	6.4%
2027	333,999	4%	9.20%	383,167	74.5%	58,712	6.4%
2028	354,835	4%	9.10%	406,622	74.3%	62,474	6.4%





LDC for the Year 2006
(Based on P3B 2006 Data)

No.	Load	Duration	Area
1	1.0000	0.00000	
5	0.8855	0.08333	0.0186
6	0.8736	0.10417	0.0183
7	0.8632	0.12500	0.0181
8	0.8532	0.14583	0.0179
9	0.8437	0.16667	0.0177
10	0.8357	0.18750	0.0175
11	0.8275	0.20833	0.0173
12	0.8213	0.22917	0.0172
13	0.8155	0.25000	0.0170
14	0.8102	0.27083	0.0169
15	0.8060	0.29167	0.0168
16	0.8019	0.31250	0.0167
17	0.7977	0.33333	0.0167
18	0.7930	0.35417	0.0166
19	0.7889	0.37500	0.0165
20	0.7839	0.39583	0.0164
21	0.7790	0.41667	0.0163
22	0.7744	0.43750	0.0162
23	0.7697	0.45833	0.0161
24	0.7646	0.47917	0.0160
25	0.7593	0.50000	0.0159
26	0.7535	0.52803	0.0212
27	0.7479	0.54167	0.0102
28	0.7425	0.56250	0.0155
29	0.7367	0.58333	0.0154
30	0.7309	0.60417	0.0153
31	0.7255	0.62500	0.0152
32	0.7203	0.64583	0.0151
33	0.7154	0.66667	0.0150
34	0.7112	0.68522	0.0132
35	0.7058	0.70833	0.0164
36	0.7006	0.72917	0.0147
37	0.6949	0.75000	0.0145
38	0.6893	0.77083	0.0144
39	0.6830	0.79167	0.0143
40	0.6770	0.81250	0.0142
41	0.6694	0.83333	0.0140
42	0.6599	0.85417	0.0139
43	0.6499	0.87500	0.0136
44	0.6380	0.89583	0.0134
45	0.6242	0.91667	0.0132
46	0.6086	0.93750	0.0128
47	0.5932	0.95833	0.0125
48	0.5631	0.97917	0.0120
49	0.3957	1.00000	0.0100
50			
51			
52			
Area (Load Factor) =			0.7551

Addition/Retirements

No.	Name	No. of Sets	Available Capacity MW	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Supply Balance Information				2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Available capacity of thermal				18,816																					
installed capacity of hydro				2,573																					
Gross available capacity				21,389	21,389	21,389	24,389	28,305	29,988	30,955	30,955	30,955	31,065	31,065	29,512	28,811	27,813	27,813	27,813	27,208	27,208	27,208	27,208	27,208	27,208
Addition/Retirement						3,000	3,916	1,683	967			110		(1,553)	(701)	(998)			(605)						
Gross available capacity(year end)				21,389	21,389	24,389	28,305	29,988	30,955	30,955	30,955	31,065	31,065	29,512	28,811	27,813	27,813	27,813	27,208	27,208	27,208	27,208	27,208	27,208	27,208
Peak Load at Power Station				-	-	19,329	20,535	21,809	23,153	24,573	26,073	27,657	29,406	31,340	33,395	35,577	37,895	40,357	42,973	45,751	48,703	51,840	55,172	58,712	62,474
Shortage/surplus of power supply				21,389	21,389	5,060	7,770	8,179	7,802	6,382	4,882	3,408	1,659	-1,828	-4,584	-7,764	-10,082	-12,544	-15,765	-18,543	-21,495	-24,632	-27,964	-31,504	-35,266
Required available capacity																									
Min. reserve margin of			10%	-	-	21,262	22,589	23,990	25,468	27,030	28,680	30,423	32,347	34,474	36,735	39,135	41,685	44,393	47,270	50,326	53,573	57,024	60,689	64,583	68,721
Max. reserve margin of			35%	-	-	26,094	27,722	29,442	31,257	33,174	35,199	37,337	39,698	42,309	45,083	48,029	51,158	54,482	58,014	61,764	65,749	69,984	74,482	79,261	84,340
Required mini. additional capacity				-	-	-	-	-	-	-	-	-	1,282	4,962	7,924	11,322	13,872	16,580	20,062	23,118	26,365	29,816	33,481	37,375	41,513
				2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
C6H	PLTU	600																							
C10H	PLTU	1000							1	1	1	1	2	5	6	9	10	13	17	19	22	26	30	34	38
LNG	PLTG	750										1	2	3	4	4	4	4	4	5	5	5	5	5	5
N10H	PLTN	1000													1	1	1	2	2	2	3	3	4	4	5
GE55	PLTP	55						6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
G150	PLTG	150																							
PS	Pumped S.	500										1	2	2	4	6	6	6	6	6	6	6	6	6	6
CIB3	PLTA	172															1	1	1	1	1	1	1	1	1
CPSG	PLTA	400															1	1	1	1	1	1	1	1	1
CMD3	PLTA	238															1	1	1	1	1	1	1	1	1
MANG	PLTA	360															1	1	1	1	1	1	1	1	1
PLTA	PLTA	300																							
Java-Sumatra I.C.		600									4	5	5	5	5	5	5	5	5	5	5	5	5	5	5
C6H	PLTU	600																							
C10H	PLTU	1000							1,000	1,000	1,000	1,000	2,000	5,000	6,000	9,000	10,000	13,000	17,000	19,000	22,000	26,000	30,000	34,000	38,000
LNG	PLTG	750										750	1,500	2,250	3,000	3,000	3,000	3,000	3,000	3,750	3,750	3,750	3,750	3,750	3,750
N10H	PLTN	1000													1,000	1,000	1,000	2,000	2,000	2,000	3,000	3,000	4,000	4,000	5,000
GE55	PLTP	55						330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330	330
G150	PLTG	150																							
PS	Pumped S.	500										500	1,000	1,000	2,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
CIB3	PLTA	172															172	172	172	172	172	172	172	172	172
CPSG	PLTA	400															400	400	400	400	400	400	400	400	400
CMD3	PLTA	238															238	238	238	238	238	238	238	238	238
MANG	PLTA	360															360	360	360	360	360	360	360	360	360
PLTA	PLTA	300																							
Java-Sumatera I.C.		600									2,400	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Total Additional Capacity						-	-	330	1,330	1,330	3,730	5,580	7,830	11,580	15,330	19,330	21,500	25,500	29,500	32,250	36,250	40,250	45,250	49,250	54,250
Total Supply Capacity at year end						24,389	28,305	30,318	32,285	32,285	34,685	36,645	38,895	41,092	44,141	47,143	49,313	53,313	56,708	59,458	63,458	67,458	72,458	76,458	81,458
Reserve Margin		%				26.2%	37.8%	39.0%	39.4%	31.4%	33.0%	32.5%	32.3%	31.1%	32.2%	32.5%	30.1%	32.1%	32.0%	30.0%	30.3%	30.1%	31.3%	30.2%	30.4%

FIXSYS HYDRO

PLTA	Index	Installed Cap. [MW]	Energy Storage (GWh)	Inflow Energy				Min. Generation				Average Capacity			
				I(Wet) [GWh]	II(Dry) [GWh]	III [GWh]	IV [GWh]	I(Wet) [GWh]	II(Dry) [GWh]	III [GWh]	IV [GWh]	I(Wet) [MW]	II(Dry) [MW]	III [MW]	IV [MW]
Jatiluhur #1-6	JTLH	180	842.6	315.8	376.9			204.3	298			180	180		
Saguling	SAGL	700.7	2,520.7	1292	680.8			999.2	400.6			701	701		
IP- Area I	IPA1	37.26	-	70.5	53.9			61.8	37.8			37	37		
IP- Area II	IPA2	59.38	-	143.1	78.9			112.3	56.7			59	59		
Sudirman	MRTC	180.9	489.8	356.9	79.7			277.3	18			181	181		
IP-Area III	APA3	125.54	-	264.1	199			235.8	166.3			126	126		
Sutami	STMI	105	451.1	263.2	155.5			164.6	127.5			105	105		
EP Non Suami	EPNS	134.5	563.5	312.3	175.8			223	115.8			135	135		
Brantas Non EP	BNEP	41.9	-	47.3	41.2			17.1	11.3			42	42		
Cirata	CRI2	1008	1,377.0	648.2	444.9			487.8	256			1008	1008		
Rajamandala	RJMD	47	90.0	82.0	61.8			70.0	52.5			47	47		
Jatigede	JTGD	110	620.0	216.8	72.3			184.3	61.4			110	110		

INPUT VARSYS

No.	Name	No. of Sets	Min. Load MW	Capacity MW	Heat Rates Kcal/kWh: Base Load	Heat Rates Kcal/kWh: Average Incremental	Fuel Costs Cents/Million Kcal: Domestic	Fuel Costs Cents/Million Kcal: Foreign	Fuel Type	Spinning Reserveas	FOR	Days Scheduled Maintenance Days	Maintenance Class Size MW	O&M (FIX) $/kWm	O&M (VAR) $/MWh	FLD HEAT RT KCAL/KWH	UNIT GENERATION COSTS ($/MWH): BASE DOM	BASE FRGN	FLD DOM	FLD FRGN	FLD TOT
1	C6H	0	300	600	2510	2389	1509	0	0	5	7	42	600	2.61	2.00	2450	39.9	0.0	39.0	0.0	39.0
2	C10H	0	500	1000	2510	2389	1509	0	0	5	7	42	1000	2.61	2.00	2450	39.9	0.0	39.0	0.0	39.0
3	LNG	0	375	750	1911	1741	0	3968	2	7	7	42	750	1.60	1.00	1826	1.0	75.8	1.0	72.5	73.5
4	N10H	0	1000	1000	2606	2606	0	250	6	0	7	28	1000	4.66	0.41	2606	0.4	6.5	0.4	6.5	6.9
5	GE55	0	44	55	1000	1000	6430	0	5	0	7	28	55	2.50	1.00	1000	65.3	0.0	65.3	0.0	65.3
6	G150	0	75	150	3150	2625	9222	0	4	10	7	28	150	0.97	2.00	2888	292.5	0.0	268.3	0.0	268.3
7	J-SIC	5	300	600	2510	2389	1509	0	7	5	8	45	600	2.64	2.00	2450	39.9	0.0	39.0	0.0	39.0

PUMP STORAGE (Upper Cisokan)

PS1

Installed Capacity 500 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2015

Period	Pump Cap. MW	Gen. Cap. MW	Max. Energy GWh
1	530	500	600
2	530	500	600

PS2

Installed Capacity 500 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2016

Period	Pump Cap. MW	Gen. Cap. MW	Max. Energy GWh
1	530	500	600
2	530	500	600

Hydropower Project

			MANG (Maung)		CIB3 (Cibuni-3)		CPSG (Cipasang)		CMD3(Cimandiri-3)	
Construction Cost		$/kW	1872	Inc.IDC	2,865	Inc.IDC	1,636	Inc.IDC	1,998	Inc.IDC
Installed Caapcity		MW	360		172		400		238	
Reservoir Energy		GWh	535		568		751		600	
Inflow Energy	wet	GWh	430		450		600		480	
	dry	GWh	160		170		230		180	
Minimum Generation	wet	GWh	320		340		450		360	
	dry	GWh	80		90		110		90	
Average Capacity	wet	MW	360		172		400		238	
	dry	MW	360		172		400		238	
Construction Period		year	5		5		5		5	
		I.D.C (%)	22.6		22.6		22.6		22.6	

Source: Hydro Inventory and Pre-feasibility Studies, June 1999, Nippon Koei Co., Ltd.

PUMP STORAGE (Matenggeng)

PS3

Installed Capacity 1000 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2019

Period	Pump Cap. MW	Gen. Cap. MW	Max. Energy GWh
1	530	500	450
2	530	500	450

PUMP STORAGE (Grindulu)

PS4

Installed Capacity 1000 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2019

Period	Pump Cap. MW	Gen. Cap. MW	Max. Energy GWh
1	530	500	450
2	530	500	450

Construction Cost inc. IDC

PLANT	CAPITAL COSTS ($/kW): DEPRECIABLE PART DOMESTIC	DEPRECIABLE PART FOREIGN	NON-DEPRECIABLE PART DOMESTIC	NON-DEPRECIABLE PART FOREIGN	PLANT LIFE YEARS	D.R=12% I.D.C. (%)	CONSTR. TIME (YEARS)
C6H	444	1,037	0	0	30	18.46	4
C10H	611	1,425	0	0	30	18.46	4
LNG	300	699	0	0	25	14.13	3
N10H	659	2,637	0	0	40	26.6	6
G150	82	466	0	0	20	9.6	2
PS 1&2	271	584	0	0	50	22.6	5
PS 3	252	541	0	0	50	22.6	5
PS 4	268	579	0	0	50	22.6	5
GE55	444	1,776	0	0	30	14.13	3
J-SIC	308	2,051	0	0	30	18.46	4

Java - Sumatra Interconnection (HVDC)

			Note
1. Investment Cost for HVDC			
EPC Cost	1,370	M.US$	
Land Acquisition + ROW	160	M.US$	
Total Investment Cost	**1,530**	**M.US$**	
2. Construction Cost for HVDC	510	$/kW	Divided by 3000 MW
3. Construction Cost of C6H	1,481	$/kW	Referred to P3B Data
4. Total Investment Cost	**1,991**	**$/kW**	

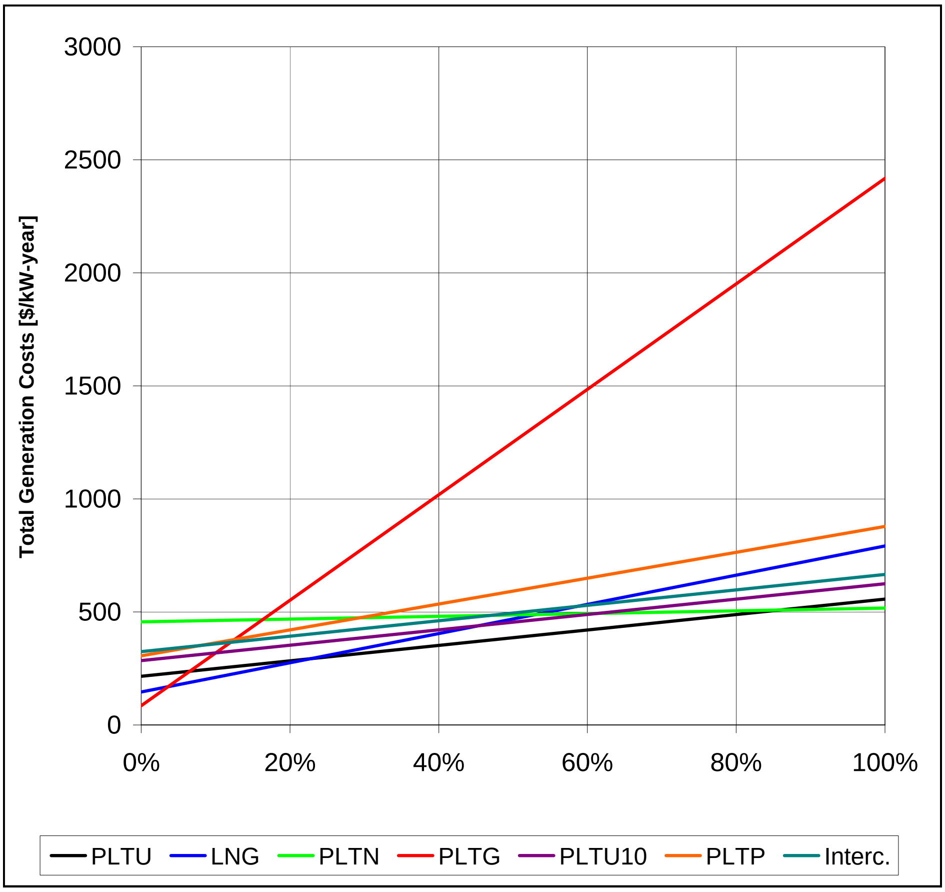
Source: Updated Feasibility Study Jawa - Sumatera Interconnection, Sep. 2007

WASP IV Screening Curve

Fuel Prices Scenario Index	2	Medium Scenario						
		PLTU	LNG	PLTN	PLTG	PLTU10	PLTP	Interc.
Installed Capacity	MW	600	750	1000	150	1000	55	3000
Fuel Type		coal	LNG	nuclear	HSD	coal	Geothermal	HVDC T/L
Fuel Price	$/MMBTU	3.80	10.00	0.63	23.24	3.80	16.20	3.80
Thermal Efficiency	%	35%	47%	33%	30%	35%	86%	35%
Variabel O&M	$/MWh	2.0	1.0	0.4	2.0	2.0	1.0	2.0
Fixed O&M	$/KW.year	31.32	19.2	55.92	11.64	31.32	30.00	31.68
Investment Cost inc. IDC	$/KW	1,481	999	3,296	548	2,036	2,220	2,359
Construction Period	Years	4	3	6	2	4	3	4
Book Life	Years	30	25	40	20	30	30	30
Discount Rate		12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%
Capital Recovery Factor (CRF)		12.41%	12.75%	12.13%	13.39%	12.41%	12.41%	12.41%
Interest During Construction (IDC)		18.46%	14.13%	26.60%	9.60%	18.46%	14.13%	14.13%
Annual Investment cost	$/KW.year	183.86	127.37	399.82	73.37	252.76	275.60	292.75
Annual Fixed Cost	**$/KW.year**	**215.18**	**146.57**	**455.74**	**85.01**	**284.08**	**305.60**	**324.43**
Annual Fuel Cost	$/KW.year	324.58	636.07	57.07	2315.88	323.65	563.14	323.65
Annual Variable O&M	$/KW.year	17.52	8.76	3.59	17.52	17.52	8.76	17.52
Annual Variable Cost	**$/KW.year**	**342.10**	**644.83**	**60.66**	**2333.40**	**341.17**	**571.90**	**341.17**
Annual Fixed Cost	$/KW.year	215.18	146.57	455.74	85.01	284.08	305.60	324.43
Total	**$/KW.year**	**557.28**	**791.40**	**516.40**	**2418.41**	**625.25**	**877.50**	**665.60**
CF	0%	215.18	146.57	455.74	85.01	284.08	305.60	324.43
	100%	557.28	791.40	516.40	2418.41	625.25	877.50	665.60

	Fuel Prices $/MMBTU		
	Low	Medium	High
Index	**1**	**2**	**3**
Coal	3.33	3.80	4.28
LNG	8.00	10.00	12.00
N.Gas	4.00	5.00	6.00
Nuclear	0.57	0.63	0.69
HSD	19.57	23.24	26.91
MFO	11.50	13.70	15.90
Geothemal	14.58	16.20	17.82

Note: $/MMBTU is referred to "Fuel Price Sheet" except Nuclear.



INPUT REMERSIM (Fuel Comsumption per GWh)

No.	Name	Type	No. of Sets	Min. Load	Capacity	Heat Rates (kcal/kWh)			Fuel Type	Heat Value kcal/kg 100kcal/MMBTU kcal/liter	Fuel Consumption (unit/GWh) at FLD			
				MW	MW	Base Load	Average Incremental	At FLD			1,000 ton	1,000 MMBTU	1,000 KL	Geo
1	SRL1	PLTU	4	240	381	2,622	2,452	2,559	0	5,100	0.502			
2	SRL2	PLTU	3	340	579	2,560	2,309	2,456	0	5,100	0.482			
3	MKR1	PLTU	3	44	84	3,273	3,194	3,235	3	9,598			0.337	
4	MKR2	PLTG	2	90	165	2,948	2,884	2,919	1	2,520		11.58		
5	MKR3	PLTGU	1	300	465	2,433	2,018	2,286	1	2,520		9.07		
6	MKRR	PLTGU	-	500	750	2,433	2,018	2,295	1	2,520		9.11		
7	PRK1	PLTU	2	25	48	3,229	2,957	3,099	3	9,598			0.323	
8	PRK2	PLTGU	2	315	560	2,319	1,994	2,177	4	9,095			0.239	
9	PRK3	PLTG	2	10	20	4,711	3,930	4,321	4	9,095			0.475	
10	PRKE	PLTGU	-	500	750	2,433	2,018	2,295	1	2,520		9.11		
11	MTR1	PLTGU	1	315	605	2,555	2,246	2,407	4	9,095			0.265	
12	MTR2	PLTG	2	72	138	3,376	3,204	3,294	4	9,095			0.362	
13	MTR3	PLTG	6	72	143	3,376	3,204	3,291	4	9,095			0.362	
14	MTRR	PLTGU	-	150	225	2,433	2,018	2,295	1	2,520		9.11		
15	SLK1	PLTP	3	52	52	1,000	1,000	1,000	5	7,308				-
16	SLK2	PLTP	3	52	52	1,000	1,000	1,000	5	7,308				-
17	CLND	PLTG	1	50	150	4,465	3,200	3,622	1	2,520		14.37		
18	CLGN	PLTGU	1	240	740	2,175	1,800	1,922	1	2,520		7.63		
19	SRL3	PLTU	-	340	600	2,560	2,309	2,451	0	4,200	0.584			
20	LBHN	PLTU	-	150	300	2,622	2,452	2,537	0	4,200	0.604			
21	TLNG	PLTU	-	150	300	2,622	2,452	2,537	0	4,200	0.604			
22	KMJ1	PLTP	1	26	26	1,000	1,000	1,000	5	7,308				-
23	KMJ2	PLTP	2	47	47	1,000	1,000	1,000	5	7,308				-
24	KMJ3	PLTP	1	60	60	1,000	1,000	1,000	5	7,308				-
25	DRJ1	PLTP	1	44	44	1,000	1,000	1,000	5	7,308				-
26	DRJ2	PLTP	1	70	70	1,000	1,000	1,000	5	5,300				-
27	DRJ3	PLTP	1	110	110	1,000	1,000	1,000	5	7,308				-
28	WW1	PLTP	1	110	110	1,000	1,000	1,000	5	7,308				-
29	SRG1	PLTG	2	8	18	4,700	4,084	4,358	1	2,520		17.29		
30	SRG2	PLTG	2	8	20	4,700	4,084	4,330	4	9,095			0.476	
31	PTH1	PLTP	-	60	60	1,000	1,000	1,000	5	7,308				-
32	JBSL	PLTU	-	150	300	2,590	2,115	2,353	0	4,200	0.560			
33	JBUT	PLTU	-	150	300	2,590	2,115	2,353	0	4,200	0.560			
34	CRBN	PLTU	-	360	600	2,560	2,160	2,400	0	5,300	0.453			
35	TBK1	PLTGU	2	297	496	2,632	2,015	2,384	4	9,095			0.262	
36	TBK2	PLTU	2	25	41	3,229	3,127	3,189	3	9,598			0.332	
37	TBK3	PLTU	1	125	192	3,229	3,127	3,193	3	9,598			0.333	
38	CLC1	PLTG	2	10	22	4,700	4,079	4,361	4	9,095			0.479	
39	CLC2	PLTU	2	150	300	2,772	2,285	2,529	0	5,215	0.485			
40	TJB1	PLTU	2	330	660	2,772	2,285	2,529	0	5,215	0.485			
41	TJB2	PLTU	-	360	600	2,560	2,160	2,400	0	4,500	0.533			
42	DIEN	PLTP	1	60	60	1,000	1,000	1,000	5	7,308				-
43	RMBG	PLTU	-	150	300	2,590	2,115	2,353	0	4,500	0.523			
44	PTN1	PLTU	2	225	370	2,579	2,412	2,514	0	5,100	0.493			
45	PTN2	PLTU	-	340	600	2,560	2,309	2,451	0	4,500	0.545			
46	PEC	PLTU	2	368	615	2,772	2,285	2,576	0	5,215	0.494			
47	JPOW	PLTU	2	355	610	2,700	2,310	2,537	0	5,500	0.461			
48	GSK1	PLGU	3	250	480	2,318	1,990	2,161	1	2,520		8.58		
49	GSK2	PLTG	2	5	16	4,456	4,284	4,338	1	2,520		17.21		
50	GSK3	PLTU	2	43	85	2,882	2,709	2,797	1	2,520		11.10		
51	GSK4	PLTU	2	90	175	2,826	2,601	2,717	1	2,520		10.78		
52	PRAK	PLTU	2	25	48	4,323	3,517	3,937	3	9,598			0.410	
53	GRT1	PLTGU	1	270	462	2,632	2,083	2,404	4	9,095			0.264	
54	GRT2	PLTG	3	40	100	3,376	3,310	3,336	4	9,095			0.367	
55	PMRN	PLTG	2	12	48	4,439	4,035	4,136	4	9,095			0.455	
56	GLMR	PLTG	2	5	16	4,456	4,284	4,338	4	9,095			0.477	
57	GLMK	PLTG	1	56	133	4,439	4,035	4,205	4	9,095			0.462	
58	BLI1	PLTG	4	6	20	4,700	4,131	4,302	4	9,095			0.473	
59	BLI2	PLTD	10	2	5	3,880	3,576	3,698	4	9,095			0.407	
60	BLUT	PLTU	-	65	130	2,590	2,115	2,353	0	5,300	0.444			
61	BDGL	PLTP	-	10	10	1,000	1,000	1,000	5	7,308				-
62	TJAW	PLTU	-	150	300	2,590	2,115	2,353	0	4,500	0.523			
63	JTSL	PLTU	-	150	300	2,590	2,115	2,353	0	4,500	0.523			

No.	Name	Type	No. of Sets	Min. Load	Capacity	Heat Rates (kcal/kWh)			Fuel Type	Heat Value kcal/kg 100kcal/MMBTU kcal/liter	Fuel Consumption (unit/GWh) a FLD			
				MW	MW	Base Load	Average Incremental	At FLD			1,000 ton	1,000 MMBTU	1,000 KL	Geo Nuclear
1	C6H	PLTU	0	300	600	2510	2389	2,450	0	4,766	0.514			
2	C10H	PLTU	0	500	1000	2510	2389	2,450	0	4,766	0.514			
3	LNG	PLTG	0	375	750	1911	1741	1,826	2	2,520		7.25		
4	N10H	PLTN	0	1000	1000	2606	2606	2,606	6	0				-
5	GE55	PLTP	0	44	55	1000	1000	1,000	5	0				-
6	G150	PLTG	0	75	150	3150	2625	2,888	4	9,095			0.318	
7	J-SIC	J-SI	5	300	600	2510	2389	2,450	7	0				-

Assumption of Fuel Prices (Medium Scenario)

Kind of Fuel	Price			Heat Content	
	USD		Cents/mKcal		
Coal	80.0	per Ton	1,509	5,300	Kcal/kg
LNG	10.0	per MMBTU	3,968	252,000	Kcal/mmbtu
Gas	5.0	per MMBTU	1,984	252,000	Kcal/mmbtu
HSD	133.0	per Barrel	9,222	9,070	Kcal/l
MFO	81.0	per Barrel	5,437	9,370	Kcal/l
Geothermal	0.0553	per kWh	6,430		
Nuclear			250		

Price	Crude Oil	95	$/barrel				
	HSD	133	$/barrel	23.24	$/mmbtu		
	MFO	81	$/barrel	13.70	$/mmbtu		
	LNG+transport	10.0	$/mmbtu				
	transport	0.7	$/mmbtu				
	LNG	9.3	$/mmbtu	9.30	$/mmbtu		
	Gas	5.0	$/mmbtu	5.00	$/mmbtu		
	Coal+transport	80	$/ton	3.80	$/mmbtu		
	transport	18	$/ton	Note: Coal price at P/S is CIF Price.			
	Coal	74	$/ton	6,300	Kcal/kg		
		62	$/ton	5,300	Kcal/kg		
Heat (	HSD	19,500	btu/lb	1 kg =		2.2	lb
		10,811	Kcal/kg	berat jenis =		0.839	kg/l
		9,070	Kcal/l				
	MFO	18,000	btu/lb	1 kg =		2.2	lb
		9,979	Kcal/kg	berat jenis =		0.939	kg/l
		9,370	Kcal/l				

Reference 2: Relationship between MOPS and Domestic Prices

MOPS (2008/03/31 ~ 2008/04/04)	$/barrel
High Speed Diesel Oil (0.05%)	132.02
Kerosene	128.36
Crude Oil	**104.30**

Note: HSD and Kerosene are FOB at Singapore
MOPS means Mean of Platts Singapore
Source://www.gu-goon.com/

PERTAMINA Price	$/barrel	Price Index (IP)
HSD	**145.93**	**1.40**
MFO	**89.14**	**0.85**
Crude Oil	**104.30**	**1.00**

Note : 1 barrel = 159 liter

New Fuel Prices for Industry in April 2008 released by PERTAMINA on March 31, 2008

Fuel Type	Economical Selling Fuel Price - Non Tax (Base Price)					
	Region 1		Region 2		Region 3	
	Rp/KL	US$/KL	Rp/KL	US$/KL	Rp/KL	US$/KL
Gasoline	7080.13	768.17	7352.107	797.68	7508.057	814.60
Kerosene	8532.07	925.76	8718.104	945.94	8903.029	966.01
High Speed Diesel	8458.78	**917.77**	8819.464	956.91	9006.539	977.20
Marine Diesel Fuel	8284.08	898.88	8464.705	918.48	8644.250	937.97
Marine Fuel Oil	5166.53	**560.60**	5278.949	572.80	5390.924	584.95
Pertamina DEX	8757.37	950.14	-	-	-	-

Source: www.pertamina.com/
Note : Fuel prices released by PERTAMINA depend on MOPS.

