Suruhanjaya Tenaga

Industri Pembekalan Elektrik di Malaysia
Electricity Supply Industry in Malaysia

Maklumat Prestasi & Statistik 2008
Performance & Statistical Information 2008

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PENDAHULUAN

Pada tahun 2008, margin simpanan sistem atau *reserve margin* di Semenanjung Malaysia berada dalam lingkungan 41% berbanding 45% pada tahun 2007. Walaupun *reserve margin* telah berkurangan, namun begitu bekalan elektrik masih berada dalam tahap yang selesa dengan kapasiti penjanaan yang sedia ada mencukupi untuk memenuhi permintaan tenaga yang meningkat pada setengah tahun pertama 2008 dan mula menguncup pada setengah tahun kedua 2008. Kehendak maksimum sistem grid di Semenanjung Malaysia telah mencatatkan pertambahan sebanyak 2.8% daripada 13,620 MW tahun 2007 kepada tahap tertinggi iaitu 14,007 MW yang direkodkan pada 21 Mei 2008. Walau bagaimanapun, jumlah kapasiti penjanaan terpasang di Semenanjung Malaysia sehingga 31 Disember 2008 kekal pada paras 19,723 MW memandangkan tiada pertambahan kapasiti penjanaan baru. Daripada jumlah keseluruhan kapasiti penjanaan tahun 2008, peratusan tenaga elektrik yang dijana oleh IPP di Semenanjung Malaysia ialah 67.8% atau 13,377 MW oleh 15 IPP [termasuk Stesen Janakuasa Janamanjung dan Kapar Energy Ventures Sdn. Bhd. (KEV)] dan selebihnya 32.2% telah dibekal oleh TNB yang menjana sebanyak 6,346 MW.

Namun begitu, kapasiti penjanaan terpasang di Semenanjung Malaysia pada tahun 2009 dijangka akan bertambah berbanding tahun 2008 apabila projek penjanaan menggunakan bahanapi arang batu oleh stesen IPP iaitu Jimah Energy Ventures Sdn. Bhd., di Mukim Jimah, Port Dickson, Negeri Sembilan dengan kapasiti 1,400 MW sedia beroperasi. Projek penjanaan ini telah siap sepenuhnya pada Disember 2008 di mana unit pertama berkapasiti 700 MW dijadualkan akan dimulatugas pada 1 Januari 2009, diikuti unit kedua 700 MW pada 1 Julai 2009.

Selain daripada projek IPP Jimah, Projek Pemulihan Stesen Janaelektrik Tuanku Jaafar bagi Fasa Kedua (kitar padu) oleh TNB atau dikenali PD2 dengan kapasiti 750 MW telah siap sepenuhnya pada Disember 2008 dan akan dimulatugas secara komersial pada awal tahun 2009. Dengan bermulatugasnya PD2, ianya akan berupaya memberikan kapasiti tambahan sebanyak 750 MW kepada kapasiti 750 MW yang sedia ada di loji PD1. Selain itu, satu lagi projek pemulihan ialah di Rancangan Hidroelektrik Cameron Highlands dan Batang Padang iaitu Projek Pemanjangan Jangka Hayat dan Automasi Loji yang dijangka siap dalam tahun 2009.

Di Sabah, jumlah kapasiti penjanaan terpasang sehingga 31 Disember 2008 berada pada paras 812 MW, bertambah 14.7% daripada 708 MW tahun 2007. Penambahan kapasiti penjanaan sebanyak 104 MW adalah berikutan telah bermulatugas dua tarbin stim berkapasiti 35 MW setiap satu (2 X 35 MW) di Stesen Ranhill Powertron Sdn. Bhd. pada bulan April 2008 dan Oktober 2008 menjadikan 2 blok kitar

FOREWORD

In 2008, the reserve margin in Peninsular Malaysia stood around 41% compared with 45% in 2007. Even though the reserve margin decreased, the total generation was more than sufficient to meet the increasing demand in the first half of 2008. However, in the second half of 2008 the electricity demand contracted as a result of slow economic activities due to global financial crisis. The maximum demand of the grid system in Peninsular Malaysia increased by 2.8% from 13,620 MW in 2007 to 14,007 MW which was recorded on 21st May 2008. The total installed generation capacity in Peninsular Malaysia in 2008 stood at 19,723 MW with no new additional capacity. The percentage of electricity generated by 15 IPP's (including of Janamanjung Power Station and Kapar Energy Ventures Sdn. Bhd.) in Peninsular Malaysia was 67.8% or 13,377 MW of the total installed capacity, and the remaining 32.2% or 6,346 MW was supplied by TNB.

However, the installed generation capacity in Peninsular Malaysia in the year 2009 is expected to increase, when 2 X 700 MW coal-fired power generation project by Jimah Energy Ventures Sdn. Bhd., at Mukim Jimah, Port Dickson, Negeri Sembilan come on stream. The generation project was completed in December 2008 and the first unit of 700 MW is scheduled to be commissioned by 1st January 2009, followed the second unit by 1st July 2009.

Apart from the IPP's project by Jimah, the Tuanku Ja'afar Power Station's Rehabilitation Phase 2 (PD2) Project by TNB with a combined cycle capacity of 750 MW was completed in December 2008 and is expected to begin operation in early 2009. Once the PD2 project is fully commissioned, there will be an additional installed capacity of 750 MW to the existing 750 MW PD1 plant. Other major rehabilitation projects took place in Cameron Highlands and Batang Padang Hydroelectric Schemes through its Plant Life Extension and Automation Project, and are expected to complete in 2009.

In Sabah, the maximum demand of the grid system increased by 7.7% to 673 MW compared 625 MW in 2007. The total installed generation capacity at end of 31st December 2008 was 812 MW, that is a 14.7% increased over 708 MW in 2007. The additional generation capacity of 104 MW were contributed by :

- *the commissioning of 2 steam turbines (2 X 35 MW) in Ranhill Powertron Sdn Bhd power plant in April 2008 and October 2008, thus forming 2 combined cycle blocks of total capacity of 190 MW;*
- *the commissioning of the 34 MW steam turbine in Sepangar Bay Power Corporation Sdn. Bhd. power plant in August 2008, thus forming 1 combined cycle block of total capacity of 100 MW.*

padu dengan jumlah kapasiti 190 MW serta bermulatugas tarbin stim berkapasiti 34 MW untuk unit kitar padu Fasa 2 di Sepangar Bay Power Corporation Sdn. Bhd. (SBPC) pada bulan Ogos 2008 menjadikan 1 blok kitar padu dengan jumlah kapasiti 100 MW. Kehendak maksimum bagi sistem grid di Sabah turut mencatatkan pertambahan sebanyak 7.7% kepada 673 MW berbanding 625 MW tahun 2007.

Dayaharap sistem bekalan elektrik di Sabah turut menjadi fokus utama apabila satu insiden gangguan bekalan elektrik yang meluas telah berlaku pada 21 April 2008 di antara 35 minit hingga tiga jam 14 minit yang menyebabkan hampir 90% bekalan elektrik ke seluruh Sabah terganggu melibatkan kesemua bandar-bandar utama di Pantai Barat dan Pantai Timur Sabah. Hanya kawasan-kawasan di sebahagian W.P. Labuan, Beaufort, Keningau, Tambunan, Tenom, Telupid dan Ranau yang tidak terjejas. Insiden tersebut telah menyebabkan lebih 300,000 pengguna di Sabah terjejas dengan kehilangan beban sebanyak 459.3 MW. Gangguan bekalan tersebut telah dipulihkan secara berperingkat oleh SESB. Siasatan Suruhanjaya mendapati terdapat insiden kecurian kelengkapan logam menara talian penghantaran di Suang Parai dalam kawasan Universiti Malaysia Sabah. Impak daripada insiden tersebut telah memberi kesan yang besar kepada prestasi sistem penghantaran serta telah menimbulkan beberapa persoalan berhubung *reliability* sistem pembekalan elektrik di Sabah.

Selain itu, pada awal Jun 2008, Kerajaan telah mengumumkan pakej penstrukturan semula subsidi bahan api berikutan kenaikan drastik harga minyak di peringkat global. Tujuan penstrukturan semula subsidi tersebut adalah supaya bantuan dapat diagihkan dengan lebih adil dan memberi lebih manfaat kepada mereka yang memerlukannya, terutama golongan berpendapatan rendah dan sederhana. Berikutan dengan kenaikan harga minyak, harga gas yang dibekalkan oleh Petronas di Semenanjung Malaysia juga telah dinaikkan mulai 1 Julai 2008.

Selaras dengan kenaikan kos bahan api, kekangan sumber gas dan arang batu dan isu pelaksanaan projek penghantaran tenaga elektrik Bakun merupakan perkara-perkara utama yang sentiasa menjadi fokus dalam tahun 2008. Berdasarkan unjuran permintaan dan bekalan setelah mengambilkira jangkaan kelembapan dalam pertumbuhan permintaan elektrik ekoran krisis ekonomi dunia, ketidaktentuan dalam pelaksanaan projek di mana banyak perkara yang belum dapat dimuktamadkan dan tarikh realistik pengilang kabel dasar laut, projek penghantaran Bakun berkemungkinan besar hanya dapat disalurkan ke Semenanjung menjelang tahun 2016.

Dengan penstrukturan semula subsidi gas dan kenaikan

In 2008, the reliability of electricity supply system in Sabah was a main concern. Incident of wide area supply interruptions occurred on 21st April 2008, interrupting the electricity supply to almost 90% of the main town in West Coast and East Coast of Sabah, with the exception of W.P. Labuan, Beaufort, Keningau, Tambunan, Tenom, Telupid dan Ranau. The incident had affected over 300,000 consumers, causing a load loss of about 459.3 MW. However, the supply interruptions were restored by SESB in stages within 35 minutes to three hours and 14 minutes. The investigation by the Energy Commission revealed that even though the supply interruption was triggered by incident of theft of metal parts on a transmission tower of a transmission line at Suang Parai in the Universiti Malaysia Sabah, indequate generation capacity had caused the system unable to withstand the disturbance and hence partially collapsed. The incident impacted significantly on the performance of the Sabah transmission system and has raised various questions on the reliability of supply system in Sabah.

In early June 2008, the Government announced the restructuring of fuels subsidies amidst the continuing escalation in oil prices globally. Subsequently, the prices of gas supplied by Petronas in Peninsular Malaysia also increased on 1st July 2008.

With the escalating fuel costs coupled with the constraint of gas supply domestically and coal resources globally, the possibility of transmission of power from Bakun project to Peninsula had rekindled the interest among the stakeholders. Base on the new supply demand balance taking into account the economic slowdown due to global financial crisis, the power from Bakun project to Peninsula is expected to be realized only in 2016.

On 1st July 2008, the Government had approved an average of 20% increase in the electricity tariff of TNB. The increase was to cater for the fuel cost (gas and coal) increase due to the restructuring of gas subsidies by the Government and the global escalation of coal prices. However, in line with the Government's effort to reduce the burden of lower income consumers, there was no increase in rates for those consumers utilising electricity at 200 kWh and below in a month, which accounted for 59% of households in Peninsular Malaysia. With the new tariff rates, the average selling prices increased to 32.5 sen/kWh compared to the previous average selling prices of 26.1 sen/kWh.

In line with the government's effort to enhance the delivery services, standard for electricity supply services was introduced by the Energy Commission in 2008. This new standard include the minimum service levels (MSL) and guaranteed service levels (GSL) to be observed by the

harga arang batu di pasaran, Kerajaan telah meluluskan satu struktur baru tarif elektrik yang berkuatkuasa pada 1 Julai 2008 bagi membolehkan TNB menyerap kos bahan api bagi gas dan arang batu. Struktur baru ini melibatkan peningkatan tarif elektrik hampir 20%. Walau bagaimanapun, selaras dengan hasrat Kerajaan untuk melindungi kebajikan golongan berpendapatan rendah dan sederhana, struktur tarif elektrik yang baru ini tidak menjejaskan pengguna yang menggunakan tenaga elektrik pada kadar 200 Kilowat-Jam (kWj) ke bawah setiap bulan, iaitu 59 peratus isi rumah di Semenanjung Malaysia, akan membayar pada kadar yang sama. Bagi pengguna komersil dan industri pula akan mengalami peningkatan tarif elektrik sebanyak 26%. Tarif purata berdasarkan kenaikan tersebut adalah 32.5 sen/kWj, berbanding dengan tarif purata sebelum kenaikan 26.1 sen/kWj.

Selain itu juga, selaras dengan hasrat Kerajaan supaya pengguna turut diberi pampasan tertentu sekiranya TNB gagal mematuhi tahap-tahap perkhidmatannya, Suruhanjaya berpendapat sudah sewajarnya standard-standard prestasi perkhidmatan pembekalan elektrik TNB diperkemaskan agar lebih berkesan dalam meningkatkan perkhidmatan TNB. Standard prestasi bekalan dan perkhidmatan yang baru digubal dengan mengambilkira *service dimension* yang sentiasa menimbulkan rungutan kepada pengguna. Penggubalan standard-standard tersebut menetapkan *minimum service level* dan *guaranteed service level*, di mana hanya *guaranteed service level* yang menetapkan penalti bagi kegagalan mematuhinya. Namun begitu, sehingga akhir tahun 2008, pelaksanaannya masih tertangguh atas kerana perbezaan pendekatan di antara Suruhanjaya dan TNB.

Penganalisisan maklumat dan data ke atas prestasi pembekalan elektrik juga merangkumi laporan yang dikemukakan oleh Pengendali Sistem Grid, laporan operasi penjana-penjana bebas, aduan-aduan daripada orang awam mengenai perkhidmatan pembekalan elektrik dan kualiti bekalan elektrik serta aduan yang diterima daripada pelbagai sumber antaranya aduan terus dari pengadu, aduan melalui email ke info ST, aduan dari media massa dan sebagainya. Kebanyakan aduan-aduan telah disiasat dan diambil tindakan terus oleh pejabat-pejabat kawasan Suruhanjaya Tenaga.

Selain dari itu, maklumat dan data yang dikumpul telah dianalisis berdasarkan kepada laporan bulanan dan tahunan yang dikemukakan kepada Suruhanjaya Tenaga oleh pemegang-pemegang lesen utiliti-utiliti utama iaitu Tenaga Nasional Berhad (di Semenanjung Malaysia), Sabah Electricity Sdn. Bhd. (di Sabah) dan NUR Distribution Sdn. Bhd. (di Kulim, Kedah). Laporan ini juga turut mengandungi maklumat prestasi dan data di Sarawak

utility, where failure to comply to GSL will warrant the utility to pay penalty in term of rebate to consumers. The proposed standard comprises of service dimensions which take into account the common grouses of the consumers. Several discussions were carried out with TNB to implement the standard. However, as at the end of 2008, the implementation of standard is still pending due differences in approach between TNB and Commission.

This performance and statistical informations of the electricity supply industry are based on the:

- *reports submitted by the Grid System Operator of Peninsular Malaysia,*
- *reports submitted by Independent Power Producers (IPPs),*
- *monthy and yearly reports submitted by major utilities namely Tenaga Nasional Berhad (in Peninsular Malaysia), Sabah Electricity Sdn. Bhd. (in Sabah) and NUR Distribution Sdn. Bhd. (in Kulim, Kedah),*
- *the information provided by Sarawak Energy Berhad (SEB),*
- *public complaints on the electricity supply services and quality of supply issues through various means.*

Prepared by :
Electricity Supply Regulatory Department
Energy Commission

yang diperolehi daripada Sarawak Energy Berhad (SEB).

Pada keseluruhannya, berdasarkan kepada petunjuk-petunjuk prestasi yang diterima dan dianalisis sepanjang tahun 2008 menunjukkan tahap prestasi pembekalan elektrik di Malaysia terutamanya TNB didapati menurun dari aspek *reliability* bekalan dimana indeks SAIDI menunjukkan pertambahan berbanding tahun sebelumnya. Pemantauan berterusan, usaha dan langkah-langkah tertentu perlu diambil oleh TNB dalam usaha untuk mengurangkan bilangan gangguan bekalan elektrik. Jika dilihat daripada punca-punca gangguan, aspek-aspek perancangan program senggaraan dan pelan pengurusan aset wajar diberi penekanan oleh semua utiliti di Malaysia. Sementara itu, insiden-insiden *power quality* terutamanya *voltage dips* di Semenanjung Malaysia juga masih memerlukan pemantauan yang berterusan oleh TNB dan NUR serta kerjasama daripada pengguna industri amat diperlukan dalam menanganinya insiden *voltage dips* dengan berkesan supaya bilangan insiden yang melibatkan gangguan dapat dikurangkan.

Disediakan oleh :
Jabatan Kawalselia Pembekalan Elektrik
Suruhanjaya Tenaga

PROFIL NEGARA
COUNTRY PROFILE

Area	329,733 sq.km
Climate	- Tropical Type - Average temperature between 20° C to 32° C - Average rainfall of about 3540 mm per annum
Population	27.7^{p} million with a multi racial community comprising Malays, Chinese, Indians, Kadazans, Bajaus, Muruts, Kelabits, Dayaks, Ibans and others
Labour force	12.0 million^{p}
Real GDP	RM528.8 billion^{p} (+4.6%^{p})
Per Capita Income	RM 25,796^{p}
Real GNI	RM 496.1 billion^{p} (+2.9%^{p})
Nominal GNI	RM 715.3 billion^{p} (+13.9%^{p})
Current Account Balance	129.4 billion^{p} (+18.1%^{p} of GNI)*
Foreign Reserves	RM 317.4 billion^{p} (7.6 months of retained imports)*
Gross National Savings	37.9^{p} (as % of GNI)*
Total Electricity Generation	113,823 GWh
Total Electricity Consumption	99,548 GWh
Per Capita Electricity Consumption	3,594 kWh
Average Price of Electricity:	
Peninsular Malaysia	32.11 sen per kWh
Sabah	25.23 sen per kWh
Sarawak	29.07 sen per kWh

Notes :

^{p} : Preliminary
* : At end of December 2008

Sources : Bank Negara Malaysia Annual Report, TNB's, SESB's, Sarawak Energy Berhad & Others Utilities

PETA MALAYSIA *MAP OF MALAYSIA*

PENCAPAIAN PRESTASI

- Pembekalan dan Permintaan Pembekalan Elektrik
- Jualan Tenaga Elektrik
- Prestasi Sistem Penjanaan
- Prestasi Sistem Penghantaran
- Prestasi Sistem Pembahagian
- Punca Gangguan Bekalan Elektrik
- Kualiti Bekalan
- Kualiti Perkhidmatan
- Purata Harga Jualan Elektrik

PERFORMANCE HIGHLIGHTS

- *Electricity Supply and Demand*
- *Sales of Electricity*
- *Performance of Generation System*
- *Performance of Transmission System*
- *Performance of Distribution System*
- *Causes of Electricity Supply Interruptions*
- *Voltage Quality*
- *Quality of Service*
- *Average Selling Prices of Electricity*

PEMBEKALAN DAN PERMINTAAN PEMBEKALAN ELEKTRIK

ELECTRICITY SUPPLY AND DEMAND

KAPASITI PENJANAAN DAN KEHENDAK MAKSIMUM

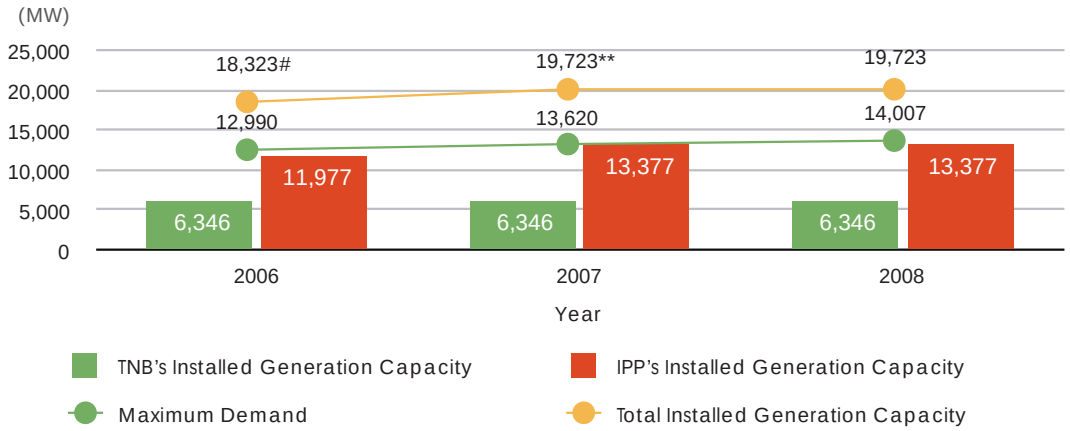
INSTALLED GENERATION CAPACITY AND MAXIMUM DEMAND

Sistem Grid Di Semenanjung Malaysia - TNB

Grid System in Peninsular Malaysia - TNB

Gambarajah 1 : Kapasiti Penjanaan dan Kehendak Maksimum di Semenanjung Malaysia Pada Tahun 2008

Figure 1 : Installed Generation Capacity and Maximum Demands in Peninsular Malaysia in the Year 2008



Nota :

Kapasiti penjanaan IPP {termasuk stesen Janamanjung dan Kapar Energy Ventures Sdn. Bhd. (KEV)}

\# - Mulatugas Unit 1 loji penjanaan arang batu 700 MW di Stesen Janakuasa Tanjung Bin Power Sdn. Bhd. di Johor pada bulan September 2006.

** - Mulatugas Unit 2 dan Unit 3 loji penjanaan arang batu berkapasiti 700 MW seunit di Stesen Janakuasa Tanjung Bin Power Sdn. Bhd. di Johor masing-masing pada bulan Februari dan Ogos 2007.

Sumber : Tenaga Nasional Berhad

Kehendak maksimum sistem grid di Semenanjung Malaysia mencatatkan pertambahan 2.8% daripada 13,620 MW tahun 2007 kepada tahap tertinggi 14,007 MW yang direkodkan pada 21 Mei 2008. Walau bagaimanapun, jumlah kapasiti penjanaan terpasang di Semenanjung Malaysia sehingga 31 Disember 2008 kekal pada paras 19,723 MW berikutan tiada penambahan kapasiti penjanaan baru.