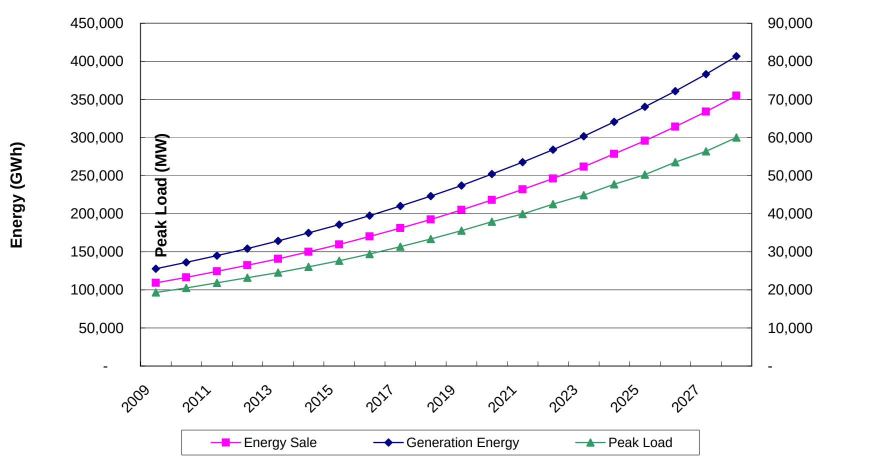
Peak Load Ratio

Period	Peak Load Ratio

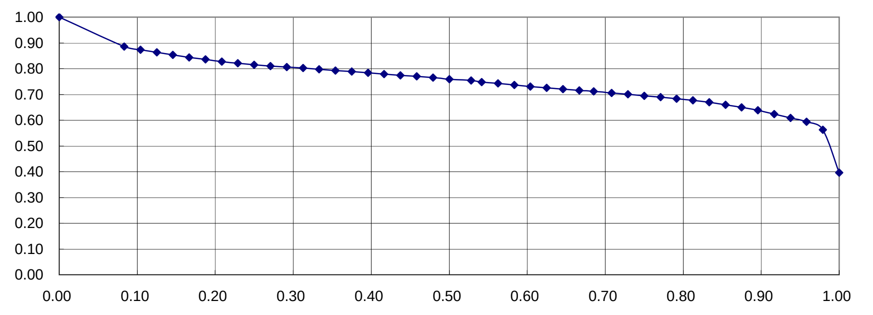
Generation Energy and Peak Load

Year	Energy Sale	Station Use	T & D Loss	Generation Energy	Less 4 % in 2008 due toPV,Wind,Bio	Generation Energy afterLess	Load Factor	Peak Load	Growth Rate of P.L.
	GWh	% of Generation Energy		GWh	GWh	GWh		MW	%
2009	109,227	4%	11.00%	127,841	-	127,841	75.5%	19,329	
2010	116,480	4%	10.90%	136,177	-	136,177	75.7%	20,535	6.2%
2011	124,169	4%	10.80%	145,003	-	145,003	75.9%	21,809	6.2%
2012	132,320	4%	10.70%	154,349	-	154,349	76.1%	23,153	6.2%
2013	140,962	4%	10.60%	164,245	-	164,245	76.3%	24,573	6.1%
2014	150,124	4%	10.50%	174,725	-	174,725	76.5%	26,073	6.1%
2015	159,838	4%	10.40%	185,824	-	185,824	76.7%	27,657	6.1%
2016	170,137	4%	10.30%	197,576	-	197,576	76.7%	29,406	6.3%
2017	181,057	4%	10.20%	210,023	-	210,023	76.5%	31,340	6.6%
2018	192,636	4%	10.10%	223,206	-	223,206	76.3%	33,395	6.6%
2019	204,913	4%	10.00%	237,168	-	237,168	76.1%	35,577	6.5%
2020	217,933	4%	9.90%	251,957	-	251,957	75.9%	37,895	6.5%
2021	231,738	4%	9.80%	267,621	1%	264,945	75.7%	39,954	5.4%
2022	246,379	4%	9.70%	284,214	1%	281,372	75.5%	42,543	6.5%
2023	261,905	4%	9.60%	301,790	2%	295,754	75.3%	44,836	5.4%
2024	278,371	4%	9.50%	320,409	2%	314,001	75.1%	47,730	6.5%
2025	295,834	4%	9.40%	340,133	3%	329,929	74.9%	50,285	5.4%
2026	314,355	4%	9.30%	361,029	3%	350,198	74.7%	53,517	6.4%
2027	333,999	4%	9.20%	383,167	4%	367,840	74.5%	56,364	5.3%
2028	354,835	4%	9.10%	406,622	4%	390,357	74.3%	59,975	6.4%

Growth of Energy and Peak Load



Load Duration Curve for the Year 2006



LDC for the Year 2006
(Based on P3B 2006 Data)

No.	Load	Duration	Area
1	1.0000	0.00000	
5	0.8855	0.08333	0.0186
6	0.8736	0.10417	0.0183
7	0.8632	0.12500	0.0181
8	0.8532	0.14583	0.0179
9	0.8437	0.16667	0.0177
10	0.8357	0.18750	0.0175
11	0.8275	0.20833	0.0173
12	0.8213	0.22917	0.0172
13	0.8155	0.25000	0.0170
14	0.8102	0.27083	0.0169
15	0.8060	0.29167	0.0168
16	0.8019	0.31250	0.0167
17	0.7977	0.33333	0.0167
18	0.7930	0.35417	0.0166
19	0.7889	0.37500	0.0165
20	0.7839	0.39583	0.0164
21	0.7790	0.41667	0.0163
22	0.7744	0.43750	0.0162
23	0.7697	0.45833	0.0161
24	0.7646	0.47917	0.0160
25	0.7593	0.50000	0.0159
26	0.7535	0.52803	0.0212
27	0.7479	0.54167	0.0102
28	0.7425	0.56250	0.0155
29	0.7367	0.58333	0.0154
30	0.7309	0.60417	0.0153
31	0.7255	0.62500	0.0152
32	0.7203	0.64583	0.0151
33	0.7154	0.66667	0.0150
34	0.7112	0.68522	0.0132
35	0.7058	0.70833	0.0164
36	0.7006	0.72917	0.0147
37	0.6949	0.75000	0.0145
38	0.6893	0.77083	0.0144
39	0.6830	0.79167	0.0143
40	0.6770	0.81250	0.0142
41	0.6694	0.83333	0.0140
42	0.6599	0.85417	0.0139
43	0.6499	0.87500	0.0136
44	0.6380	0.89583	0.0134
45	0.6242	0.91667	0.0132
46	0.6086	0.93750	0.0128
47	0.5932	0.95833	0.0125
48	0.5631	0.97917	0.0120
49	0.3957	1.00000	0.0100
50			
51			
52			
Area (Load Factor) =			0.7551

Addition/Retirements

No.	Name	No. of Sets	Available Capacity MW	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Supply Balance Information				2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Available capacity of thermal				18,816																					
installed capacity of hydro				2,573																					
Gross available capacity				21,389	21,389	21,389	24,389	28,305	29,988	30,955	30,955	30,955	31,065	31,065	29,512	28,811	27,813	27,813	27,813	27,208	27,208	27,208	27,208	27,208	27,208
Addition/Retirement						3,000	3,916	1,683	967			110		(1,553)	(701)	(998)			(605)						
Gross available capacity(year end)				21,389	21,389	24,389	28,305	29,988	30,955	30,955	30,955	31,065	31,065	29,512	28,811	27,813	27,813	27,813	27,208	27,208	27,208	27,208	27,208	27,208	27,208
Peak Load at Power Station				-	-	19,329	20,535	21,809	23,153	24,573	26,073	27,657	29,406	31,340	33,395	35,577	37,895	39,954	42,543	44,836	47,730	50,285	53,517	56,364	59,975

				2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
C6H	PLTU	600																							
C10H	PLTU	1000							1	1	1	1	1	5	5	7	7	9	10	13	13	16	17	20	24
LNG	PLTG	750										1	2	3	4	4	6	6	8	8	10	10	12	12	12
N10H	PLTN	1000													1	1	1	2	2	2	3	3	4	4	5
GE55	PLTP	55						6	6	6	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38
G150	PLTG	150														3	4	4	6	6	8	8	10	12	12
PS	Pumped S.	500										1	2	2	4	6	6	6	6	6	6	6	6	6	6
CIB3	PLTA	172															1	1	1	1	1	1	1	1	1
CPSG	PLTA	400															1	1	1	1	1	1	1	1	1
CMD3	PLTA	238															1	1	1	1	1	1	1	1	1
MANG	PLTA	360															1	1	1	1	1	1	1	1	1
PLTA	PLTA	300																	3	3	6	6	6	7	7
Java-Sumatra I.C.		600									4	5	5	5	5	5	5	5	5	5	5	5	5	5	5
C6H	PLTU	600																							
C10H	PLTU	1000							1,000	1,000	1,000	1,000	1,000	5,000	5,000	7,000	7,000	9,000	10,000	13,000	13,000	16,000	17,000	20,000	24,000
LNG	PLTG	750										750	1,500	2,250	3,000	3,000	4,500	4,500	6,000	6,000	7,500	7,500	9,000	9,000	9,000
N10H	PLTN	1000													1,000	1,000	1,000	2,000	2,000	2,000	3,000	3,000	4,000	4,000	5,000
GE55	PLTP	55						330	330	330	550	660	770	880	990	1,100	1,210	1,320	1,430	1,540	1,650	1,760	1,870	1,980	2,090
G150	PLTG	150														450	600	600	900	900	1,200	1,200	1,500	1,800	1,800
PS	Pumped S.	500										500	1,000	1,000	2,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
CIB3	PLTA	172															172	172	172	172	172	172	172	172	172
CPSG	PLTA	400															400	400	400	400	400	400	400	400	400
CMD3	PLTA	238															238	238	238	238	238	238	238	238	238
MANG	PLTA	360															360	360	360	360	360	360	360	360	360
PLTA	PLTA	300																	900	900	1,800	1,800	1,800	2,100	2,100
Java-Sumatera I.C.		600									2,400	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Total Additional Capacity						-	-	330	1,330	1,330	3,950	5,910	7,270	12,130	14,990	18,550	21,480	24,590	28,400	31,510	35,320	38,430	42,340	46,050	51,160
Total Supply Capacity at year end						24,389	28,305	30,318	32,285	32,285	34,905	36,975	38,335	41,642	43,801	46,363	49,293	52,403	55,608	58,718	62,528	65,638	69,548	73,258	78,368
Reserve Margin		%				26.2%	37.8%	39.0%	39.4%	31.4%	33.9%	33.7%	30.4%	32.9%	31.2%	30.3%	30.1%	31.2%	30.7%	31.0%	31.0%	30.5%	30.0%	30.0%	30.7%

FIXSYS HYDRO

PLTA	Index	Installed Cap. [MW]	Energy Storage (GWh)	Inflow Energy				Min. Generation				Average Capacity			
				I(Wet) [GWh]	II(Dry) [GWh]	III [GWh]	IV [GWh]	I(Wet) [GWh]	II(Dry) [GWh]	III [GWh]	IV [GWh]	I(Wet) [MW]	II(Dry) [MW]	III [MW]	IV [MW]
Jatiluhur #1-6	JTLH	180	842.6	315.8	376.9			204.3	298			180	180		
Saguling	SAGL	700.7	2,520.7	1292	680.8			999.2	400.6			701	701		
IP- Area I	IPA1	37.26	-	70.5	53.9			61.8	37.8			37	37		
IP- Area II	IPA2	59.38	-	143.1	78.9			112.3	56.7			59	59		
Sudirman	MRTC	180.9	489.8	356.9	79.7			277.3	18			181	181		
IP-Area III	APA3	125.54	-	264.1	199			235.8	166.3			126	126		
Sutami	STMI	105	451.1	263.2	155.5			164.6	127.5			105	105		
EP Non Suami	EPNS	134.5	563.5	312.3	175.8			223	115.8			135	135		
Brantas Non EP	BNEP	41.9	-	47.3	41.2			17.1	11.3			42	42		
Cirata	CRI2	1008	1,377.0	648.2	444.9			487.8	256			1008	1008		
Rajamandala	RJMD	47	90.0	82.0	61.8			70.0	52.5			47	47		
Jatigede	JTGD	110	620.0	216.8	72.3			184.3	61.4			110	110		

INPUT VARSYS

No.	Name	No. of Sets	Min. Load MW	Capacity MW	Heat Rates Kcal/kWh Base Load	Heat Rates Kcal/kWh Average Incremental	Fuel Costs Cents/Million Kcal Domestic	Fuel Costs Cents/Million Kcal Foreign	Fuel Type	Spinning Reserveas	FOR	Days Scheduled Maintenance Days	Maintenance Class Size MW	O&M (FIX) $/kWm	O&M (VAR) $/MWh	FLD HEAT RT KCAL/KWH	UNIT GENERATION COSTS ($/MWH) BASE DOM	BASE FRGN	FLD DOM	FLD FRGN	FLD TOT
1	C6H	0	300	600	2510	2389	1509	0	0	5	7	42	600	2.61	2.00	2450	39.9	0.0	39.0	0.0	39.0
2	C10H	0	500	1000	2510	2389	1509	0	0	5	7	42	1000	2.61	2.00	2450	39.9	0.0	39.0	0.0	39.0
3	LNG	0	375	750	1911	1741	0	3968	2	7	7	42	750	1.60	1.00	1826	1.0	75.8	1.0	72.5	73.5
4	N10H	0	1000	1000	2606	2606	0	250	6	0	7	28	1000	4.66	0.41	2606	0.4	6.5	0.4	6.5	6.9
5	GE55	0	44	55	1000	1000	6430	0	5	0	7	28	55	2.50	1.00	1000	65.3	0.0	65.3	0.0	65.3
6	G150	0	75	150	3150	2625	9222	0	4	10	7	28	150	0.97	2.00	2888	292.5	0.0	268.3	0.0	268.3
7	J-SIC	5	300	600	2510	2389	1509	0	7	5	8	45	600	2.64	2.00	2450	39.9	0.0	39.0	0.0	39.0

PUMP STORAGE (Upper Cisokan)

PS1

Installed Capacity 500 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2015

Period	Pump Cap. MW	Gen. Cap. MW	Max. Energy GWh
1	530	500	600
2	530	500	600

PS2

Installed Capacity 500 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2016

Period	Pump Cap. MW	Gen. Cap. MW	Max. Energy GWh
1	530	500	600
2	530	500	600

Hydropower Project

		MANG (Maung)		CIB3 (Cibuni-3)		CPSG (Cipasang)		CMD3(Cimandiri-3)	
Construction Cost	$/kW	1872	Inc.IDC	2,865	Inc.IDC	1,636	Inc.IDC	1,998	Inc.IDC
Installed Caapcity	MW	360		172		400		238	
Reservoir Energy	GWh	535		568		751		600	
Inflow Energy wet	GWh	430		450		600		480	
dry	GWh	160		170		230		180	
Minimum Generation wet	GWh	320		340		450		360	
dry	GWh	80		90		110		90	
Average Capacity wet	MW	360		172		400		238	
dry	MW	360		172		400		238	
Construction Period	year	5		5		5		5	
	I.D.C (%)	22.6		22.6		22.6		22.6	

Source: Hydro Inventory and Pre-feasibility Studies, June 1999, Nippon Koei Co., Ltd.

PUMP STORAGE (Matenggeng)

PS3

Installed Capacity 1000 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2019

Period	Pump Cap. MW	Gen. Cap. MW	Max. Energy GWh
1	530	500	450
2	530	500	450

PUMP STORAGE (Grindulu)

PS4

Installed Capacity 1000 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2019

Period	Pump Cap MW	Gen. Cap MW	Max. Energy GWh
1	530	500	450
2	530	500	450

Construction Cost inc. IDC

PLANT	CAPITAL COSTS ($/kW) DEPRECIABLE PART DOMESTIC	DEPRECIABLE PART FOREIGN	NON-DEPRECIABLE PART DOMESTIC	NON-DEPRECIABLE PART FOREIGN	PLANT LIFE YEARS	D.R=12% I.D.C. (%)	CONSTR. TIME (YEARS)
C6H	444	1,037	0	0	30	18.46	4
C10H	611	1,425	0	0	30	18.46	4
LNG	300	699	0	0	25	14.13	3
N10H	659	2,637	0	0	40	26.6	6
G150	82	466	0	0	20	9.6	2
PS 1&2	271	584	0	0	50	22.6	5
PS 3	252	541	0	0	50	22.6	5
PS 4	268	579	0	0	50	22.6	5
GE55	444	1,776	0	0	30	14.13	3
J-SIC	308	2,051	0	0	30	18.46	4

Java - Sumatra Interconnection (HVDC)

			Note
1. Investment Cost for HVDC			
EPC Cost	1,370	M.US$	
Land Acquisition + ROW	160	M.US$	
Total Investment Cost	**1,530**	**M.US$**	
2. Construction Cost for HVDC	510	$/kW	Divided by 3000 MW
3. Construction Cost of C6H	1,481	$/kW	Referred to P3B Data
4. Total Investment Cost	**1,991**	**$/kW**	

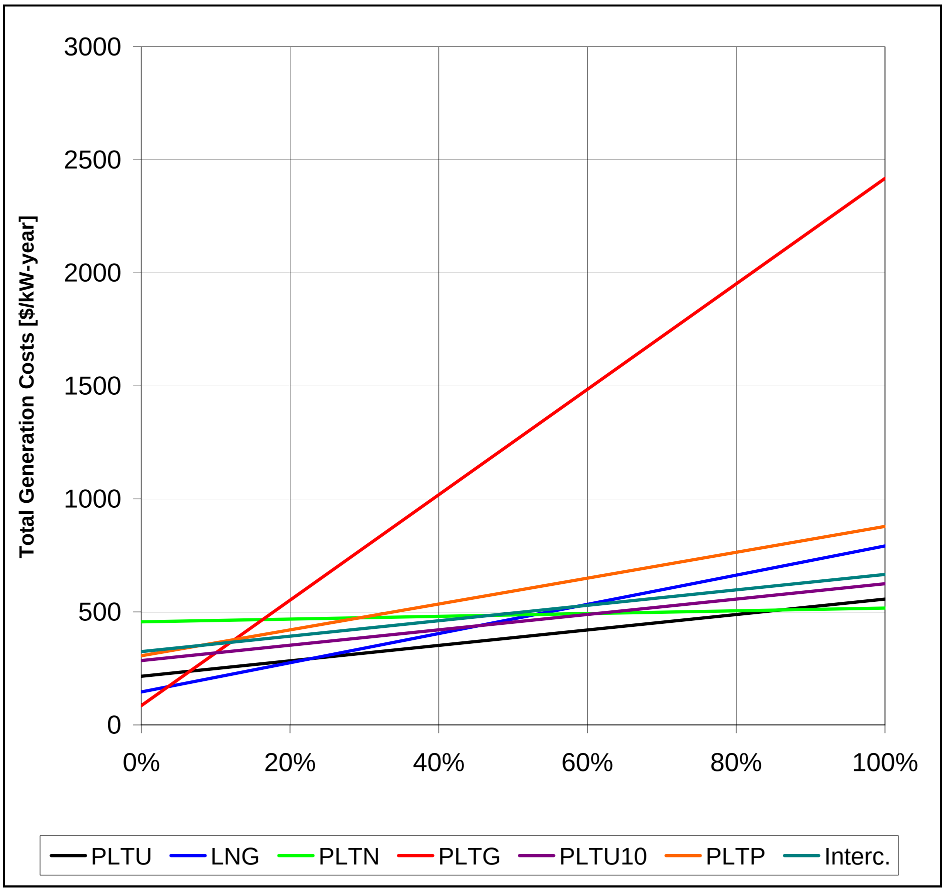
Source: Updated Feasibility Study Jawa - Sumatera Interconnection, Sep. 2007

WASP IV Screening Curve

Fuel Prices Scenario Index	2	Medium Scenario						
		PLTU	LNG	PLTN	PLTG	PLTU10	PLTP	Interc.
Installed Capacity	MW	600	750	1000	150	1000	55	3000
Fuel Type		coal	LNG	nuclear	HSD	coal	Geothermal	HVDC T/L
Fuel Price	$/MMBTU	3.80	10.00	0.63	23.24	3.80	16.20	3.80
Thermal Efficiency	%	35%	47%	33%	30%	35%	86%	35%
Variabel O&M	$/MWh	2.0	1.0	0.4	2.0	2.0	1.0	2.0
Fixed O&M	$/KW.year	31.32	19.2	55.92	11.64	31.32	30.00	31.68
Investment Cost inc. IDC	$/KW	1,481	999	3,296	548	2,036	2,220	2,359
Construction Period	Years	4	3	6	2	4	3	4
Book Life	Years	30	25	40	20	30	30	30
Discount Rate		12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%
Capital Recovery Factor (CRF)		12.41%	12.75%	12.13%	13.39%	12.41%	12.41%	12.41%
Interest During Construction (IDC)		18.46%	14.13%	26.60%	9.60%	18.46%	14.13%	14.13%
Annual Investment cost	$/KW.year	183.86	127.37	399.82	73.37	252.76	275.60	292.75
Annual Fixed Cost	**$/KW.year**	**215.18**	**146.57**	**455.74**	**85.01**	**284.08**	**305.60**	**324.43**
Annual Fuel Cost	$/KW.year	324.58	636.07	57.07	2315.88	323.65	563.14	323.65
Annual Variable O&M	$/KW.year	17.52	8.76	3.59	17.52	17.52	8.76	17.52
Annual Variable Cost	**$/KW.year**	**342.10**	**644.83**	**60.66**	**2333.40**	**341.17**	**571.90**	**341.17**
Annual Fixed Cost	$/KW.year	215.18	146.57	455.74	85.01	284.08	305.60	324.43
Total	**$/KW.year**	**557.28**	**791.40**	**516.40**	**2418.41**	**625.25**	**877.50**	**665.60**
CF	0%	215.18	146.57	455.74	85.01	284.08	305.60	324.43
	100%	557.28	791.40	516.40	2418.41	625.25	877.50	665.60

	Fuel Prices $/MMBTU		
	Low	Medium	High
Index	**1**	**2**	**3**
Coal	3.33	3.80	4.28
LNG	8.00	10.00	12.00
N.Gas	4.00	5.00	6.00
Nuclear	0.57	0.63	0.69
HSD	19.57	23.24	26.91
MFO	11.50	13.70	15.90
Geothemal	14.58	16.20	17.82

Note: $/MMBTU is referred to "Fuel Price Sheet" except Nuclear.



INPUT REMERSIM (Fuel Comsumption per GWh)

No.	Name	Type	No. of Sets	Min. Load MW	Capacity MW	Heat Rates (kcal/kWh) Base Load	Average Incremental	At FLD	Fuel Type	Heat Value kcal/kg 100kcal/MMBTU kcal/liter	Fuel Consumption (unit/GWh) at FLD 1,000 ton	1,000 MMBTU	1,000 KL	Geo
1	SRL1	PLTU	4	240	381	2,622	2,452	2,559	0	5,100	0.502			
2	SRL2	PLTU	3	340	579	2,560	2,309	2,456	0	5,100	0.482			
3	MKR1	PLTU	3	44	84	3,273	3,194	3,235	3	9,598			0.337	
4	MKR2	PLTG	2	90	165	2,948	2,884	2,919	1	2,520		11.58		
5	MKR3	PLTGU	1	300	465	2,433	2,018	2,286	1	2,520		9.07		
6	MKRR	PLTGU	-	500	750	2,433	2,018	2,295	1	2,520		9.11		
7	PRK1	PLTU	2	25	48	3,229	2,957	3,099	3	9,598			0.323	
8	PRK2	PLTGU	2	315	560	2,319	1,994	2,177	4	9,095			0.239	
9	PRK3	PLTG	2	10	20	4,711	3,930	4,321	4	9,095			0.475	
10	PRKE	PLTGU	-	500	750	2,433	2,018	2,295	1	2,520		9.11		
11	MTR1	PLTGU	1	315	605	2,555	2,246	2,407	4	9,095			0.265	
12	MTR2	PLTG	2	72	138	3,376	3,204	3,294	4	9,095			0.362	
13	MTR3	PLTG	6	72	143	3,376	3,204	3,291	4	9,095			0.362	
14	MTRR	PLTGU	-	150	225	2,433	2,018	2,295	1	2,520		9.11		
15	SLK1	PLTP	3	52	52	1,000	1,000	1,000	5	7,308				-
16	SLK2	PLTP	3	52	52	1,000	1,000	1,000	5	7,308				-
17	CLND	PLTG	1	50	150	4,465	3,200	3,622	1	2,520		14.37		
18	CLGN	PLTGU	1	240	740	2,175	1,800	1,922	1	2,520		7.63		
19	SRL3	PLTU	-	340	600	2,560	2,309	2,451	0	4,200	0.584			
20	LBHN	PLTU	-	150	300	2,622	2,452	2,537	0	4,200	0.604			
21	TLNG	PLTU	-	150	300	2,622	2,452	2,537	0	4,200	0.604			
22	KMJ1	PLTP	1	26	26	1,000	1,000	1,000	5	7,308				-
23	KMJ2	PLTP	2	47	47	1,000	1,000	1,000	5	7,308				-
24	KMJ3	PLTP	1	60	60	1,000	1,000	1,000	5	7,308				-
25	DRJ1	PLTP	1	44	44	1,000	1,000	1,000	5	7,308				-
26	DRJ2	PLTP	1	70	70	1,000	1,000	1,000	5	5,300				-
27	DRJ3	PLTP	1	110	110	1,000	1,000	1,000	5	7,308				-
28	WW1	PLTP	1	110	110	1,000	1,000	1,000	5	7,308				-
29	SRG1	PLTG	2	8	18	4,700	4,084	4,358	1	2,520		17.29		
30	SRG2	PLTG	2	8	20	4,700	4,084	4,330	4	9,095			0.476	
31	PTH1	PLTP	-	60	60	1,000	1,000	1,000	5	7,308				-
32	JBSL	PLTU	-	150	300	2,590	2,115	2,353	0	4,200	0.560			
33	JBUT	PLTU	-	150	300	2,590	2,115	2,353	0	4,200	0.560			
34	CRBN	PLTU	-	360	600	2,560	2,160	2,400	0	5,300	0.453			
35	TBK1	PLTGU	2	297	496	2,632	2,015	2,384	4	9,095			0.262	
36	TBK2	PLTU	2	25	41	3,229	3,127	3,189	3	9,598			0.332	
37	TBK3	PLTU	1	125	192	3,229	3,127	3,193	3	9,598			0.333	
38	CLC1	PLTG	2	10	22	4,700	4,079	4,361	4	9,095			0.479	
39	CLC2	PLTU	2	150	300	2,772	2,285	2,529	0	5,215	0.485			
40	TJB1	PLTU	2	330	660	2,772	2,285	2,529	0	5,215	0.485			
41	TJB2	PLTU	-	360	600	2,560	2,160	2,400	0	4,500	0.533			
42	DIEN	PLTP	1	60	60	1,000	1,000	1,000	5	7,308				-
43	RMBG	PLTU	-	150	300	2,590	2,115	2,353	0	4,500	0.523			
44	PTN1	PLTU	2	225	370	2,579	2,412	2,514	0	5,100	0.493			
45	PTN2	PLTU	-	340	600	2,560	2,309	2,451	0	4,500	0.545			
46	PEC	PLTU	2	368	615	2,772	2,285	2,576	0	5,215	0.494			
47	JPOW	PLTU	2	355	610	2,700	2,310	2,537	0	5,500	0.461			
48	GSK1	PLGU	3	250	480	2,318	1,990	2,161	1	2,520		8.58		
49	GSK2	PLTG	2	5	16	4,456	4,284	4,338	1	2,520		17.21		
50	GSK3	PLTU	2	43	85	2,882	2,709	2,797	1	2,520		11.10		
51	GSK4	PLTU	2	90	175	2,826	2,601	2,717	1	2,520		10.78		
52	PRAK	PLTU	2	25	48	4,323	3,517	3,937	3	9,598			0.410	
53	GRT1	PLTGU	1	270	462	2,632	2,083	2,404	4	9,095			0.264	
54	GRT2	PLTG	3	40	100	3,376	3,310	3,336	4	9,095			0.367	
55	PMRN	PLTG	2	12	48	4,439	4,035	4,136	4	9,095			0.455	
56	GLMR	PLTG	2	5	16	4,456	4,284	4,338	4	9,095			0.477	
57	GLMK	PLTG	1	56	133	4,439	4,035	4,205	4	9,095			0.462	
58	BLI1	PLTG	4	6	20	4,700	4,131	4,302	4	9,095			0.473	
59	BLI2	PLTD	10	2	5	3,880	3,576	3,698	4	9,095			0.407	
60	BLUT	PLTU	-	65	130	2,590	2,115	2,353	0	5,300	0.444			
61	BDGL	PLTP	-	10	10	1,000	1,000	1,000	5	7,308				-
62	TJAW	PLTU	-	150	300	2,590	2,115	2,353	0	4,500	0.523			
63	JTSL	PLTU	-	150	300	2,590	2,115	2,353	0	4,500	0.523			

No.	Name	Type	No. of Sets	Min. Load MW	Capacity MW	Heat Rates (kcal/kWh) Base Load	Average Incremental	At FLD	Fuel Type	Heat Value kcal/kg 100kcal/MMBTU kcal/liter	Fuel Consumption (unit/GWh) a FLD 1,000 ton	1,000 MMBTU	1,000 KL	Geo Nuclear
1	C6H	PLTU	0	300	600	2510	2389	2,450	0	4,766	0.514			
2	C10H	PLTU	0	500	1000	2510	2389	2,450	0	4,766	0.514			
3	LNG	PLTG	0	375	750	1911	1741	1,826	2	2,520		7.25		
4	N10H	PLTN	0	1000	1000	2606	2606	2,606	6	0				-
5	GE55	PLTP	0	44	55	1000	1000	1,000	5	0				-
6	G150	PLTG	0	75	150	3150	2625	2,888	4	9,095			0.318	
7	J-SIC	J-SI	5	300	600	2510	2389	2,450	7	0				-

Assumption of Fuel Prices (Medium Scenario)

Kind of Fuel	Price			Heat Content	
	USD		Cents/mKcal		
Coal	80.0	per Ton	1,509	5,300	Kcal/kg
LNG	10.0	per MMBTU	3,968	252,000	Kcal/mmbtu
Gas	5.0	per MMBTU	1,984	252,000	Kcal/mmbtu
HSD	133.0	per Barrel	9,222	9,070	Kcal/l
MFO	81.0	per Barrel	5,437	9,370	Kcal/l
Geothermal	0.0553	per kWh	6,430		
Nuclear			250		

Price	Crude Oil	95	$/barrel			
	HSD	133	$/barrel	23.24	$/mmbtu	
	MFO	81	$/barrel	13.70	$/mmbtu	
	LNG+transport	10.0	$/mmbtu			
	transport	0.7	$/mmbtu			
	LNG	9.3	$/mmbtu	9.30	$/mmbtu	
	Gas	5.0	$/mmbtu	5.00	$/mmbtu	
	Coal+transport	80	$/ton	3.80	$/mmbtu	
	transport	18	$/ton	Note: Coal price at P/S is CIF Price.		
	Coal	74	$/ton	6,300	Kcal/kg	
		62	$/ton	5,300	Kcal/kg	
Heat (	HSD	19,500	btu/lb	1 kg =		2.2 lb
		10,811	Kcal/kg	berat jenis =		0.839 kg/l
		9,070	Kcal/l			
	MFO	18,000	btu/lb	1 kg =		2.2 lb
		9,979	Kcal/kg	berat jenis =		0.939 kg/l
		9,370	Kcal/l			

Reference 2: Relationship between MOPS and Domestic Prices

MOPS (2008/03/31 ~ 2008/04/04)	$/barrel
High Speed Diesel Oil (0.05%)	132.02
Kerosene	128.36
Crude Oil	**104.30**

Note: HSD and Kerosene are FOB at Singapore
MOPS means Mean of Platts Singapore
Source://www.gu-goon.com/

PERTAMINA Price	$/barrel	Price Index (IP)
HSD	**145.93**	**1.40**
MFO	**89.14**	**0.85**
Crude Oil	**104.30**	**1.00**

Note : 1 barrel = 159 liter

New Fuel Prices for Industry in April 2008 released by PERTAMINA on March 31, 2008						
Fuel Type	Economical Selling Fuel Price - Non Tax (Base Price)					
	Region 1		Region 2		Region 3	
	Rp/KL	US$/KL	Rp/KL	US$/KL	Rp/KL	US$/KL
Gasoline	7080.13	768.17	7352.107	797.68	7508.057	814.60
Kerosene	8532.07	925.76	8718.104	945.94	8903.029	966.01
High Speed Diesel	8458.78	**917.77**	8819.464	956.91	9006.539	977.20
Marine Diesel Fuel	8284.08	898.88	8464.705	918.48	8644.250	937.97
Marine Fuel Oil	5166.53	**560.60**	5278.949	572.80	5390.924	584.95
Pertamina DEX	8757.37	950.14	-	-	-	-

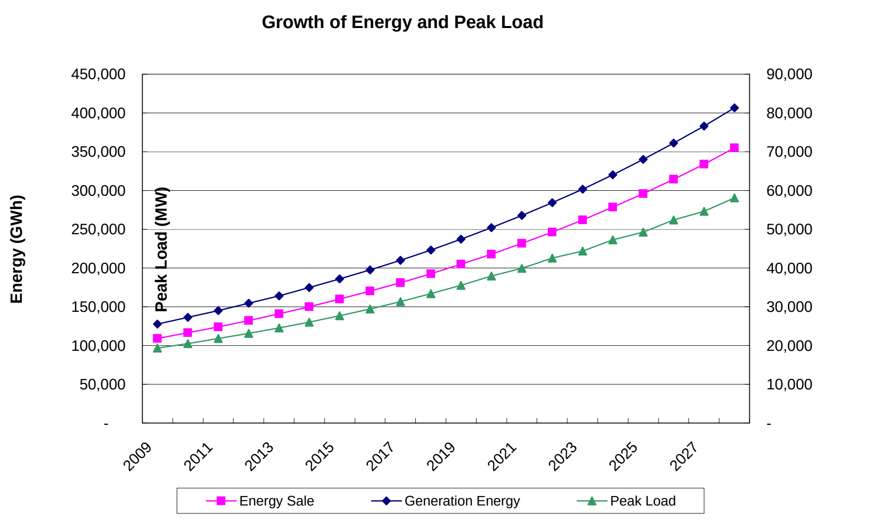
Source: www.pertamina.com/
Note : Fuel prices released by PERTAMINA depend on MOPS.

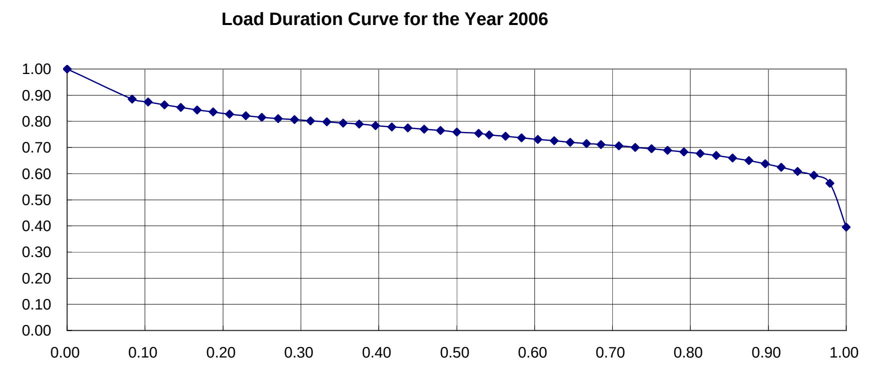
Peak Load Ratio

Period	Peak Load Ratio

Generation Energy and Peak Load

Year	Energy Sale	Station Use	T & D Loss	Generation Energy	Less 7 % in 2008 due toPV,Wind,Bio	Generation Energy afterLess	Load Factor	Peak Load	Growth Rate of P.L.
	GWh	% of Generation Energy		GWh	GWh	GWh		MW	%
2009	109,227	4%	11.00%	127,841	-	127,841	75.5%	19,329	
2010	116,480	4%	10.90%	136,177	-	136,177	75.7%	20,535	6.2%
2011	124,169	4%	10.80%	145,003	-	145,003	75.9%	21,809	6.2%
2012	132,320	4%	10.70%	154,349	-	154,349	76.1%	23,153	6.2%
2013	140,962	4%	10.60%	164,245	-	164,245	76.3%	24,573	6.1%
2014	150,124	4%	10.50%	174,725	-	174,725	76.5%	26,073	6.1%
2015	159,838	4%	10.40%	185,824	-	185,824	76.7%	27,657	6.1%
2016	170,137	4%	10.30%	197,576	-	197,576	76.7%	29,406	6.3%
2017	181,057	4%	10.20%	210,023	-	210,023	76.5%	31,340	6.6%
2018	192,636	4%	10.10%	223,206	-	223,206	76.3%	33,395	6.6%
2019	204,913	4%	10.00%	237,168	-	237,168	76.1%	35,577	6.5%
2020	217,933	4%	9.90%	251,957	-	251,957	75.9%	37,895	6.5%
2021	231,738	4%	9.80%	267,621	1%	264,945	75.7%	39,954	5.4%
2022	246,379	4%	9.70%	284,214	1%	281,372	75.5%	42,543	6.5%
2023	261,905	4%	9.60%	301,790	3%	292,736	75.3%	44,379	4.3%
2024	278,371	4%	9.50%	320,409	3%	310,797	75.1%	47,242	6.5%
2025	295,834	4%	9.40%	340,133	5%	323,126	74.9%	49,248	4.2%
2026	314,355	4%	9.30%	361,029	5%	342,978	74.7%	52,413	6.4%
2027	333,999	4%	9.20%	383,167	7%	356,345	74.5%	54,602	4.2%
2028	354,835	4%	9.10%	406,622	7%	378,158	74.3%	58,101	6.4%





LDC for the Year 2006
(Based on P3B 2006 Data)

No.	Load	Duration	Area
1	1.0000	0.00000	
5	0.8855	0.08333	0.0186
6	0.8736	0.10417	0.0183
7	0.8632	0.12500	0.0181
8	0.8532	0.14583	0.0179
9	0.8437	0.16667	0.0177
10	0.8357	0.18750	0.0175
11	0.8275	0.20833	0.0173
12	0.8213	0.22917	0.0172
13	0.8155	0.25000	0.0170
14	0.8102	0.27083	0.0169
15	0.8060	0.29167	0.0168
16	0.8019	0.31250	0.0167
17	0.7977	0.33333	0.0167
18	0.7930	0.35417	0.0166
19	0.7889	0.37500	0.0165
20	0.7839	0.39583	0.0164
21	0.7790	0.41667	0.0163
22	0.7744	0.43750	0.0162
23	0.7697	0.45833	0.0161
24	0.7646	0.47917	0.0160
25	0.7593	0.50000	0.0159
26	0.7535	0.52803	0.0212
27	0.7479	0.54167	0.0102
28	0.7425	0.56250	0.0155
29	0.7367	0.58333	0.0154
30	0.7309	0.60417	0.0153
31	0.7255	0.62500	0.0152
32	0.7203	0.64583	0.0151
33	0.7154	0.66667	0.0150
34	0.7112	0.68522	0.0132
35	0.7058	0.70833	0.0164
36	0.7006	0.72917	0.0147
37	0.6949	0.75000	0.0145
38	0.6893	0.77083	0.0144
39	0.6830	0.79167	0.0143
40	0.6770	0.81250	0.0142
41	0.6694	0.83333	0.0140
42	0.6599	0.85417	0.0139
43	0.6499	0.87500	0.0136
44	0.6380	0.89583	0.0134
45	0.6242	0.91667	0.0132
46	0.6086	0.93750	0.0128
47	0.5932	0.95833	0.0125
48	0.5631	0.97917	0.0120
49	0.3957	1.00000	0.0100
50			
51			
52			
Area (Load Factor) =			0.7551

Addition/Retirements

No.	Name	No. of Sets	Available Capacity MW	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028

Supply Balance Information	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Available capacity of thermal	18,816																					
installed capacity of hydro	2,573																					
Gross available capacity	21,389	21,389	21,389	24,389	28,305	29,988	30,955	30,955	30,955	31,065	31,065	29,512	28,811	27,813	27,813	27,813	27,208	27,208	27,208	27,208	27,208	27,208
Addition/Retirement			3,000	3,916	1,683	967			110		(1,553)	(701)	(998)			(605)						
Gross available capacity(year end)	21,389	21,389	24,389	28,305	29,988	30,955	30,955	30,955	31,065	31,065	29,512	28,811	27,813	27,813	27,813	27,208	27,208	27,208	27,208	27,208	27,208	27,208
Peak Load at Power Station	-	-	19,329	20,535	21,809	23,153	24,573	26,073	27,657	29,406	31,340	33,395	35,577	37,895	39,954	42,543	44,379	47,242	49,248	52,413	54,602	58,101

				2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
C6H	PLTU	600																							
C10H	PLTU	1000							1	1	1	1	1	5	5	7	7	9	10	12	12	15	16	18	21
LNG	PLTG	750										1	2	3	4	4	6	6	8	8	10	10	12	12	12
N10H	PLTN	1000													1	1	1	2	2	2	3	3	4	4	5
GE55	PLTP	55						6	6	6	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38
G150	PLTG	150														3	4	4	6	6	8	8	10	12	12
PS	Pumped S.	500										1	2	2	4	6	6	6	6	6	6	6	6	6	6
CIB3	PLTA	172															1	1	1	1	1	1	1	1	1
CPSG	PLTA	400															1	1	1	1	1	1	1	1	1
CMD3	PLTA	238															1	1	1	1	1	1	1	1	1
MANG	PLTA	360															1	1	1	1	1	1	1	1	1
PLTA	PLTA	300																	3	3	6	6	6	8	8
Java-Sumatra I.C.		600									4	5	5	5	5	5	5	5	5	5	5	5	5	5	5

C6H	PLTU	600																							
C10H	PLTU	1000							1,000	1,000	1,000	1,000	1,000	5,000	5,000	7,000	7,000	9,000	10,000	12,000	12,000	15,000	16,000	18,000	21,000
LNG	PLTG	750										750	1,500	2,250	3,000	3,000	4,500	4,500	6,000	6,000	7,500	7,500	9,000	9,000	9,000
N10H	PLTN	1000													1,000	1,000	1,000	2,000	2,000	2,000	3,000	3,000	4,000	4,000	5,000
GE55	PLTP	55						330	330	330	550	660	770	880	990	1,100	1,210	1,320	1,430	1,540	1,650	1,760	1,870	1,980	2,090
G150	PLTG	150														450	600	600	900	900	1,200	1,200	1,500	1,800	1,800
PS	Pumped S.	500										500	1,000	1,000	2,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
CIB3	PLTA	172															172	172	172	172	172	172	172	172	172
CPSG	PLTA	400															400	400	400	400	400	400	400	400	400
CMD3	PLTA	238															238	238	238	238	238	238	238	238	238
MANG	PLTA	360															360	360	360	360	360	360	360	360	360
PLTA	PLTA	300																	900	900	1,800	1,800	1,800	2,400	2,400
Java-Sumatera I.C.		600									2,400	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Total Additional Capacity						-	-	330	1,330	1,330	3,950	5,910	7,270	12,130	14,990	18,550	21,480	24,590	28,400	30,510	34,320	37,430	41,340	44,350	48,460
Total Supply Capacity at year end						24,389	28,305	30,318	32,285	32,285	34,905	36,975	38,335	41,642	43,801	46,363	49,293	52,403	55,608	57,718	61,528	64,638	68,548	71,558	75,668
Reserve Margin		%				26.2%	37.8%	39.0%	39.4%	31.4%	33.9%	33.7%	30.4%	32.9%	31.2%	30.3%	30.1%	31.2%	30.7%	30.1%	30.2%	31.3%	30.8%	31.1%	30.2%

FIXSYS HYDRO

PLTA	Index	Installed Cap. [MW]	Energy Storage (GWh)	Inflow Energy				Min. Generation				Average Capacity			
				I(Wet) [GWh]	II(Dry) [GWh]	III [GWh]	IV [GWh]	I(Wet) [GWh]	II(Dry) [GWh]	III [GWh]	IV [GWh]	I(Wet) [MW]	II(Dry) [MW]	III [MW]	IV [MW]
Jatiluhur #1-6	JTLH	180	842.6	315.8	376.9			204.3	298			180	180		
Saguling	SAGL	700.7	2,520.7	1292	680.8			999.2	400.6			701	701		
IP- Area I	IPA1	37.26	-	70.5	53.9			61.8	37.8			37	37		
IP- Area II	IPA2	59.38	-	143.1	78.9			112.3	56.7			59	59		
Sudirman	MRTC	180.9	489.8	356.9	79.7			277.3	18			181	181		
IP-Area III	APA3	125.54	-	264.1	199			235.8	166.3			126	126		
Sutami	STMI	105	451.1	263.2	155.5			164.6	127.5			105	105		
EP Non Suami	EPNS	134.5	563.5	312.3	175.8			223	115.8			135	135		
Brantas Non EP	BNEP	41.9	-	47.3	41.2			17.1	11.3			42	42		
Cirata	CRI2	1008	1,377.0	648.2	444.9			487.8	256			1008	1008		
Rajamandala	RJMD	47	90.0	82.0	61.8			70.0	52.5			47	47		
Jatigede	JTGD	110	620.0	216.8	72.3			184.3	61.4			110	110		

INPUT VARSYS

No.	Name	No. of Sets	Min. Load MW	Capacity MW	Heat Rates Kcal/kWh: Base Load	Heat Rates Kcal/kWh: Average Incremental	Fuel Costs Cents/Million Kcal: Domestic	Fuel Costs Cents/Million Kcal: Foreign	Fuel Type	Spinning Reserveas	FOR	Days Scheduled Maintenance Days	Maintenance Class Size MW	O&M (FIX) $/kWm	O&M (VAR) $/MWh	FLD HEAT RT KCAL/KWH	UNIT GENERATION COSTS ($/MWH): BASE DOM	BASE FRGN	FLD DOM	FLD FRGN	FLD TOT
1	C6H	0	300	600	2510	2389	1509	0	0	5	7	42	600	2.61	2.00	2450	39.9	0.0	39.0	0.0	39.0
2	C10H	0	500	1000	2510	2389	1509	0	0	5	7	42	1000	2.61	2.00	2450	39.9	0.0	39.0	0.0	39.0
3	LNG	0	375	750	1911	1741	0	3968	2	7	7	42	750	1.60	1.00	1826	1.0	75.8	1.0	72.5	73.5
4	N10H	0	1000	1000	2606	2606	0	250	6	0	7	28	1000	4.66	0.41	2606	0.4	6.5	0.4	6.5	6.9
5	GE55	0	44	55	1000	1000	6430	0	5	0	7	28	55	2.50	1.00	1000	65.3	0.0	65.3	0.0	65.3
6	G150	0	75	150	3150	2625	9222	0	4	10	7	28	150	0.97	2.00	2888	292.5	0.0	268.3	0.0	268.3
7	J-SIC	5	300	600	2510	2389	1509	0	7	5	8	45	600	2.64	2.00	2450	39.9	0.0	39.0	0.0	39.0

PUMP STORAGE (Upper Cisokan)

PS1

Installed Capacity 500 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2015

Period	Pump Cap. MW	Gen. Cap. MW	Max. Energy GWh
1	530	500	600
2	530	500	600

PS2

Installed Capacity 500 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2016

Period	Pump Cap. MW	Gen. Cap. MW	Max. Energy GWh
1	530	500	600
2	530	500	600

Hydropower Project

			MANG (Maung)		CIB3 (Cibuni-3)		CPSG (Cipasang)		CMD3(Cimandiri-3)	
Construction Cost										
		$/kW	1872	Inc.IDC	2,865	Inc.IDC	1,636	Inc.IDC	1,998	Inc.IDC
Installed Caapcity										
		MW	360		172		400		238	
Reservoir Energy										
		GWh	535		568		751		600	
Inflow Energy										
	wet	GWh	430		450		600		480	
	dry	GWh	160		170		230		180	
Minimum Generation										
	wet	GWh	320		340		450		360	
	dry	GWh	80		90		110		90	
Average Capacity										
	wet	MW	360		172		400		238	
	dry	MW	360		172		400		238	
Construction Period										
		year	5		5		5		5	
		I.D.C (%)	22.6		22.6		22.6		22.6	

Source: Hydro Inventory and Pre-feasibility Studies, June 1999, Nippon Koei Co., Ltd.