Notes :

Installed capacity of IPPs includes capacity of Janamanjung Power Station and Kapar Energy Ventures Sdn. Bhd. (KEV)

 # - Commissioning of Unit No. 1 (700 MW) of coal generation at Tanjung Bin Power Station, Johor in September 2006.

*** - Commissioning of Unit No. 2 (700 MW) and Unit No. 3 (700MW) coal generation at Tanjung Bin Power Station, Johor in February and August 2007.*

Source : Tenaga Nasional Berhad

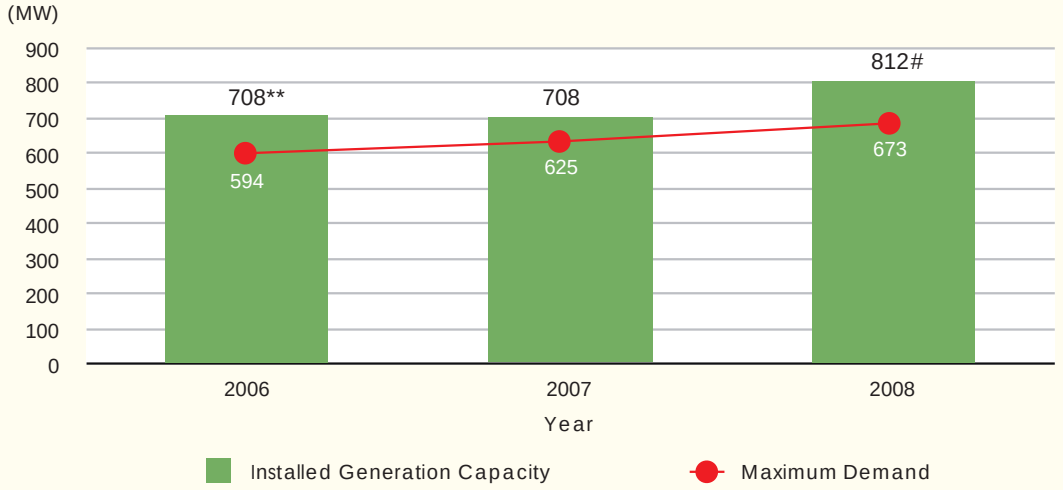
In 2008, the maximum demand of the grid system in Peninsular Malaysia grew by 2.8% from 13,620 MW in 2007 to 14,007 MW recorded on 21st May 2008. However, the total installed generation capacity in 2008 stood at 19,723 MW, with no additional new capacity.

Sistem Grid Di Sabah – SESB

Gambarajah 2 : Kapasiti Penjanaan dan Kehendak Maksimum di Sabah Pada Tahun 2008

Grid System in Sabah – SESB

Figure 2: Installed Generation Capacity and Maximum Demands in Sabah in the Year 2008



Nota :

** - Mulatugas Fasa 1 (kitar terbuka) berkapasiti 66 MW di Sepangar Bay, Sabah oleh Sepangar Bay Power Corporation Sdn. Bhd. pada bulan November 2006.

- 1) Mulatugas tarbin stim 35 MW bagi kitar padu Blok 1 di Ranhill Powertron Sdn. Bhd. pada bulan April 2008

2) Mulatugas tarbin stim 34 MW bagi kitar padu Fasa 2 di Sepangar Bay, Sabah oleh Sepangar Bay Power Corporation Sdn. Bhd. (SBPC) pada bulan Ogos 2008.

3) Mulatugas tarbin stim 35 MW bagi kitar padu Blok 2 di Ranhill Powertron Sdn. Bhd. pada bulan Oktober 2008.

Notes :

*** - Commissioning of First Phase of open cycle (66 MW) at Sepangar Bay, Sabah by Sepangar Bay Power Corporation Sdn. Bhd. in November 2006.*

 # - 1) Commissioning of ST (35 MW) of a Combined Cycle Block at Ranhill Powertron Sdn. Bhd. in April 2008.

2) Commissioning of ST (34 MW) of a Combined Cycle Block at Sepangar Bay, Sabah by Sepangar Bay Power Corporation Sdn. Bhd. (SBPC) in August 2008.

3) Commissioning of Second ST (35 MW) of a Combined Cycle Block at Ranhill Powertron Sdn. Bhd. in October 2008.

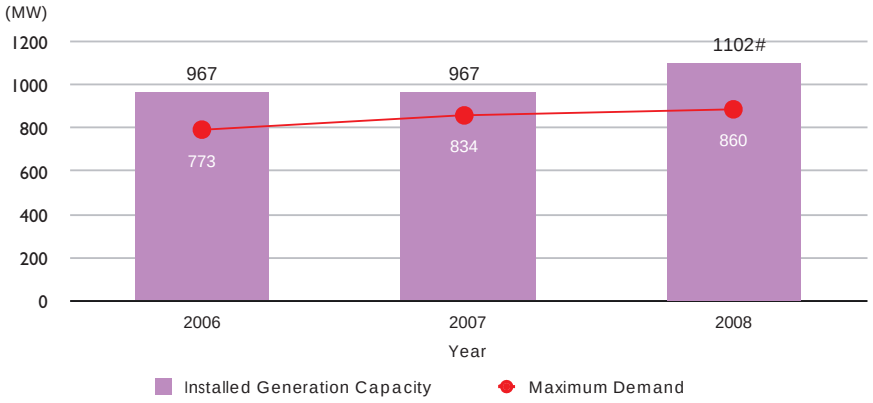
Jumlah keseluruhan kapasiti penjanaan terpasang di Sabah sehingga 31 Disember 2008 berada pada paras 812 MW, iaitu bertambah 14.7% daripada 708 MW tahun 2007. Penambahan kapasiti penjanaan sebanyak 104 MW adalah berikutan telah bermulatugas dua tarbin stim berkapasiti 35 MW setiap satu (2 X 35 MW) di Stesen Ranhill Powertron Sdn. Bhd. pada bulan April 2008 dan Oktober 2008 serta mulatugas tarbin stim berkapasiti 34 MW untuk unit kitar padu Fasa 2 di Sepangar Bay Power Corporation Sdn. Bhd. (SBPC) pada bulan Ogos 2008. Kehendak maksimum sistem grid di Sabah turut mencatatkan pertambahan 7.7% daripada 625 MW tahun 2007 kepada 673 MW.

At the end of December 2008, the total installed generation capacity in Sabah was 812 MW, an increase of 14.7% over 708 MW in 2007. The additional generation capacities of 104 MW, were due to the commissioning of two units of steam turbines (35 MW each) in Ranhill Powertron Sdn. Bhd. power plant in April 2008 and October 2008 respectively, and the commissioning of 34 MW steam turbine of Second Phase of combined cycle block in Sepangar Bay Power Corporation Sdn. Bhd. (SBPC) in August 2008.

The maximum demand of the grid system increased by 7.7% from 625 MW in 2007 to 673 MW in 2008.

Sistem Grid Di Sarawak – SARAWAK ENERGY BERHAD (SEB)

Gambarajah 3: Kapasiti Penjanaan dan Kehendak Maksimum di Sarawak Pada Tahun 2008



Nota :

Penambahan 135MW penjanaan arang batu di Stesen Janakuasa Mukah Power Generation (MPG) pada bulan November 2008.

Dalam tempoh dua tahun kebelakang iaitu dari tahun 2006 hingga 2007, kapasiti penjanaan terpasang di Sarawak tidak banyak berubah berikutan tiadanya penambahan kapasiti penjanaan baru. Namun begitu dalam tahun 2008, jumlah kapasiti penjanaan terpasang di Sarawak bertambah 14% kepada 1,102 MW berbanding 967 MW tahun 2007. Pertambahan kapasiti ini adalah berikutan dengan mulatugasnya stesen penjanaan arang batu di Stesen Janakuasa Mukah Power Generation (MPG) pada November 2008. Kehendak maksimum sistem grid SEB juga turut mencatatkan pertambahan 3.1% daripada 834 MW kepada 860 MW.

Grid System in Sarawak – SARAWAK ENERGY BERHAD (SEB)

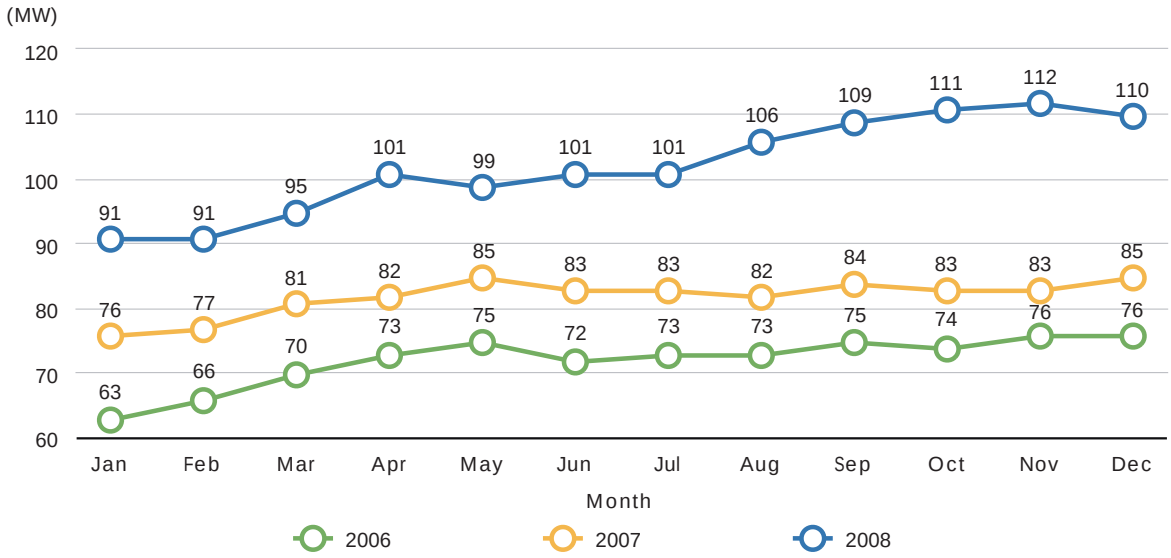
Figure 3 : Installed Generation Capacity and Maximum Demand in Sarawak in the Year 2008

Notes :

 # Additional of 135MW coal-fired thermal plant in Mukah Power Generation (MPG) in November 2008.

In the past two years from 2006 to 2007, there were no significant changes in the installed generation capacity in Sarawak, as there was no new capacity installed. However, in 2008 the total installed generation capacity in Sarawak increased by 14% from 967 MW in 2007 to 1,102 MW. The additional generation capacity was due to the commissioning of coal power plant at Mukah Power Generation (MPG) in November 2008. The maximum demand of SEB grid system also increased by 3.1% to 860 MW from 834 MW.

Gambarajah 4 : Kehendak Maksimum Bulanan di Kulim Hi-Tech Park (KHTP) yang dilaporkan oleh NUR Distribution Sdn. Bhd.



Sepanjang tiga tahun iaitu dari tahun 2006 hingga 2008 didapati kadar pertumbuhan beban di KHTP telah menunjukkan pertambahan dari setahun ke setahun. Ini dapat dilihat pada tahun 2008, kadar pertumbuhan beban juga mencatatkan pertambahan 31.8% daripada 85 MW kepada 112 MW.

Figure 4 : Monthly Maximum Demands in Kulim Hi-Tech Park (KHTP) Reported by NUR Distribution Sdn. Bhd.

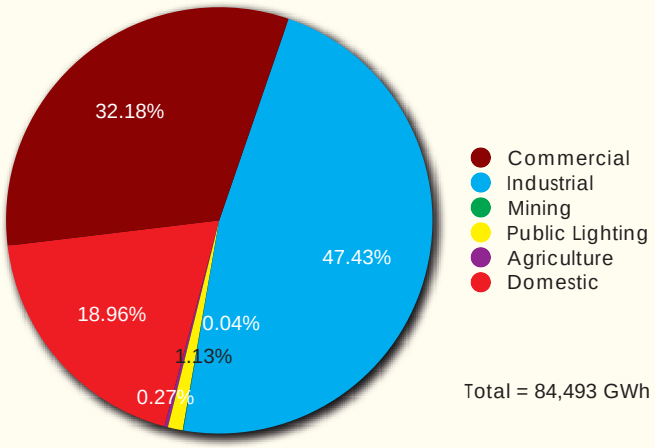
The load growth in 2008 was 31.8% from 85 MW to 112 MW.

JUALAN TENAGA ELEKTRIK TNB, SESB, SARAWAK ENERGY BERHAD (SEB) DAN NUR

Gambarajah 5 : Jualan Tenaga Elektrik (GWj) oleh TNB Pada Tahun 2008.

SALES OF ELECTRICITY OF TNB, SESB, SARAWAK ENERGY BERHAD (SEB) AND NUR

Figure 5 : Sales of Electricity (GWh) by TNB in 2008



Nota :

Jumlah jualan tenaga elektrik TNB dari tahun 2004 hingga 2007 :

Tahun 2004 : 68,974 GWj
Tahun 2005 : 73,102 GWj
Tahun 2006 : 77,008 GWj
Tahun 2007 : 81,360 GWj

- Data tahun kalendar
- Tidak termasuk eksport

Jumlah jualan tenaga elektrik oleh TNB pada tahun 2008 adalah sebanyak 84,493 GWj, iaitu mencatatkan pertambahan 3.9% daripada 81,360GWj yang dijual tahun 2007. Sektor perindustrian mencatatkan jualan yang tertinggi berbanding dengan sektor lain iaitu 47.4% daripada jumlah keseluruhan jualan tenaga elektrik tahun 2008. Sementara itu, sektor kedua tertinggi adalah sektor komersial dengan peratusan 32.2% .

Notes :

Total energy sales of TNB from year 2004 to 2007 :

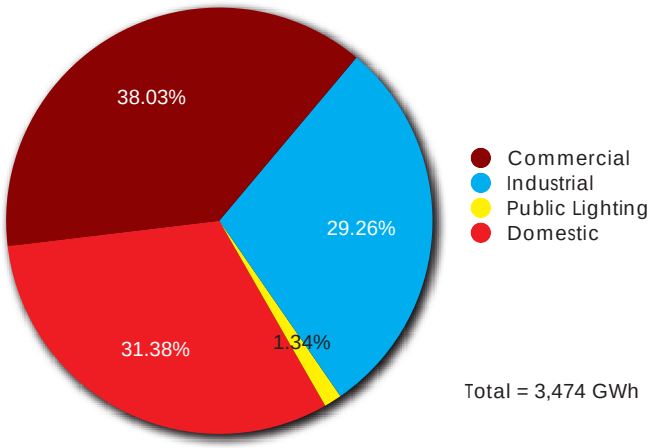
68,974 GWh (Year 2004)
73,102 GWh (Year 2005)
77,008 GWh (Year 2006)
81,360 GWh (Year 2007)

- *Data for Calendar Year*
- *Excluding export*

The total electricity energy sold by TNB in 2008 increased by 3.9% to 84,493 GWh from 81,360 GWh sold in 2007. The industrial sector recorded the highest percentage of energy sold at 47.4%, followed by the commercial sector at 32.2% and domestic sector at 8.9%.

Gambarajah 6 : Jualan Tenaga Elektrik (GWj) oleh SESB Pada Tahun 2008

Figure 6 : Sales of Electricity (GWh) by SESB in 2008



Nota :

Jumlah jualan tenaga elektrik SESB dari tahun 2004 hingga 2007 :

Tahun 2004 : 2,556 GWj
Tahun 2005 : 2,770 GWj
Tahun 2006 : 2,968 GWj
Tahun 2007 : 3,312 GWj

- Data tahun kalendar

Sejumlah 3,474 GWj tenaga elektrik telah dijual oleh SESB di Sabah dalam tahun 2008, iaitu mencatatkan pertambahan sebanyak 4.9% berbanding 3,312 GWj yang dijual tahun 2007. Sektor komersial mencatatkan jualan yang tertinggi berbanding dengan sektor lain iaitu 38.0% daripada jumlah keseluruhan jualan tenaga elektrik tahun 2008. Sementara itu, sektor kedua tertinggi dengan peratusan 31.4% adalah sektor domestik.

Notes :

Total energy sales of SESB from year 2004 to 2007 :

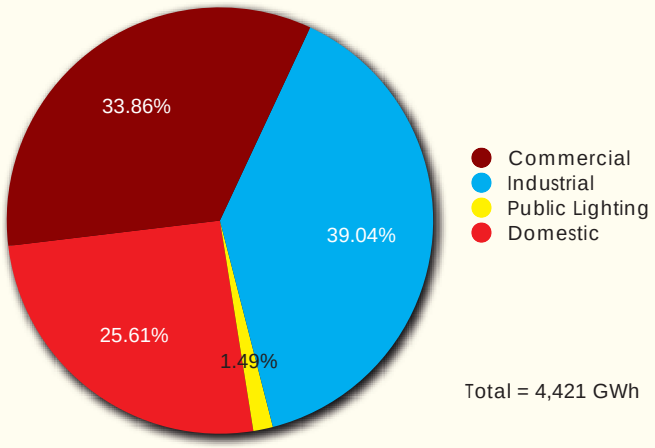
2,556 GWh (Year 2004)
2,770 GWh (Year 2005)
2,968 GWh (Year 2006)
3,312 GWh (Year 2007)

- *Data for Calendar Year*

The total electricity energy sold by SESB in 2008 increased by 4.9% to 3,474 GWh from 3,312 GWh sold in 2007. The commercial sector recorded the highest percentage of energy sold at 38.0%, followed by the domestic sector at 31.4% and industrial sector 29.3%.

Gambarajah 7 : Jualan Tenaga Elektrik (GWj) oleh SEB Pada Tahun 2008

Figure 7 : Sales of Electricity (GWh) by Sarawak Energy Berhad (SEB) in 2008



Nota :

Jumlah jualan tenaga elektrik SEB dari tahun 2004 hingga 2007 :

Tahun 2004 : 3,679 GWj
Tahun 2005 : 3,942 GWj
Tahun 2006 : 4,045 GWj
Tahun 2007 : 4,272 GWj

- Data tahun kalendar

Jumlah jualan tenaga elektrik oleh Sarawak Energy Berhad pada tahun 2008 adalah sebanyak 4,421 GWj, iaitu mencatatkan pertambahan 3.5% daripada 4,272 GWj yang dijual tahun 2007. 39.0% daripada jumlah keseluruhan jualan tenaga elektrik tahun 2008 telah diperolehi daripada sektor perindustrian. Sementara itu, sektor kedua tertinggi dengan peratusan 33.9% adalah sektor komersial.

Notes :

Total energy sales of SEB from year 2004 to 2007 :

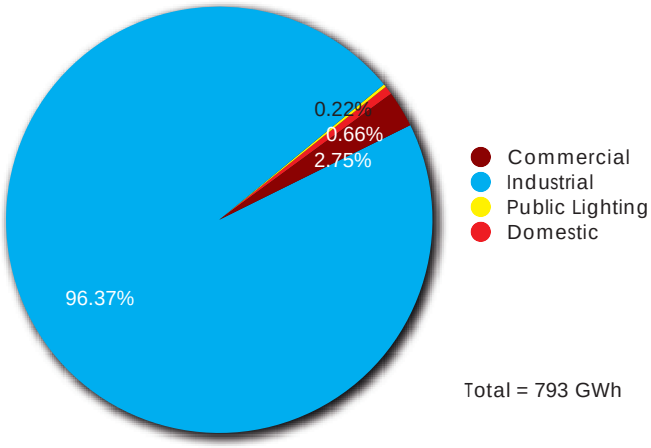
3,679 GWh (Year 2004)
3,942 GWh (Year 2005)
4,045 GWh (Year 2006)
4,272 GWh (Year 2007)

- *Data for Calendar Year*

The total electricity energy sold by SEB in 2008 was 4,421 GWh, i.e. a 3.5% increment from 4,272 GWh sold in 2007. Thirty nine percent (39%) of the total energy sold to industrial sector, followed by the commercial sector at 33.9% and domestic sector 25.6%.

Gambarajah 8 : Jualan Tenaga Elektrik (GWj)
NUR Distribution Sdn. Bhd. Pada Tahun 2008

Figure 8 : Sales of Electricity (GWh)
of NUR Distribution Sdn. Bhd. in 2008



Nota :

Jumlah jualan tenaga elektrik NUR dari tahun 2004 hingga 2007 :

Tahun 2004 : 408 GWj
Tahun 2005 : 427 GWj
Tahun 2006 : 555 GWj
Tahun 2007 : 618 GWj

- Data tahun kalendar

Pada tahun 2008, jumlah jualan tenaga elektrik NUR Distribution Sdn. Bhd. di Kulim Hi-Tech Park (KHTP) juga telah mencatatkan pertambahan 28.3% kepada 793 GWj berbanding 618 GWj yang dijual tahun 2007. Hampir 96.4% daripada jumlah keseluruhan jualan tenaga elektrik tahun 2008 telah diperolehi daripada sektor perindustrian. Sementara itu, sektor kedua tertinggi dengan peratusan 2.8% adalah sektor komersial.