PUMP STORAGE (Matenggeng)

PS3

Installed Capacity 1000 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2019

Period	Pump Cap. MW	Gen. Cap. MW	Max. Energy GWh
1	530	500	450
2	530	500	450

PUMP STORAGE (Grindulu)

PS4

Installed Capacity 1000 MW
Efficiency 76 %
O&M (Fix) 0.55 $/kW-month
Available Year 2019

Period	Pump Cap MW	Gen. Cap MW	Max. Energy GWh
1	530	500	450
2	530	500	450

Construction Cost inc. IDC

PLANT	CAPITAL COSTS ($/kW): DEPRECIABLE PART: DOMESTIC	DEPRECIABLE PART: FOREIGN	NON-DEPRECIABLE PART: DOMESTIC	NON-DEPRECIABLE PART: FOREIGN	PLANT LIFE YEARS	D.R=12% I.D.C. (%)	CONSTR. TIME (YEARS)
C6H	444	1,037	0	0	30	18.46	4
C10H	611	1,425	0	0	30	18.46	4
LNG	300	699	0	0	25	14.13	3
N10H	659	2,637	0	0	40	26.6	6
G150	82	466	0	0	20	9.6	2
PS 1&2	271	584	0	0	50	22.6	5
PS 3	252	541	0	0	50	22.6	5
PS 4	268	579	0	0	50	22.6	5
GE55	444	1,776	0	0	30	14.13	3
J-SIC	308	2,051	0	0	30	18.46	4

Java - Sumatra Interconnection (HVDC)

			Note
1. Investment Cost for HVDC			
EPC Cost	1,370	M.US$	
Land Acquisition + ROW	160	M.US$	
Total Investment Cost	**1,530**	**M.US$**	
2. Construction Cost for HVDC	510	$/kW	Divided by 3000 MW
3. Construction Cost of C6H	1,481	$/kW	Referred to P3B Data
4. Total Investment Cost	**1,991**	**$/kW**	

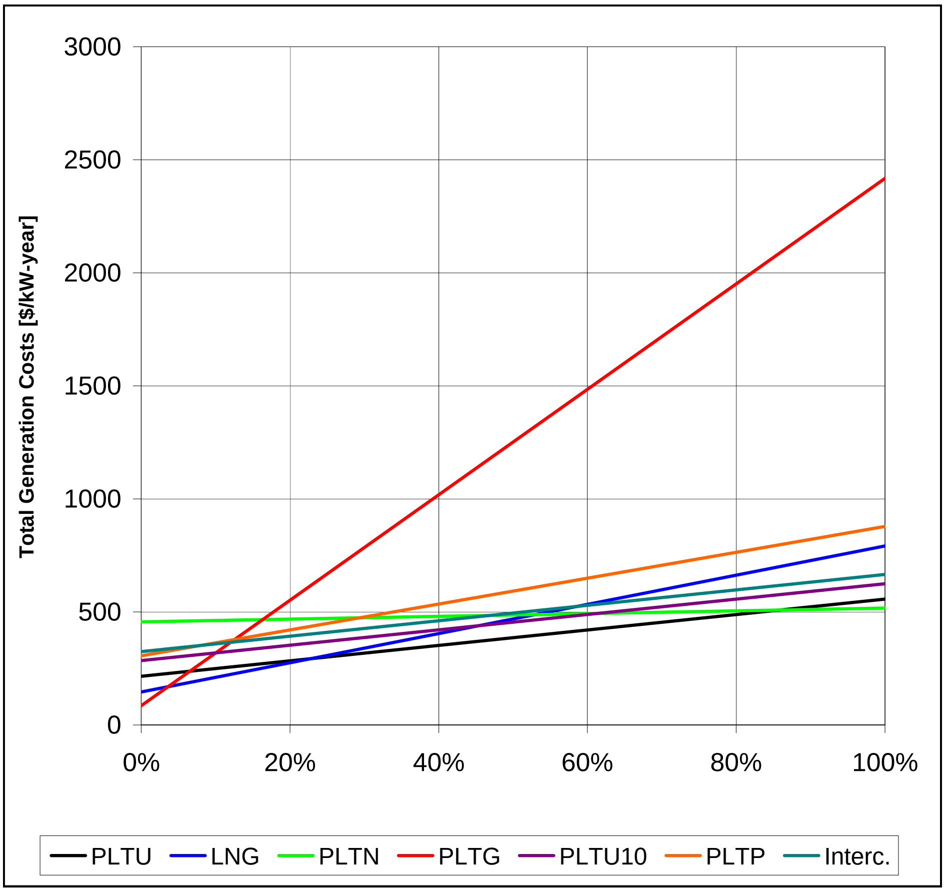
Source: Updated Feasibility Study Jawa - Sumatera Interconnection, Sep. 2007

WASP IV Screening Curve

Fuel Prices Scenario Index	2	Medium Scenario						
		PLTU	LNG	PLTN	PLTG	PLTU10	PLTP	Interc.
Installed Capacity	MW	600	750	1000	150	1000	55	3000
Fuel Type		coal	LNG	nuclear	HSD	coal	Geothermal	HVDC T/L
Fuel Price	$/MMBTU	3.80	10.00	0.63	23.24	3.80	16.20	3.80
Thermal Efficiency	%	35%	47%	33%	30%	35%	86%	35%
Variabel O&M	$/MWh	2.0	1.0	0.4	2.0	2.0	1.0	2.0
Fixed O&M	$/KW.year	31.32	19.2	55.92	11.64	31.32	30.00	31.68
Investment Cost inc. IDC	$/KW	1,481	999	3,296	548	2,036	2,220	2,359
Construction Period	Years	4	3	6	2	4	3	4
Book Life	Years	30	25	40	20	30	30	30
Discount Rate		12.00%	12.00%	12.00%	12.00%	12.00%	12.00%	12.00%
Capital Recovery Factor (CRF)		12.41%	12.75%	12.13%	13.39%	12.41%	12.41%	12.41%
Interest During Construction (IDC)		18.46%	14.13%	26.60%	9.60%	18.46%	14.13%	14.13%
Annual Investment cost	$/KW.year	183.86	127.37	399.82	73.37	252.76	275.60	292.75
Annual Fixed Cost	**$/KW.year**	**215.18**	**146.57**	**455.74**	**85.01**	**284.08**	**305.60**	**324.43**
Annual Fuel Cost	$/KW.year	324.58	636.07	57.07	2315.88	323.65	563.14	323.65
Annual Variable O&M	$/KW.year	17.52	8.76	3.59	17.52	17.52	8.76	17.52
Annual Variable Cost	**$/KW.year**	**342.10**	**644.83**	**60.66**	**2333.40**	**341.17**	**571.90**	**341.17**
Annual Fixed Cost	$/KW.year	215.18	146.57	455.74	85.01	284.08	305.60	324.43
Total	**$/KW.year**	**557.28**	**791.40**	**516.40**	**2418.41**	**625.25**	**877.50**	**665.60**
CF	0%	215.18	146.57	455.74	85.01	284.08	305.60	324.43
	100%	557.28	791.40	516.40	2418.41	625.25	877.50	665.60

	Fuel Prices $/MMBTU		
	Low	Medium	High
Index	**1**	**2**	**3**
Coal	3.33	3.80	4.28
LNG	8.00	10.00	12.00
N.Gas	4.00	5.00	6.00
Nuclear	0.57	0.63	0.69
HSD	19.57	23.24	26.91
MFO	11.50	13.70	15.90
Geothemal	14.58	16.20	17.82

Note: $/MMBTU is referred to "Fuel Price Sheet" except Nuclear.



INPUT REMERSIM (Fuel Comsumption per GWh)

No.	Name	Type	No. of Sets	Min. Load MW	Capacity MW	Heat Rates (kcal/kWh) Base Load	Average Incremental	At FLD	Fuel Type	Heat Value kcal/kg 100kcal/MMBTU kcal/liter	Fuel Consumption (unit/GWh) at FLD 1,000 ton	1,000 MMBTU	1,000 KL	Geo
1	SRL1	PLTU	4	240	381	2,622	2,452	2,559	0	5,100	0.502			
2	SRL2	PLTU	3	340	579	2,560	2,309	2,456	0	5,100	0.482			
3	MKR1	PLTU	3	44	84	3,273	3,194	3,235	3	9,598			0.337	
4	MKR2	PLTG	2	90	165	2,948	2,884	2,919	1	2,520		11.58		
5	MKR3	PLTGU	1	300	465	2,433	2,018	2,286	1	2,520		9.07		
6	MKRR	PLTGU	-	500	750	2,433	2,018	2,295	1	2,520		9.11		
7	PRK1	PLTU	2	25	48	3,229	2,957	3,099	3	9,598			0.323	
8	PRK2	PLTGU	2	315	560	2,319	1,994	2,177	4	9,095			0.239	
9	PRK3	PLTG	2	10	20	4,711	3,930	4,321	4	9,095			0.475	
10	PRKE	PLTGU	-	500	750	2,433	2,018	2,295	1	2,520		9.11		
11	MTR1	PLTGU	1	315	605	2,555	2,246	2,407	4	9,095			0.265	
12	MTR2	PLTG	2	72	138	3,376	3,204	3,294	4	9,095			0.362	
13	MTR3	PLTG	6	72	143	3,376	3,204	3,291	4	9,095			0.362	
14	MTRR	PLTGU	-	150	225	2,433	2,018	2,295	1	2,520		9.11		
15	SLK1	PLTP	3	52	52	1,000	1,000	1,000	5	7,308				-
16	SLK2	PLTP	3	52	52	1,000	1,000	1,000	5	7,308				-
17	CLND	PLTG	1	50	150	4,465	3,200	3,622	1	2,520		14.37		
18	CLGN	PLTGU	1	240	740	2,175	1,800	1,922	1	2,520		7.63		
19	SRL3	PLTU	-	340	600	2,560	2,309	2,451	0	4,200	0.584			
20	LBHN	PLTU	-	150	300	2,622	2,452	2,537	0	4,200	0.604			
21	TLNG	PLTU	-	150	300	2,622	2,452	2,537	0	4,200	0.604			
22	KMJ1	PLTP	1	26	26	1,000	1,000	1,000	5	7,308				-
23	KMJ2	PLTP	2	47	47	1,000	1,000	1,000	5	7,308				-
24	KMJ3	PLTP	1	60	60	1,000	1,000	1,000	5	7,308				-
25	DRJ1	PLTP	1	44	44	1,000	1,000	1,000	5	7,308				-
26	DRJ2	PLTP	1	70	70	1,000	1,000	1,000	5	5,300				-
27	DRJ3	PLTP	1	110	110	1,000	1,000	1,000	5	7,308				-
28	WW1	PLTP	1	110	110	1,000	1,000	1,000	5	7,308				-
29	SRG1	PLTG	2	8	18	4,700	4,084	4,358	1	2,520		17.29		
30	SRG2	PLTG	2	8	20	4,700	4,084	4,330	4	9,095			0.476	
31	PTH1	PLTP	-	60	60	1,000	1,000	1,000	5	7,308				-
32	JBSL	PLTU	-	150	300	2,590	2,115	2,353	0	4,200	0.560			
33	JBUT	PLTU	-	150	300	2,590	2,115	2,353	0	4,200	0.560			
34	CRBN	PLTU	-	360	600	2,560	2,160	2,400	0	5,300	0.453			
35	TBK1	PLTGU	2	297	496	2,632	2,015	2,384	4	9,095			0.262	
36	TBK2	PLTU	2	25	41	3,229	3,127	3,189	3	9,598			0.332	
37	TBK3	PLTU	1	125	192	3,229	3,127	3,193	3	9,598			0.333	
38	CLC1	PLTG	2	10	22	4,700	4,079	4,361	4	9,095			0.479	
39	CLC2	PLTU	2	150	300	2,772	2,285	2,529	0	5,215	0.485			
40	TJB1	PLTU	2	330	660	2,772	2,285	2,529	0	5,215	0.485			
41	TJB2	PLTU	-	360	600	2,560	2,160	2,400	0	4,500	0.533			
42	DIEN	PLTP	1	60	60	1,000	1,000	1,000	5	7,308				-
43	RMBG	PLTU	-	150	300	2,590	2,115	2,353	0	4,500	0.523			
44	PTN1	PLTU	2	225	370	2,579	2,412	2,514	0	5,100	0.493			
45	PTN2	PLTU	-	340	600	2,560	2,309	2,451	0	4,500	0.545			
46	PEC	PLTU	2	368	615	2,772	2,285	2,576	0	5,215	0.494			
47	JPOW	PLTU	2	355	610	2,700	2,310	2,537	0	5,500	0.461			
48	GSK1	PLGU	3	250	480	2,318	1,990	2,161	1	2,520		8.58		
49	GSK2	PLTG	2	5	16	4,456	4,284	4,338	1	2,520		17.21		
50	GSK3	PLTU	2	43	85	2,882	2,709	2,797	1	2,520		11.10		
51	GSK4	PLTU	2	90	175	2,826	2,601	2,717	1	2,520		10.78		
52	PRAK	PLTU	2	25	48	4,323	3,517	3,937	3	9,598			0.410	
53	GRT1	PLTGU	1	270	462	2,632	2,083	2,404	4	9,095			0.264	
54	GRT2	PLTG	3	40	100	3,376	3,310	3,336	4	9,095			0.367	
55	PMRN	PLTG	2	12	48	4,439	4,035	4,136	4	9,095			0.455	
56	GLMR	PLTG	2	5	16	4,456	4,284	4,338	4	9,095			0.477	
57	GLMK	PLTG	1	56	133	4,439	4,035	4,205	4	9,095			0.462	
58	BLI1	PLTG	4	6	20	4,700	4,131	4,302	4	9,095			0.473	
59	BLI2	PLTD	10	2	5	3,880	3,576	3,698	4	9,095			0.407	
60	BLUT	PLTU	-	65	130	2,590	2,115	2,353	0	5,300	0.444			
61	BDGL	PLTP	-	10	10	1,000	1,000	1,000	5	7,308				-
62	TJAW	PLTU	-	150	300	2,590	2,115	2,353	0	4,500	0.523			
63	JTSL	PLTU	-	150	300	2,590	2,115	2,353	0	4,500	0.523			

No.	Name	Type	No. of Sets	Min. Load MW	Capacity MW	Heat Rates (kcal/kWh) Base Load	Average Incremental	At FLD	Fuel Type	Heat Value kcal/kg 100kcal/MMBTU kcal/liter	Fuel Consumption (unit/GWh) a FLD 1,000 ton	1,000 MMBTU	1,000 KL	Geo Nuclear
1	C6H	PLTU	0	300	600	2510	2389	2,450	0	4,766	0.514			
2	C10H	PLTU	0	500	1000	2510	2389	2,450	0	4,766	0.514			
3	LNG	PLTG	0	375	750	1911	1741	1,826	2	2,520		7.25		
4	N10H	PLTN	0	1000	1000	2606	2606	2,606	6	0				-
5	GE55	PLTP	0	44	55	1000	1000	1,000	5	0				-
6	G150	PLTG	0	75	150	3150	2625	2,888	4	9,095			0.318	
7	J-SIC	J-SI	5	300	600	2510	2389	2,450	7	0				-

Assumption of Fuel Prices (Medium Scenario)

Kind of Fuel	Price			Heat Content	
	USD		Cents/mKcal		
Coal	80.0	per Ton	1,509	5,300	Kcal/kg
LNG	10.0	per MMBTU	3,968	252,000	Kcal/mmbtu
Gas	5.0	per MMBTU	1,984	252,000	Kcal/mmbtu
HSD	133.0	per Barrel	9,222	9,070	Kcal/l
MFO	81.0	per Barrel	5,437	9,370	Kcal/l
Geothermal	0.0553	per kWh	6,430		
Nuclear			250		

Price	Crude Oil	95	$/barrel				
	HSD	133	$/barrel	23.24	$/mmbtu		
	MFO	81	$/barrel	13.70	$/mmbtu		
	LNG+transport	10.0	$/mmbtu				
	transport	0.7	$/mmbtu				
	LNG	9.3	$/mmbtu	9.30	$/mmbtu		
	Gas	5.0	$/mmbtu	5.00	$/mmbtu		
	Coal+transport	80	$/ton	3.80	$/mmbtu		
	transport	18	$/ton	Note: Coal price at P/S is CIF Price.			
	Coal	74	$/ton	6,300	Kcal/kg		
		62	$/ton	5,300	Kcal/kg		
Heat (	HSD	19,500	btu/lb	1 kg =		2.2	lb
		10,811	Kcal/kg	berat jenis =		0.839	kg/l
		9,070	Kcal/l				
	MFO	18,000	btu/lb	1 kg =		2.2	lb
		9,979	Kcal/kg	berat jenis =		0.939	kg/l
		9,370	Kcal/l				

Reference 2: Relationship between MOPS and Domestic Prices

MOPS (2008/03/31 ~ 2008/04/04)	$/barrel
High Speed Diesel Oil (0.05%)	132.02
Kerosene	128.36
Crude Oil	**104.30**

Note: HSD and Kerosene are FOB at Singapore
MOPS means Mean of Platts Singapore
Source://www.gu-goon.com/

PERTAMINA Price	$/barrel	Price Index (IP)
HSD	**145.93**	**1.40**
MFO	**89.14**	**0.85**
Crude Oil	**104.30**	**1.00**

Note : 1 barrel = 159 liter

New Fuel Prices for Industry in April 2008 released by PERTAMINA on March 31, 2008

Fuel Type	Economical Selling Fuel Price - Non Tax (Base Price)					
	Region 1		Region 2		Region 3	
	Rp/KL	US$/KL	Rp/KL	US$/KL	Rp/KL	US$/KL
Gasoline	7080.13	768.17	7352.107	797.68	7508.057	814.60
Kerosene	8532.07	925.76	8718.104	945.94	8903.029	966.01
High Speed Diesel	8458.78	**917.77**	8819.464	956.91	9006.539	977.20
Marine Diesel Fuel	8284.08	898.88	8464.705	918.48	8644.250	937.97
Marine Fuel Oil	5166.53	**560.60**	5278.949	572.80	5390.924	584.95
Pertamina DEX	8757.37	950.14	-	-	-	-

Source: www.pertamina.com/
Note : Fuel prices released by PERTAMINA depend on MOPS.

6.2　出力データ

Base Scenario (Policy Oriented)

YEAR	PRESENT WORTH COST OF THE YEAR (K$)					OBJ.FUN.	LOLP	LNG	N10H	GE55	G150	C10H	J-SI	Hydro	PUMP
	CONCST	SALVAL	OPCOST	OP-Coal	TOTAL	(CUMM.)	%								
2009	-	-	6,019,205	-	6,019,205	6,019,205	0.029	-	-	-	-	-	-	-	-
2010	-	-	4,899,357	-	4,899,357	10,918,562	0.027	-	-	-	-	-	-	-	-
2011	584,024	58,402	4,655,034	-	5,180,656	16,099,218	0.028	-	-	6	-	-	-	-	-
2012	1,449,185	168,314	4,456,589	-	5,737,460	21,836,678	0.028	-	-	6	-	1	-	-	-
2013	-	-	4,266,500	(1,364)	4,265,136	26,101,814	0.029	-	-	6	-	1	-	-	-
2014	3,489,675	539,066	4,148,529	(19,034)	7,080,104	33,181,918	0.027	-	-	10	-	1	4	-	-
2015	1,436,983	251,476	4,013,061	(52,615)	5,145,953	38,327,871	0.027	1	-	12	-	1	5	-	1
2016	642,766	127,520	3,937,326	(82,181)	4,370,391	42,698,262	0.030	2	-	14	-	1	5	-	2
2017	3,690,462	846,235	3,878,421	(179,366)	6,543,282	49,241,544	0.029	3	-	16	-	5	5	-	2
2018	1,832,782	502,776	3,801,422	(181,411)	4,950,017	54,191,561	0.030	4	1	18	-	5	5	-	3
2019	2,317,949	697,791	3,727,594	(262,416)	5,085,336	59,276,897	0.029	4	1	20	-	8	5	-	4
2020	1,917,688	662,641	3,625,065	(307,148)	4,572,964	63,849,861	0.029	4	1	22	-	10	5	4	4
2021	1,953,862	760,847	3,427,301	(325,347)	4,294,969	68,144,830	0.029	4	2	24	-	12	5	4	4
2022	1,937,782	848,107	3,298,525	(376,012)	4,012,188	72,157,018	0.029	4	2	26	-	15	5	7	4
2023	1,189,803	578,293	3,225,698	(404,629)	3,432,579	75,589,597	0.029	6	2	28	-	17	5	7	4
2024	1,403,016	786,478	3,039,239	(398,816)	3,256,960	78,846,557	0.029	6	3	30	-	18	5	10	4
2025	1,280,619	795,249	2,960,542	(420,187)	3,025,725	81,872,282	0.029	8	3	32	-	21	5	10	4
2026	1,405,205	989,483	2,808,038	(425,804)	2,797,956	84,670,238	0.029	8	4	34	-	24	5	10	4
2027	1,112,072	878,219	2,723,275	(435,811)	2,521,317	87,191,555	0.029	10	4	36	-	27	5	11	4
2028	1,356,615	1,207,217	2,584,914	(439,529)	2,294,783	89,486,338	0.029	10	5	38	-	31	5	11	4

Base Scenario (Policy Oriented)

YEAR	Peak Load	Supply Cap.	LNG	N10H	GE55	G150	C10H	J-SI	Hydro	PUMP	RENEW	RES.
	(MW)	(MW)									Wind+Bio	%
2009	19,329	24,390	-	-	-	-	-	-	-	-	-	26.2%
2010	20,535	28,306	-	-	-	-	-	-	-	-	-	37.8%
2011	21,809	30,319	-	-	330	-	-	-	-	-	-	39.0%
2012	23,153	32,286	-	-	-	-	1,000	-	-	-	-	39.4%
2013	24,573	32,286	-	-	-	-	-	-	-	-	-	31.4%
2014	26,073	34,906	-	-	220	-	-	2,400	-	-	-	33.9%
2015	27,657	36,976	750	-	110	-	-	600	-	500	-	33.7%
2016	29,406	38,336	750	-	110	-	-	-	-	500	-	30.4%
2017	31,340	41,643	750	-	110	-	4,000	-	-	-	-	32.9%
2018	33,395	43,802	750	1,000	110	-	-	-	-	500	-	31.2%
2019	35,577	46,914	-	-	110	-	3,000	-	-	500	-	31.9%
2020	37,895	50,194	-	-	110	-	2,000	-	1,170	-	-	32.5%
2021	40,357	53,304	-	1,000	110	-	2,000	-	-	-	-	32.1%
2022	42,973	56,709	-	-	110	-	3,000	-	900	-	-	32.0%
2023	45,751	60,319	1,500	-	110	-	2,000	-	-	-	-	31.8%
2024	48,703	63,329	-	1,000	110	-	1,000	-	900	-	-	30.0%
2025	51,840	67,939	1,500	-	110	-	3,000	-	-	-	-	31.1%
2026	55,172	72,049	-	1,000	110	-	3,000	-	-	-	-	30.6%
2027	58,712	76,959	1,500	-	110	-	3,000	-	300	-	-	31.1%
2028	62,474	82,069	-	1,000	110	-	4,000	-	-	-	-	31.4%
TOTAL			7,500	5,000	2,090	-	31,000	3,000	3,270	2,000	-	

Base Scenario (Policy Oriented)

Operation Cost of Coal-fired in VarSys Adjustment (Net Present Value)

YEAR	t'-0.5	NPV Conv.	C10H Generation (1000 GWh)				JS-I Generation (1000 GWh)				T. Generation (1000 GWh)		OP Cost	OP Cost
		12.0%	P-1 Base	P1-Peak	P-2 Base	P-2 Peak	P-1 Base	P1-Peak	P-2 Base	P-2 Peak	BASE	PEAK	K$	(NPV) K$
2009	-0.5	0.94491	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2010	-1.5	0.84367	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2011	-2.5	0.75328	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2012	-3.5	0.67257	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2013	-4.5	0.60051	0.02	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	-2,272	-1,364
2014	-5.5	0.53617	0.40	0.00	0.33	0.00	0.15	0.00	0.37	0.00	1.25	0.00	-35,500	-19,034
2015	-6.5	0.47872	0.76	0.00	0.60	0.00	1.12	0.00	1.39	0.00	3.87	0.00	-109,908	-52,615
2016	-7.5	0.42743	1.12	0.00	0.91	0.00	2.28	0.00	2.46	0.00	6.77	0.00	-192,268	-82,181
2017	-8.5	0.38163	6.42	0.02	5.51	0.01	2.10	0.00	2.49	0.00	16.52	0.03	-469,999	-179,366
2018	-9.5	0.34074	7.12	0.03	5.85	0.11	2.59	0.00	3.05	0.00	18.61	0.14	-532,402	-181,411
2019	-10.5	0.30424	12.68	0.70	10.13	0.89	2.79	0.00	3.22	0.00	28.82	1.59	-862,531	-262,416
2020	-11.5	0.27164	16.23	1.01	14.29	1.67	3.13	0.00	3.55	0.00	37.20	2.68	########	-307,148
2021	-12.5	0.24254	19.52	1.63	17.59	1.90	3.39	0.00	3.29	0.00	43.79	3.53	########	-325,347
2022	-13.5	0.21655	25.21	2.55	22.90	3.54	3.40	0.00	3.69	0.00	55.20	6.09	########	-376,012
2023	-14.5	0.19335	29.84	4.04	27.06	4.97	3.86	0.01	4.13	0.00	64.89	9.02	########	-404,629
2024	-15.5	0.17263	31.51	5.37	29.46	6.93	4.10	0.01	4.26	0.01	69.33	12.32	########	-398,816
2025	-16.5	0.15414	37.09	6.54	35.27	8.60	4.27	0.01	4.57	0.01	81.20	15.16	########	-420,187
2026	-17.5	0.13762	43.01	8.20	39.89	9.40	4.40	0.01	4.46	0.01	91.76	17.62	########	-425,804
2027	-18.5	0.12288	49.50	10.07	44.82	11.75	4.55	0.01	4.71	0.01	103.58	21.84	########	-435,811
2028	-19.5	0.10971	56.05	11.55	52.31	12.52	4.56	0.01	4.65	0.01	117.57	24.09	########	-439,529
TOTAL														

Scenario 1 (Coal Power Acceleration)