Notes :

Total energy sales of NUR from year 2004 to 2007 :

408 GWh (Year 2004)
427 GWh (Year 2005)
555 GWh (Year 2006)
618 GWh (Year 2007)

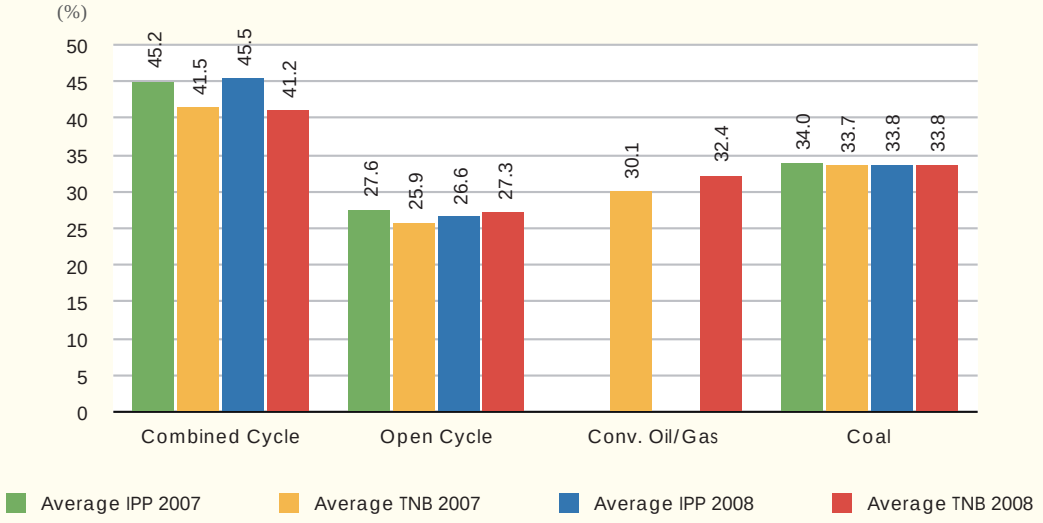
- *Data for Calendar Year*

In 2008, the total electricity energy sold by NUR Distribution Sdn. Bhd. in Kulim Hi-Tech Park (KHTP) increased by 28.3% to 793 GWh from 618 GWh sold in 2007. Almost 96.4% of the total energy sold in 2008 was consumed by industrial sector, followed by the commercial sector at 2.8% and less than 1% by domestic and public lighting.

PRESTASI SISTEM PENJANAAN

Prestasi Sistem Penjanaan - TNB

Gambarajah 9 : Purata *Thermal Efficiency* Bagi Loji-Loji Penjanaan IPP dan TNB Pada Tahun 2007 dan 2008



Nota :

Bermula Julai 2004, Kapar Energy Ventures Sdn. Bhd. (KEV) telah mengambil alih pemilikan, operasi dan penyelenggaraan Stesen Janakuasa Sultan Salahuddin Abdul Aziz Shah di Kapar, Klang daripada TNB.

Pada keseluruhannya, kebanyakan loji-loji IPP dan TNB pada tahun 2008 telah mencapai kecekapan yang lebih tinggi berbanding dengan *contracted efficiency* dan *target efficiency* yang ditetapkan dalam Perjanjian Pembelian Tenaga (PPA).

Purata tahunan kecekapan *thermal* bagi loji-loji penjanaan IPP pada tahun 2008 untuk loji kitar padu tidak menunjukkan perubahan yang ketara daripada tahun sebelumnya, manakala loji kitar terbuka pula berada dalam lingkungan 26.6% berbanding 27.6% tahun 2007. Bagi TNB pula, purata tahunan kecekapan *thermal* loji-loji penjanaan yang menggunakan gas sebagai bahanapi berada pada tahap 28.0% untuk mesin-mesin kitar terbuka yang telah berusia, manakala untuk loji-loji kitar padu yang baru iaitu Stesen Janakuasa Tuanku Jaafar Fasa 1 (PD1) berada dalam linkungan 48.5%. Sementara itu, purata tahunan kecekapan *thermal* untuk loji-loji *thermal* TNB bagi loji penjanaan minyak berada pada paras 32.4% dan untuk loji-loji penjanaan arang batu pula dalam lingkungan 33.8%.

PERFORMANCE OF GENERATION SYSTEM

Performance of Generation System - TNB

Figure 9 : Average Thermal Efficiency of IPP's and TNB's Plants for Year 2007 and 2008

Notes :

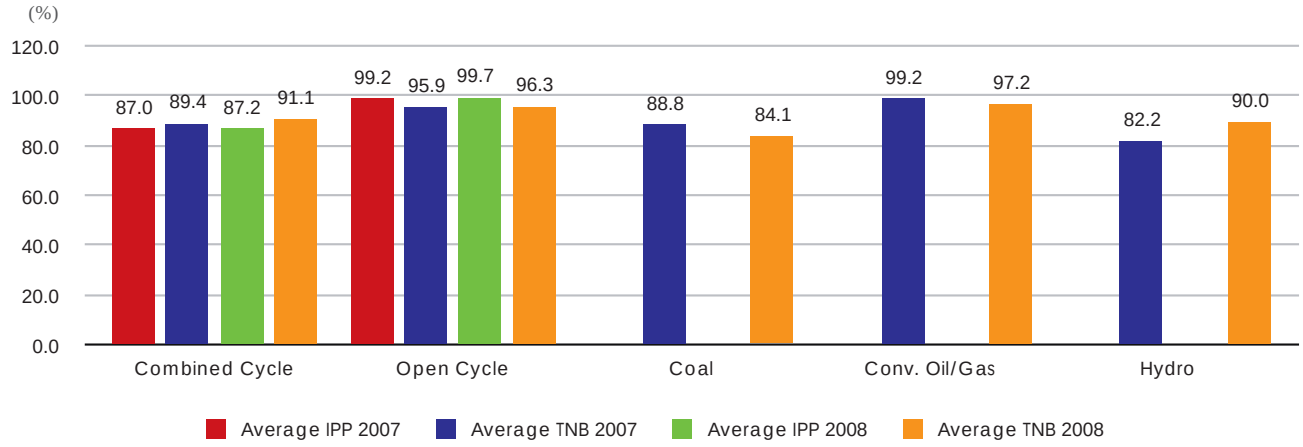
Effective from July 2004, Kapar Energy Ventures (KEV) had assumed ownership on the operation and maintenance of Sultan Salahuddin Abdul Aziz Shah Power Station at Kapar, Klang from TNB.

Overall, most IPP's and TNB's generating plants in Peninsular Malaysia in 2008 achieved higher efficiency compared to the contracted and target efficiency in the Power Purchases Agreement (PPA).

The yearly average thermal efficiency for IPP's generating plants in 2008 for combined cycle plant did not show a significant changes compared to the previous year, while for open cycle plants the yearly average stood around 26.6% compared 27.6% in 2007. For TNB, the yearly average thermal efficiency for the oldest open cycle gas-based generating plants stood around 28.0% whereas for new combined cycle plant i.e. Tuanku Ja'afar Power Station's Phase 1 (PD1) was 48.5%. Meanwhile, the yearly average thermal efficiency for TNB thermal plants was 32.4% for oil-based generating plants and 33.8% for coal-fired generating plants.

Gambarajah 10 : *Equivalent Availability Factor (EAF)* Bagi Loji-Loji Penjanaan IPP dan TNB Pada Tahun 2007 dan 2008

Figure 10 : Equivalent Availability Factor (EAF) of IPP's and TNB's Plants for Year 2007 and 2008

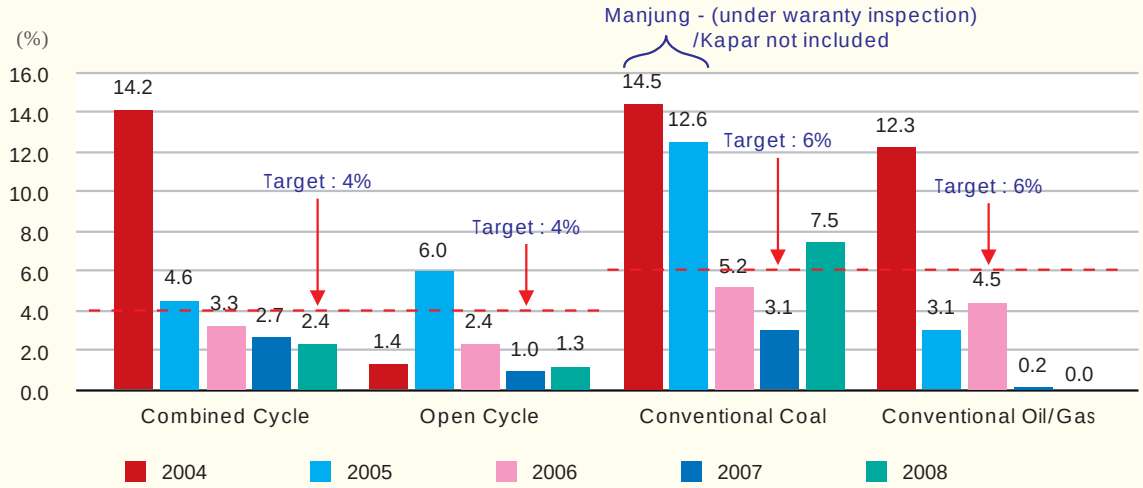


Pada tahun 2008, purata *EAF* bagi loji-loji penjanaan IPP untuk loji kitar padu pada tahap 87.2% iaitu bersamaan dengan tahap tahun 2007 pada 87.0%, manakala untuk loji kitar terbuka pula pada paras 99.7% berbanding 99.2% tahun sebelumnya. Sementara itu untuk loji lain TNB, loji-loji penjanaan arang batu telah mencapai *EAF* 84.1%, disusuli loji penjanaan menggunakan minyak sebanyak 97.2% dan loji hidro dalam lingkungan 90.0%.

In 2008, the average EAF of IPP's combined cycle plants stood at 87.2%, i.e. no significant increased from 87.0% in 2007, while for open cycle plants was 99.6% from 99.2% in the previous year. Meanwhile, for TNB's coal-fired generating plants the average EAF decrease to 84.1% compared to 88.8% in 2007, followed by oil-based generating plants at 97.2% and hydro plants at 90.0%.

Gambarajah 11 : *Equivalent Unplanned Outage Factor (EUOF)* Bagi Loji-Loji Penjanaan TNB

Figure 11 : Equivalent Unplanned Outage Factor (EUOF) of TNB's Plants



Pada keseluruhannya prestasi *EUOF* bagi loji-loji penjanaan TNB dalam tahun 2008 adalah semakin baik dengan loji kitar padu dan loji kitar terbuka telah mencapai *EUOF* kurang daripada 4% manakala loji menggunakan minyak dan arang batu pula kurang daripada 6%.

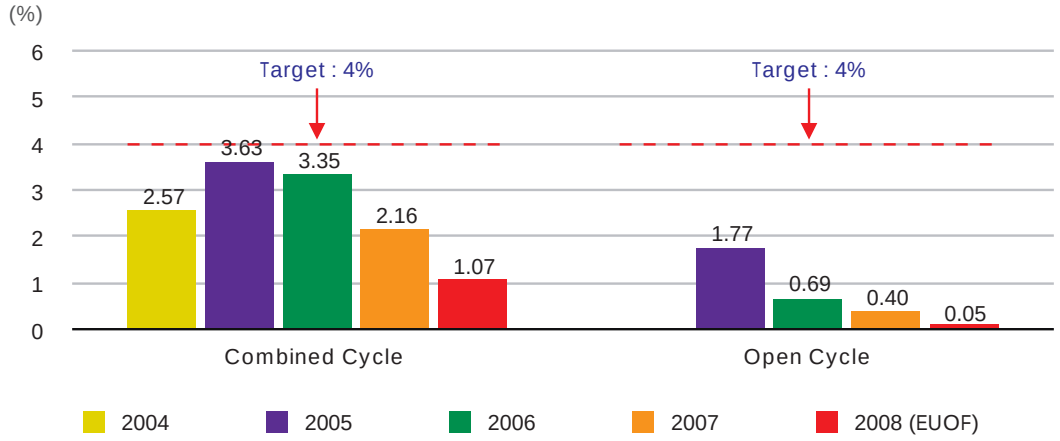
Walau bagaimanapun, purata *EUOF* bagi loji arang batu berada pada paras tertinggi iaitu 7.5% dan telah melepasi *threshold* yang ditetapkan iaitu 6%. Pertambahan ini disebabkan oleh kerosakan mekanikal pada turbin-turbin stim. Ini menunjukkan terdapat kemerosotan dalam aspek prestasi *EUOF* bagi loji arang batu.

Overall EUOF for TNB's generating plants in 2008 indicated improvement in performance with the combined cycle plants and open cycle plants achieved EUOF of less than 4%, and for oil-based and coal plants of less than 6%.

However, the average EUOF of coal-fired plants stood at 7.5% and exceeded the yearly threshold of 6%. The increase in EUOF was due to the mechanical failures of the steam turbines in one of the stations.

Gambarajah 12 : Unplanned Outage Rate (UOR) bagi IPP Pada Tahun 2005 Hingga 2008

Figure 12 : Unplanned Outage Rate (UOR) of IPP's Plants for Year 2005 to 2008



Nota : *EUOF (Equivalent Unplanned Outage Factor)*
- Seperti definasi dalam IEEE Std 762™-2006

Note : EUOF (Equivalent Unplanned Outage Factor)
- Such as the definition in IEEE Std 762™-2006

Purata *UOR* tahun 2008 bagi loji-loji penjanaan IPP telah menunjukkan prestasi yang baik dengan penurunan *UOR* berbanding dengan tahun sebelumnya. Pada keseluruhannya, prestasi *UOR* untuk loji kitar padu dan kitar terbuka berada pada tahap yang lebih baik berbanding *threshold* yang telah ditetapkan iaitu 4%.

Mulai 2008 Suruhanjaya Tenaga mula memperkemaskan petunjuk prestasi dengan memperkenalkan *EUOF* bagi menggantikan *UOR*. Pada keseluruhannya, purata *EUOF* bagi loji-loji penjanaan IPP adalah rendah iaitu 1.07% untuk loji kitar padu dan 0.05% untuk loji kitar terbuka, yang menggambarkan prestasi *EUOF* untuk loji-loji penjanaan IPP adalah lebih baik dengan kebanyakan daripada stesen mencapai *EUOF* kurang daripada 4%.

In 2008, the average UOR of combined cycle and open cycle plants of IPPs were much below the UOR limit of 4%.

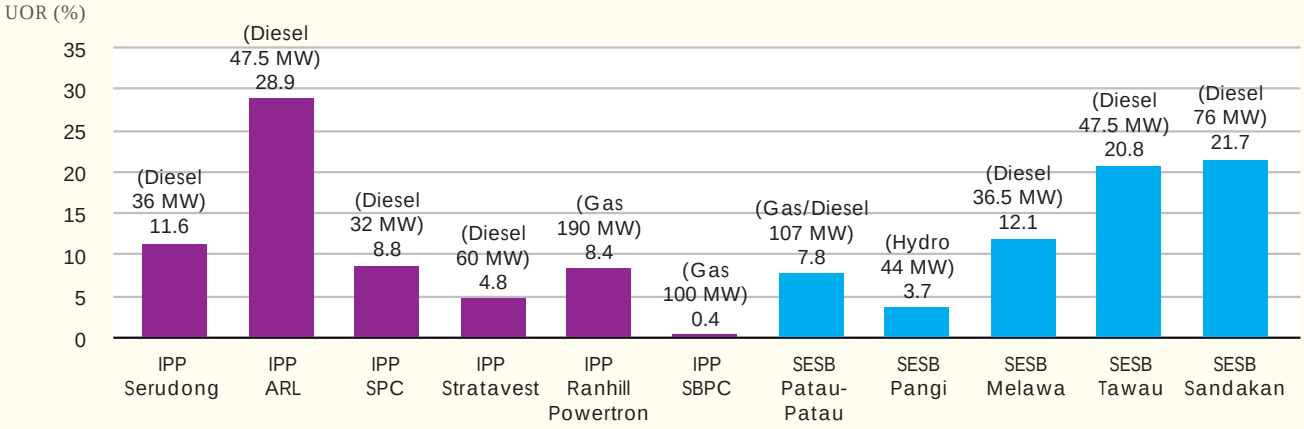
In 2008, standardization of reporting format was introduced, and the IPPs were requested to report EUOF figures based on IEEE definition rather than UOR. Average EUOF for combined cycle and open cycle IPP's plants in 2008 were 1.07% and 0.05% respectively.

Prestasi Sistem Penjanaan – SESB

Gambarajah 13 : Hentitugas Tidak Berjadual di Sabah Pada Tahun 2008

Performance of Generation System – SESB

Figure 13 : Unplanned Outage Rate (UOR) for Sabah in 2008



Nota :

Loji-loji penjanaan di Sabah masih diukur menggunakan *UOR* dan tidak mempunyai maklumat *EUOF*.

Note :

The generation plants in Sabah are still measured using of UOR.

Pada tahun 2008, keboleharapan bekalan elektrik di Sabah masih berada dalam keadaan kurang memuaskan di mana kebanyakan loji-loji penjanaan di Sabah terdiri daripada yang telah berusia dan tidak ekonomik lagi. Situasi ini diburukkan lagi dengan peratusan hentitugas tidak berjadual *(forced outages)* bagi loji-loji penjanaan IPPs dan SESB di Sabah telah mencatatkan kadar *forced outages* yang tinggi. Selain itu kekurangan kapasiti penjanaan dalam memenuhi pertumbuhan permintaan juga menjadi semakin meruncing. Dalam masa yang sama, sebahagian daripada projek-projek penambahan bekalan yang dirancang telah mengalami kelewatan dan tersasar daripada tarikh mula tugas yang ditetapkan.

Pada keseluruhannya, purata hentitugas tidak berjadual bagi loji-loji penjanaan IPPs berada dalam lingkungan 5.6% dan bagi loji-loji penjanaan SESB pula sebanyak 12.2%.

In 2008, the reliability of electricity supply in Sabah was seriously undermined due to inadequate generation capacity. The situation arose because of several factors such as delay in new projects supposed to come on stream, old and uneconomical plants in the system and decision making process.

IPP's and SESB's generating plants in Sabah recorded high forced outage rates and thus affecting the reliability of the whole supply system.

PRESTASI SISTEM PENGHANTARAN

Sistem Penghantaran TNB

Jadual 1 : Bilangan Pelantikan Sistem Penghantaran di Semenanjung Malaysia dengan Kehilangan Beban 50 MW Ke Atas dari Tahun 2006 Hingga 2008

PERFORMANCE OF TRANSMISSION SYSTEM

Transmission System of TNB

Table 1 : Transmission System Tripping with a Load Loss of above 50 MW for Year 2006 to 2008 in Peninsular Malaysia

Indicators	2006	2007	2008
No. of Tripping without Load Shedding	6	9	6
Unsupplied Energy due to Tripping (MWh)	215.4	1,246.8#	309.8
No. of Tripping with Load Shedding	1	1	0
Unsupplied Energy during Load Shedding (MWh)	179.1	103.5	0

Nota : # Termasuk insiden pelantikan di Pulau Pinang pada 20 November 2007.

Note :# Include tripping incident on 20 November 2007 in Pulau Pinang.

Pada tahun 2008, jumlah keseluruhan bilangan pelantikan sistem penghantaran di Semenanjung Malaysia dengan kehilangan beban 50 MW telah berkurangan sedikit berbanding dengan tahun 2007. Bilangan insiden pelantikan yang dilaporkan dalam tahun 2008 juga telah berkurangan kepada 6 insiden daripada 9 insiden tahun 2007. Walau bagaimanapun, tiada insiden lucutan beban dilaporkan dalam tahun 2008.

Berikutan dengan penurunan bilangan insiden pelantikan, jumlah tenaga yang tidak dibekalkan tahun 2008 turut berkurangan kepada 309.8 MWj berbanding 1,246.8 MWj tahun 2007.

In 2008, the total number of tripping in the transmission network in Peninsular Malaysia with a load loss of above 50 MW recorded 6 incidents compared to 9 incidents in 2007, and there was no load shedding reported in 2008.

Subsequent to the reduction in the number of tripping in 2008, the total unsupplied energy also reduced from 1,246.8 MWh in 2007 to 309.8 MWh in 2008.