YEAR	PRESENT WORTH COST OF THE YEAR (K$)					OBJ.FUN.	LOLP	LNG	N10H	GE55	G150	C10H	J-SI	Hydro	PUMP
	CONCST	SALVAL	OPCOST	OP-Coal	TOTAL	(CUMM.)	%								
2009	-	-	6,019,205	-	6,019,205	6,019,205	0.029	-	-	-	-	-	-	-	-
2010	-	-	4,899,357	-	4,899,357	10,918,562	0.027	-	-	-	-	-	-	-	-
2011	584,024	58,402	4,655,034	-	5,180,656	16,099,218	0.028	-	-	6	-	-	-	-	-
2012	1,449,185	168,314	4,456,589	-	5,737,460	21,836,678	0.028	-	-	6	-	1	-	-	-
2013	-	-	4,266,500	(1,364)	4,265,136	26,101,814	0.029	-	-	6	-	1	-	-	-
2014	3,212,544	496,255	4,147,409	(23,907)	6,839,791	32,941,605	0.028	-	-	6	-	1	4	-	-
2015	1,313,264	229,556	4,013,965	(60,501)	5,037,171	37,978,776	0.028	1	-	6	-	1	5	-	1
2016	1,453,285	291,695	3,938,238	(105,974)	4,993,854	42,972,630	0.029	2	-	6	-	2	5	-	2
2017	2,769,528	633,492	3,908,800	(201,899)	5,842,937	48,815,567	0.030	3	-	6	-	5	5	-	2
2018	2,478,923	672,626	3,816,995	(213,425)	5,409,867	54,225,434	0.029	4	1	6	-	6	5	-	3
2019	2,239,324	674,316	3,742,177	(299,293)	5,007,891	59,233,325	0.029	4	1	6	-	9	5	-	4
2020	1,262,186	440,731	3,661,677	(338,139)	4,144,993	63,378,318	0.029	4	1	6	-	10	5	4	4
2021	2,413,772	937,132	3,446,940	(363,982)	4,559,598	67,937,916	0.029	4	2	6	-	13	5	4	4
2022	1,866,394	808,966	3,337,636	(430,453)	3,964,611	71,902,527	0.029	4	2	6	-	17	5	4	4
2023	986,523	480,879	3,266,052	(464,021)	3,307,675	75,210,202	0.028	5	2	6	-	19	5	4	4
2024	1,718,075	955,387	3,090,336	(471,186)	3,381,838	78,592,040	0.028	5	3	6	-	22	5	4	4
2025	1,328,463	827,539	3,006,373	(504,961)	3,002,335	81,594,375	0.028	5	3	6	-	26	5	4	4
2026	1,666,171	1,172,638	2,847,643	(507,067)	2,834,109	84,428,484	0.028	5	4	6	-	30	5	4	4
2027	1,059,042	836,849	2,763,199	(528,500)	2,456,892	86,885,376	0.027	5	4	6	-	34	5	4	4
2028	1,328,261	1,182,002	2,621,172	(524,173)	2,243,259	89,128,635	0.027	5	5	6	-	38	5	4	4

Scenario 1 (Coal Power Acceleration)

YEAR	Peak Load	Supply Cap.	LNG	N10H	GE55	G150	C10H	J-SI	Hydro	PUMP	RENEW	RES.
	(MW)	(MW)									Wind+Bio	%
2009	19,329	24,390	-	-	-	-	-	-	-	-	-	26.2%
2010	20,535	28,306	-	-	-	-	-	-	-	-	-	37.8%
2011	21,809	30,319	-	-	330	-	-	-	-	-	-	39.0%
2012	23,153	32,286	-	-	-	-	1,000	-	-	-	-	39.4%
2013	24,573	32,286	-	-	-	-	-	-	-	-	-	31.4%
2014	26,073	34,686	-	-	-	-	-	2,400	-	-	-	33.0%
2015	27,657	36,646	750	-	-	-	-	600	-	500	-	32.5%
2016	29,406	38,896	750	-	-	-	1,000	-	-	500	-	32.3%
2017	31,340	41,093	750	-	-	-	3,000	-	-	-	-	31.1%
2018	33,395	44,142	750	1,000	-	-	1,000	-	-	500	-	32.2%
2019	35,577	47,144	-	-	-	-	3,000	-	-	500	-	32.5%
2020	37,895	49,314	-	-	-	-	1,000	-	1,170	-	-	30.1%
2021	40,357	53,314	-	1,000	-	-	3,000	-	-	-	-	32.1%
2022	42,973	56,709	-	-	-	-	4,000	-	-	-	-	32.0%
2023	45,751	59,459	750	-	-	-	2,000	-	-	-	-	30.0%
2024	48,703	63,459	-	1,000	-	-	3,000	-	-	-	-	30.3%
2025	51,840	67,459	-	-	-	-	4,000	-	-	-	-	30.1%
2026	55,172	72,459	-	1,000	-	-	4,000	-	-	-	-	31.3%
2027	58,712	76,459	-	-	-	-	4,000	-	600	-	-	30.2%
2028	62,474	81,459	-	1,000	-	-	4,000	-	-	-	-	30.4%
TOTAL			3,750	5,000	330	-	38,000	3,000	1,770	2,000	-	

Scenario 1 (Coal Power Acceleration)

Operation Cost of Coal-fired in VarSys Adjustment (Net Present Value)

YEAR	t'-0.5	NPV Conv.	C10H Generation (1000 GWh)				JS-I Generation (1000 GWh)				T. Generation (1000 GWh)		OP Cost	OP Cost
		12.0%	P-1 Base	P1-Peak	P-2 Base	P-2 Peak	P-1 Base	P1-Peak	P-2 Base	P-2 Peak	BASE	PEAK	K$	(NPV) K$
2009	-0.5	0.94491	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2010	-1.5	0.84367	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2011	-2.5	0.75328	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2012	-3.5	0.67257	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2013	-4.5	0.60051	0.02	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.08	0.00	-2,272	-1,364
2014	-5.5	0.53617	0.44	0.00	0.38	0.00	0.22	0.00	0.53	0.00	1.57	0.00	-44,588	-23,907
2015	-6.5	0.47872	0.82	0.00	0.66	0.00	1.37	0.00	1.60	0.00	4.45	0.00	-126,380	-60,501
2016	-7.5	0.42743	2.39	0.00	1.78	0.00	2.29	0.00	2.27	0.00	8.73	0.00	-247,932	-105,974
2017	-8.5	0.38163	6.93	0.04	6.50	0.03	2.27	0.00	2.86	0.00	18.56	0.07	-529,043	-201,899
2018	-9.5	0.34074	9.13	0.12	7.03	0.09	2.78	0.00	2.91	0.00	21.85	0.21	-626,357	-213,425
2019	-10.5	0.30424	14.57	1.02	11.88	1.06	2.97	0.00	3.19	0.00	32.61	2.08	-983,740	-299,293
2020	-11.5	0.27164	17.19	2.23	14.61	2.59	3.63	0.00	3.70	0.00	39.13	4.82	########	-338,139
2021	-12.5	0.24254	21.76	2.27	19.45	2.52	3.48	0.00	3.48	0.00	48.17	4.79	########	-363,982
2022	-13.5	0.21655	29.06	3.53	26.34	4.09	3.49	0.00	3.67	0.00	62.56	7.62	########	-430,453
2023	-14.5	0.19335	33.22	5.84	31.05	6.56	3.97	0.01	4.14	0.02	72.38	12.43	########	-464,021
2024	-15.5	0.17263	38.54	6.68	35.98	7.18	4.01	0.02	4.03	0.01	82.56	13.89	########	-471,186
2025	-16.5	0.15414	46.01	8.86	43.23	9.31	4.14	0.01	4.23	0.01	97.61	18.19	########	-504,961
2026	-17.5	0.13762	52.62	9.16	50.21	10.00	4.07	0.01	4.14	0.00	111.04	19.17	########	-507,067
2027	-18.5	0.12288	61.10	12.59	56.85	12.88	4.29	0.01	4.34	0.01	126.58	25.49	########	-528,500
2028	-19.5	0.10971	68.19	13.98	63.82	14.31	4.24	0.01	4.38	0.00	140.63	28.30	########	-524,173
TOTAL														

Scenario 2 (Power Source Diversification)

YEAR	PRESENT WORTH COST OF THE YEAR (K$)					OBJ.FUN.	LOLP	LNG	N10H	GE55	G150	C10H	J-SI	Hydro	PUMP
	CONCST	SALVAL	OPCOST	OP-Coal	TOTAL	(CUMM.)	%								
2009	-	-	6,019,205	-	6,019,205	6,019,205	0.029	-	-	-	-	-	-	-	-
2010	-	-	4,899,357	-	4,899,357	10,918,562	0.027	-	-	-	-	-	-	-	-
2011	584,024	58,402	4,655,034	-	5,180,656	16,099,218	0.028	-	-	6	-	-	-	-	-
2012	1,449,185	168,313	4,456,651	-	5,737,522	21,836,740	0.028	-	-	6	-	1	-	-	-
2013	-	-	4,267,108	(1,138)	4,265,970	26,102,710	0.029	-	-	6	-	1	-	-	-
2014	3,489,675	539,064	4,155,456	(23,572)	7,082,494	33,185,204	0.027	-	-	10	-	1	4	-	-
2015	1,436,983	251,475	4,030,534	(46,810)	5,169,232	38,354,436	0.027	1	-	12	-	1	5	-	1
2016	642,766	127,521	3,964,651	(87,316)	4,392,580	42,747,016	0.030	2	-	14	-	1	5	-	2
2017	3,690,462	846,234	3,937,643	(182,096)	6,599,776	49,346,792	0.029	3	-	16	-	5	5	-	2
2018	1,832,782	502,776	3,860,806	(183,764)	5,007,048	54,353,840	0.030	4	1	18	-	5	5	-	3
2019	1,741,811	521,413	3,854,422	(260,781)	4,814,039	59,167,879	0.030	4	1	20	3	7	5	-	4
2020	1,201,499	411,259	3,782,688	(259,923)	4,313,005	63,480,884	0.030	6	1	22	4	7	5	4	4
2021	1,953,862	760,850	3,517,136	(280,966)	4,429,182	67,910,066	0.029	6	2	24	4	9	5	4	4
2022	1,385,679	601,874	3,434,939	(295,528)	3,923,216	71,833,282	0.029	8	2	26	6	10	5	7	4
2023	1,299,786	636,367	3,323,517	(350,701)	3,636,235	75,469,517	0.029	8	2	28	6	13	5	7	4
2024	1,334,852	744,452	3,152,904	(316,621)	3,426,683	78,896,200	0.029	10	3	30	8	13	5	10	4
2025	1,036,181	645,474	3,043,621	(359,364)	3,074,964	81,971,164	0.029	10	3	32	8	16	5	10	4
2026	1,054,334	740,919	2,911,153	(342,165)	2,882,403	84,853,567	0.028	12	4	34	10	17	5	10	4
2027	938,587	741,885	2,814,338	(370,067)	2,640,973	87,494,540	0.028	12	4	36	12	20	5	11	4
2028	1,356,615	1,207,212	2,673,134	(391,778)	2,430,758	89,925,298	0.028	12	5	38	12	24	5	11	4

Note: Construction Cost (CONCST) and Operation Cost (OPCOST) do not include those of RENEWBALE ENERGY.

Scenario 2 (Power Source Diversification)

YEAR	Peak Load	Supply Cap.	LNG	N10H	GE55	G150	C10H	J-SI	Hydro	PUMP	RENEW	RES.
	(MW)	(MW)									Wind+Bio	%
2009	19,329	24,390	-	-	-	-	-	-	-	-	-	26.2%
2010	20,535	28,306	-	-	-	-	-	-	-	-	-	37.8%
2011	21,809	30,319	-	-	330	-	-	-	-	-	-	39.0%
2012	23,153	32,286	-	-	-	-	1,000	-	-	-	-	39.4%
2013	24,573	32,286	-	-	-	-	-	-	-	-	-	31.4%
2014	26,073	34,906	-	-	220	-	-	2,400	-	-	-	33.9%
2015	27,657	36,976	750	-	110	-	-	600	-	500	-	33.7%
2016	29,406	38,336	750	-	110	-	-	-	-	500	-	30.4%
2017	31,340	41,643	750	-	110	-	4,000	-	-	-	-	32.9%
2018	33,395	43,802	750	1,000	110	-	-	-	-	500	-	31.2%
2019	35,577	46,364	-	-	110	450	2,000	-	-	500	-	30.3%
2020	37,895	49,294	1,500	-	110	150	-	-	1,170	-	-	30.1%
2021	40,357	52,939	-	1,000	110	-	2,000	-	-	-	535	31.2%
2022	42,973	56,176	1,500	-	110	300	1,000	-	900	-	32	30.7%
2023	45,751	59,926	-	-	110	-	3,000	-	-	-	640	31.0%
2024	48,703	63,810	1,500	1,000	110	300	-	-	900	-	74	31.0%
2025	51,840	67,677	-	-	110	-	3,000	-	-	-	757	30.5%
2026	55,172	70,713	1,500	1,000	110	300	1,000	-	-	-	126	28.2%
2027	58,712	76,322	-	-	110	300	3,000	-	300	-	899	30.0%
2028	62,474	81,619	-	1,000	110	-	4,000	-	-	-	187	30.6%
TOTAL			9,000	5,000	2,090	1,800	24,000	3,000	3,270	2,000	3,250	

Note: Renewable Energy comes on line in 2021 with Capacity Factor of 20 %.

Scenario 2 (Power Source Diversification)

Operation Cost of Coal-fired in VarSys Adjustment (Net Present Value)

YEAR	t'-0.5	NPV Conv.	C10H Generation (1000 GWh)				JS-I Generation (1000 GWh)				T. Generation (1000 GWh)		OP Cost	OP Cost
		12.0%	P-1 Base	P1-Peak	P-2 Base	P-2 Peak	P-1 Base	P1-Peak	P-2 Base	P-2 Peak	BASE	PEAK	K$	(NPV) K$
2009	-0.5	0.94491	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2010	-1.5	0.84367	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2011	-2.5	0.75328	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2012	-3.5	0.67257	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2013	-4.5	0.60051	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.05	0.00	-1,895	-1,138
2014	-5.5	0.53617	0.37	0.00	0.32	0.00	0.14	0.00	0.33	0.00	1.16	0.00	-43,964	-23,572
2015	-6.5	0.47872	0.64	0.00	0.52	0.00	0.56	0.00	0.86	0.00	2.58	0.00	-97,782	-46,810
2016	-7.5	0.42743	0.90	0.00	0.78	0.00	1.71	0.00	2.00	0.00	5.39	0.00	-204,281	-87,316
2017	-8.5	0.38163	5.25	0.01	4.13	0.00	1.49	0.00	1.71	0.00	12.58	0.01	-477,152	-182,096
2018	-9.5	0.34074	5.69	0.01	4.63	0.00	1.78	0.00	2.12	0.00	14.22	0.01	-539,308	-183,764
2019	-10.5	0.30424	10.02	0.15	7.52	0.01	2.40	0.00	2.52	0.00	22.46	0.16	-857,154	-260,781
2020	-11.5	0.27164	10.96	0.12	8.24	0.00	2.93	0.00	3.00	0.00	25.13	0.12	-956,867	-259,923
2021	-12.5	0.24254	13.60	0.15	11.12	0.04	2.84	0.00	2.82	0.00	30.38	0.19	########	-280,966
2022	-13.5	0.21655	15.44	0.14	13.75	0.36	3.03	0.00	3.30	0.00	35.52	0.50	########	-295,528
2023	-14.5	0.19335	20.79	0.36	19.08	0.99	3.26	0.00	3.41	0.00	46.54	1.35	########	-350,701
2024	-15.5	0.17263	21.03	0.26	19.27	0.87	3.40	0.00	3.59	0.00	47.29	1.13	########	-316,621
2025	-16.5	0.15414	26.88	0.94	24.56	1.80	3.51	0.00	3.89	0.00	58.84	2.74	########	-359,364
2026	-17.5	0.13762	28.58	0.97	26.60	1.91	3.74	0.00	3.87	0.00	62.79	2.88	########	-342,165
2027	-18.5	0.12288	34.01	1.79	32.58	3.18	3.92	0.00	4.10	0.00	74.61	4.97	########	-370,067
2028	-19.5	0.10971	41.61	2.58	38.60	3.63	3.80	0.00	4.15	0.00	88.16	6.21	########	-391,778
TOTAL														

Scenario 3 (CO2 Emission Reduction)

YEAR	PRESENT WORTH COST OF THE YEAR (K$)					OBJ.FUN.	LOLP	LNG	N10H	GE55	G150	C10H	J-SI	Hydro	PUMP
	CONCST	SALVAL	OPCOST	OP-Coal	TOTAL	(CUMM.)	%								
2009	-	-	6,019,205	-	6,019,205	6,019,205	0.029	-	-	-	-	-	-	-	-
2010	-	-	4,899,357	-	4,899,357	10,918,562	0.027	-	-	-	-	-	-	-	-
2011	584,024	58,402	4,655,034	-	5,180,656	16,099,218	0.028	-	-	6	-	-	-	-	-
2012	1,449,185	168,313	4,456,651	-	5,737,522	21,836,740	0.028	-	-	6	-	1	-	-	-
2013	-	-	4,267,108	(1,138)	4,265,970	26,102,710	0.029	-	-	6	-	1	-	-	-
2014	3,489,675	539,064	4,155,456	(23,572)	7,082,494	33,185,204	0.027	-	-	10	-	1	4	-	-
2015	1,436,983	251,475	4,030,534	(46,810)	5,169,232	38,354,436	0.027	1	-	12	-	1	5	-	1
2016	642,766	127,521	3,964,651	(87,316)	4,392,580	42,747,016	0.030	2	-	14	-	1	5	-	2
2017	3,690,462	846,234	3,937,643	(182,096)	6,599,776	49,346,792	0.029	3	-	16	-	5	5	-	2
2018	1,832,782	502,776	3,860,806	(183,764)	5,007,048	54,353,840	0.030	4	1	18	-	5	5	-	3
2019	1,741,811	521,413	3,854,422	(260,781)	4,814,039	59,167,879	0.030	4	1	20	3	7	5	-	4
2020	1,201,499	411,259	3,782,688	(259,923)	4,313,005	63,480,884	0.030	6	1	22	4	7	5	4	4
2021	1,953,862	760,850	3,517,136	(280,966)	4,429,182	67,910,066	0.029	6	2	24	4	9	5	4	4
2022	1,385,679	601,874	3,434,939	(295,528)	3,923,216	71,833,282	0.029	8	2	26	6	10	5	7	4
2023	883,180	432,397	3,275,657	(328,198)	3,398,242	75,231,524	0.029	8	2	28	6	12	5	7	4
2024	1,334,852	744,451	3,106,903	(295,944)	3,401,360	78,632,884	0.029	10	3	30	8	12	5	10	4
2025	1,036,181	645,472	2,948,251	(328,139)	3,010,821	81,643,705	0.029	10	3	32	8	15	5	10	4
2026	1,054,334	740,912	2,820,059	(313,723)	2,819,757	84,463,462	0.029	12	4	34	10	16	5	10	4
2027	764,997	605,287	2,680,707	(323,764)	2,516,652	86,980,114	0.029	12	4	36	12	18	5	12	4
2028	1,120,221	997,022	2,551,425	(342,052)	2,332,572	89,312,686	0.028	12	5	38	12	21	5	12	4

Note: Construction Cost (CONCST) and Operation Cost (OPCOST) do not include those of RENEWBALE ENERGY.

Scenario 3 (CO2 Emission Reduction)

YEAR	Peak Load	Supply Cap.	LNG	N10H	GE55	G150	C10H	J-SI	Hydro	PUMP	RENEW	RES.
	(MW)	(MW)									Wind+Bio	%
2009	19,329	24,390	-	-	-	-	-	-	-	-	-	26.2%
2010	20,535	28,306	-	-	-	-	-	-	-	-	-	37.8%
2011	21,809	30,319	-	-	330	-	-	-	-	-	-	39.0%
2012	23,153	32,286	-	-	-	-	1,000	-	-	-	-	39.4%
2013	24,573	32,286	-	-	-	-	-	-	-	-	-	31.4%
2014	26,073	34,906	-	-	220	-	-	2,400	-	-	-	33.9%
2015	27,657	36,976	750	-	110	-	-	600	-	500	-	33.7%
2016	29,406	38,336	750	-	110	-	-	-	-	500	-	30.4%
2017	31,340	41,643	750	-	110	-	4,000	-	-	-	-	32.9%
2018	33,395	43,802	750	1,000	110	-	-	-	-	500	-	31.2%
2019	35,577	46,364	-	-	110	450	2,000	-	-	500	-	30.3%
2020	37,895	49,294	1,500	-	110	150	-	-	1,170	-	-	30.1%
2021	40,357	52,939	-	1,000	110	-	2,000	-	-	-	535	31.2%
2022	42,973	56,176	1,500	-	110	300	1,000	-	900	-	32	30.7%
2023	45,751	59,527	-	-	110	-	2,000	-	-	-	1,241	30.1%
2024	48,703	63,449	1,500	1,000	110	300	-	-	900	-	112	30.3%
2025	51,840	68,037	-	-	110	-	3,000	-	-	-	1,478	31.2%
2026	55,172	72,155	1,500	1,000	110	300	1,000	-	-	-	208	30.8%
2027	58,712	76,917	-	-	110	300	2,000	-	600	-	1,752	31.0%
2028	62,474	81,355	-	1,000	110	-	3,000	-	-	-	328	30.2%
TOTAL			9,000	5,000	2,090	1,800	21,000	3,000	3,570	2,000	5,686	

Note: Renewable Energy comes on line in 2021 with Capacity Factor of 20 %.

Scenario 3 (CO2 Emission Reduction)

Operation Cost of Coal-fired in VarSys Adjustment (Net Present Value)

YEAR	t'-0.5	NPV Conv.	C10H Generation (1000 GWh)				JS-I Generation (1000 GWh)				T. Generation (1000 GWh)		OP Cost	OP Cost
		12.0%	P-1 Base	P1-Peak	P-2 Base	P-2 Peak	P-1 Base	P1-Peak	P-2 Base	P-2 Peak	BASE	PEAK	K$	(NPV) K$
2009	-0.5	0.94491	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2010	-1.5	0.84367	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2011	-2.5	0.75328	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2012	-3.5	0.67257	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2013	-4.5	0.60051	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.05	0.00	-1,895	-1,138
2014	-5.5	0.53617	0.37	0.00	0.32	0.00	0.14	0.00	0.33	0.00	1.16	0.00	-43,964	-23,572
2015	-6.5	0.47872	0.64	0.00	0.52	0.00	0.56	0.00	0.86	0.00	2.58	0.00	-97,782	-46,810
2016	-7.5	0.42743	0.90	0.00	0.78	0.00	1.71	0.00	2.00	0.00	5.39	0.00	-204,281	-87,316
2017	-8.5	0.38163	5.25	0.01	4.13	0.00	1.49	0.00	1.71	0.00	12.58	0.01	-477,152	-182,096
2018	-9.5	0.34074	5.69	0.01	4.63	0.00	1.78	0.00	2.12	0.00	14.22	0.01	-539,308	-183,764
2019	-10.5	0.30424	10.02	0.15	7.52	0.01	2.40	0.00	2.52	0.00	22.46	0.16	-857,154	-260,781
2020	-11.5	0.27164	10.96	0.12	8.24	0.00	2.93	0.00	3.00	0.00	25.13	0.12	-956,867	-259,923
2021	-12.5	0.24254	13.60	0.15	11.12	0.04	2.84	0.00	2.82	0.00	30.38	0.19	########	-280,966
2022	-13.5	0.21655	15.44	0.14	13.75	0.36	3.03	0.00	3.30	0.00	35.52	0.50	########	-295,528
2023	-14.5	0.19335	18.91	0.32	17.77	1.07	3.23	0.00	3.52	0.00	43.43	1.39	########	-328,198
2024	-15.5	0.17263	19.15	0.22	17.91	0.92	3.37	0.00	3.69	0.00	44.12	1.14	########	-295,944
2025	-16.5	0.15414	24.79	0.43	22.59	1.26	3.36	0.00	3.78	0.00	54.52	1.69	########	-328,139
2026	-17.5	0.13762	26.79	0.51	24.31	1.23	3.60	0.00	3.75	0.00	58.45	1.74	########	-313,723
2027	-18.5	0.12288	30.15	0.83	28.75	2.13	3.76	0.00	3.97	0.00	66.63	2.96	########	-323,764
2028	-19.5	0.10971	36.41	1.98	33.17	2.93	3.82	0.00	4.07	0.00	77.47	4.91	########	-342,052
TOTAL														

PRODUCTION MIX (1000 GWh)

Base Scenario (Policy Oriented)

YEAR	FUEL TYPE										TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	
2009	87.34	24.29	-	1.41	2.86	4.17	-	-	-	6.00	126.07
2010	#####	13.06	-	-	0.02	0.15	-	-	-	6.00	133.93
2011	#####	15.02	-	-	0.02	0.05	-	-	-	6.00	142.23
2012	#####	21.34	-	-	0.02	0.31	-	-	-	6.14	151.01
2013	#####	27.47	-	0.01	0.06	2.15	-	-	-	6.14	160.25
2014	#####	32.38	-	0.02	0.09	5.20	-	0.52	-	6.14	170.04
2015	#####	36.58	0.07	0.02	0.13	8.12	-	2.51	0.70	6.43	181.28
2016	#####	39.35	1.65	0.11	0.38	12.10	-	4.74	1.73	6.43	194.06
2017	#####	38.70	2.32	-	0.38	14.81	-	4.58	1.38	6.43	206.19
2018	#####	37.57	4.03	-	2.70	15.23	7.52	5.64	0.38	6.43	218.29
2019	#####	37.92	4.55	-	2.59	16.98	7.52	6.02	0.30	6.43	232.41
2020	#####	38.04	5.34	-	3.32	18.25	7.52	6.68	0.24	9.13	247.43
2021	#####	38.05	5.42	-	3.46	19.10	15.05	6.68	0.23	9.13	263.47
2022	#####	38.10	5.97	-	3.02	20.17	15.05	7.09	0.15	10.99	280.45
2023	#####	38.13	10.13	-	3.39	21.06	15.05	8.00	0.04	10.99	298.41
2024	#####	38.15	10.94	-	3.79	21.97	22.57	8.38	0.03	12.85	317.65
2025	#####	38.23	15.48	-	3.99	22.88	22.57	8.87	0.02	12.85	338.09
2026	#####	38.23	15.70	-	4.11	23.74	30.09	8.88	0.02	12.85	359.83
2027	#####	38.25	20.86	-	4.37	24.71	30.09	9.29	0.02	13.47	382.91
2028	#####	38.25	20.79	-	4.40	25.52	37.62	9.23	0.02	13.47	407.45

PRODUCTION MIX (1000 GWh)

Scenario 1 (Coal Power Acceleration)