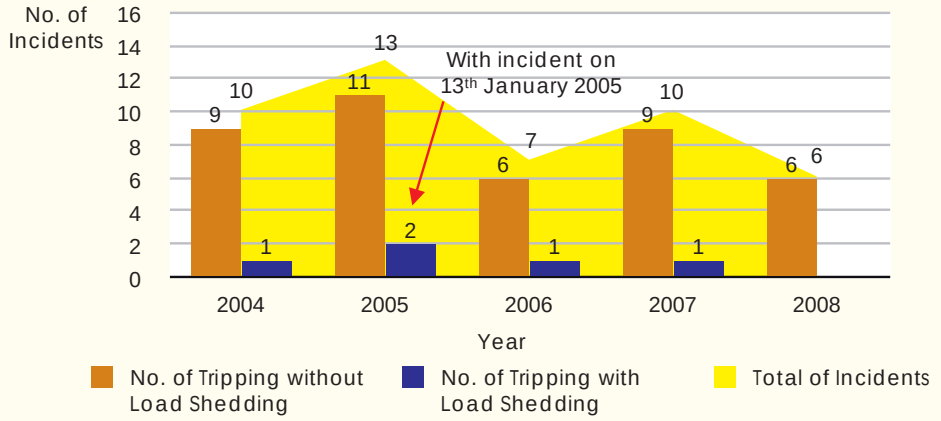
Jadual 2 : Bilangan Pelantikan Bulanan Sistem Penghantaran di Semenanjung Malaysia dengan Kehilangan Beban 50 MW Ke Atas Pada Tahun 2008

Table 2 : Monthly Transmission System Tripping with a Load Loss of Above 50 MW for Year 2008 in Peninsular Malaysia

Indicators	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
No. of Tripping without Load Shedding	0	0	1	2	0	1	2	0	0	0	0	0
Unsupplied Energy due to Tripping (MWh)			71.4	121.5		68.74	48.1					
Average Unsupplied Energy per Trip (MWh)			71.4	60.8		68.74	24.1					
Average Duration per Trip (Hour)			1:05	1:04		0:18	0:52					
No. of Tripping with Load Shedding	0	0	0	0	0	0	0	0	0	0	0	0
Unsupplied Energy during Load Shedding (MWh)	0	0	0	0	0	0	0	0	0	0	0	0

Gambarajah 14 : Bilangan Pelantikan Sistem Penghantaran di Semenanjung Malaysia dengan Kehilangan Beban 50 MW Ke Atas Pada Tahun 2004 Hingga 2008

Figure 14: Number of Transmission System Tripping with a Load Loss of Above 50 MW for Year 2004 to 2008 in Peninsular Malaysia

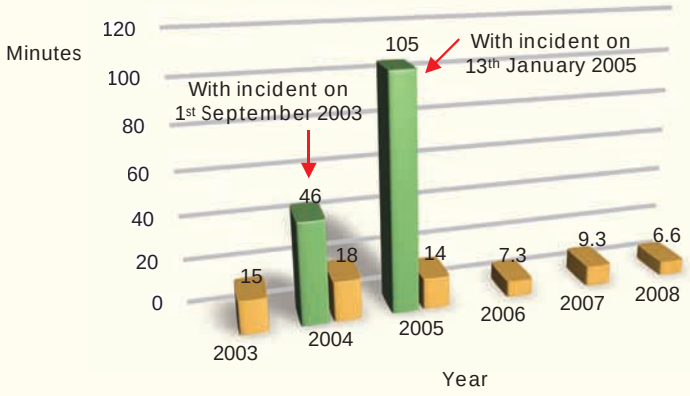


Gambarajah 15 : *System Minutes* TNB

Delivery Point Unreliability Index (DePUI) – *System Minutes*

Figure 15 : System Minutes TNB

Delivery Point Unreliability Index (DePUI) – System Minutes



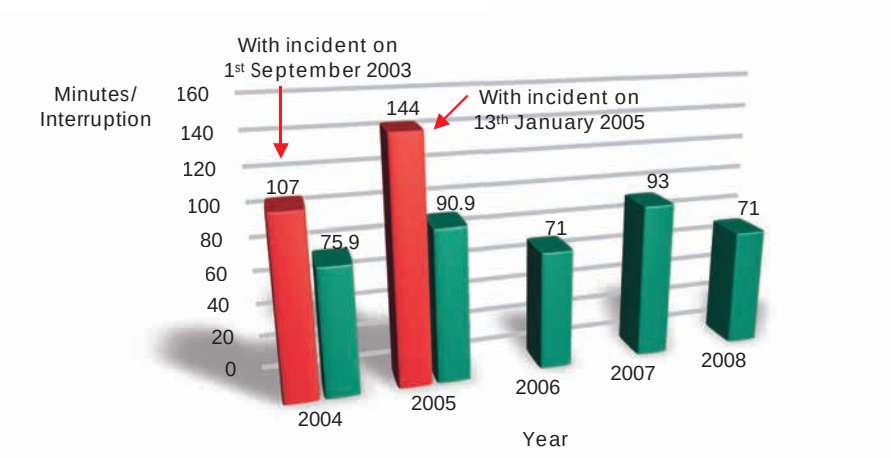
Source : Tenaga Nasional Berhad

Keupayaan rangkaian penghantaran diukur menerusi Minit Sistem iaitu pengukuran jangka waktu gangguan bekalan kepada pelanggan disebabkan kegagalan rangkaian penghantaran. *Delivery Point Unreliability Index (DePUI) -System minutes* TNB tahun 2008 telah berkurangan sedikit kepada 6.6 minit berbanding 9.3 minit tahun 2007. Pengurangan dalam Minit Sistem ini menunjukkan ada sedikit peningkatan dalam aspek prestasi sistem penghantaran di Semenanjung Malaysia.

Transmission network reliability is measured in terms of System Minutes, which measures the supply interruption to consumers due to transmission network failure. The Delivery Point Unreliability Index (DePUI) or System minutes of TNB's in 2008 decreased to 6.6 minutes compared to 9.3 minutes in 2007. The reduction in system minutes showed an improvement in performance of transmission system in Peninsular Malaysia.

Gambarajah 16 : *System Average Restoration Index (SARI)*

Figure 16 : System Average Restoration Index (SARI)



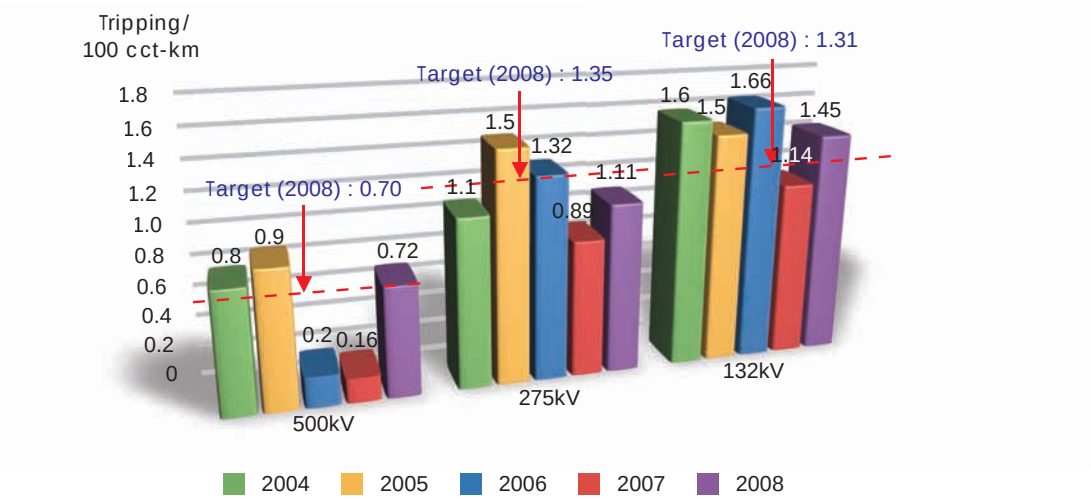
Source : Tenaga Nasional Berhad

Indeks Purata Pemulihan Sistem (SARI) atau purata tempoh masa dalam minit yang diambil untuk memulihkan gangguan bekalan yang dialami telah menunjukkan kemajuan iaitu 71 minit berbanding 93 minit tahun 2007. Pengurangan sebanyak 23.7% memberi gambaran tempoh masa yang diambil untuk memulihkan sesuatu gangguan telah berkurangan berbanding tahun lepas.

System Average Restoration Index (SARI) or the average duration in minutes taken to restore any occurrence of supply interruptions showed an improvement with 71 minutes compared 93 minutes in 2007. The reduction in SARI by 23.7% represented speedier restoration of supply compared to the previous year.

Gambarajah 17 : Bilangan Pelantikan Talian dan Kabel Bagi Setiap 100 cct-km

Figure 17 : No. of Combined Line and Cable Tripping Per 100 cct-km



Pada keseluruhannya, bilangan pelantikan pada voltan talian dan kabel pada sistem 132 kV, 275 kV dan 500 kV masing-masing telah menunjukkan pertambahan berbanding dengan tahun 2007. Voltan talian 132 kV masih mencatatkan bilangan yang paling banyak iaitu 164 kali. Disusuli bilangan pelantikan pada voltan talian 500 kV dan 275 kV masing-masing sebanyak 5 kali dan 84 kali.

Overall, the number of line and cable tripping in the 132 kV, 275 kV and 500 kV networks recorded a minimal increase from the previous year. The 132 kV network recorded the highest number of incidents with 164 events, followed by the 275 kV networks with 84 events and 500 kV network with 5 events.

Profile for Year 2008

Line Voltage	Total Length (cct-km)	Total Tripping	Tripping per 100 cct-km
132 kV	11,299	164	1.45
275 kV	7,616	84	1.11
500 kV	638	5	0.72
Total	19,553	253	-

Source : Tenaga Nasional Berhad

Sistem Penghantaran SESB

Gambarajah 3 : Bilangan Pelantikan Sistem Penghantaran Bagi Grid Sabah dengan Kehilangan Beban 50 MW Ke Atas Pada Tahun 2008

Transmission System of SESB

Table 3 : Transmission System Tripping of Sabah Grid with a Load Loss of Above 50 MW in the Year 2008

Indicators	Sep	Okt	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
No. of Tripping without Load Shedding	1	0	1	1	0	1	4	9	1	1	3	10
Unsupplied Energy due to Tripping (MWh)	175.63		368.36	89.6		87.39	404.28	2968.34	59.62	169.61	590.84	3042.1
Average Unsupplied Energy per Trip (MWh)	175.63		368.36	89.6		87.39	101.07	329.82	59.62	169.61	196.95	304.21
Average Duration per Trip (Hour)	2:17		3:33	5:33		3:26	3:32	8:08	1:18	5:02	5:08	8:21
No. of Tripping with Load Shedding	0	0	0	0	0	0	0	0	0	0	0	0
Unsupplied Energy during Load Shedding (MWh)	0	0	0	0	0	0	0	0	0	0	0	0

Source : Sabah Electricity Sdn. Bhd.

Pada keseluruhannya, walaupun sambungtara grid Timur Barat di Sabah dimulatugas pada 28 Julai 2007, prestasi sistem penghantaran di Sabah telah mengalami penurunan berbanding tahun sebelumnya. Penurunan ini disebabkan oleh masalah kekurangan penjanaan menyebabkan pengoperasian sistem terpaksa dibuat dengan margin simpanan yang rendah. Ini dapat dilihat pada tahun 2008, bilangan pelantikan sistem grid di Sabah dengan kehilangan beban sebanyak 50 MW ke atas telah menunjukkan pertambahan yang begitu ketara kepada 32 insiden berbanding 2 insiden tahun 2007. Namun begitu, tiada insiden lucutan beban dilaporkan dalam tahun 2008.

Walau bagaimanapun, tiga insiden besar pada sistem penghantaran pada 30 September 2007, 6 November 2007 dan 21 April 2008 telah menyebabkan *system minutes* bagi sistem grid di Sabah mengalami pertambahan yang amat ketara sekali kepada 154.38 minit berbanding 18.99 minit dalam tahun 2007.

Although the East West interconnection grid in Sabah was commissioned on 28th July 2007, the performance of transmission system in Sabah is still plagued with transmission constraints and minimal operating system margin. This was due to the inadequacy of generation capacity which caused the system to be managed and operated with very tight margin. In 2008, the number of transmission system tripping with a load loss of above 50 MW had increased significantly from 2 incidents in 2007 to 32 incidents. Nevertheless, there was no incident of load shedding reported in 2008.

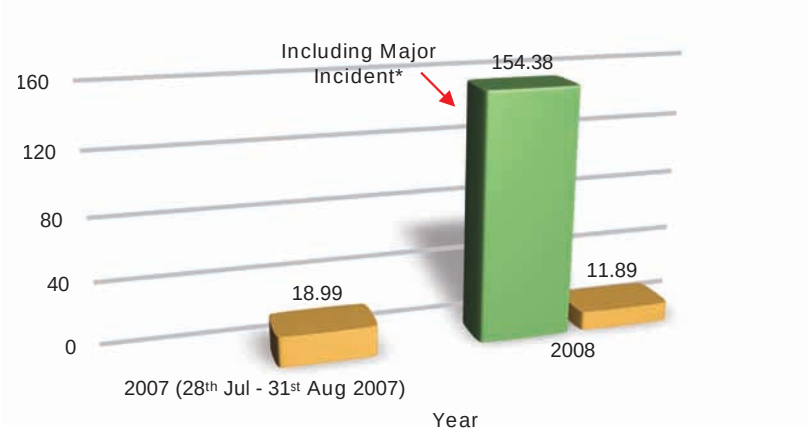
During the financial year 2007/2008, three major incidents in the transmission system which occurred on 30th September 2007, 6th November 2007 and 21st April 2008 had impacted the overall performance of the grid. The system minutes of the grid system in Sabah increased significantly from 18.99 minutes in 2007 to 154.38 minutes.

Gambarajah 18 : *System Minutes* SESB

Delivery Point Unreliability Index (DePUI)
– System Minutes Bagi Grid Sabah

Figure 18 : System Minutes SESB

Delivery Point Unreliability Index (DePUI)
– System Minutes for Sabah Grid



Source : Sabah Electricity Sdn. Bhd

Nota :

Grid sambungtara timur barat telah dimulatugas pada 28 Julai 2007.

* - Insiden besar ditakrif sebagai kehilangan beban sebanyak 50 MW ke atas. Tiga insiden besar yang menyebabkan perbezaan yang ketara iaitu:
  1) Bekalan elektrik di Pantai Timur putus keseluruhannya disebabkan oleh pelantikan di kedua-dua talian 275 kV Kolopis – Segaliud dengan jumlah kehilangan beban sebanyak 124 MW pada 30 September 2007;
  2) Kerosakan VT di Pencawang Karamunsing dengan jumlah kehilangan beban sebanyak 308 MW pada 6 November 2007; dan
  3) Keruntuhan menara 132 kV di talian Kayu Madang dalam kawasan Universiti Malaysia Sabah akibat kecurian kelengkapan logam pada bahagian menara yang menyebabkan kehilangan beban sebanyak 459.3 MW pada 21 April 2008.

Dalam tahun 2008, *System Minutes* bagi sistem grid di Sabah telah bertambah dengan ketara sekali kepada 154.38 minit berbanding 18.99 minit dalam tahun 2007. Pertambahan ketara ini disebabkan oleh tiga insiden besar pada sistem penghantaran di Sabah iaitu pada 30 September 2007, 6 November 2007 dan 21 April 2008. Impak daripada insiden-insiden tersebut telah memberi kesan yang besar kepada sistem minit iaitu menyumbang sebanyak 142.49 minit.

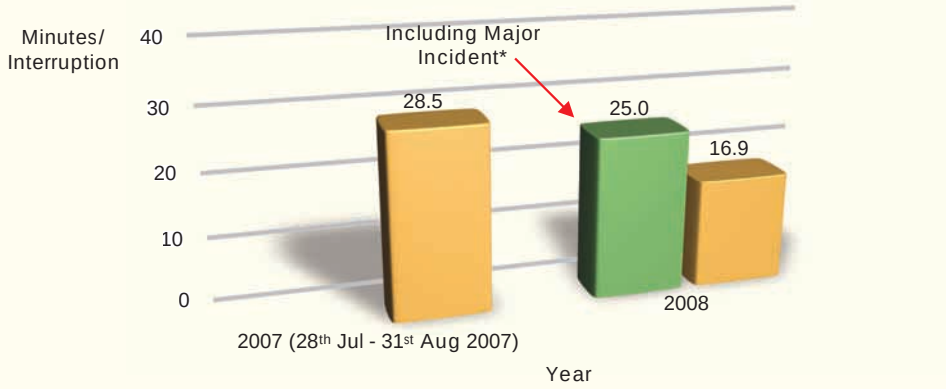
Notes :

West coast interconnection grid was commissioned on 28th July 2007.

* - *A major incident is defined as a load loss of 50 MW and above. Three major incidents that led to the large detroriation in performance during the period under review were :*
  1) Total blackout on the East Coast due to tripping of both 275 kV Kolopis – Segaliud lines with a total load loss of 124 MW on 30 September 2007;
  2) VT faulted at Karamunsing Sub-Station with total load loss of 308 MW on 6 November 2007; and
  3) Tower of 132 kV along Kayu Madang – Universiti Malaysia Sabah lines collapsed due to theft on tower members with a total load loss 459.3 MW on 21 April 2008.

Gambarajah 19 : *System Average Restoration Index* (SARI)

Figure 19 : System Average Restoration Index (SARI)



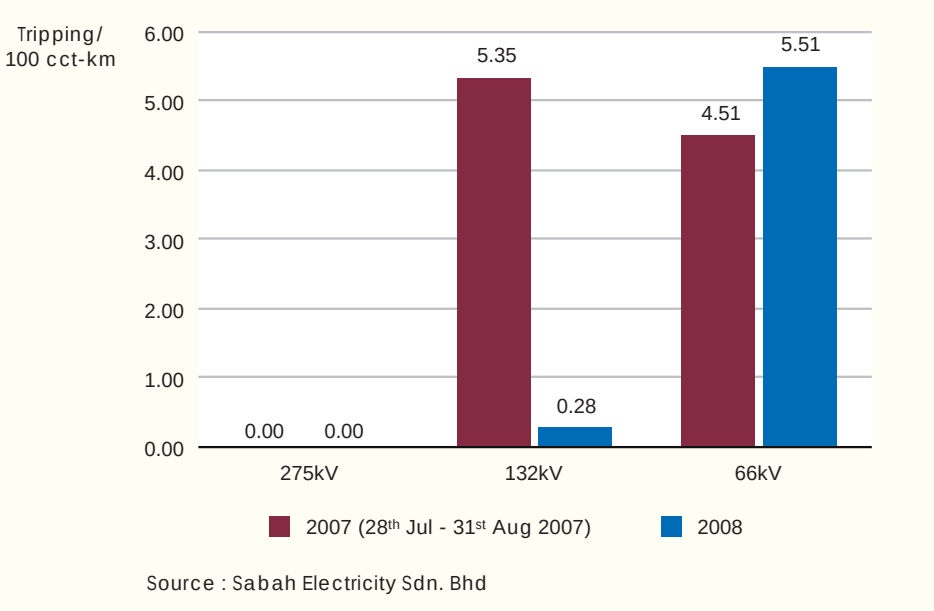
Source : Sabah Electricity Sdn. Bhd

Walaupun sistem minit telah menunjukkan pertambahan di Sabah, namun begitu SARI telah berkurangan sedikit kepada 25.0 minit berbanding 28.5 minit tahun 2007. Pengurangan ini memberi gambaran yang tempoh masa yang lebih cepat diambil untuk memulihkan sesuatu gangguan di Sabah berbanding tahun 2007.

The SARI reduced slightly to 25.0 minutes compared 28.5 minutes in 2007. The reduction of SARI represented a shorter time taken to restore supply following interruptions in the transmission network in Sabah compared to previous year.

Gambarajah 20 : Bilangan Pelantikan Talian dan Kabel Bagi Setiap 100 cct-km (Dengan Kehilangan Beban) Bagi Grid Sabah

Figure 20 : No. of Combined Line and Cable Tripping per 100 cct-km (With Load Loss) in Sabah Grid



Source : Sabah Electricity Sdn. Bhd

Bilangan pelantikan talian dan kabel di Sabah dengan kehilangan beban bagi setiap 100 cct-km bagi sistem grid Sabah pada tahun 2008 telah mencatatkan peningkatan sedikit terutamanya pada voltan talian 66 kV dengan 5.51 berbanding 4.51 tahun 2007. Walau bagaimanapun, voltan talian 132 kV telah menunjukkan penurunan yang ketara kepada 0.28 daripada 5.35 tahun sebelumnya. Sementara itu pada voltan talian 275 kV, tiada insiden pelantikan yang dilaporkan dalam tahun 2008.

The number of line and cable tripping for every 100 cct-km with a load loss in the grid system in 2008 increased, mainly on the 66 kV network. Nevertheless, on the 132 kV network, the number decreased significantly from 5.35 in previous year to 0.28. Meanwhile, there was no incident on 275 kV network reported in 2008.

Sistem Penghantaran Sarawak Energy Berhad (SEB)

Jadual 4 : Bilangan Pelantikan Sistem Penghantaran SEB di Sarawak Pada Tahun 2008

Transmission System of Sarawak Energy Berhad (SEB)

Table 4 : Monthly Transmision System of SEB in Sarawak for Year 2008

Indicators	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
No. of Tripping without Load Shedding	0	0	0	0	1	0	3	4	0	0	0	0
Unsupplied Energy due to Tripping (MWh)					59		12	586				
Average Unsupplied Energy per Trip (MWh)					0							
Average Duration per Trip (Hour)					1:06		1:07	0:50				
No. of Tripping with Load Shedding	0	0	0	0	0	0	0	20	0	0	0	0
Unsupplied Energy during Load Shedding (MWh)								35				

Pada keseluruhannya, bilangan pelantikan pada sistem penghantaran SEB di Sarawak yang dilaporkan dalam tahun 2008 telah bertambah dengan ketara sekali kepada 27 insiden (dengan 7 insiden pelantikan dan 20 insiden lucutan beban), iaitu pertambahan 80.0% berbanding 15 insiden tahun 2007.

In 2008, the number of transmission tripping in SEB's system in Sarawak increased significantly from 15 incidents in 2007 to 27 incidents. This accounts for an increase of 80% from the previous year, comprised of 7 incidents of tripping and 20 incidents of load shedding.