YEAR	FUEL TYPE										TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	
2009	87.34	24.29	-	1.41	2.86	4.17	-	-	-	6.00	126.07
2010	#####	13.06	-	-	0.02	0.15	-	-	-	6.00	133.93
2011	#####	15.02	-	-	0.02	0.05	-	-	-	6.00	142.23
2012	#####	21.34	-	-	0.02	0.31	-	-	-	6.14	151.01
2013	#####	27.47	-	-	0.06	2.15	-	-	-	6.14	160.24
2014	#####	32.38	-	0.02	0.11	4.87	-	0.75	-	6.14	170.04
2015	#####	36.77	0.14	0.03	0.17	7.27	-	2.97	0.81	6.43	181.44
2016	#####	39.34	1.58	0.09	0.28	10.27	-	4.56	1.59	6.43	193.86
2017	#####	38.72	2.73	-	0.78	12.03	-	5.13	1.80	6.43	206.74
2018	#####	37.57	4.06	-	2.80	11.77	7.52	5.69	0.39	6.43	218.28
2019	#####	37.92	4.67	-	2.70	12.47	7.52	6.16	0.30	6.43	232.40
2020	#####	38.07	6.05	-	3.99	12.84	7.52	7.33	0.24	9.13	247.50
2021	#####	38.06	5.72	-	3.72	12.90	15.05	6.96	0.23	9.13	263.47
2022	#####	38.10	6.04	-	3.07	13.01	15.05	7.16	0.14	9.13	280.43
2023	#####	38.14	8.80	-	3.67	13.08	15.05	8.15	0.02	9.13	298.42
2024	#####	38.14	8.80	-	3.72	13.10	22.57	8.07	0.10	9.13	317.72
2025	#####	38.21	9.39	-	4.06	13.20	22.57	8.40	0.01	9.13	338.09
2026	#####	38.21	9.22	-	4.02	13.23	30.09	8.22	0.01	9.13	359.82
2027	#####	38.23	9.94	-	4.43	13.29	30.09	8.64	0.01	9.13	382.89
2028	#####	38.23	10.00	-	4.49	13.30	37.62	8.64	0.01	9.13	407.43

PRODUCTION MIX (1000 GWh)

Scenario 2 (Power Source Diversification)

YEAR	FUEL TYPE											TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	RENEW	
2009	87.34	24.29	-	1.41	2.86	4.17	-	-	-	6.00	-	126.07
2010	#####	13.06	-	-	0.02	0.15	-	-	-	6.00	-	133.93
2011	#####	15.02	-	-	0.02	0.05	-	-	-	6.00	-	142.23
2012	#####	21.34	-	-	0.02	0.31	-	-	-	6.14	-	151.01
2013	#####	27.49	-	-	0.06	2.15	-	-	-	6.14	-	160.23
2014	#####	32.47	-	0.02	0.09	5.20	-	0.48	-	6.14	-	170.05
2015	#####	37.00	1.02	0.02	0.13	8.12	-	1.41	0.90	6.43	-	181.55
2016	#####	39.44	2.94	0.11	0.38	12.10	-	3.71	1.73	6.43	-	194.05
2017	#####	38.89	6.09	-	0.38	14.81	-	3.20	1.38	6.43	-	206.19
2018	#####	37.77	8.33	-	2.70	15.23	7.52	3.91	0.37	6.43	-	218.27
2019	#####	38.27	11.13	-	3.41	17.02	7.52	4.93	0.30	6.43	-	232.42
2020	#####	38.45	18.11	-	4.70	18.32	7.52	5.93	0.24	9.13	-	247.43
2021	#####	38.44	18.20	-	4.48	19.06	15.05	5.66	0.24	9.13	2.68	263.55
2022	#####	38.56	26.12	-	4.86	20.17	15.05	6.34	0.17	10.99	2.84	280.51
2023	#####	38.61	27.89	-	5.25	21.04	15.05	6.67	0.09	10.99	6.04	298.55
2024	#####	38.64	35.00	-	6.22	21.86	22.57	7.00	0.07	12.85	6.41	317.76
2025	#####	38.71	37.01	-	6.74	22.78	22.57	7.40	0.03	12.85	10.20	338.17
2026	#####	38.74	44.61	-	7.70	23.63	30.09	7.62	0.02	12.85	10.83	359.86
2027	#####	38.78	46.36	-	8.98	24.60	30.09	8.02	0.02	13.47	15.33	382.91
2028	#####	38.79	46.79	-	8.96	25.41	37.62	7.95	0.02	13.47	16.27	407.42

PRODUCTION MIX (1000 GWh)

Scenario 3 (CO2 Emission Reduction)

YEAR	FUEL TYPE											TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	RENEW	
2009	87.34	24.29	-	1.41	2.86	4.17	-	-	-	6.00	-	126.07
2010	#####	13.06	-	-	0.02	0.15	-	-	-	6.00	-	133.93
2011	#####	15.02	-	-	0.02	0.05	-	-	-	6.00	-	142.23
2012	#####	21.34	-	-	0.02	0.31	-	-	-	6.14	-	151.01
2013	#####	27.49	-	-	0.06	2.15	-	-	-	6.14	-	160.23
2014	#####	32.47	-	0.02	0.09	5.20	-	0.48	-	6.14	-	170.05
2015	#####	37.00	1.02	0.02	0.13	8.12	-	1.41	0.90	6.43	-	181.55
2016	#####	39.44	2.94	0.11	0.38	12.10	-	3.71	1.73	6.43	-	194.05
2017	#####	38.89	6.09	-	0.38	14.81	-	3.20	1.38	6.43	-	206.19
2018	#####	37.77	8.33	-	2.70	15.23	7.52	3.91	0.37	6.43	-	218.27
2019	#####	38.27	11.13	-	3.41	17.02	7.52	4.93	0.30	6.43	-	232.42
2020	#####	38.45	18.11	-	4.70	18.32	7.52	5.93	0.24	9.13	-	247.43
2021	#####	38.44	18.20	-	4.48	19.06	15.05	5.66	0.24	9.13	2.68	263.55
2022	#####	38.56	26.12	-	4.86	20.17	15.05	6.34	0.17	10.99	2.84	280.51
2023	#####	38.61	27.90	-	5.31	21.05	15.05	6.75	0.10	10.99	9.05	298.59
2024	#####	38.64	34.94	-	6.27	21.87	22.57	7.06	0.09	12.85	9.61	317.81
2025	#####	38.67	36.06	-	6.42	22.68	22.57	7.15	0.04	12.85	17.01	338.23
2026	#####	38.70	43.43	-	7.34	23.50	30.09	7.35	0.03	12.85	18.05	359.89
2027	#####	38.75	44.90	-	8.53	24.42	30.09	7.73	0.02	14.09	26.82	382.92
2028	#####	38.77	46.19	-	8.84	25.31	37.62	7.89	0.02	14.09	28.46	407.38

PRODUCTION MIX (%)

Base Scenario (Policy Oriented)

YEAR	FUEL TYPE										TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	
2009	69.3	19.3	-	1.1	2.3	3.3	-	-	-	4.8	100.0
2010	85.6	9.8	-	-	0.0	0.1	-	-	-	4.5	100.0
2011	85.2	10.6	-	-	0.0	0.0	-	-	-	4.2	100.0
2012	81.6	14.1	-	-	0.0	0.2	-	-	-	4.1	100.0
2013	77.6	17.1	-	0.0	0.0	1.3	-	-	-	3.8	100.0
2014	73.9	19.0	-	0.0	0.1	3.1	-	0.3	-	3.6	100.0
2015	69.9	20.2	0.0	0.0	0.1	4.5	-	1.4	0.4	3.5	100.0
2016	65.7	20.3	0.9	0.1	0.2	6.2	-	2.4	0.9	3.3	100.0
2017	66.7	18.8	1.1	-	0.2	7.2	-	2.2	0.7	3.1	100.0
2018	63.6	17.2	1.8	-	1.2	7.0	3.4	2.6	0.2	2.9	100.0
2019	64.6	16.3	2.0	-	1.1	7.3	3.2	2.6	0.1	2.8	100.0
2020	64.2	15.4	2.2	-	1.3	7.4	3.0	2.7	0.1	3.7	100.0
2021	63.1	14.4	2.1	-	1.3	7.2	5.7	2.5	0.1	3.5	100.0
2022	64.2	13.6	2.1	-	1.1	7.2	5.4	2.5	0.1	3.9	100.0
2023	64.2	12.8	3.4	-	1.1	7.1	5.0	2.7	0.0	3.7	100.0
2024	62.6	12.0	3.4	-	1.2	6.9	7.1	2.6	0.0	4.0	100.0
2025	63.1	11.3	4.6	-	1.2	6.8	6.7	2.6	0.0	3.8	100.0
2026	62.9	10.6	4.4	-	1.1	6.6	8.4	2.5	0.0	3.6	100.0
2027	63.2	10.0	5.4	-	1.1	6.5	7.9	2.4	0.0	3.5	100.0
2028	63.4	9.4	5.1	-	1.1	6.3	9.2	2.3	0.0	3.3	100.0

PRODUCTION MIX (%)

Scenario 1 (Coal Power Acceleration)

YEAR	FUEL TYPE										TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	
2009	69.3	19.3	-	1.1	2.3	3.3	-	-	-	4.8	100.0
2010	85.6	9.8	-	-	0.0	0.1	-	-	-	4.5	100.0
2011	85.2	10.6	-	-	0.0	0.0	-	-	-	4.2	100.0
2012	81.6	14.1	-	-	0.0	0.2	-	-	-	4.1	100.0
2013	77.6	17.1	-	-	0.0	1.3	-	-	-	3.8	100.0
2014	74.0	19.0	-	0.0	0.1	2.9	-	0.4	-	3.6	100.0
2015	69.9	20.3	0.1	0.0	0.1	4.0	-	1.6	0.4	3.5	100.0
2016	66.9	20.3	0.8	0.0	0.1	5.3	-	2.4	0.8	3.3	100.0
2017	67.3	18.7	1.3	-	0.4	5.8	-	2.5	0.9	3.1	100.0
2018	65.1	17.2	1.9	-	1.3	5.4	3.4	2.6	0.2	2.9	100.0
2019	66.4	16.3	2.0	-	1.2	5.4	3.2	2.7	0.1	2.8	100.0
2020	65.6	15.4	2.4	-	1.6	5.2	3.0	3.0	0.1	3.7	100.0
2021	65.2	14.4	2.2	-	1.4	4.9	5.7	2.6	0.1	3.5	100.0
2022	67.3	13.6	2.2	-	1.1	4.6	5.4	2.6	0.0	3.3	100.0
2023	67.8	12.8	2.9	-	1.2	4.4	5.0	2.7	0.0	3.1	100.0
2024	67.4	12.0	2.8	-	1.2	4.1	7.1	2.5	0.0	2.9	100.0
2025	69.0	11.3	2.8	-	1.2	3.9	6.7	2.5	0.0	2.7	100.0
2026	68.8	10.6	2.6	-	1.1	3.7	8.4	2.3	0.0	2.5	100.0
2027	70.3	10.0	2.6	-	1.2	3.5	7.9	2.3	0.0	2.4	100.0
2028	70.2	9.4	2.5	-	1.1	3.3	9.2	2.1	0.0	2.2	100.0

PRODUCTION MIX (%)

Scenario 2 (Power Source Diversification)

YEAR	FUEL TYPE											TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	RENEW	
2009	69.3	19.3	-	1.1	2.3	3.3	-	-	-	4.8	-	100.0
2010	85.6	9.8	-	-	0.0	0.1	-	-	-	4.5	-	100.0
2011	85.2	10.6	-	-	0.0	0.0	-	-	-	4.2	-	100.0
2012	81.6	14.1	-	-	0.0	0.2	-	-	-	4.1	-	100.0
2013	77.6	17.2	-	-	0.0	1.3	-	-	-	3.8	-	100.0
2014	73.9	19.1	-	0.0	0.1	3.1	-	0.3	-	3.6	-	100.0
2015	69.7	20.4	0.6	0.0	0.1	4.5	-	0.8	0.5	3.5	-	100.0
2016	65.6	20.3	1.5	0.1	0.2	6.2	-	1.9	0.9	3.3	-	100.0
2017	65.5	18.9	3.0	-	0.2	7.2	-	1.6	0.7	3.1	-	100.0
2018	62.3	17.3	3.8	-	1.2	7.0	3.4	1.8	0.2	2.9	-	100.0
2019	61.7	16.5	4.8	-	1.5	7.3	3.2	2.1	0.1	2.8	-	100.0
2020	58.6	15.5	7.3	-	1.9	7.4	3.0	2.4	0.1	3.7	-	100.0
2021	57.1	14.6	6.9	-	1.7	7.2	5.7	2.1	0.1	3.5	1.0	100.0
2022	55.4	13.7	9.3	-	1.7	7.2	5.4	2.3	0.1	3.9	1.0	100.0
2023	55.9	12.9	9.3	-	1.8	7.0	5.0	2.2	0.0	3.7	2.0	100.0
2024	52.6	12.2	11.0	-	2.0	6.9	7.1	2.2	0.0	4.0	2.0	100.0
2025	53.2	11.4	10.9	-	2.0	6.7	6.7	2.2	0.0	3.8	3.0	100.0
2026	51.1	10.8	12.4	-	2.1	6.6	8.4	2.1	0.0	3.6	3.0	100.0
2027	51.5	10.1	12.1	-	2.3	6.4	7.9	2.1	0.0	3.5	4.0	100.0
2028	52.1	9.5	11.5	-	2.2	6.2	9.2	2.0	0.0	3.3	4.0	100.0

PRODUCTION MIX (%)

Scenario 3 (CO2 Emission Reduction)

YEAR	FUEL TYPE											TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	RENEW	
2009	69.3	19.3	-	1.1	2.3	3.3	-	-	-	4.8	-	100.0
2010	85.6	9.8	-	-	0.0	0.1	-	-	-	4.5	-	100.0
2011	85.2	10.6	-	-	0.0	0.0	-	-	-	4.2	-	100.0
2012	81.6	14.1	-	-	0.0	0.2	-	-	-	4.1	-	100.0
2013	77.6	17.2	-	-	0.0	1.3	-	-	-	3.8	-	100.0
2014	73.9	19.1	-	0.0	0.1	3.1	-	0.3	-	3.6	-	100.0
2015	69.7	20.4	0.6	0.0	0.1	4.5	-	0.8	0.5	3.5	-	100.0
2016	65.6	20.3	1.5	0.1	0.2	6.2	-	1.9	0.9	3.3	-	100.0
2017	65.5	18.9	3.0	-	0.2	7.2	-	1.6	0.7	3.1	-	100.0
2018	62.3	17.3	3.8	-	1.2	7.0	3.4	1.8	0.2	2.9	-	100.0
2019	61.7	16.5	4.8	-	1.5	7.3	3.2	2.1	0.1	2.8	-	100.0
2020	58.6	15.5	7.3	-	1.9	7.4	3.0	2.4	0.1	3.7	-	100.0
2021	57.1	14.6	6.9	-	1.7	7.2	5.7	2.1	0.1	3.5	1.0	100.0
2022	55.4	13.7	9.3	-	1.7	7.2	5.4	2.3	0.1	3.9	1.0	100.0
2023	54.9	12.9	9.3	-	1.8	7.0	5.0	2.3	0.0	3.7	3.0	100.0
2024	51.6	12.2	11.0	-	2.0	6.9	7.1	2.2	0.0	4.0	3.0	100.0
2025	51.7	11.4	10.7	-	1.9	6.7	6.7	2.1	0.0	3.8	5.0	100.0
2026	49.6	10.8	12.1	-	2.0	6.5	8.4	2.0	0.0	3.6	5.0	100.0
2027	49.0	10.1	11.7	-	2.2	6.4	7.9	2.0	0.0	3.7	7.0	100.0
2028	49.1	9.5	11.3	-	2.2	6.2	9.2	1.9	0.0	3.5	7.0	100.0

CAPACITY FACTOR (%)

Base Scenario (Policy Oriented)

YEAR	FUEL TYPE									
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD
2009	87.68	74.68	-	22.42	6.37	53.73	-	-	-	26.61
2010	84.31	40.15	-	-	0.04	1.51	-	-	-	26.61
2011	85.04	36.57	-	-	0.04	0.37	-	-	-	26.61
2012	81.48	44.80	-	-	0.04	2.09	-	-	-	26.74
2013	82.28	57.67	-	0.59	0.13	14.47	-	-	-	26.74
2014	83.12	67.97	-	1.19	0.20	30.98	-	2.47	-	26.74
2015	83.81	76.79	1.07	1.19	0.29	45.75	-	9.55	15.98	26.88
2016	84.37	82.60	12.56	6.54	0.85	64.67	-	18.04	19.75	26.88
2017	73.88	84.36	11.77	-	1.11	75.27	-	17.43	15.75	26.88
2018	74.52	84.56	15.33	-	9.11	73.79	85.84	21.46	2.17	26.88
2019	70.63	85.35	17.31	-	12.40	78.60	85.84	22.91	1.14	26.88
2020	69.08	85.62	20.32	-	15.90	80.87	85.84	25.42	0.91	26.72
2021	67.19	85.64	20.62	-	16.57	81.18	85.90	25.42	0.88	26.72
2022	65.70	85.75	22.72	-	19.38	82.35	85.90	26.98	0.57	26.13
2023	65.77	85.82	25.70	-	21.75	82.73	85.90	30.44	0.15	26.13
2024	66.30	85.86	27.75	-	24.32	83.16	85.88	31.89	0.11	25.73
2025	65.32	86.04	29.45	-	25.60	83.55	85.88	33.75	0.08	25.73
2026	64.14	86.04	29.87	-	26.37	83.75	85.87	33.79	0.08	25.73
2027	63.82	86.09	31.75	-	28.04	84.30	85.87	35.35	0.08	25.62
2028	62.35	86.09	31.64	-	28.23	84.30	85.89	35.12	0.08	25.62

CAPACITY FACTOR (%)

Scenario 1 (Coal Power Acceleration)

YEAR	FUEL TYPE									
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD
2009	87.68	74.68	-	22.42	6.37	53.73	-	-	-	26.61
2010	84.31	40.15	-	-	0.04	1.51	-	-	-	26.61
2011	85.04	36.57	-	-	0.04	0.37	-	-	-	26.61
2012	81.48	44.80	-	-	0.04	2.09	-	-	-	26.74
2013	82.28	57.67	-	-	0.13	14.47	-	-	-	26.74
2014	83.18	67.97	-	1.19	0.25	32.78	-	3.57	-	26.74
2015	83.89	77.19	2.13	1.78	0.38	48.93	-	11.30	18.49	26.88
2016	81.09	82.58	12.02	5.35	0.63	69.13	-	17.35	18.15	26.88
2017	74.70	84.40	13.85	-	2.27	80.97	-	19.52	20.55	26.88
2018	72.84	84.56	15.45	-	9.45	79.22	85.84	21.65	2.23	26.88
2019	69.70	85.35	17.77	-	12.93	83.93	85.84	23.44	1.14	26.88
2020	70.56	85.68	23.02	-	19.11	86.42	85.84	27.89	0.91	26.72
2021	66.98	85.66	21.77	-	17.81	86.83	85.90	26.48	0.88	26.72
2022	64.77	85.75	22.98	-	19.70	87.57	85.90	27.25	0.53	26.72
2023	65.52	85.84	26.79	-	23.55	88.04	85.90	31.01	0.08	26.72
2024	63.88	85.84	26.79	-	23.87	88.17	85.88	30.71	0.38	26.72
2025	62.97	86.00	28.58	-	26.05	88.85	85.88	31.96	0.04	26.72
2026	61.12	86.00	28.07	-	25.80	89.05	85.87	31.28	0.04	26.72
2027	61.13	86.04	30.26	-	28.43	89.45	85.87	32.88	0.04	26.72
2028	60.17	86.04	30.44	-	28.81	89.52	85.89	32.88	0.04	26.72

CAPACITY FACTOR (%)

Scenario 2 (Power Source Diversification)

YEAR	FUEL TYPE										
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	RENEW
2009	87.68	74.68	-	22.42	6.37	53.73	-	-	-	26.61	-
2010	84.31	40.15	-	-	0.04	1.51	-	-	-	26.61	-
2011	85.04	36.57	-	-	0.04	0.37	-	-	-	26.61	-
2012	81.48	44.80	-	-	0.04	2.09	-	-	-	26.74	-
2013	82.27	57.71	-	-	0.13	14.47	-	-	-	26.74	-
2014	83.10	68.16	-	1.19	0.20	30.98	-	2.28	-	26.74	-
2015	83.67	77.67	15.53	1.19	0.29	45.75	-	5.37	20.55	26.88	-
2016	84.13	82.79	22.37	6.54	0.85	64.67	-	14.12	19.75	26.88	-
2017	72.49	84.77	30.90	-	1.11	75.27	-	12.18	15.75	26.88	-
2018	73.03	85.01	31.70	-	9.11	73.79	85.84	14.88	2.11	26.88	-
2019	70.38	86.13	42.35	-	13.74	78.79	85.84	18.76	1.14	26.88	-
2020	71.17	86.54	45.94	-	17.98	81.18	85.84	22.56	0.91	26.72	-
2021	68.06	86.52	46.17	-	17.14	81.01	85.90	21.54	0.91	26.72	20.01
2022	67.56	86.79	49.70	-	20.71	82.35	85.90	24.12	0.65	26.13	20.01
2023	65.12	86.90	53.06	-	22.37	82.65	85.90	25.38	0.34	26.13	19.99
2024	65.21	86.97	53.27	-	23.84	82.74	85.88	26.64	0.27	25.73	19.99
2025	63.65	87.12	56.33	-	25.83	83.19	85.88	28.16	0.11	25.73	20.00
2026	65.03	87.19	56.58	-	26.81	83.36	85.87	29.00	0.08	25.73	20.00
2027	62.10	87.28	58.80	-	28.64	83.93	85.87	30.52	0.08	25.62	20.00
2028	60.15	87.30	59.35	-	28.58	83.93	85.89	30.25	0.08	25.62	20.00

CAPACITY FACTOR (%)

Scenario 3 (CO2 Emission Reduction)

YEAR	FUEL TYPE										
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	RENEW
2009	87.68	74.68	-	22.42	6.37	53.73	-	-	-	26.61	-
2010	84.31	40.15	-	-	0.04	1.51	-	-	-	26.61	-
2011	85.04	36.57	-	-	0.04	0.37	-	-	-	26.61	-
2012	81.48	44.80	-	-	0.04	2.09	-	-	-	26.74	-
2013	82.27	57.71	-	-	0.13	14.47	-	-	-	26.74	-
2014	83.10	68.16	-	1.19	0.20	30.98	-	2.28	-	26.74	-
2015	83.67	77.67	15.53	1.19	0.29	45.75	-	5.37	20.55	26.88	-
2016	84.13	82.79	22.37	6.54	0.85	64.67	-	14.12	19.75	26.88	-
2017	72.49	84.77	30.90	-	1.11	75.27	-	12.18	15.75	26.88	-
2018	73.03	85.01	31.70	-	9.11	73.79	85.84	14.88	2.11	26.88	-
2019	70.38	86.13	42.35	-	13.74	78.79	85.84	18.76	1.14	26.88	-
2020	71.17	86.54	45.94	-	17.98	81.18	85.84	22.56	0.91	26.72	-
2021	68.06	86.52	46.17	-	17.14	81.01	85.90	21.54	0.91	26.72	20.01
2022	67.56	86.79	49.70	-	20.71	82.35	85.90	24.12	0.65	26.13	20.01
2023	66.16	86.90	53.08	-	22.63	82.69	85.90	25.68	0.38	26.13	20.00
2024	66.21	86.97	53.18	-	24.03	82.78	85.88	26.86	0.34	25.73	20.00
2025	63.82	87.03	54.89	-	24.60	82.82	85.88	27.21	0.15	25.73	20.00
2026	63.18	87.10	55.09	-	25.55	82.90	85.87	27.97	0.11	25.73	20.00
2027	62.50	87.21	56.95	-	27.21	83.31	85.87	29.41	0.08	25.53	20.00
2028	61.33	87.26	58.59	-	28.20	83.60	85.89	30.02	0.08	25.53	20.00

FUEL CONSUMPTIO

Base Scenario (Policy Oriented)

TYPE OF PLANT	COAL			GAS	LNG	MFO	HSD
	Million Tones	Million Tones	Million Tones	Million MMBTU	Million MMBTU	Million KL	Million KL
YEAR	Coal	J-SI	Sub total				
2009	44.1	-	44.1	221.1	-	0.5	0.7
2010	59.4	-	59.4	111.8	-	-	-
2011	62.4	-	62.4	128.0	-	-	-
2012	63.4	-	63.4	185.9	-	-	-
2013	64.0	-	64.0	244.1	-	-	-
2014	64.6	0.3	64.9	290.9	-	-	-
2015	65.1	1.3	66.4	331.1	0.5	-	-
2016	65.5	2.4	67.9	359.6	11.9	-	0.1
2017	70.1	2.4	72.5	351.1	16.8	-	0.1
2018	70.6	2.9	73.5	337.8	29.2	-	0.8
2019	75.7	3.1	78.8	341.3	33.0	-	0.9
2020	79.7	3.5	83.2	342.7	38.7	-	1.1
2021	83.0	3.5	86.5	342.8	39.3	-	1.2
2022	89.1	3.7	92.8	343.3	43.3	-	1.1
2023	94.4	4.2	98.6	343.8	73.4	-	1.3
2024	97.7	4.4	102.1	344.1	79.3	-	1.4
2025	104.2	4.6	108.8	344.9	112.3	-	1.5
2026	110.0	4.6	114.6	345.0	113.8	-	1.6
2027	117.0	4.9	121.9	345.3	151.2	-	1.7
2028	124.4	4.8	129.2	345.3	150.7	-	1.7
TOTAL	1,604.4	50.6	1,655.0	5,999.9	893.4	0.5	15.2

CO_2 Emission

Base Scenario (Policy Oriented)

YEAR	Coal+JSI	Gas	LNG	MFC	HSD	Total CO2 Emission
	CO2 Emission 887 t-CO2/GWh	CO2 Emission 443 t-CO2/GWh	CO2 Emission 443 t-CO2/GWh	CO2 Emission 704 t-CO2/GWh	CO2 Emission 704 t-CO2/GWh	
	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2
	887	443	443	704	704	
2009	77,471	10,760	0	993	2,013	91,237
2010	101,739	5,786	0	0	14	107,539
2011	107,451	6,654	0	0	14	114,119
2012	109,278	9,454	0	0	14	118,746
2013	110,361	12,169	0	7	42	122,579
2014	111,948	14,344	0	14	63	126,369
2015	114,627	16,205	31	14	92	130,969
2016	117,359	17,432	731	77	268	135,867
2017	126,105	17,144	1,028	0	268	144,545
2018	128,109	16,644	1,785	0	1,901	148,439
2019	138,478	16,799	2,016	0	1,823	159,116
2020	146,878	16,852	2,366	0	2,337	168,433
2021	153,478	16,856	2,401	0	2,436	175,171
2022	165,869	16,878	2,645	0	2,126	187,518
2023	177,063	16,892	4,488	0	2,387	200,830
2024	183,919	16,900	4,846	0	2,668	208,333
2025	196,976	16,936	6,858	0	2,809	223,579
2026	208,525	16,936	6,955	0	2,893	235,309
2027	222,761	16,945	9,241	0	3,076	252,023
2028	237,166	16,945	9,210	0	3,098	266,419
TOTAL	2,935,561	295,531	54,601	1,105	30,342	3,317,140

SOx and NOx Emission

Base Scenario (Policy Oriented)

YEAR	Coal+JSI		Gas		LNG		MFO+HSD		Total	
	SOx Emission 2.0	NOx Emission 4.4	SOx Emission 0.0 t/GWh	NOx Emission 4.4 t/GWh	SOx Emission 0.0 t/GWh	NOx Emission 4.4 t/GWh	SOx Emission 2.0 t/GWh	NOx Emission 4.4 t/GWh	SOx Emission	NOx Emission
	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton
	2.0	4.4	0.0	4.4	0.0	4.4	2.0	4.4		
2009	175	384	0	107	0	0	9	19	184	510
2010	229	505	0	57	0	0	0	0	229	562
2011	242	533	0	66	0	0	0	0	242	599
2012	246	542	0	94	0	0	0	0	246	636
2013	249	547	0	121	0	0	0	0	249	668
2014	252	555	0	142	0	0	0	0	252	697
2015	258	569	0	161	0	0	0	1	258	731
2016	265	582	0	173	0	7	1	2	266	764
2017	284	626	0	170	0	10	1	2	285	808
2018	289	635	0	165	0	18	5	12	294	830
2019	312	687	0	167	0	20	5	11	317	885
2020	331	729	0	167	0	23	7	15	338	934
2021	346	761	0	167	0	24	7	15	353	967
2022	374	823	0	168	0	26	6	13	380	1,030
2023	399	878	0	168	0	45	7	15	406	1,106
2024	415	912	0	168	0	48	8	17	423	1,145
2025	444	977	0	168	0	68	8	18	452	1,231
2026	470	1,034	0	168	0	69	8	18	478	1,289
2027	502	1,105	0	168	0	92	9	19	511	1,384
2028	535	1,176	0	168	0	91	9	19	544	1,454
TOTAL	6,617	14,560	0	2,933	0	541	90	196	6,707	18,230

FUEL CONSUMPTIO

Scenario 1 (Coal Power Acceleration)

TYPE OF PLANT	COAL			GAS	LNG	MFO	HSD
	Million Tones	Million Tones	Million Tones	Million MMBTU	Million MMBTU	Million KL	Million KL
YEAR	Coal	J-SI	Sub total				
2009	44.1	-	44.1	221.1	-	0.5	0.7
2010	59.4	-	59.4	111.8	-	-	-
2011	62.4	-	62.4	128.0	-	-	-
2012	63.4	-	63.4	185.9	-	-	-
2013	64.0	-	64.0	244.1	-	-	-
2014	64.7	0.4	65.1	290.9	-	-	-
2015	65.2	1.6	66.8	333.3	1.0	-	-
2016	66.5	2.4	68.9	359.6	11.4	-	0.1
2017	70.7	2.7	73.4	351.4	19.8	-	0.2
2018	72.1	3.0	75.1	337.9	29.5	-	0.1
2019	77.6	3.2	80.8	341.3	33.8	-	0.9
2020	81.2	3.8	85.0	343.0	43.9	-	1.4
2021	85.4	3.6	89.0	342.9	41.5	-	1.3
2022	93.1	3.7	96.8	343.3	43.8	-	1.2
2023	99.3	4.3	103.6	343.7	63.8	-	1.4
2024	104.6	4.2	108.8	343.9	63.8	-	1.4
2025	113.1	4.4	117.5	344.6	68.0	-	1.5
2026	119.7	4.3	124.0	344.6	66.8	-	1.5
2027	129.4	4.5	133.9	344.9	72.1	-	1.7
2028	137.0	4.5	141.5	344.9	72.5	-	1.7
TOTAL	1,672.9	50.6	1,723.5	6,001.1	631.7	0.5	15.1

CO_2 Emission

Scenario 1 (Coal Power Acceleration)

YEAR	Coal+JSI	Gas	LNG	MFC	HSD	Total CO2 Emission
	CO2 Emission 887 t-CO2/GWh	CO2 Emission 443 t-CO2/GWh	CO2 Emission 443 t-CO2/GWh	CO2 Emission 704 t-CO2/GWh	CO2 Emission 704 t-CO2/GWh	
	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2
	887	443	443	704	704	
2009	77,471	10,760	0	993	2,013	91,237
2010	101,739	5,786	0	0	14	107,539
2011	107,451	6,654	0	0	14	114,119
2012	109,278	9,454	0	0	14	118,746
2013	110,361	12,169	0	0	42	122,572
2014	112,223	14,344	0	14	77	126,658
2015	115,150	16,289	62	21	120	131,642
2016	119,106	17,428	700	63	197	137,494
2017	127,950	17,153	1,209	0	549	146,861
2018	131,045	16,644	1,799	0	1,971	151,459
2019	142,266	16,799	2,069	0	1,901	163,035
2020	150,488	16,865	2,680	0	2,809	172,842
2021	158,471	16,861	2,534	0	2,619	180,485
2022	173,754	16,878	2,676	0	2,161	195,469
2023	186,740	16,896	3,898	0	2,584	210,118
2024	197,056	16,896	3,898	0	2,619	220,469
2025	214,228	16,927	4,160	0	2,858	238,173
2026	226,992	16,927	4,084	0	2,830	250,833
2027	246,382	16,936	4,403	0	3,119	270,840
2028	261,355	16,936	4,430	0	3,161	285,882
TOTAL	3,069,506	295,602	38,602	1,091	31,672	3,436,473

SOx and NOx Emission

Scenario 1 (Coal Power Acceleration)

YEAR	Coal+JSI		Gas		LNG		MFO+HSD		Total	
	SOx Emission 2.0	NOx Emission 4.4	SOx Emission 0.0 t/GWh	NOx Emission 4.4 t/GWh	SOx Emission 0.0 t/GWh	NOx Emission 4.4 t/GWh	SOx Emission 2.0 t/GWh	NOx Emission 4.4 t/GWh	SOx Emission	NOx Emission
	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton
	2.0	4.4	0.0	4.4	0.0	4.4	2.0	4.4		
2009	175	384	0	107	0	0	9	19	184	510
2010	229	505	0	57	0	0	0	0	229	562
2011	242	533	0	66	0	0	0	0	242	599
2012	246	542	0	94	0	0	0	0	246	636
2013	249	547	0	121	0	0	0	0	249	668
2014	253	557	0	142	0	0	0	1	253	700
2015	260	571	0	162	0	1	0	1	260	735
2016	269	591	0	173	0	7	1	2	270	773
2017	289	635	0	170	0	12	2	3	291	820
2018	295	650	0	165	0	18	6	12	301	845
2019	321	706	0	167	0	21	5	12	326	906
2020	339	747	0	168	0	27	8	18	347	960
2021	357	786	0	167	0	25	7	16	364	994
2022	392	862	0	168	0	27	6	14	398	1,071
2023	421	926	0	168	0	39	7	16	428	1,149
2024	444	978	0	168	0	39	7	16	451	1,201
2025	483	1,063	0	168	0	41	8	18	491	1,290
2026	512	1,126	0	168	0	41	8	18	520	1,353
2027	556	1,222	0	168	0	44	9	19	565	1,453
2028	589	1,296	0	168	0	44	9	20	598	1,528
TOTAL	6,921	15,227	0	2,935	0	386	92	205	7,013	18,753

FUEL CONSUMPTIO

Scenario 2 (Power Source Diversification)

TYPE OF PLANT	COAL			GAS	LNG	MFO	HSD
	Million Tones	Million Tones	Million Tones	Million MMBTU	Million MMBTU	Million KL	Million KL
YEAR	Coal	J-SI	Sub total				
2009	44.1	-	44.1	221.1	-	0.5	0.7
2010	59.4	-	59.4	111.8	-	-	-
2011	62.4	-	62.4	128.0	-	-	-
2012	63.4	-	63.4	185.9	-	-	-
2013	64.0	-	64.0	244.4	-	-	-
2014	64.6	0.2	64.8	292.1	-	-	-
2015	65.0	0.7	65.7	336.1	7.4	-	-
2016	65.4	1.9	67.3	361.0	21.3	-	0.1
2017	68.9	1.7	70.6	353.9	44.2	-	0.1
2018	69.3	2.0	71.3	340.9	60.4	-	0.8
2019	72.7	2.6	75.3	346.3	80.7	-	1.1
2020	73.4	3.1	76.5	348.5	131.3	-	1.6
2021	75.9	3.0	78.9	348.4	131.9	-	1.5
2022	78.1	3.3	81.4	349.9	189.4	-	1.7
2023	83.3	3.5	86.8	350.6	202.2	-	1.9
2024	83.4	3.7	87.1	351.1	253.8	-	2.2
2025	89.1	3.9	93.0	351.9	268.3	-	2.4
2026	90.9	4.0	94.9	352.3	323.4	-	2.7
2027	97.0	4.2	101.2	352.9	336.1	-	3.1
2028	103.7	4.2	107.9	352.9	339.2	-	3.1
TOTAL	1,474.0	42.0	1,516.0	6,080.0	2,389.6	0.5	23.0

CO_2 Emission

Scenario 2 (Power Source Diversification)

YEAR	Coal+JSI	Gas	LNG	MFC	HSD	Total CO2 Emission
	CO2 Emission 887 t-CO2/GWh	CO2 Emission 443 t-CO2/GWh	CO2 Emission 443 t-CO2/GWh	CO2 Emission 704 t-CO2/GWh	CO2 Emission 704 t-CO2/GWh	
	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2
	887	443	443	704	704	
2009	77,471	10,760	0	993	2,013	91,237
2010	101,739	5,786	0	0	14	107,539
2011	107,451	6,654	0	0	14	114,119
2012	109,278	9,454	0	0	14	118,746
2013	110,334	12,178	0	0	42	122,554
2014	111,877	14,384	0	14	63	126,338
2015	113,474	16,391	452	14	92	130,423
2016	116,126	17,472	1,302	77	268	135,245
2017	122,592	17,228	2,698	0	268	142,786
2018	124,109	16,732	3,690	0	1,901	146,432
2019	131,578	16,954	4,931	0	2,401	155,864
2020	133,902	17,033	8,023	0	3,309	162,267
2021	138,611	17,029	8,063	0	3,154	166,857
2022	143,472	17,082	11,571	0	3,421	175,546
2023	153,974	17,104	12,355	0	3,696	187,129
2024	154,462	17,118	15,505	0	4,379	191,464
2025	166,117	17,149	16,395	0	4,745	204,406
2026	169,763	17,162	19,762	0	5,421	212,108
2027	182,083	17,180	20,537	0	6,322	226,122
2028	195,220	17,184	20,728	0	6,308	239,440
TOTAL	2,663,633	298,034	146,012	1,098	47,845	3,156,622

SOx and NOx Emission

Scenario 2 (Power Source Diversification)

YEAR	Coal+JSI		Gas		LNG		MFO+HSD		Total	
	SOx Emission 2.0	NOx Emission 4.4	SOx Emission 0.0 t/GWh	NOx Emission 4.4 t/GWh	SOx Emission 0.0 t/GWh	NOx Emission 4.4 t/GWh	SOx Emission 2.0 t/GWh	NOx Emission 4.4 t/GWh	SOx Emission	NOx Emission
	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton
	2.0	4.4	0.0	4.4	0.0	4.4	2.0	4.4		
2009	175	384	0	107	0	0	9	19	184	510
2010	229	505	0	57	0	0	0	0	229	562
2011	242	533	0	66	0	0	0	0	242	599
2012	246	542	0	94	0	0	0	0	246	636
2013	249	547	0	121	0	0	0	0	249	668
2014	252	555	0	143	0	0	0	0	252	698
2015	256	563	0	163	0	4	0	1	256	731
2016	262	576	0	174	0	13	1	2	263	765
2017	276	608	0	171	0	27	1	2	277	808
2018	280	616	0	166	0	37	5	12	285	831
2019	297	653	0	168	0	49	7	15	304	885
2020	302	664	0	169	0	80	9	21	311	934
2021	313	688	0	169	0	80	9	20	322	957
2022	324	712	0	170	0	115	10	21	334	1,018
2023	347	764	0	170	0	123	11	23	358	1,080
2024	348	766	0	170	0	154	12	27	360	1,117
2025	375	824	0	170	0	163	13	30	388	1,187
2026	383	842	0	170	0	196	15	34	398	1,242
2027	411	903	0	171	0	204	18	40	429	1,318
2028	440	968	0	171	0	206	18	39	458	1,384
TOTAL	6,007	13,213	0	2,960	0	1,451	138	306	6,145	17,930

FUEL CONSUMPTIO

Scenario 3 (CO2 Emission Reduction)

TYPE OF PLANT	COAL			GAS	LNG	MFO	HSD
	Million Tones	Million Tones	Million Tones	Million MMBTU	Million MMBTU	Million KL	Million KL
YEAR	Coal	J-SI	Sub total				
2009	44.1	-	44.1	221.1	-	0.5	0.7
2010	59.4	-	59.4	111.8	-	-	-
2011	62.4	-	62.4	128.0	-	-	-
2012	63.4	-	63.4	185.9	-	-	-
2013	64.0	-	64.0	244.4	-	-	-
2014	64.6	0.2	64.8	292.1	-	-	-
2015	65.0	0.7	65.7	336.1	7.4	-	-
2016	65.4	1.9	67.3	361.0	21.3	-	0.1
2017	68.9	1.7	70.6	353.9	44.2	-	0.1
2018	69.3	2.0	71.3	340.9	60.4	-	0.8
2019	72.7	2.6	75.3	346.3	80.7	-	1.1
2020	73.4	3.1	76.5	348.5	131.3	-	1.6
2021	75.9	3.0	78.9	348.4	131.9	-	1.5
2022	78.1	3.3	81.4	350.0	189.4	-	1.7
2023	81.9	3.5	85.4	350.6	202.2	-	1.9
2024	81.9	3.7	85.6	351.0	253.3	-	2.2
2025	86.8	3.7	90.5	351.4	261.4	-	2.3
2026	88.5	3.8	92.3	351.8	314.9	-	2.6
2027	92.6	4.0	96.6	352.4	325.5	-	3.0
2028	98.3	4.1	102.4	352.8	334.9	-	3.1
TOTAL	1,456.6	41.3	1,497.9	6,078.4	2,358.8	0.5	22.7

CO_2 Emission

Scenario 3 (CO2 Emission Reduction)

YEAR	Coal+JSI	Gas	LNG	MFC	HSD	Total CO2 Emission
	CO2 Emission 887 t-CO2/GWh	CO2 Emission 443 t-CO2/GWh	CO2 Emission 443 t-CO2/GWh	CO2 Emission 704 t-CO2/GWh	CO2 Emission 704 t-CO2/GWh	
	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2	1,000 ton-CO2
	887	443	443	704	704	
2009	77,471	10,760	0	993	2,013	91,237
2010	101,739	5,786	0	0	14	107,539
2011	107,451	6,654	0	0	14	114,119
2012	109,278	9,454	0	0	14	118,746
2013	110,334	12,178	0	0	42	122,554
2014	111,877	14,384	0	14	63	126,338
2015	113,474	16,391	452	14	92	130,423
2016	116,126	17,472	1,302	77	268	135,245
2017	122,592	17,228	2,698	0	268	142,786
2018	124,109	16,732	3,690	0	1,901	146,432
2019	131,578	16,954	4,931	0	2,401	155,864
2020	133,902	17,033	8,023	0	3,309	162,267
2021	138,611	17,029	8,063	0	3,154	166,857
2022	143,472	17,082	11,571	0	3,421	175,546
2023	151,260	17,104	12,360	0	3,738	184,462
2024	151,650	17,118	15,478	0	4,414	188,660
2025	161,372	17,131	15,975	0	4,520	198,998
2026	164,893	17,144	19,239	0	5,167	206,443
2027	173,231	17,166	19,891	0	6,005	216,293
2028	184,567	17,175	20,462	0	6,223	228,427
TOTAL	2,628,987	297,975	144,135	1,098	47,041	3,119,236

SOx and NOx Emission

Scenario 3 (CO2 Emission Reduction)

YEAR	Coal+JSI		Gas		LNG		MFO+HSD		Total	
	SOx Emission 2.0	NOx Emission 4.4	SOx Emission 0.0 t/GWh	NOx Emission 4.4 t/GWh	SOx Emission 0.0 t/GWh	NOx Emission 4.4 t/GWh	SOx Emission 2.0 t/GWh	NOx Emission 4.4 t/GWh	SOx Emission	NOx Emission
	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton	1,000 ton
	2.0	4.4	0.0	4.4	0.0	4.4	2.0	4.4		
2009	175	384	0	107	0	0	9	19	184	510
2010	229	505	0	57	0	0	0	0	229	562
2011	242	533	0	66	0	0	0	0	242	599
2012	246	542	0	94	0	0	0	0	246	636
2013	249	547	0	121	0	0	0	0	249	668
2014	252	555	0	143	0	0	0	0	252	698
2015	256	563	0	163	0	4	0	1	256	731
2016	262	576	0	174	0	13	1	2	263	765
2017	276	608	0	171	0	27	1	2	277	808
2018	280	616	0	166	0	37	5	12	285	831
2019	297	653	0	168	0	49	7	15	304	885
2020	302	664	0	169	0	80	9	21	311	934
2021	313	688	0	169	0	80	9	20	322	957
2022	324	712	0	170	0	115	10	21	334	1,018
2023	341	750	0	170	0	123	11	23	352	1,066
2024	342	752	0	170	0	154	13	28	355	1,104
2025	364	800	0	170	0	159	13	28	377	1,157
2026	372	818	0	170	0	191	15	32	387	1,211
2027	391	859	0	171	0	198	17	38	408	1,266
2028	416	916	0	171	0	203	18	39	434	1,329
TOTAL	5,929	13,041	0	2,960	0	1,433	138	301	6,067	17,735

SUMMARY OF
FIXED SYSTEM
(NOMINAL CAPACITY (MW))

Base Scenario (Policy Oriented)

YEAR	FUEL TYPE										TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	
2009	11,371	3,713	-	718	5,128	886	-	-	-	2,574	24,390
2010	15,531	3,713	-	274	5,078	1,136	-	-	-	2,574	28,306
2011	16,261	4,688	-	192	5,078	1,526	-	-	-	2,574	30,319
2012	17,261	5,438	-	192	5,078	1,696	-	-	-	2,621	32,286
2013	17,261	5,438	-	192	5,078	1,696	-	-	-	2,621	32,286
2014	17,261	5,438	-	192	5,078	1,916	-	2,400	-	2,621	34,906
2015	17,261	5,438	750	192	5,078	2,026	-	3,000	500	2,731	36,976
2016	17,261	5,438	1,500	192	5,078	2,136	-	3,000	1,000	2,731	38,336
2017	21,261	5,237	2,250	-	3,918	2,246	-	3,000	1,000	2,731	41,643
2018	21,261	5,072	3,000	-	3,382	2,356	1,000	3,000	2,000	2,731	43,802
2019	24,261	5,072	3,000	-	2,384	2,466	1,000	3,000	3,000	2,731	46,914
2020	26,261	5,072	3,000	-	2,384	2,576	1,000	3,000	3,000	3,901	50,194
2021	28,261	5,072	3,000	-	2,384	2,686	2,000	3,000	3,000	3,901	53,304
2022	31,261	5,072	3,000	-	1,779	2,796	2,000	3,000	3,000	4,801	56,709
2023	33,261	5,072	4,500	-	1,779	2,906	2,000	3,000	3,000	4,801	60,319
2024	34,261	5,072	4,500	-	1,779	3,016	3,000	3,000	3,000	5,701	63,329
2025	37,261	5,072	6,000	-	1,779	3,126	3,000	3,000	3,000	5,701	67,939
2026	40,261	5,072	6,000	-	1,779	3,236	4,000	3,000	3,000	5,701	72,049
2027	43,261	5,072	7,500	-	1,779	3,346	4,000	3,000	3,000	6,001	76,959
2028	47,261	5,072	7,500	-	1,779	3,456	5,000	3,000	3,000	6,001	82,069

SUMMARY OF
FIXED SYSTEM
(NOMINAL CAPACITY (MW))

Scenario 1 (Coal Power Acceleration)

YEAR	FUEL TYPE										TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	
2009	11,371	3,713	-	718	5,128	886	-	-	-	2,574	24,390
2010	15,531	3,713	-	274	5,078	1,136	-	-	-	2,574	28,306
2011	16,261	4,688	-	192	5,078	1,526	-	-	-	2,574	30,319
2012	17,261	5,438	-	192	5,078	1,696	-	-	-	2,621	32,286
2013	17,261	5,438	-	192	5,078	1,696	-	-	-	2,621	32,286
2014	17,261	5,438	-	192	5,078	1,696	-	2,400	-	2,621	34,686
2015	17,261	5,438	750	192	5,078	1,696	-	3,000	500	2,731	36,646
2016	18,261	5,438	1,500	192	5,078	1,696	-	3,000	1,000	2,731	38,896
2017	21,261	5,237	2,250	-	3,918	1,696	-	3,000	1,000	2,731	41,093
2018	22,261	5,072	3,000	-	3,382	1,696	1,000	3,000	2,000	2,731	44,142
2019	25,261	5,072	3,000	-	2,384	1,696	1,000	3,000	3,000	2,731	47,144
2020	26,261	5,072	3,000	-	2,384	1,696	1,000	3,000	3,000	3,901	49,314
2021	29,261	5,072	3,000	-	2,384	1,696	2,000	3,000	3,000	3,901	53,314
2022	33,261	5,072	3,000	-	1,779	1,696	2,000	3,000	3,000	3,901	56,709
2023	35,261	5,072	3,750	-	1,779	1,696	2,000	3,000	3,000	3,901	59,459
2024	38,261	5,072	3,750	-	1,779	1,696	3,000	3,000	3,000	3,901	63,459
2025	42,261	5,072	3,750	-	1,779	1,696	3,000	3,000	3,000	3,901	67,459
2026	46,261	5,072	3,750	-	1,779	1,696	4,000	3,000	3,000	3,901	72,459
2027	50,261	5,072	3,750	-	1,779	1,696	4,000	3,000	3,000	3,901	76,459
2028	54,261	5,072	3,750	-	1,779	1,696	5,000	3,000	3,000	3,901	81,459

SUMMARY OF
FIXED SYSTEM
(NOMINAL CAPACITY (MW))

Scenario 2 (Power Source Diversification)

YEAR	FUEL TYPE											TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	RENEW	
2009	11,371	3,713	-	718	5,128	886	-	-	-	2,574	-	24,390
2010	15,531	3,713	-	274	5,078	1,136	-	-	-	2,574	-	28,306
2011	16,261	4,688	-	192	5,078	1,526	-	-	-	2,574	-	30,319
2012	17,261	5,438	-	192	5,078	1,696	-	-	-	2,621	-	32,286
2013	17,261	5,438	-	192	5,078	1,696	-	-	-	2,621	-	32,286
2014	17,261	5,438	-	192	5,078	1,916	-	2,400	-	2,621	-	34,906
2015	17,261	5,438	750	192	5,078	2,026	-	3,000	500	2,731	-	36,976
2016	17,261	5,438	1,500	192	5,078	2,136	-	3,000	1,000	2,731	-	38,336
2017	21,261	5,237	2,250	-	3,918	2,246	-	3,000	1,000	2,731	-	41,643
2018	21,261	5,072	3,000	-	3,382	2,356	1,000	3,000	2,000	2,731	-	43,802
2019	23,261	5,072	3,000	-	2,834	2,466	1,000	3,000	3,000	2,731	-	46,364
2020	23,261	5,072	4,500	-	2,984	2,576	1,000	3,000	3,000	3,901	-	49,294
2021	25,261	5,072	4,500	-	2,984	2,686	2,000	3,000	3,000	3,901	535	52,939
2022	26,261	5,072	6,000	-	2,679	2,796	2,000	3,000	3,000	4,801	567	56,176
2023	29,261	5,072	6,000	-	2,679	2,906	2,000	3,000	3,000	4,801	1,207	59,926
2024	29,261	5,072	7,500	-	2,979	3,016	3,000	3,000	3,000	5,701	1,281	63,810
2025	32,261	5,072	7,500	-	2,979	3,126	3,000	3,000	3,000	5,701	2,038	67,677
2026	32,261	5,072	9,000	-	3,279	3,236	4,000	3,000	3,000	5,701	2,164	70,713
2027	36,261	5,072	9,000	-	3,579	3,346	4,000	3,000	3,000	6,001	3,063	76,322
2028	40,261	5,072	9,000	-	3,579	3,456	5,000	3,000	3,000	6,001	3,250	81,619

Note: Capacity Factor of Renewable is assumed 20 %.