PRESTASI SISTEM PEMBAHAGIAN

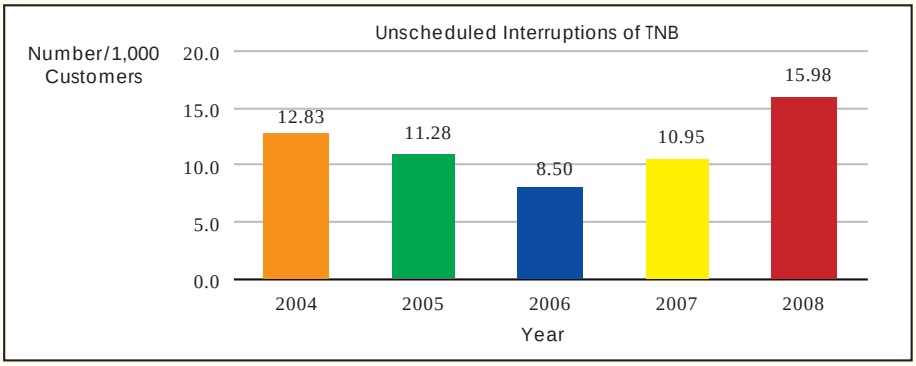
Statistik Gangguan Bekalan TNB

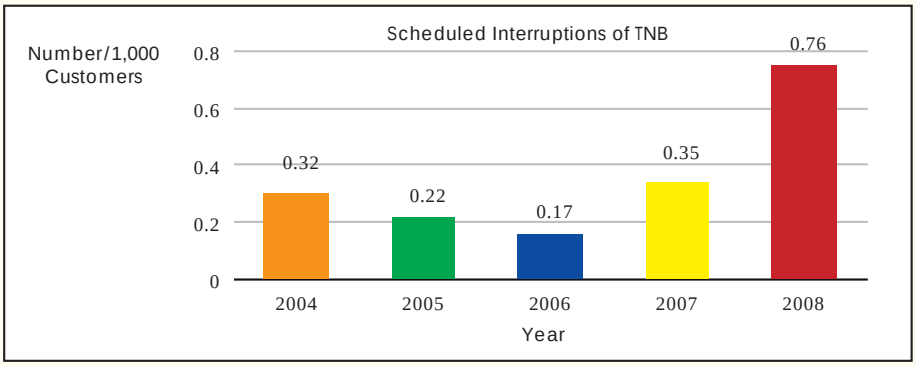
Gambarajah 21 : Bilangan Gangguan Bekalan Elektrik TNB Pada Tahun 2004 hingga 2008 – Bagi Setiap 1,000 Pengguna

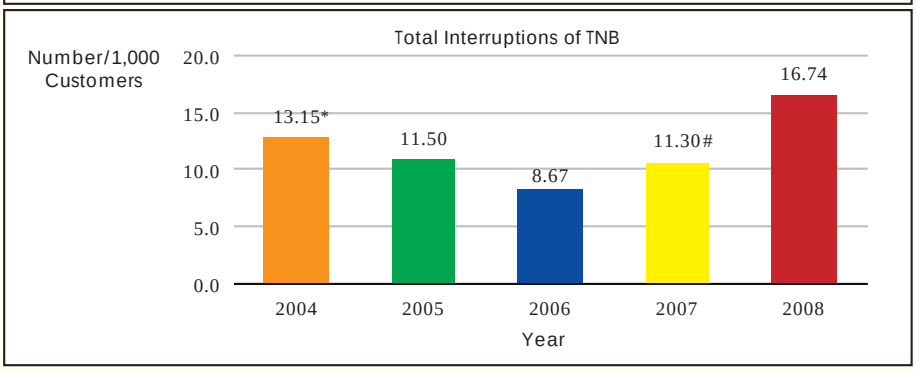
PERFORMANCE OF DISTRIBUTION SYSTEM

Statistics of Supply Interruptions of TNB

Figure 21 : Number of Electricity Interruptions per 1,000 Customers of TNB for Year 2004 to 2008







Nota :

a) Bilangan pengguna :
Tahun 2004 - 6.0 Juta
Tahun 2005 - 6.23 Juta
Tahun 2006 - 6.53 Juta
Tahun 2007 - 6.76 Juta
Tahun 2008 – 7.01 Juta

b) * Mulai 1 September 2004, TNB telah memperluaskan laporan gangguan dengan meliputi pengguna tunggal yang mengalami gangguan melebihi tempoh 1 minit, di mana sebelum ini pengguna-pengguna tersebut tidak diambilkira.

c) # Mulai September 2007, TNB menggunapakai sistem pemantauan dan pelaporan prestasi sistem pembekalan dengan menggunakan software baru iaitu *TOMS (Total Outage Management System)*. Dengan sistem *TOMS* ini berupaya mengelakkan kejadian gangguan dari tercicir dari laporan.

Notes :

a) Numbers of Customers :
6.0 Million (Year 2004)
6.23 Million (Year 2005)
6.53 Million (Year 2006)
6.76 Million (Year 2007)
7.01 Million (Year 2008)

*b) * From 1 September 2004, the reported figures of supply interruption include supply interruption to a single customer for more than 1 minute which was omitted in the past statistics.*

c) # From September 2007, application of new monitoring and reporting system on performance of supply system using the new software, i.e. Total Outage Management System (TOMS) by TNB.

Jika dianalisis dalam tempoh 3 tahun iaitu dari tahun 2006 hingga 2008, bilangan gangguan bekalan bagi setiap

Averaging over the last 3 years statistics from 2006 to 2008, the number of electricity supply interruptions per 1,000

1,000 pengguna pada sistem pembekalan TNB di Semenanjung Malaysia telah menunjukkan *trend* bertambah dari setahun ke setahun. Dalam pada itu, bagi memperkemaskan dan meningkatkan kredibiliti dalam pengumpulan data, TNB telah melancarkan penggunaan sistem pemantauan dan pelaporan prestasi sistem pembekalan yang baru iaitu *TOMS (Total Outage Management System)*.

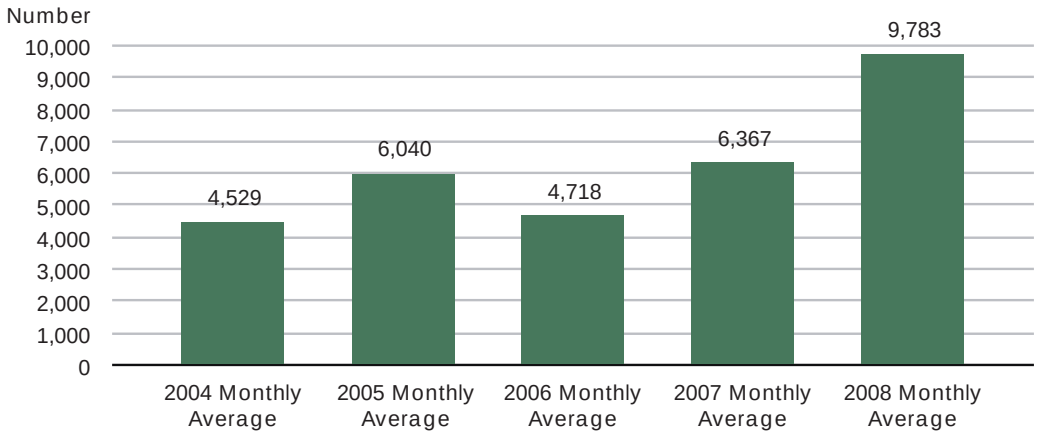
Pada keseluruhannya, selaras dengan dengan penggunaan sistem baru tersebut menunjukkan bilangan gangguan bekalan elektrik bagi setiap 1,000 pengguna pada tahun 2008 telah bertambah kepada 16.74 gangguan berbanding 11.30 gangguan tahun 2007, iaitu pertambahan sebanyak 48.1%. Pertambahan ini adalah disebabkan ciri-ciri kawalan data yang lebih ketat oleh *TOMS* dari peringkat penerimaan aduan sehingga ke peringkat pemulihan bekalan. Hampir 95.5% daripada jumlah keseluruhan gangguan bekalan tahun 2008 adalah disebabkan oleh gangguan tidak berjadual manakala gangguan berjadual hanya mencatat peratusan 4.5% sahaja.

customers of TNB in Peninsular Malaysia showed an increase trend from year to year. Since 1st September 2007, TNB has embarked on new software for monitoring and reporting on performance of supply system namely Total Outage Management System (TOMS). TOMS is expected to provide higher credibility in data collecting and reporting.

With the new system the number of electricity supply interruptions per 1,000 customers in 2008 recorded an increase of 48% at 16.74 interruptions over 11.30 interruptions in 2007. Almost 95.5% of the total number of supply interruptions recorded in 2008 was due to unscheduled interruptions, whereas only 4.5% was due to scheduled interruptions.

Gambarajah 22 : Purata Bulanan Bilangan Gangguan Bekalan Elektrik TNB Pada Tahun 2008

Figure 22 : Monthly Supply Interruptions of TNB in 2008

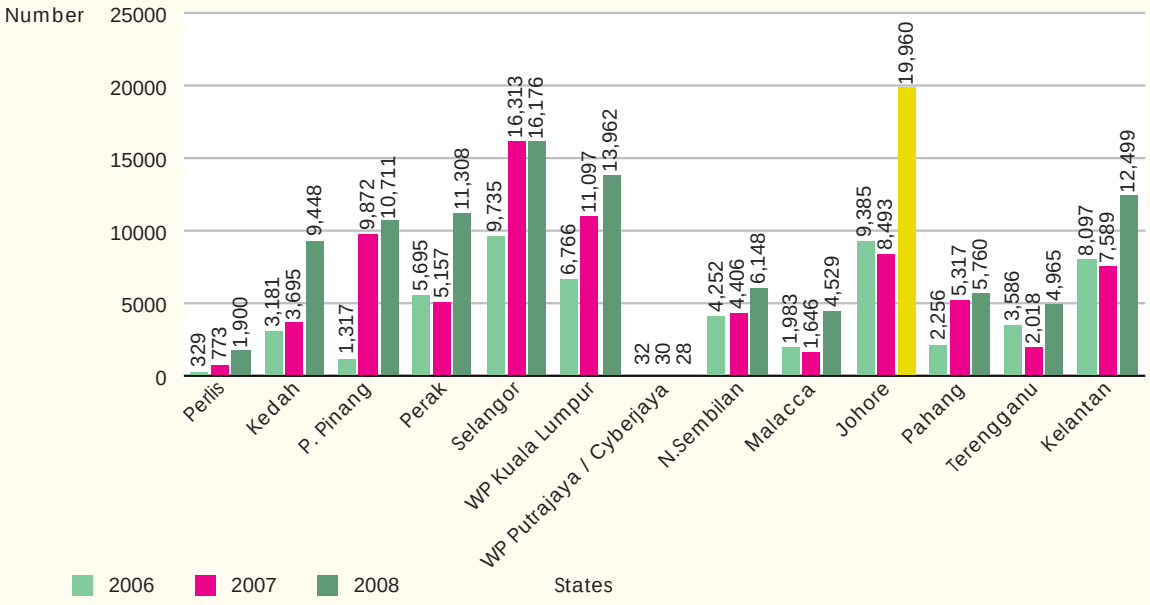


Dari segi purata bulanan bilangan gangguan bekalan elektrik TNB pula telah menunjukkan pertambahan yang begitu ketara dalam tahun 2008 iaitu sebanyak 53.7% kepada 9,783 berbanding 6,367 tahun 2007.

In 2008, the monthly average number of supply interruptions of TNB showed a significant increased by 53.7% from 6,367 in 2007 to 9,783.

Gambarajah 23 (a) : Jumlah kumulatif Bilangan Gangguan Bekalan Elektrik bagi Negeri-Negeri di Semenanjung Malaysia Pada Tahun 2006 hingga 2008

Figure 23 (a) : Total Number of Supply Interruptions in Various States in Peninsular Malaysia for Year 2006 to 2008



Nota :

a) Jumlah bilangan gangguan bekalan elekrtik :
Tahun 2006 - 56,614
Tahun 2007 - 76,406
Tahun 2008 - 117,394

b) Jumlah gangguan bekalan elekrtik bagi setiap 1,000 pengguna :
Tahun 2006 - 8.67 gangguan
Tahun 2007 - 11.30 gangguan
Tahun 2008 - 16.74 gangguan

Notes :

a) Total number of supply interruption:
56,614 (Year 2006)
76,406 (Year 2007)
117,394 (Year 2008)

b) Total number of supply interruption per 1,000 customers:
8.67 (Year 2006)
11.30 (Year 2007)
16.74 (Year 2008)

Gambarajah 23 (b) : Bilangan Gangguan Bagi Setiap 1,000 Pengguna bagi Negeri-Negeri di Semenanjung Malaysia Pada Tahun 2006 Hingga 2008

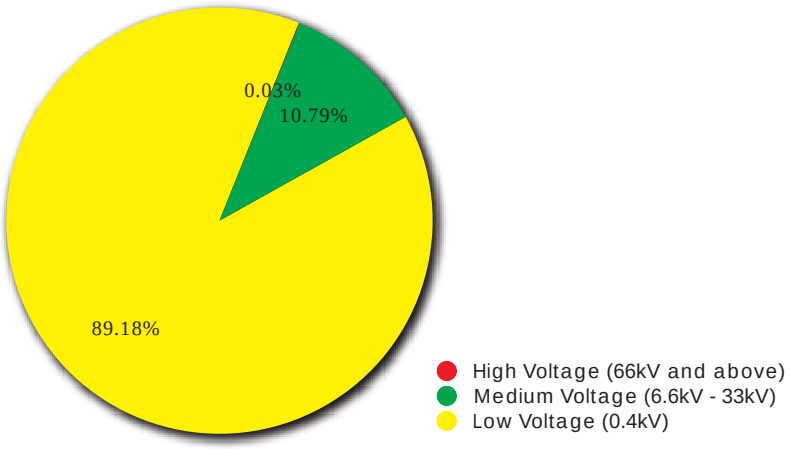
Figure 23 (b) : Number of Interruptions per 1,000 Customers in Various States in Peninsular Malaysia for Year 2006 to 2008

Pada tahun 2008, bilangan gangguan bekalan yang paling banyak telah dicatatkan oleh Negeri Johor dengan 19,960 gangguan. Sementara Selangor pula merupakan yang kedua tertinggi dengan gangguan sebanyak 16,176 berbanding dengan negeri-negeri lain. Namun begitu jika dikira berdasarkan kepada bilangan gangguan bagi setiap 1,000 pengguna, Kelantan masih lagi mencatatkan peratusan yang tertinggi dengan 34.20 gangguan, diikuti Perlis sebanyak 27.81 gangguan.

In the year 2008, the state of Johor recorded higher number of supply interruptions at 19,960 interruptions, followed by Selangor with 16,176 interruptions. However, Kelantan still recorded the highest number of supply interruptions per 1,000 customers at 34.20 interruptions, followed by Perlis at 27.81 interruptions.

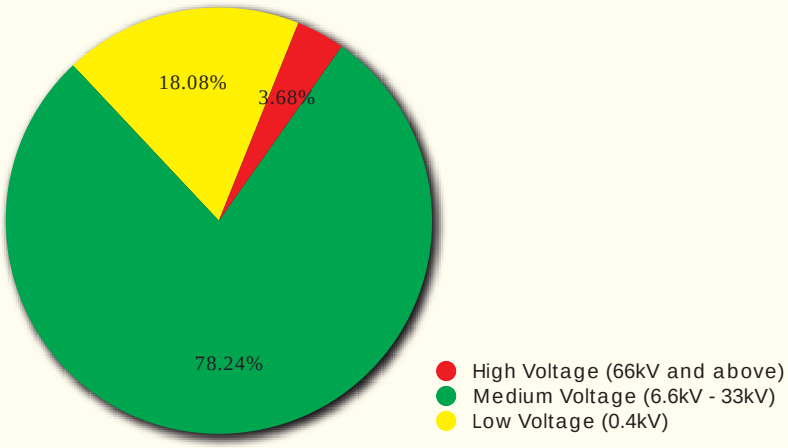
Gambarajah 24 (a) : Peratusan Bilangan Gangguan Bekalan Mengikut Tahap Voltan

Figures 24 (a) : The percentage of interruption based on supply network voltages



Gambarajah 24 (b) : Peratusan SAIDI Mengikut Tahap Voltan

Figures 24 (b) : The Percentage of SAIDI Based on Supply Networks Voltages

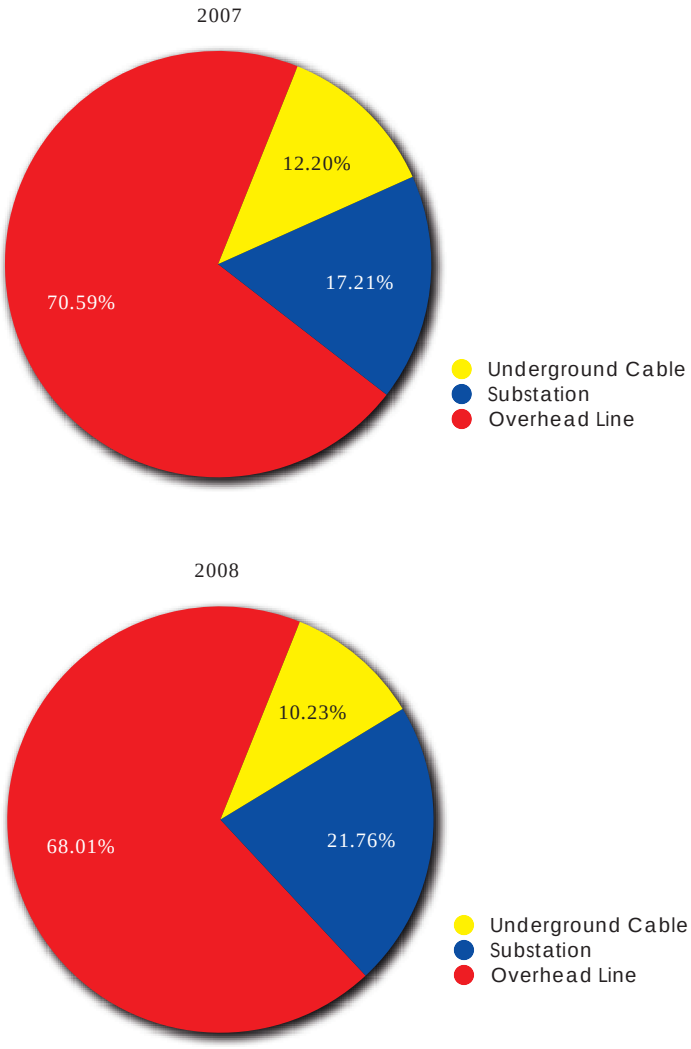


Berdasarkan analisis bilangan gangguan dan SAIDI mengikut tahap voltan menunjukkan hampir 89.2% daripada bilangan gangguan tahun 2008 adalah disebabkan oleh Voltan Rendah, namun begitu ia hanya menyumbang 18.1% kepada SAIDI. Walau bagaimanapun, Voltan Sederhana hanya menyumbang 10.8% kepada bilangan gangguan, tetapi merupakan penyumbang tertinggi kepada SAIDI iaitu sebanyak 78.2%. Sementara Voltan Tinggi pula hanya menyumbang 0.03% kepada bilangan gangguan dengan SAIDI sebanyak 3.7%.

Almost 89.2% of the interruptions in 2008 were recorded at low voltage levels, which accounted for only 18.1% to the SAIDI index. Interruptions at medium voltage networks accounted 10.8% of the total interruptions and accounted for 78.2% to the total SAIDI index. Meanwhile the high voltage networks accounted for only 0.03% of the total interruptions and 3.7% of total index.

Gambarajah 25 : Peratusan Bilangan Gangguan Bekalan Elektrik Keseluruhan di Semenanjung Malaysia Mengikut Bahagian Terlibat Pada Tahun 2007 dan 2008

Figure 25: Total Number of Supply Interruption in Peninsular Malaysia Based on Component of Network System in the Year 2007 and 2008



Note : Excluding high voltage supply interruptions

Pada keseluruhannya, daripada analisis bilangan gangguan bekalan elektrik pada tahun 2007 dan 2008 menunjukkan gangguan yang berpunca daripada talian atas telah mencatatkan peratusan yang tertinggi berbanding dengan gangguan yang disebabkan oleh kabel bawah tanah dan pencawang.

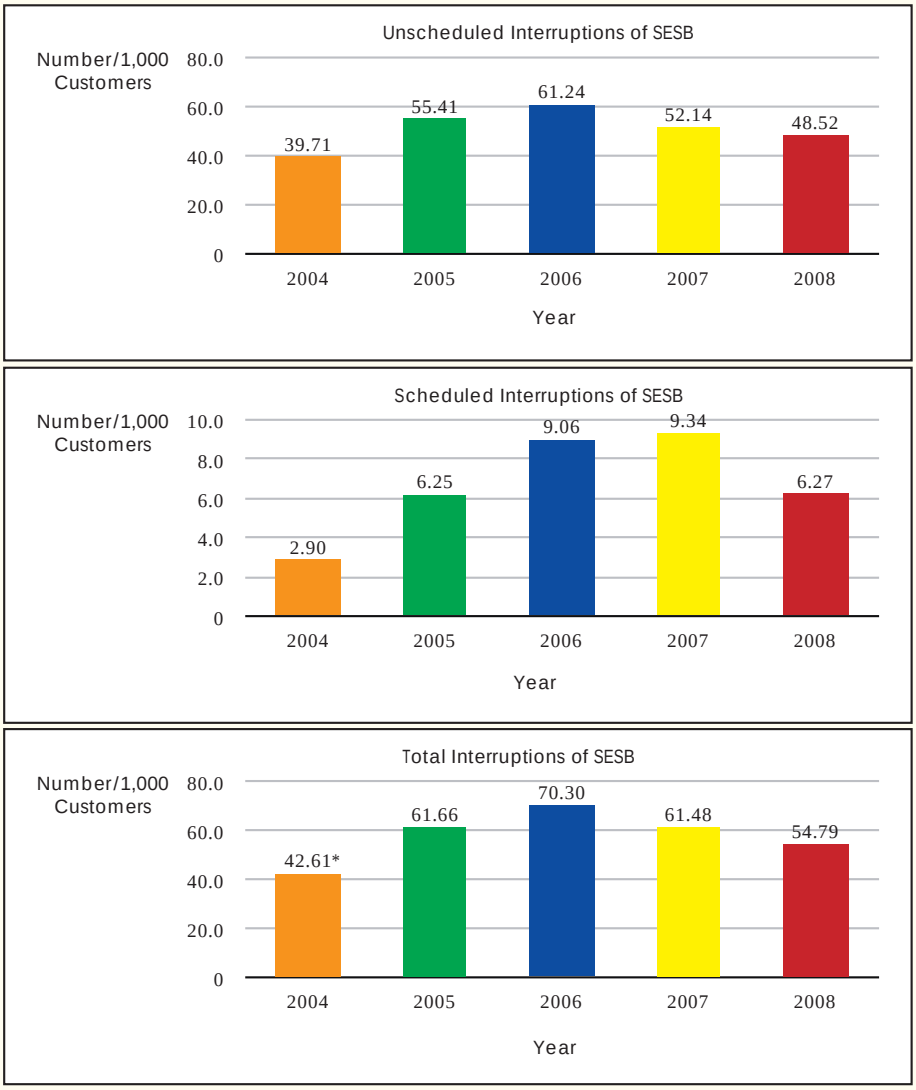
Further analysis on the number of supply interruptions in 2007 and 2008 showed that the interruptions due to overhead line was the highest compared with the interruptions due to underground cable and substation.

Statistik Gangguan Bekalan SESB

Gambarajah 26 : Bilangan Gangguan Bekalan Elektrik SESB Pada Tahun 2004 hingga 2008 – Bagi Setiap 1,000 Pengguna

Statistics of Supply Interruptions of SESB

Figure 26 : Number of Electricity Supply Interruption per 1,000 Customers of SESB in Sabah for Year 2004 to 2008



Nota :

a) Bilangan pengguna :
Tahun 2004 – 335,800
Tahun 2005 – 349,757
Tahun 2006 – 366,380
Tahun 2007 – 383,716
Tahun 2008 – 401,590

b) * Mulai 1 September 2004, SESB telah melaksanakan perubahan dalam sistem gangguannya di mana aduan-aduan gangguan bekalan elektrik akan direkodkan secara tetap dalam aplikasi baru LGBNet.