SUMMARY OF
FIXED SYSTEM
(NOMINAL CAPACITY (MW))

Scenario 3 (CO2 Emission Reduction)

YEAR	FUEL TYPE											TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	RENEW	
2009	11,371	3,713	-	718	5,128	886	-	-	-	2,574	-	24,390
2010	15,531	3,713	-	274	5,078	1,136	-	-	-	2,574	-	28,306
2011	16,261	4,688	-	192	5,078	1,526	-	-	-	2,574	-	30,319
2012	17,261	5,438	-	192	5,078	1,696	-	-	-	2,621	-	32,286
2013	17,261	5,438	-	192	5,078	1,696	-	-	-	2,621	-	32,286
2014	17,261	5,438	-	192	5,078	1,916	-	2,400	-	2,621	-	34,906
2015	17,261	5,438	750	192	5,078	2,026	-	3,000	500	2,731	-	36,976
2016	17,261	5,438	1,500	192	5,078	2,136	-	3,000	1,000	2,731	-	38,336
2017	21,261	5,237	2,250	-	3,918	2,246	-	3,000	1,000	2,731	-	41,643
2018	21,261	5,072	3,000	-	3,382	2,356	1,000	3,000	2,000	2,731	-	43,802
2019	23,261	5,072	3,000	-	2,834	2,466	1,000	3,000	3,000	2,731	-	46,364
2020	23,261	5,072	4,500	-	2,984	2,576	1,000	3,000	3,000	3,901	-	49,294
2021	25,261	5,072	4,500	-	2,984	2,686	2,000	3,000	3,000	3,901	535	52,939
2022	26,261	5,072	6,000	-	2,679	2,796	2,000	3,000	3,000	4,801	567	56,176
2023	28,261	5,072	6,000	-	2,679	2,906	2,000	3,000	3,000	4,801	1,808	59,527
2024	28,261	5,072	7,500	-	2,979	3,016	3,000	3,000	3,000	5,701	1,920	63,449
2025	31,261	5,072	7,500	-	2,979	3,126	3,000	3,000	3,000	5,701	3,398	68,037
2026	32,261	5,072	9,000	-	3,279	3,236	4,000	3,000	3,000	5,701	3,606	72,155
2027	34,261	5,072	9,000	-	3,579	3,346	4,000	3,000	3,000	6,301	5,358	76,917
2028	37,261	5,072	9,000	-	3,579	3,456	5,000	3,000	3,000	6,301	5,686	81,355

Note: Capacity Factor of Renewable is assumed 20 %.

SUMMARY OF
FIXED SYSTEM
(%)

Base Scenario (Policy Oriented)

YEAR	FUEL TYPE										TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	
2009	46.6	15.2	-	2.9	21.0	3.6	-	-	-	10.6	100.0
2010	54.9	13.1	-	1.0	17.9	4.0	-	-	-	9.1	100.0
2011	53.6	15.5	-	0.6	16.7	5.0	-	-	-	8.5	100.0
2012	53.5	16.8	-	0.6	15.7	5.3	-	-	-	8.1	100.0
2013	53.5	16.8	-	0.6	15.7	5.3	-	-	-	8.1	100.0
2014	49.4	15.6	-	0.6	14.5	5.5	-	6.9	-	7.5	100.0
2015	46.7	14.7	2.0	0.5	13.7	5.5	-	8.1	1.4	7.4	100.0
2016	45.0	14.2	3.9	0.5	13.2	5.6	-	7.8	2.6	7.1	100.0
2017	51.1	12.6	5.4	-	9.4	5.4	-	7.2	2.4	6.6	100.0
2018	48.5	11.6	6.8	-	7.7	5.4	2.3	6.8	4.6	6.2	100.0
2019	51.7	10.8	6.4	-	5.1	5.3	2.1	6.4	6.4	5.8	100.0
2020	52.3	10.1	6.0	-	4.7	5.1	2.0	6.0	6.0	7.8	100.0
2021	53.0	9.5	5.6	-	4.5	5.0	3.8	5.6	5.6	7.3	100.0
2022	55.1	8.9	5.3	-	3.1	4.9	3.5	5.3	5.3	8.5	100.0
2023	55.1	8.4	7.5	-	2.9	4.8	3.3	5.0	5.0	8.0	100.0
2024	54.1	8.0	7.1	-	2.8	4.8	4.7	4.7	4.7	9.0	100.0
2025	54.8	7.5	8.8	-	2.6	4.6	4.4	4.4	4.4	8.4	100.0
2026	55.9	7.0	8.3	-	2.5	4.5	5.6	4.2	4.2	7.9	100.0
2027	56.2	6.6	9.7	-	2.3	4.3	5.2	3.9	3.9	7.8	100.0
2028	57.6	6.2	9.1	-	2.2	4.2	6.1	3.7	3.7	7.3	100.0

SUMMARY OF
FIXED SYSTEM
(%)

Scenario 1 (Coal Power Acceleration)

YEAR	FUEL TYPE										TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	
2009	46.6	15.2	-	2.9	21.0	3.6	-	-	-	10.6	100.0
2010	54.9	13.1	-	1.0	17.9	4.0	-	-	-	9.1	100.0
2011	53.6	15.5	-	0.6	16.7	5.0	-	-	-	8.5	100.0
2012	53.5	16.8	-	0.6	15.7	5.3	-	-	-	8.1	100.0
2013	53.5	16.8	-	0.6	15.7	5.3	-	-	-	8.1	100.0
2014	49.8	15.7	-	0.6	14.6	4.9	-	6.9	-	7.6	100.0
2015	47.1	14.8	2.0	0.5	13.9	4.6	-	8.2	1.4	7.5	100.0
2016	46.9	14.0	3.9	0.5	13.1	4.4	-	7.7	2.6	7.0	100.0
2017	51.7	12.7	5.5	-	9.5	4.1	-	7.3	2.4	6.6	100.0
2018	50.4	11.5	6.8	-	7.7	3.8	2.3	6.8	4.5	6.2	100.0
2019	53.6	10.8	6.4	-	5.1	3.6	2.1	6.4	6.4	5.8	100.0
2020	53.3	10.3	6.1	-	4.8	3.4	2.0	6.1	6.1	7.9	100.0
2021	54.9	9.5	5.6	-	4.5	3.2	3.8	5.6	5.6	7.3	100.0
2022	58.7	8.9	5.3	-	3.1	3.0	3.5	5.3	5.3	6.9	100.0
2023	59.3	8.5	6.3	-	3.0	2.9	3.4	5.0	5.0	6.6	100.0
2024	60.3	8.0	5.9	-	2.8	2.7	4.7	4.7	4.7	6.1	100.0
2025	62.6	7.5	5.6	-	2.6	2.5	4.4	4.4	4.4	5.8	100.0
2026	63.8	7.0	5.2	-	2.5	2.3	5.5	4.1	4.1	5.4	100.0
2027	65.7	6.6	4.9	-	2.3	2.2	5.2	3.9	3.9	5.1	100.0
2028	66.6	6.2	4.6	-	2.2	2.1	6.1	3.7	3.7	4.8	100.0

SUMMARY OF
FIXED SYSTEM
(%)

Scenario 2 (Power Source Diversification)

YEAR	FUEL TYPE											TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	RENEW	
2009	46.6	15.2	-	2.9	21.0	3.6	-	-	-	10.6	-	100.0
2010	54.9	13.1	-	1.0	17.9	4.0	-	-	-	9.1	-	100.0
2011	53.6	15.5	-	0.6	16.7	5.0	-	-	-	8.5	-	100.0
2012	53.5	16.8	-	0.6	15.7	5.3	-	-	-	8.1	-	100.0
2013	53.5	16.8	-	0.6	15.7	5.3	-	-	-	8.1	-	100.0
2014	49.4	15.6	-	0.6	14.5	5.5	-	6.9	-	7.5	-	100.0
2015	46.7	14.7	2.0	0.5	13.7	5.5	-	8.1	1.4	7.4	-	100.0
2016	45.0	14.2	3.9	0.5	13.2	5.6	-	7.8	2.6	7.1	-	100.0
2017	51.1	12.6	5.4	-	9.4	5.4	-	7.2	2.4	6.6	-	100.0
2018	48.5	11.6	6.8	-	7.7	5.4	2.3	6.8	4.6	6.2	-	100.0
2019	50.2	10.9	6.5	-	6.1	5.3	2.2	6.5	6.5	5.9	-	100.0
2020	47.2	10.3	9.1	-	6.1	5.2	2.0	6.1	6.1	7.9	-	100.0
2021	47.7	9.6	8.5	-	5.6	5.1	3.8	5.7	5.7	7.4	1.0	100.0
2022	46.7	9.0	10.7	-	4.8	5.0	3.6	5.3	5.3	8.5	1.0	100.0
2023	48.8	8.5	10.0	-	4.5	4.8	3.3	5.0	5.0	8.0	2.0	100.0
2024	45.9	7.9	11.8	-	4.7	4.7	4.7	4.7	4.7	8.9	2.0	100.0
2025	47.7	7.5	11.1	-	4.4	4.6	4.4	4.4	4.4	8.4	3.0	100.0
2026	45.6	7.2	12.7	-	4.6	4.6	5.7	4.2	4.2	8.1	3.1	100.0
2027	47.5	6.6	11.8	-	4.7	4.4	5.2	3.9	3.9	7.9	4.0	100.0
2028	49.3	6.2	11.0	-	4.4	4.2	6.1	3.7	3.7	7.4	4.0	100.0

SUMMARY OF
FIXED SYSTEM
(%)

Scenario 3 (CO2 Emission Reduction)

YEAR	FUEL TYPE											TOTAL
	COAL	GAS	LNG	MFO	HSD	GEO	NUC	J-SI	PUMP	HYD	RENEW	
2009	46.6	15.2	-	2.9	21.0	3.6	-	-	-	10.6	-	100.0
2010	54.9	13.1	-	1.0	17.9	4.0	-	-	-	9.1	-	100.0
2011	53.6	15.5	-	0.6	16.7	5.0	-	-	-	8.5	-	100.0
2012	53.5	16.8	-	0.6	15.7	5.3	-	-	-	8.1	-	100.0
2013	53.5	16.8	-	0.6	15.7	5.3	-	-	-	8.1	-	100.0
2014	49.4	15.6	-	0.6	14.5	5.5	-	6.9	-	7.5	-	100.0
2015	46.7	14.7	2.0	0.5	13.7	5.5	-	8.1	1.4	7.4	-	100.0
2016	45.0	14.2	3.9	0.5	13.2	5.6	-	7.8	2.6	7.1	-	100.0
2017	51.1	12.6	5.4	-	9.4	5.4	-	7.2	2.4	6.6	-	100.0
2018	48.5	11.6	6.8	-	7.7	5.4	2.3	6.8	4.6	6.2	-	100.0
2019	50.2	10.9	6.5	-	6.1	5.3	2.2	6.5	6.5	5.9	-	100.0
2020	47.2	10.3	9.1	-	6.1	5.2	2.0	6.1	6.1	7.9	-	100.0
2021	47.7	9.6	8.5	-	5.6	5.1	3.8	5.7	5.7	7.4	1.0	100.0
2022	46.7	9.0	10.7	-	4.8	5.0	3.6	5.3	5.3	8.5	1.0	100.0
2023	47.5	8.5	10.1	-	4.5	4.9	3.4	5.0	5.0	8.1	3.0	100.0
2024	44.5	8.0	11.8	-	4.7	4.8	4.7	4.7	4.7	9.0	3.0	100.0
2025	45.9	7.5	11.0	-	4.4	4.6	4.4	4.4	4.4	8.4	5.0	100.0
2026	44.7	7.0	12.5	-	4.5	4.5	5.5	4.2	4.2	7.9	5.0	100.0
2027	44.5	6.6	11.7	-	4.7	4.4	5.2	3.9	3.9	8.2	7.0	100.0
2028	45.8	6.2	11.1	-	4.4	4.2	6.1	3.7	3.7	7.7	7.0	100.0

Breakdown of Renewable Energ

	Energy Share (%)	in 2028 (MW) Sc 2	Sc 3
PV	65.0%	6,036	10,560
Wind	34.4%	3,194	5,589
Biomass	0.6%	56	97

添付資料－7　General Information of System Planning

Appendix 7 : General Information of System Planning

A. General Information

<u>Process for Optimal Bank Combination</u>

1. Precondition

*Cost of Distribution Tr : Tn (MVA) 10,20,30,50,100
P(Tn) ={0.3+0.7(Tn/10)**3/4}*10**2+1.5Tn(10**3$)

*Loss of Tr
LI (Tn)=3.6812(Tn)**0.6879364 Charge Loss
LC(Tn)=14.3645(Tn)**0.6986798 Current Loss

*Construction Cost for Substation (Excluding Tr)
- Land Price = 750000d+51000($)
  Required Space 30000 m^2 Z($/$m^2$)=25d+1.7 d=Demand density(MW/km^2)
- House Building = 587000($)
- Equipment Cost
  150kV Line Bay :487000($) 150KV Bus coupler:420000($)
  150kV Tr bay : 326000($)
  -20KV Switchgear-
  Tr 2^{nd} :21533($) PD,Ar:37400($) Bus sect:19267($)
  H.Tr:17000($) Feeder: 20400($)

<u>Cost Assumption for Substation</u>

1. Cost Assumption for 2 Bank[S(2)] & 3 Bank [S(3)] Substation

*S(2):150kV 2cct, 2Bank
S(2)=750d+51+587
+487*2+420+326*2+21.5*2+37.4*2
+19.3+17.2*2+20.4+F =750d+20.4F+2855 (10**3$)

*S(3):150kV 2cct, 3Bank
S(3)=750d+51+587
+487*2+420+326*3+21.5*3+37.4*3
+19.3*2+17.2*2+20.4+F =750d+20.4F+3259 (10**3$)

*S(n):150 kV 2cct, nBank
S(n)=750d+20.4F+404n+2047 (10**3$)

<u>The total length of 20kV Feeder(1)</u>

1. Dispatching Demand :D (MVA)

   D=T*X*k

   Total bank Capacity : T = Σ Tn (1 → n) (MVA)

   Demand Density : d=D/A(MVA/km**2)

   Supply Area : A=D/d (km**2) k:time difference coefficient

   → Supply Length : L = √A =.√D/d

2. The Number of Feeders required for each Bank

   Dn = Tn*X*k

   Normal Current for one Feeder is 300A → √3*20kV*300A*10**-3=√3*6 (MVA)

   Fn = Int (Dn/(√3*6))+1 F = Σ Fn (1 → n)

<u>The total length of 20kV Feeder (2)</u>

Total Length of Overhead and Cable

F	Overhead	Under Cable
2	0	0
3	2/3*L	0
4	¼L*4=4/4*L	0
5	6/5*L	0
6	2/6L*4=8/6*L	0
7	10/7*L	2/7*L
-----	---------	--------
n(Inte)	(2*n-4)/n*L	Calculation

Loss Evaluation of 20kV Feeder

1. Average Current of 20kV Dispatching Feeder : I

$$I = \frac{300}{\sqrt{3}*6}*\frac{D}{F}(A)$$

Imax=300(A)

Horizontal Direction Line → Current is Constant

Vertical Direction Line → Current Sending End Current is Zero

So, Equivalent loss length = 1/3*L

2. Loss of 20kV Dispatching Feeders: Ploss

$$Ploss= [(Lx+\frac{1}{3}Ly)*I^{2}*Ro+Lz*I^{2}*Ru]*3$$

Where: Ro: Resistance of Overhead line per km
Ru: Resistance of Cable line per km

3. Evaluation of annual Loss

(1) Modification for Load Factor(f)

Annual Loss coefficient(Lf)=0.7f**2+0.3f

(2) Middle system Loss

0.0744($/kWh)

<u>Other assumption used for evaluation</u>

1. Install Cost of 20kV dispatching Feeder
   - Overhead : 13.715(10**3 $/km)
   - Cable : 71.078(10**3 $/km)

2. Resistance of 20 kV lines
   - Resistance of Overhead line : Ro = 0.284 (Ω/km)
   - Resistance of Cable line : Ru = 0.206 (Ω/km)

3. O&M Cost for Equipment
   - Substation Kh = 0.133
   - 20 kV Line (Overhead) Ko = 0.132
   - 20 kV Line (Cable) Ku = 0.136

Based on the assumption mentioned above, Figure-1 shows the optimal bank combination calculated experimentally. From this experiment result, Bank combination of 100MVA, 3 banks should be recommended in heavy demand density area and on the other hand smaller bank combination should be recommended in light demand density area.

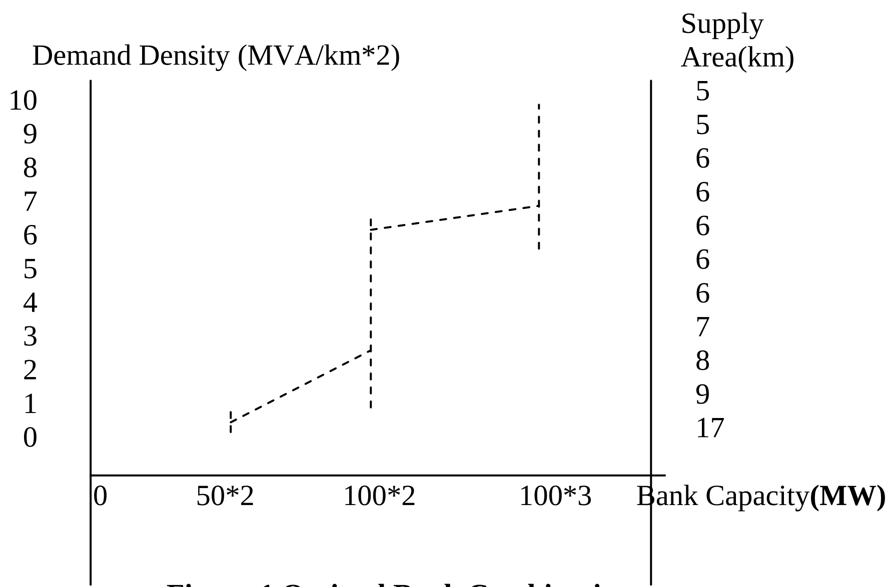


Figure-1 Optimal Bank Combination

B. Mitigation Measure on Three Phase Short Circuit Fault Current Capacity

① System Division
This method avoids the increase in short-circuit current by dividing the bus bar of the substation or increasing the impedance of the system with the reduction of the number of loop lines of the transmission line. Though this measure has 2 systems, normal division and in-accident division, it is necessary to adopt these after ensuring the stability required, since either way leads to the degradation of the stability.

② System Division by Introduction of High Order Voltage
In case short-circuit current in a system of a certain voltage class increases and comes to a dead lock, voltage of one class higher is introduced as a main system, suppressing the short-circuit current by the division of the lower order system. Though this method is the most practical when harmonized with the future system expansion as it also contributes to the improvement of stability, the reorganization of the systems requires a huge investment so careful examination is necessary.

③ Division of AC system by DC Interconnection
Moreover, this method might be adopted as a means of the short-circuit current control in the future AC/DC transfer equipment is costly.

④ Adoption of High Impedance Equipment
Raising the impedance of transformers, generators and so on effective in controlling the system short-circuit current and advantageous in reducing the size and the production cost of the equipment. In the meantime, when raised above a certain level, it may require a special design involving higher cost, and disadvantages can result such as increase in reactive power loss and voltage fluctuation as well as deterioration of the stability of the system.

⑤ Adoption of Current-Limiting Reactor
This a method of raising the impedance of the system, and there are two types; setting a serial reactor in a transmission line and setting a shunt reactor after dividing the bus bar. Since the current always flows in the reactor in the former method, it is disadvantageous concerning loss, voltage adjustment, and stability, and there have been few cases, where this system has been adopted and therefore the latter system has usually been adopted.

******* Reference : Countermeasures for System Stability *******************

To ensure stability, all generators connected with the electric power system must always operate at synchronous speed, providing stable electricity to the customers. In the situation where these generators cannot operate at synchronous speed (called step-out), the generators are unable to provide sufficient electricity for the load thus resulting in insufficient power. The ability to run the generators at this synchronous speed is called stability. Accordingly, good stability means a high capability of running the machines at synchronous speed.

Stability is evaluated by phase-angle in the electric power system, and it can be calculated as below. When the angle is over 90 degrees, step-out results.

$$\text{Phase-angle} = \Sigma K(\text{active power of each point} \times \text{reactance})$$

K: Proportion constant

In the actual system, transient stability problems arise, such as conditions in which the above mentioned shafts temporarily become extremely thin because of power line accidents, solving and fixing these problems, or considering whether stability can be maintained despite external disturbances.

For enhancing system Stability, the following Improvement Measures should be considered as required.

SVR (STATCOM) :
Adoption of High Capacity Transmission Line with Multi Bind Phase Conductor

(1) Decrease of the systematic serial reactance in the system.
If the serial reactance is decreased, stable electric power limit can be increased.
The following outlines the various ways this can be done:

a. Increasing the number of conductors of transmission line.
By introducing multi-conductor system and providing 2 to 4 power lines per one main line, meaning equivalent to increasing the power line radius, stability improves since the reactance decreases by 20-40%.

(2) Serial Capacitor
By using serial capacitors, stability can be improved since the reactance of the line is compensated for. However, for the improvement of transient stability, it is necessary to re-insert serial capacitors immediately after removing the fault. Moreover, it is necessary to give consideration to some protective device after the compensation since serial capacitors can cause some abnormal phenomena such as ferroresonance, low frequency continuous oscillation and so on.

(3) Reactance Decrease of Serial Equipment such as Generators and Transformers
The reactance of generators and transformers should be preferably small for stability reasons. However, setting the reactance much lower than the standard value is difficult due to the price of the machine and the short-circuit capacity of the transformer.

(4) Installation of Intermediate Switching Stations
The sections of lines which would be opened during cases of fault in transmission lines can be made short.

(5) Adoption of High-Speed AVR
In an immediate response to the voltage fluctuation at generator terminals in accidents, it is possible to improve the stability by rapidly increasing the excitation current, raising the induced voltage inside the generator and reinforcing the synchronizing power. By this, the dynamic stability during the leading power factor operation, an especially important problem relating to stability, is remarkably improved. However, while the adoption of high-speed and high-gain AVR can increase the synchronizing power, it has some characteristics that result in weakening the braking force, and there is even a possibility of generating a secondary disturbance by AVR depending on the operating conditions and the system configuration. As a countermeasure for this problem, a system is being developed in which the braking force is made to increase by inputting into AVR the stabilizing signals detected from the change of rotational speed and output of the generator, and it is called PSS (Power System Stabilizer).

(6) Intermediate Reactive Power Supplier
Stability can be improved by installing reactive power suppliers at the middle points of transmission lines therefore maintaining the voltage of those points.

(7) Immediate Removal of Trouble

a. High-Speed Relay and Circuit Breaker

The transient stability is improved by removing the trouble speedily since it can reduce the acceleration energy of the generator. Figure 2-13 shows the effect of the length of duration of fault on the stability of the 2-line transmission line classified by the types of fault in operation.

The fault can be removed very speedily, within 70～80mS, from the important transmission lines.

b. High-Speed Automatic Reclosing System

After circuit-breaking the faulty section of the line and then reclosing following adequate dead time, it is possible to continue the power transmission under normal conditions again, provided the fault point arc has been extinguished. There are 2-line or loop-system 1-line 3-phase reclosing system as well as 2-line multi-phase and 1-line single-phase reclosing systems. The dead time is an important issue in this case, and from the standpoint of stability, the shorter the better, but in general, in 275kV systems or less, about 500mS is secured to ensure the insulation recovery of the fault point by means of ion dispersal. In the higher voltage systems, longer dead time is required. Especially the single-phase reclosing system is effective for the 1-line transmission line since it cuts off only the faulty phase in case of single-line ground fault and carries on exchanges of electric power using the sound 2-phases, keeping the synchronization. The multi-phase reclosing system is effective for the 2-line transmission line particularly in frequent cases of 2-line simultaneous failure. However, sufficient examination is required when adopting the reclosing protection for large-capacity turbine generators since excessive torque can be generated in the turbine shaft by failure in reclosing.

(8) Equilibration of Generator Input/Output in Disturbance

a. Braking Resistance

Immediately after a case of fault, resistance can be inserted in the generator circuit in parallel or in series so that energy is consumed and the imbalance of input and output of the generator is suppressed, preventing the acceleration of the generator and thus improving the transient stability.

b. High-Speed Valve Control

Whereas the above braking resistance suppresses the imbalance on the output side of the generator, as a countermeasure on the input side, transient stability can be improved by means of a steam bypass which reduces the amount of steam entering the turbine at high speed, thus preventing acceleration of the generator.

(9) DC Interconnection

By the division of long-distance AC systems and operation of crossing series-parallel systems using the DC interconnection facility, stability can be remarkably improved.

(10) System Separation

In case a step-out has already occurred partially or such a case is expected to occur due to fault in a system, by appropriately separating the affected system, the stability of the remaining system can be ensured. Still, it is necessary to make decisions considering power flows and characteristics of the protective relay, etc. in the selection of the line separation point.

(11) Power Restriction and Load Restriction

By speedily limiting a part of power and load, the acceleration of other generators and the abrupt reduction of voltage can be prevented, thus securing stability.

***************Reference : Upgrading Planning for. Distributing Substation ***************

1. Basic matters

(1) Standards of upgrading period

Distribution substations are upgraded when the overall utilization factor of the target group exceeds 95%. The utilization factor of each substation in the target group must be kept below 100%. But, if there are special circumstances regarding importance of loads, distribution switching capability and overload unit of equipment, and in case of measures for Voltage, consideration mast be given to individual cases.

(2) Upgrading process

In principle, priority must be given to construction of new substations when the average (supply area of the target group is larger than the appropriate supply area and to line improvement When the average Supply area of the target group is smaller than the appropriate supply area. But, if there is one-bank substation _in the target group, the decision must be made based on cost accounting of that substation, or in such cases where individual conditions have particular factors such as distribution switching capability and in such regions where appropriate areas can hardly be defined (regions with load density of higher than $24MW/km^2$ or lower than $1.5MW/km^2$), the decision must be made based on cost accounting of individual cases.

[Average supply area < Appropriate supply area < Average supply area

Line improvement	construction of new substation

(3) Procedures for consideration of upgrading process -

Consideration of upgrading process must follow the procedures shown in the Figure-2.
Specific procedures must be considered according to rV.2-(5).

Note 1 : Overall group utilization factor of distributing substations

continuous overload limit of transformer	113%
Error of assumed demand	-8%
Diversity factor between banks	-5%
utilization factor limit of substation	100%
Lump ratio of distribution	-5%
overall group utilization factor	95%

添付資料－8　Outline of PSS/E Software

Appendix 8 : Outline of PSS/E software

PSS/E (Power system Simulation for Engineering) is the program, of which authorized distributor is SIEMENS/PTI, and widely used by power network expert in many countries, such as Malaysia and China. The newest version of PSS/E is Ver.30 released in September 2004 and introducing an entirely new GUI. PSS/E provides the following functions which covers all analyses to be done under the TOR;

- Load flow analysis
- Short circuit current analysis
- Nominal state stability analysis
- Transient stability analysis
- Voltage stability analysis

Concerning hardware, we are tentatively considering the following configuration to run the above software.