Notes :

a) Number of Customers:
335,800 (Year 2004)
349,757 (Year 2005)
366,380 (Year 2006)
383,716 (Year 2007)
401,590 (Year 2008)

*b) * Starting from 1 September 2004, SESB introduced changes in monitoring and recording of supply interruption whereby all the complaints of electricity supply interruption will be recorded in the new application, namely LGBNet.*

Di Sabah, jumlah bilangan gangguan bekalan elektrik bagi setiap 1,000 pengguna pada sistem pembekalan SESB tahun 2008 telah berkurangan sedikit kepada 54.79 gangguan berbanding 61.48 gangguan tahun 2007. Penurunan sebanyak 10.9% menunjukkan prestasi di Sabah semakin bertambah baik berbanding tahun sebelumnya.

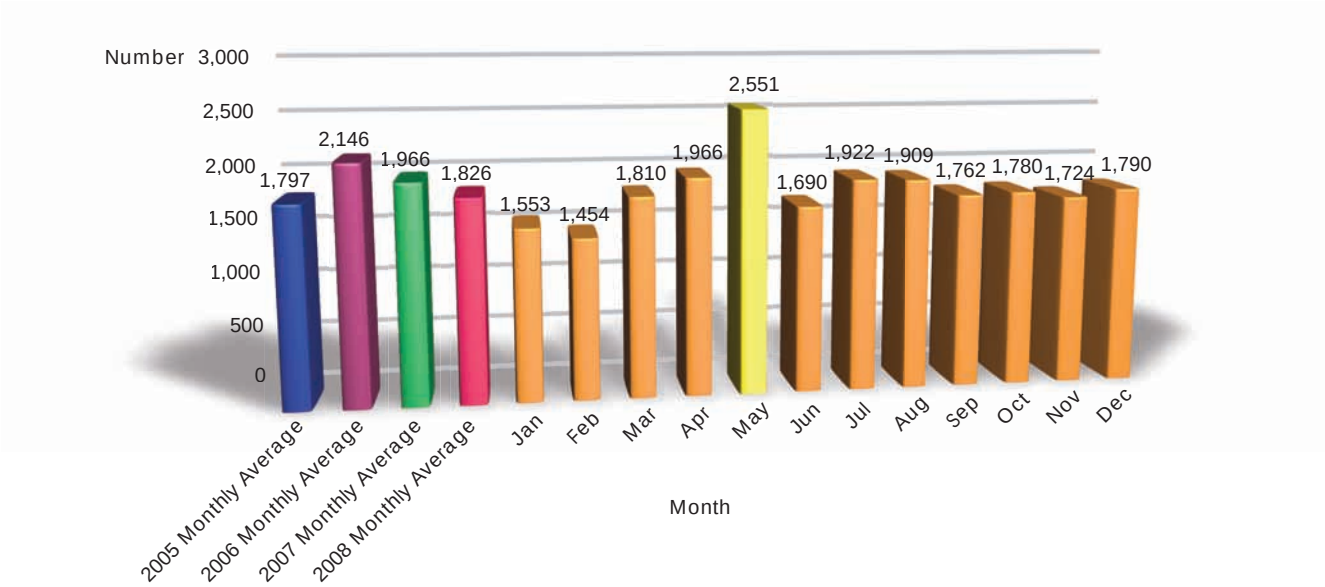
In Sabah, the number of electricity supply interruptions per 1,000 customers of SESB's supply system in 2008 reduced by 10.9% to 54.79 interruptions from 61.48 interruptions in 2007.

Overall, the unscheduled interruptions which accounted for 88.6% of the total interruptions also reduced slightly compared to previous year.

Pada keseluruhannya gangguan tidak berjadual telah berkurangan sedikit tetapi masih mencatatkan peratusan yang tinggi dengan 88.6% manakala gangguan berjadual pula telah berkurangan daripada tahun lepas iaitu hanya 11.4% daripada jumlah keseluruhan gangguan bekalan tahun 2008. Ini menunjukkan prestasi sistem pembekalan SESB telah meningkat dengan bilangan gangguan telah berkurangan daripada tahun-tahun lepas.

Gambarajah 27 : Purata Bilangan Gangguan Bekalan Elektrik Bulanan di Sabah Pada Tahun 2008

Figure 27 : Monthly Supply Interruptions of SESB in Sabah in 2008



Purata bulanan bilangan gangguan bekalan elektrik di Sabah tahun 2008 juga telah berkurangan sedikit daripada 1,966 tahun 2007 kepada 1,826. Bilangan gangguan pada bulan Mei telah mencatatkan bilangan gangguan bekalan yang tertinggi berbanding dengan bulan-bulan yang lain.

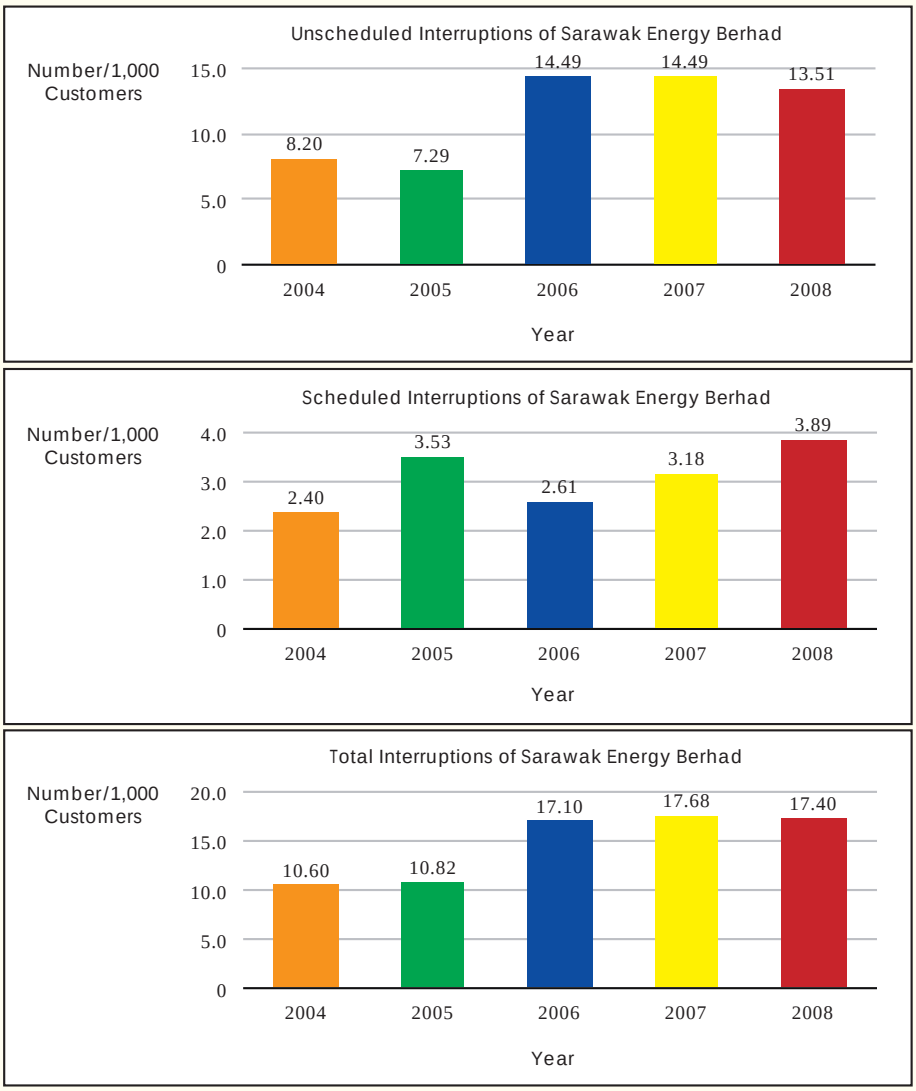
The monthly average number of supply interruptions in Sabah in 2008 also reduced slightly to 1,826 from 1,966 in 2007. The highest number of interruptions was recorded in May at 2,551 interruptions.

Statistik Gangguan Bekalan Sarawak Energy Berhad (SEB)

Gambarajah 28 : Bilangan Gangguan Bekalan Elektrik SEB Pada Tahun 2004 hingga 2008 – Bagi Setiap 1,000 Pengguna

Statistics of Supply Interruptions of Sarawak Energy Berhad (SEB)

Figure 28 : Number of Electricity Supply Interruption per 1,000 Customers of SEB for Year 2004 to 2008



Nota :

a) Bilangan pengguna :
Tahun 2004 – 400,348
Tahun 2005 – 414,767
Tahun 2006 – 433,401
Tahun 2007 – 447,750
Tahun 2008 – 466,404

Notes :

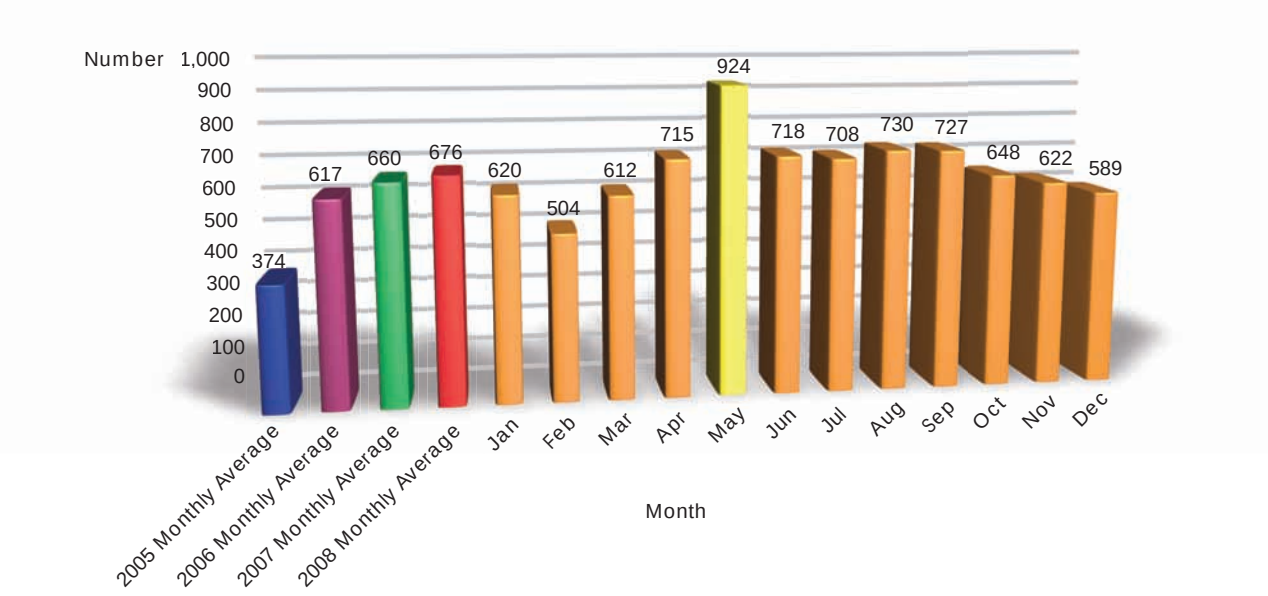
a) Number of Customers :
400,348 (Year 2004)
414,767 (Year 2005)
433,401 (Year 2006)
447,750 (Year 2007)
466,404 (Year 2008)

Di Sarawak, bilangan gangguan bekalan elektrik bagi setiap 1,000 pengguna telah berkurangan sedikit kepada 17.40 gangguan berbanding 17.68 gangguan tahun 2007, iaitu pengurangan sebanyak 1.6%. Walaupun pengurangan yang sedikit, ini menunjukkan prestasi sistem pembekalan di Sarawak bertambah baik berbanding daripada tahun 2007. 77.6% daripada jumlah keseluruhan gangguan tahun 2008 adalah disebabkan oleh gangguan tidak berjadual, manakala 22.4% pula berpunca daripada gangguan berjadual.

In Sarawak, the number of electricity supply interruptions per 1,000 customers reduced slightly by 1.6% to 17.40 interruptions compared 17.68 interruptions in 2007. Almost 77.6% of the total supply interruptions in 2008 were recorded due to unscheduled interruptions, and 22.4% were due to scheduled interruptions.

Gambarajah 29 : Purata Bilangan Gangguan Bekalan Elektrik Bulanan SEB Pada Tahun 2008

Figure 29 : Monthly Average Number of Supply Interruption of SEB in 2008



Walau bagaimanapun, purata bulanan bilangan gangguan bekalan elektrik di Sarawak telah bertambah kepada 676 berbanding 660 tahun 2007. Bilangan gangguan bulan Mei mencatatkan jumlah tertinggi dengan 924 gangguan.

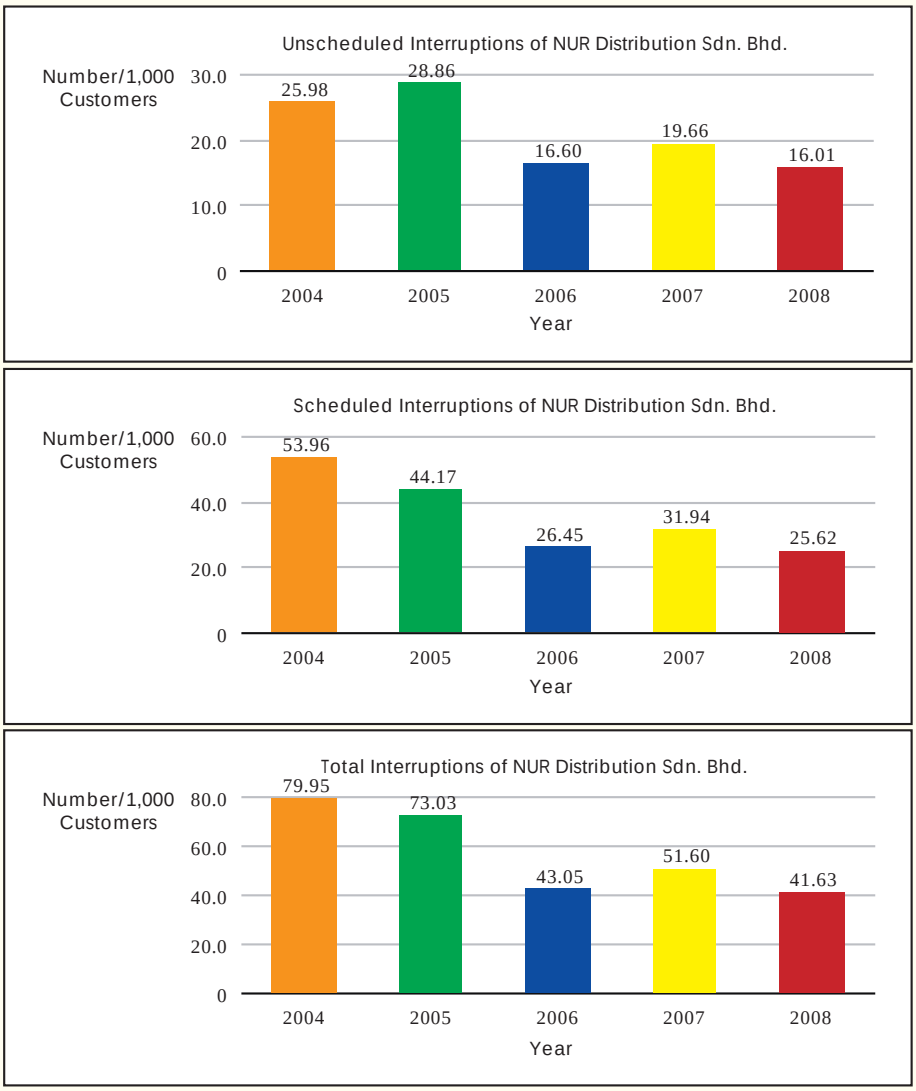
However, the monthly average number of supply interruption increased slightly to 676 compared 660 in 2007. The highest number of interruptions was recorded in May at 924 interruptions.

Statistik Gangguan Bekalan NUR

Gambarajah 30 : Bilangan Gangguan Bekalan Elektrik di Kulim Hi-Tech Park yang dilaporkan oleh NUR Distribution Sdn. Bhd. Pada Tahun 2004 hingga 2008 – Bagi Setiap 1,000 Pengguna

Statistics of Supply Interruptions of NUR

Figure 30 : Number of Electricity Supply Interruption per 1,000 Customers in Kulim Hi-Tech Park Reported by NUR Distribution Sdn. Bhd. For Year 2004 to 2008



Nota :

a) Bilangan pengguna :
Tahun 2004 – 1,501
Tahun 2005 – 1,698
Tahun 2006 – 1,928
Tahun 2007 – 2,035
Tahun 2008 – 2,186

Notes :

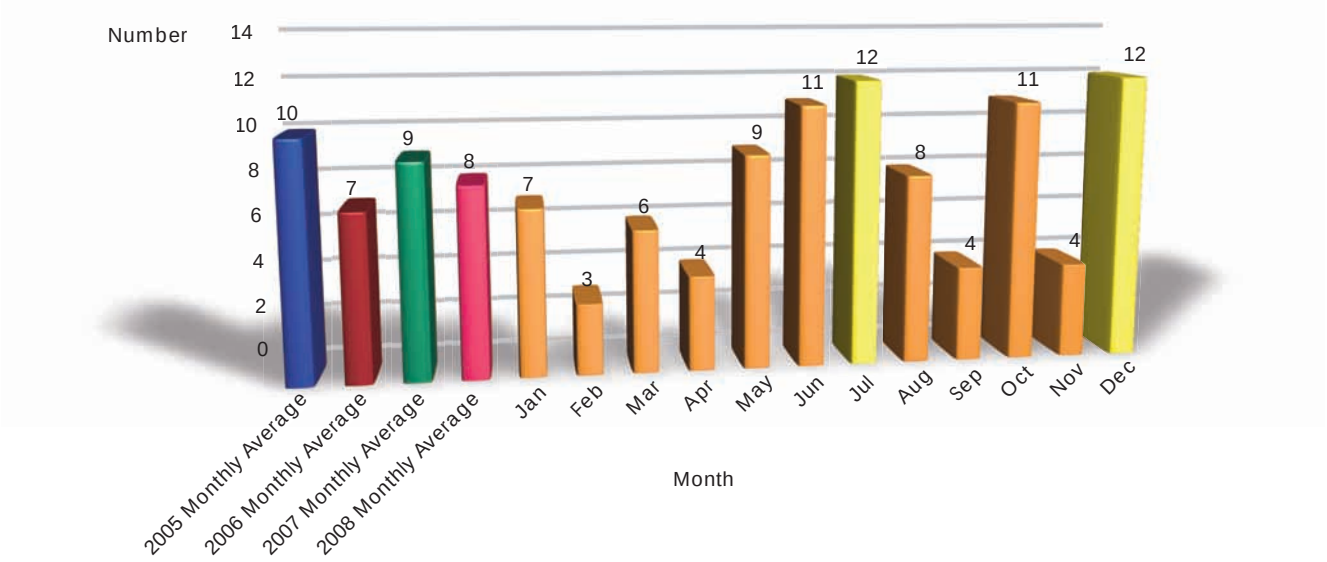
a) Number of Customers :
1,501 (Year 2004)
1,698 (Year 2005)
1,928 (Year 2006)
2,035 (Year 2007)
2,186 (Year 2008)

Pada keseluruhannya bilangan gangguan bekalan elektrik bagi setiap 1,000 pengguna di Kulim Hi-Tech Park (KHTP) yang dilaporkan oleh NUR Distribution Sdn. Bhd. pada tahun 2008 telah berkurangan sebanyak 19.3% daripada 51.60 gangguan tahun 2007 kepada 41.63 gangguan. Ini menunjukkan prestasi sistem pembekalan di KHTP semakin bertambah baik dengan bilangan gangguan telah berkurangan. Peratusan gangguan berjadual dan tidak berjadual telah berkurangan daripada tahun sebelumnya, namun begitu gangguan berjadual masih mencatatkan peratusan tertinggi iaitu 61.5%, manakala gangguan tidak berjadual sebanyak 38.5%.

Overall, the number of supply interruption per 1,000 customers in Kulim Hi-Tech Park (KHTP) reported by NUR Distribution Sdn. Bhd. in 2008 reduced by 19.3% to 41.63 interruptions from 51.60 interruptions in 2007. The percentage of scheduled and unscheduled interruptions was 61.5% and 38.5% respectively.

Gambarajah 31 : Purata Bilangan Gangguan Bekalan Elektrik Bulanan NUR Distribution Sdn. Bhd. Pada Tahun 2008

Figure 31 : Monthly Supply Interruptions of NUR Distribution Sdn. Bhd. in 2008



Purata bulanan bilangan gangguan bekalan elektrik di KHTP telah berkurangan sedikit daripada 9 tahun 2007 kepada 8. Bilangan gangguan pada bulan Julai dan Disember telah mencatatkan bilangan yang tertinggi pada tahun 2008.

The monthly average number of supply interruption in KHTP reduced slightly from 9 in 2007 to 8 in 2008. The highest numbers of interruptions in 2008 were recorded in July and December.

SISTEM PEMBAHAGIAN TNB

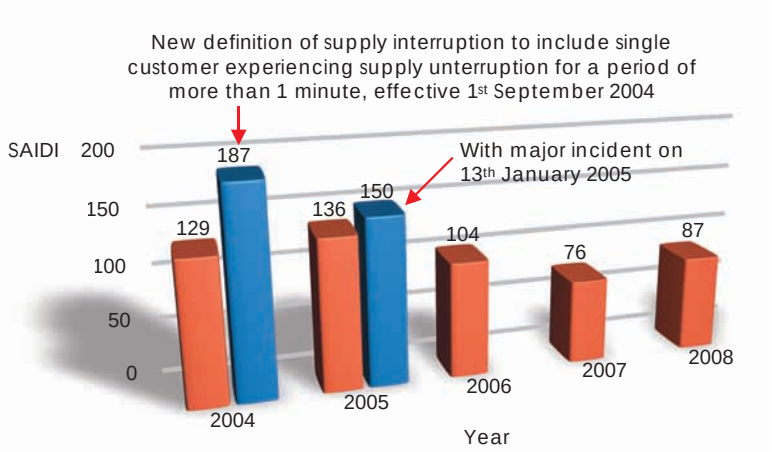
System Average Interruption Duration Index (SAIDI)

DISTRIBUTION SYSTEM OF TNB

System Average Interruption Duration Index (SAIDI)

Gambarajah 32 : SAIDI (Minit/Pelanggan/Tahun) di Semenanjung Malaysia dari tahun 2004 hingga 2008

Figure 32 : SAIDI (Minutes/Customer/Year) in Peninsular Malaysia from the Year 2004 to 2008

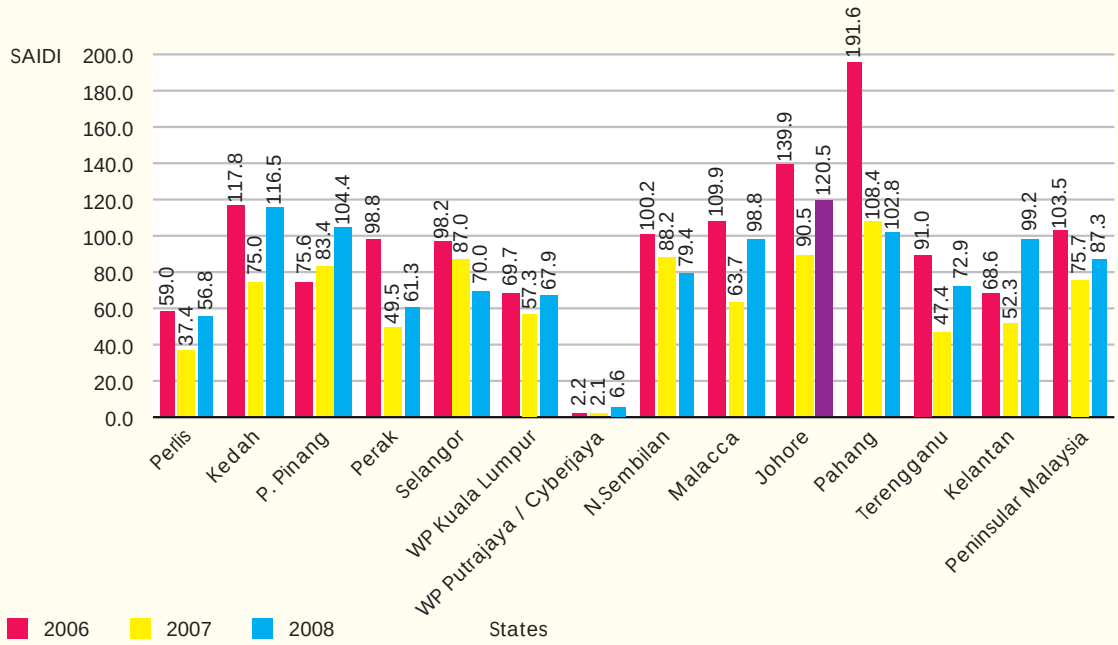


Pada keseluruhannya indeks SAIDI TNB dalam tahun 2008 menunjukkan *trend* pertambahan sebanyak 14.5% daripada 76 minit/pelanggan/tahun kepada 87 minit/pelanggan/tahun. Pertambahan SAIDI ini memberi gambaran bahawa tempoh masa gangguan dalam setahun setiap pelanggan mengalami gangguan bekalan telah bertambah sekaligus menunjukkan prestasi yang menurun sedikit daripada tahun sebelumnya.

The overall SAIDI of TNB in the year 2008 increased by 14.5% to 87 minutes/customer/year from 76 minutes/customer/year in 2007. This means on average every customer experienced an increased in supply interruptions by 11 minutes and thus indicating a slight decline in the performance of supply system compared to previous year.

Gambarajah 33 : SAIDI (Minit/Pelanggan/Tahun) bagi Negeri-Negeri di Semenanjung Malaysia Pada Tahun 2006 Hingga 2008

Figure 33 : SAIDI (Minutes/Customer/Year) for the Various States in Peninsular for Year 2006 to 2008



Pada keseluruhannya kebanyakan SAIDI bagi negeri-negeri di Semenanjung Malaysia pada tahun 2008 telah menunjukkan pertambahan kecuali Selangor, Negeri Sembilan dan Pahang. Negeri Johor telah mencatatkan SAIDI yang tertinggi dalam tahun 2008 iaitu 120.5 minit/pelanggan/tahun berbanding 90.5 minit/pelanggan/tahun pada tahun 2007.

Overall, the SAIDI in all of Peninsula states increased, except for Selangor, N. Sembilan and Pahang. Johor recorded the highest SAIDI at 120.5 minutes/customer/year compared 90.5 minutes/customer/year in 2007.

Jadual 5 : SAIDI TNB dan Utiliti-Utiliti Luar Negara

Table 5 : SAIDI of TNB and Several Utilities in Other Countries

Utility / Country	SAIDI (Minutes/Customer/Year)
Singapore(2008)	1.14
KEPCO (Korea Electric Power Corporation), Korea (2008)	2.2
TEPCO (Tokyo Electric Power Company), Jepun - 2007	4
United Kingdom (2008)	39
Australia – Citipower (2007)	40.33
Thailand – Metropolitan Electric Authority (MEA) - (2007)	50.40
TNB Distribution	87
Spain (2008)	94
Victoria (2007)	165
Australia – Powercor (2007)	161.17
South Australia (2007)	184
Aurora, New Zealand (2008)	192
New South Wales (2007)	211
Tasmania (2007)	256
Sarawak Energy Berhad (SEB)	273
United States (2008)	292 (146 – if major events excluded)
Western Power, Australia (2008)	298
Energex, Queensland, Australia (2008)	330.8
California – Pacific Corp (2008)	931.71 (198.47 if major events excluded)
SESB	1,078

Source : TNB, SESB, SEB and from web sites

System Average Interruption Frequency Index (SAIFI)

Gambarajah 34 : SAIFI (Bil. Gangguan/ Pelanggan/Tahun) di Semenanjung Malaysia Dari Tahun 2004 Hingga 2008

System Average Interruption Frequency Index (SAIFI)

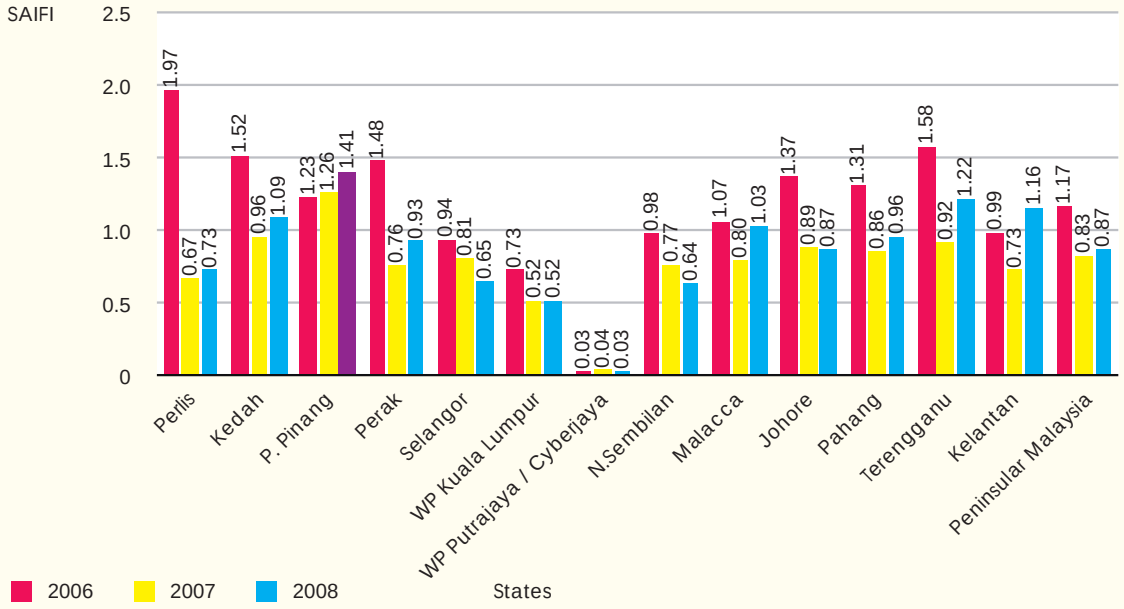
Figure 34 : SAIFI (No's of Interruption/ Customer/Year) in Peninsular Malaysia from the Year 2004 to 2008

Indeks SAIFI tahun 2008 di Semenanjung Malaysia juga telah menunjukkan *trend* pertambahan sedikit daripada 0.83 tahun 2007 kepada 0.87. Peningkatan ini menunjukkan pencapaian SAIFI tahun 2008 telah menurun daripada beberapa tahun sebelumnya.

In 2008, the SAIFI in Peninsular Malaysia also showed an increase in trend from 0.83 in 2007 to 0.87. This reflects a drop in the performance of the supply system compared to the previous year.

Gambarajah 35 : SAIFI (Bil. Gangguan/ Pelanggan/Tahun) bagi Negeri-Negeri di Semenanjung Malaysia Pada Tahun 2006 Hingga 2008

Figure 35 : SAIFI (No's of Interruption/ Customer/Year) for the Various States in Peninsular Malaysia for Year 2006 to 2008



Pada keseluruhannya kebanyakan SAIFI di negeri-negeri di Semenanjung Malaysia dalam tahun 2008 telah menunjukkan pertambahan daripada tahun 2007 kecuali Selangor, N. Sembilan dan Johor. Pulau Pinang telah mencatatkan SAIFI yang lebih tinggi berbanding dengan negeri lain iaitu 1.41. Sementara SAIFI yang terendah adalah bagi WP Putrajaya/Cyberjaya dengan 0.03.

Overall, most states in Peninsular Malaysia showed an increase in SAIFI in 2008 as compared to the previous year, except for Selangor, N. Sembilan and Johor. Pulau Pinang recorded the highest SAIFI compared to other states at 1.41. Meanwhile, WP Putrajaya/Cyberjaya recorded the lowest SAIFI at 0.03.

Gambarajah 36 : Pecahan SAIFI Dan Gangguan Mengikut Tahap Voltan Pada Tahun 2008

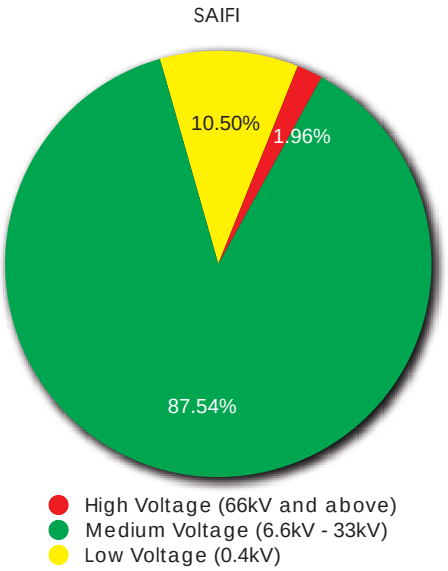
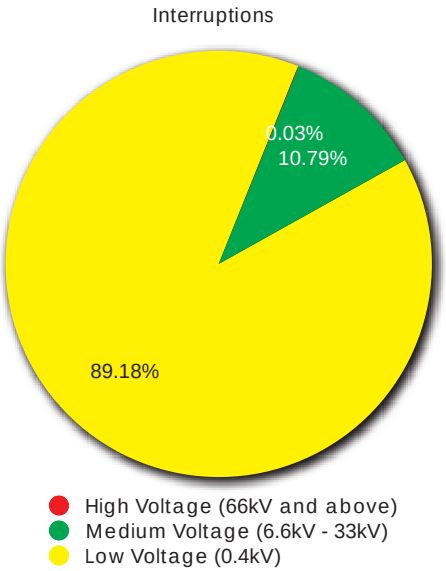


Figure 36 : SAIFI and Interruptions based on supply networks voltages for Year 2008



Berdasarkan analisis SAIFI dan bilangan gangguan mengikut tahap voltan pada tahun 2008 menunjukkan Voltan Sederhana merupakan penyumbang tertinggi kepada SAIFI iaitu 88%, walaupun bilangan gangguan hanya 10.8%. Walau bagaimanapun, Voltan Rendah hanya menyumbang sebanyak 10.5% kepada SAIFI, namun ia merupakan penyumbang paling tinggi kepada bilangan gangguan iaitu sebanyak 89%. Sementara itu Voltan Tinggi hanya menyumbang 1.9% kepada SAIFI dengan bilangan gangguan hanya sebanyak 0.03%.

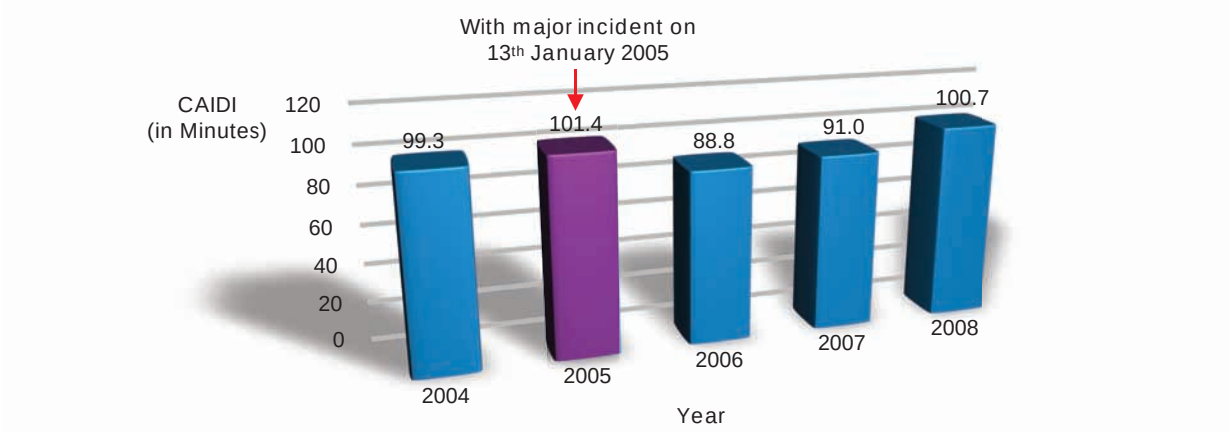
The analysis of SAIFI and the interruptions based on supply network in 2008 shows that the medium voltage supply networks recorded the highest SAIFI at 88%, with the percentage of interruptions at 10.8%. However, the low voltage networks accounted for 10.5% of SAIFI, but high percentage of interruptions at 89%. Meanwhile the high voltage supply networks recorded 1.9% of SAIFI with the percentage of interruptions at only 0.03%.

Customer Average Interruption Duration Index (CAIDI)

Customer Average Interruption Duration Index (CAIDI)

Gambarajah 37 : CAIDI (Minit/Pelanggan Terlibat/Tahun) di Semenanjung Malaysia Dari Tahun 2004 Hingga 2008

Figure 37 : CAIDI (Minutes/Interrupted Customer/Year) in Peninsular Malaysia from the Year 2004 to 2008

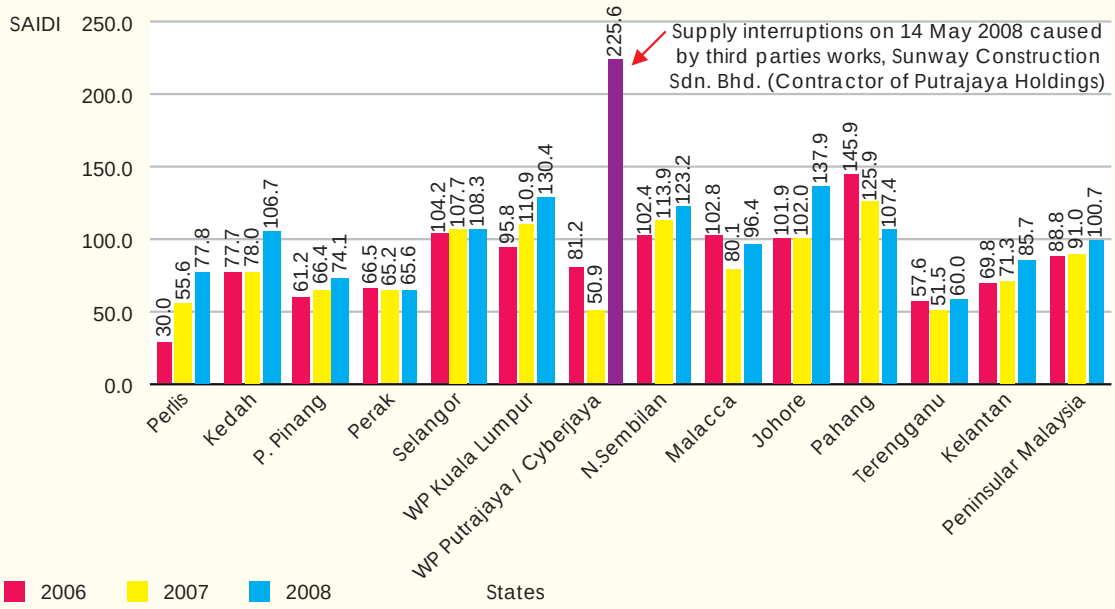


Pencapaian CAIDI di Semenanjung Malaysia pada tahun 2008 adalah 10.7% lebih tinggi daripada pencapaian CAIDI tahun 2007. Ini menunjukkan pertambahan CAIDI memberi gambaran prestasi yang tidak berapa baik, dimana CAIDI yang rendah adalah lebih baik daripada CAIDI yang tinggi.

The CAIDI in Peninsular Malaysia in 2008 was 100.7 i.e 10.7% higher than the CAIDI in 2007. The increased in CAIDI index indicates longer interruption duration and represents longer average time taken by the utility to restore the electricity supply.

Gambarajah 38 : CAIDI (Minit/Pelanggan Terlibat/Tahun) bagi Negeri-Negeri di Semenanjung Malaysia Pada Tahun 2006 Hingga 2008

Figure 38 : CAIDI (Minutes/Interrupted Customer/Year) for the Various States in Peninsular Malaysia for Year 2006 to 2008

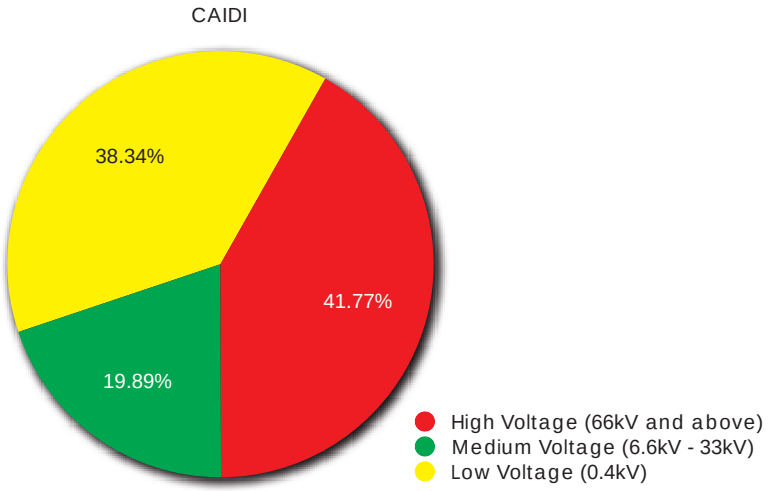


Pada keseluruhannya, kebanyakan negeri-negeri di Semenanjung Malaysia telah menunjukkan pertambahan CAIDI pada tahun 2008 berbanding dua tahun kebelakang. WP Putrajaya/Cyberjaya telah mencatatkan CAIDI yang tertinggi iaitu 225.6 minit. Pertambahan ketara ini disebabkan oleh gangguan bekalan elektrik yang berlaku pada 14 Mei 2008 dalam tempoh masa lebih kurang 8 jam 17 minit yang disebabkan oleh kerja-kerja korekan oleh pihak ketiga iaitu Sunway Construction Sdn. Bhd. (Kontraktor Putrajaya Holdings). Kerja-kerja pengorekan ini telah menyebabkan kedua-dua kabel (keluar-masuk) dari PPU PTJ1 mengalami kerosakan dan menyebabkan keseluruhan kawasan Presint 11A mengalami gangguan bekalan elektrik.

Most of the states in Peninsular Malaysia showed an increase in CAIDI in 2008 as compared to the past two years. WP Putrajaya/Cyberjaya recorded the higher CAIDI at 225.6 minutes. The significant increased in CAIDI was due to an interruption on 14 May 2008 caused by third parties activity, affecting the electricity supply to the whole area of Precint 11A. The interruption lasted for 8 hours and 17 minutes.

Gambarajah 39 : Pecahan CAIDI dan Gangguan Mengikut Tahap Voltan Pada Tahun 2008

Figure 39 : CAIDI based on supply networks voltages for Year 2008



Daripada analisis di antara CAIDI dan bilangan gangguan mengikut tahap voltan pada tahun 2008 menggambarkan masa pemulihan bekalan bagi kerosakan pada Voltan Tinggi masih mencatatkan peratusan yang paling tinggi iaitu 41.8%. Ini diikuti voltan rendah (38.3%) dan voltan sederhana (19.9%).

The CAIDI index in 2008 showed that the duration of interruption was longer at high voltage networks at 41.8% followed by the low voltage and medium voltage networks at 38.3% and 19.9% respectively.

SISTEM PEMBAHAGIAN SESB

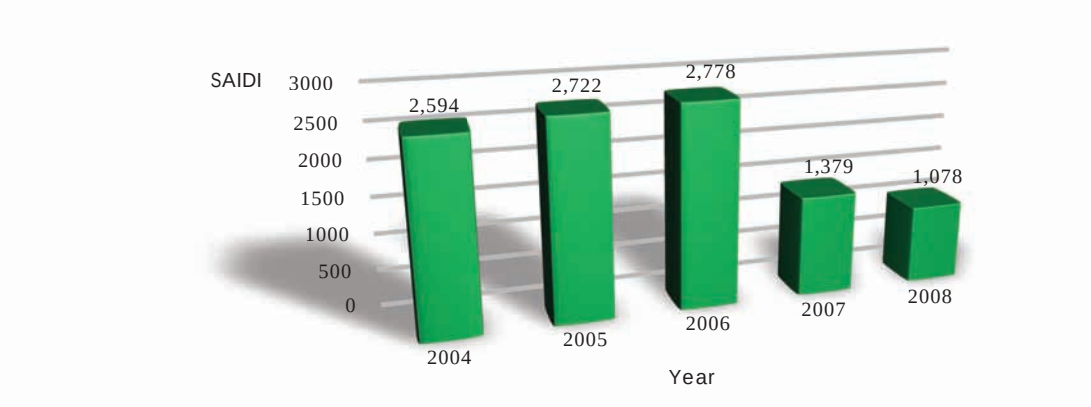
System Average Interruption Duration Index (SAIDI)

DISTRIBUTION SYSTEM OF SESB

System Average Interruption Duration Index (SAIDI)

Gambarajah 40 : SAIDI (Minit/Pelanggan/Tahun) di Negeri Sabah Pada Tahun 2006 Hingga 2008

Figure 40 : SAIDI (Minutes/Customer/Year) for the State of Sabah for Year 2006 to 2008



Nota : SAIDI Pembahagian

Note : Distribution SAIDI

Bermula dari tahun 2007, indeks SAIDI di Sabah telah menunjukkan *trend* menurun. Ini dapat dilihat pada tahun 2008 SAIDI telah berkurangan kepada 1,078 minit/pelanggan/tahun tahun 2008 berbanding 1,379 minit/pelanggan/tahun tahun 2007, iaitu penurunan 21.8%. Ini menunjukkan prestasi pembekalan SESB semakin bertambah baik berbanding dengan beberapa tahun sebelumnya.

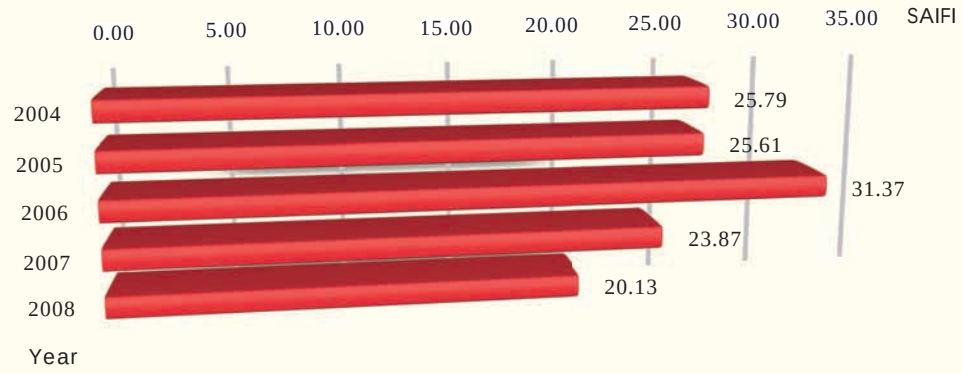
The SAIDI in 2008 dropped by 21.8% to 1,078 minutes/customer/year compared 1,379 minutes/customer/year in 2007. This reflects an improvement in the performance of SESB supply system compared to previous years.

System Average Interruption Frequency Index (SAIFI)

Gambarajah 41 : SAIFI (Bil. Gangguan/Pelanggan/Tahun) di Negeri Sabah Pada Tahun 2004 Hingga 2008

System Average Interruption Frequency Index (SAIFI)

Figure 41 : SAIFI (No. of Interruption/Customer/Year) in Sabah for Year 2004 to 2008



Nota : SAIFI Pembahagian

Note : Distribution SAIFI

Pada keseluruhannya indeks SAIFI di Sabah juga telah menunjukkan *trend* menurun sebanyak 15.7% kepada 20.13 berbanding dengan SAIFI tahun 2007 iaitu 23.87. Pencapaian SAIFI tahun 2008 semakin baik daripada tahun sebelumnya.

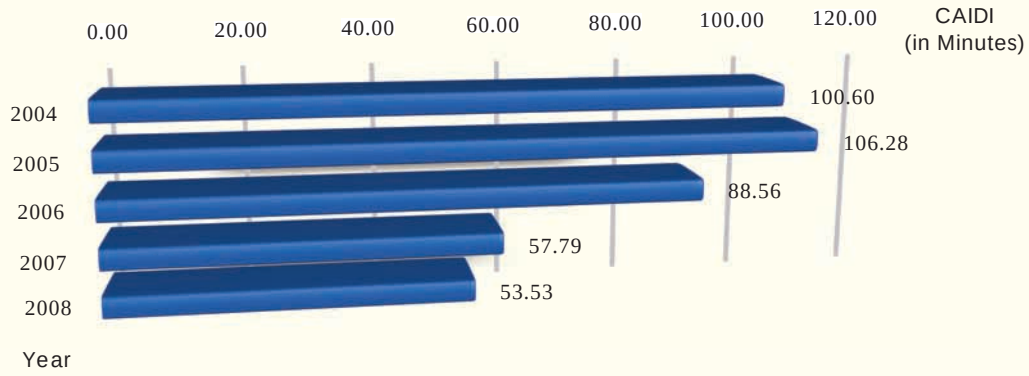
Overall, the SAIFI in Sabah in 2008 improved by 15.7% to 20.13 from 23.87 in 2007.

Customer Average Interruption Duration Index (CAIDI)

Gambarajah 42 : CAIDI (Minit/Pelanggan Terlibat/Tahun) Bulanan di Negeri Sabah Pada Tahun 2004 Hingga 2008

Customer Average Interruption Duration Index (CAIDI)

Figure 42 : CAIDI (Minutes/Interrupted Customer/Year) in Sabah for Year 2004 to 2008



Nota : CAIDI Pembahagian

Note : Distribution CAIDI

Pada keseluruhannya CAIDI di Sabah pada tahun 2008 juga telah menunjukkan *trend* menurun sedikit daripada 57.8 minit tahun 2007 kepada 53.5 minit. Penurunan CAIDI memberi gambaran pencapaian CAIDI tahun 2008 semakin baik berbanding beberapa tahun kebelakang.

The CAIDI in Sabah in 2008 also improved to 53.5 minutes from previous year of 57.8 minutes.

SISTEM PEMBAHAGIAN SARAWAK ENERGY BERHAD (SEB)

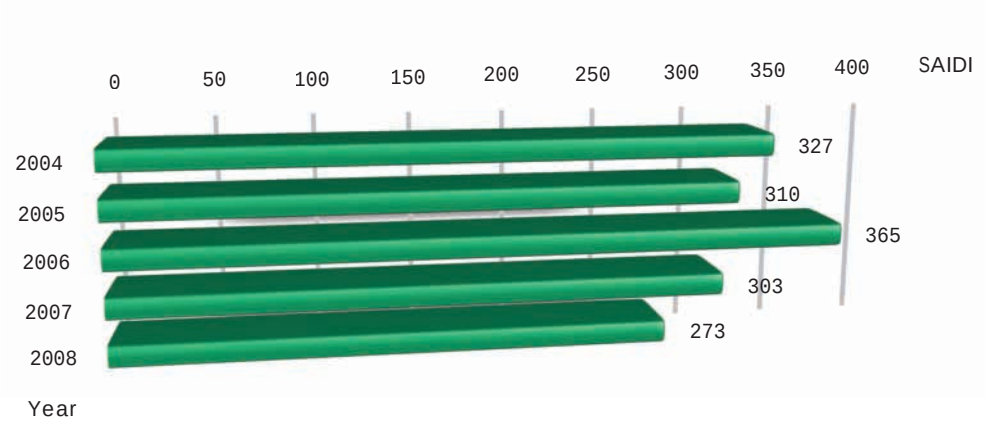
System Average Interruption Duration Index (SAIDI)

Gambarajah 43 : SAIDI (Minit/Pelanggan/Tahun)
SEB Pada Tahun 2004 Hingga 2008

DISTRIBUTION SYSTEM OF SARAWAK ENERGY BERHAD (SEB)

System Average Interruption Duration Index (SAIDI)

Figure 43 : SAIDI (Minutes/Customer/Year) of SEB in Sarawak for Year 2004 to 2008



Prestasi keseluruhan sistem pembekalan SEB di sarawak pada tahun 2008 telah bertambah baik berbanding dengan beberapa tahun sebelumnya. Peningkatan prestasi ini disebabkan oleh indeks SAIDI telah menunjukkan *trend* menurun sebanyak 10.0% kepada 273 minit/ pelanggan/tahun daripada 303 minit/pelanggan/tahun pada tempoh yang sama tahun lepas.

The overall performance of SEB supply system in Sarawak for the year 2008 showed an improvement with its SAIDI reduced by 10% to 273 minutes/customer/year from 303 minutes/customer/ year in 2007.

SISTEM PEMBAHAGIAN NUR

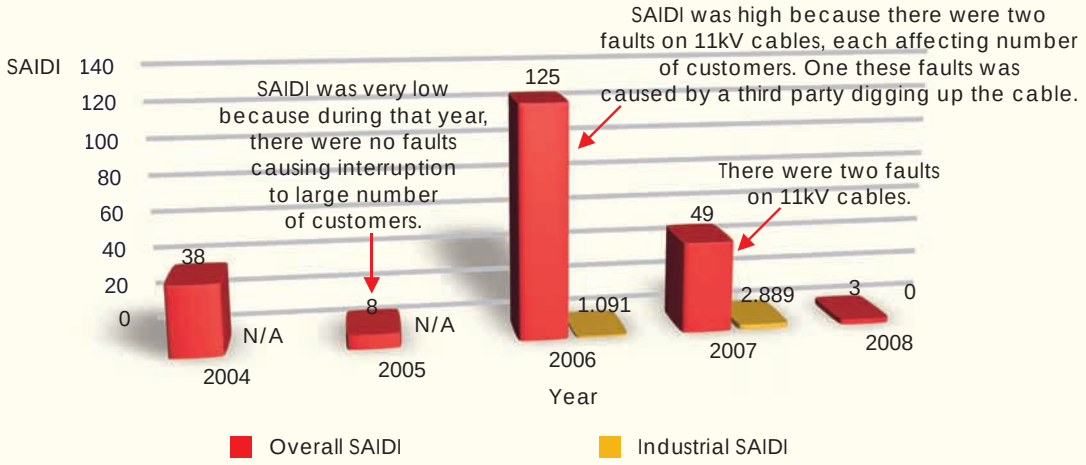
System Average Interruption Duration Index (SAIDI)

Gambarajah 44 : SAIDI (Minit/Pelanggan/Tahun) Keseluruhan dan Industri (untuk Pengguna Voltan Tinggi sahaja) di Kulim Hi-Tech Park yang dilaporkan oleh NUR Distribution Sdn. Bhd. Pada Tahun 2004 hingga 2008

DISTRIBUTION SYSTEM OF NUR

System Average Interruption Duration Index (SAIDI)

Figure 44 : Total SAIDI (Minutes/Customer/Year) and Industrial SAIDI (for High Voltage Customers Only) in Kulim Hi-Tech Park Reported by NUR Distribution Sdn. Bhd. for Year 2004 to 2008



Pada tahun 2008, indeks SAIDI keseluruhan yang dilaporkan di KHTP telah menunjukkan *trend* menurun dengan ketara sekali, iaitu penurunan sebanyak 93.9% daripada 49 minit/pelanggan/tahun kepada 3 minit/pelanggan/tahun. Penurunan SAIDI ini menunjukkan prestasi sistem pembekalan di KHTP semakin bertambah baik/meningkat berbanding dengan beberapa tahun sebelumnya.

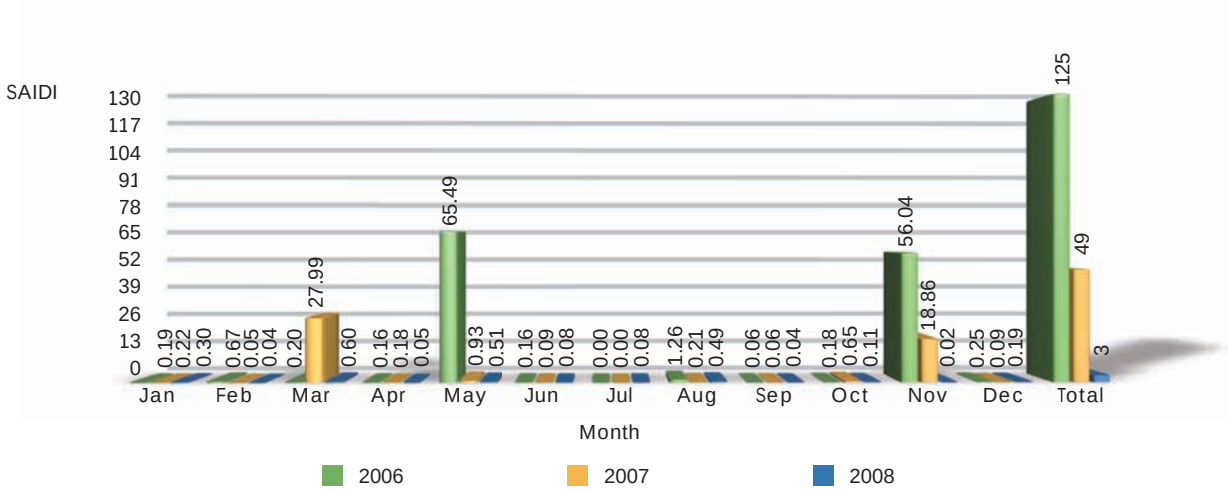
Sementara itu prestasi SAIDI industri (untuk pengguna voltan tinggi sahaja) juga bertambah baik memandangkan tiada pertambahan SAIDI industri dilaporkan dalam tahun 2008.

In 2008, the overall SAIDI reported in KHTP reduced significantly by 93.9% from 49 minutes/customer/year to only 3 minutes/customer/year. This reduction reflects significant improvement in the performance of the supply system in KHTP compared to the previous years.

Meanwhile, the performance of industrial SAIDI (for high voltage customer only) also improved, as there was no interruption reported in 2008.

Gambarajah 45 : SAIDI (Minit/Pelanggan/Tahun) Keseluruhan di KHTP yang dilaporkan oleh NUR Distribution Sdn. Bhd. Pada Tahun 2006 Hingga 2008

Figure 45 : Monthly SAIDI (Minutes/Customer/Year) in KHTP Reported by NUR Distribution Sdn. Bhd. for Year 2006 to 2008



Pada keseluruhannya SAIDI bulanan di KHTP kebanyakannya tidak menunjukkan peningkatan yang ketara dimana semuanya berada dalam kedudukan SAIDI yang rendah. SAIDI paling tinggi telah dicatatkan pada bulan Ogos iaitu 0.49 minit/pelanggan/tahun.

Overall, most of the monthly SAIDI in KHTP did not show a significant increase. The highest SAIDI in 2008 was recorded in the month of August at 0.49 minutes/ customer/year.

PUNCA GANGGUAN BEKALAN ELEKTRIK

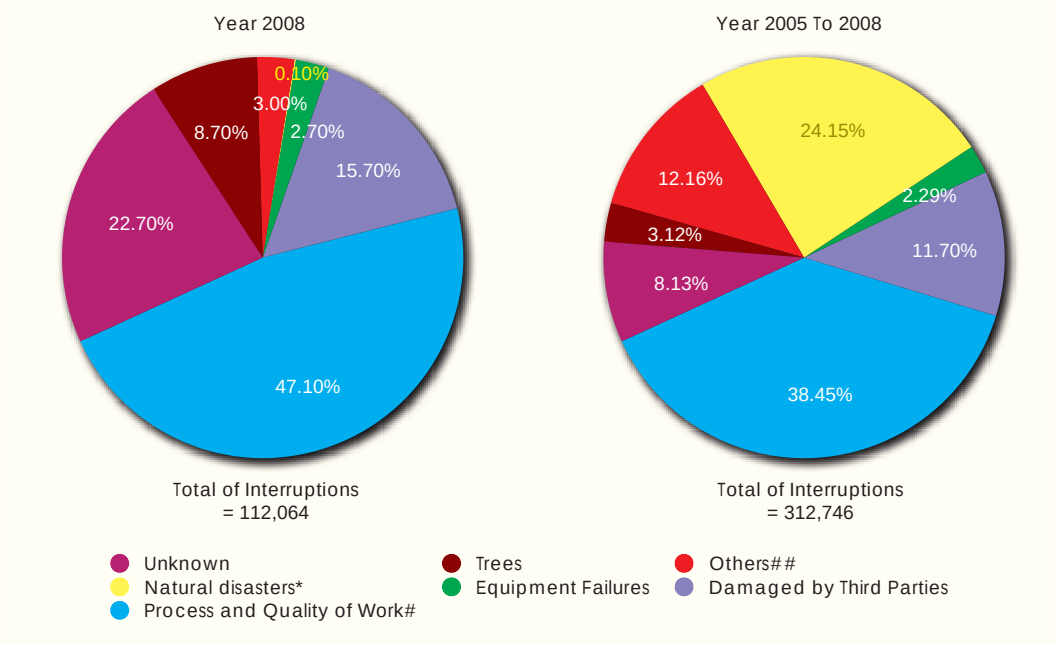
Punca Gangguan TNB

Gambarajah 46 : Punca-Punca Gangguan Bekalan Elektrik Tidak Berjadual di Semenanjung Malaysia

CAUSES OF ELECTRICITY SUPPLY INTERRUPTIONS

Causes of Interruptions - TNB

Figure 46 : Causes of Unscheduled Electricity Supply Interruptions in Peninsular Malaysia



Nota :

a) * (angin, ribut, banjir, tanah runtuh dan lain-lain)
(sambungan tidak baik, mutu kerja, beban lampau dan senggaraan)
(Pepasangan kena langgar, kecacatan rekabentuk, kerosakan geganti, *transient overload*, *shorting*, pencerobohan/perbuatan khianat, kesalahan operasi/tatahan)

b) Jumlah gangguan bekalan elektrik tidak berjadual di Semenanjung Malaysia dari tahun 2005 hingga 2007 :
Tahun 2005 : 71,101
Tahun 2006 : 55,523
Tahun 2007 : 74,058

Notes :

*a) * (wind, storm, flood, land slides, etc.)*
 # (loose contact, quality of work, overloading and maintenance)
(ageing of insulation, design defect, relay malfunction, transient overload, encroachment/vandalism, maloperation of protection)

b) Total unscheduled interruptions in Peninsular Malaysia from Year 2005 to 2007 :
71,101 (Year 2005)
55,523 (Year 2006)
74,058 (Year 2007)

Pada tahun 2008, jumlah gangguan tidak berjadual telah bertambah dengan begitu ketara sekali kepada 112,064, iaitu pertambahan sebanyak 51.3% berbanding 74,058 tahun 2007. Gangguan yang paling banyak direkodkan adalah berpunca daripada sambungan tidak baik, mutu kerja, beban lampau dan senggaraan dengan 47.1%. Punca kedua yang tertinggi disebabkan oleh gangguan yang tidak diketahui sebanyak 22.7%.

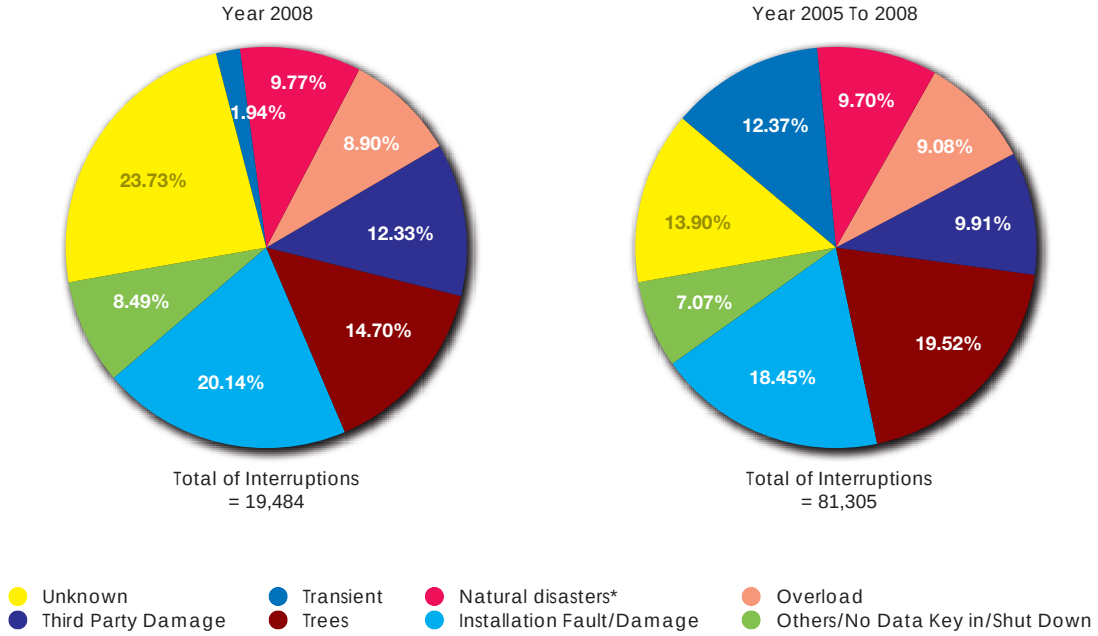
Daripada analisis punca-punca gangguan tidak berjadual dari tahun 2005 hingga 2008, didapati gangguan yang berpunca daripada sambungan tidak baik, mutu kerja, beban lampau dan senggaraan telah merekodkan bilangan yang paling banyak berbanding dengan lain-lain punca iaitu 38.5%.

The total unscheduled interruptions in 2008 increased significantly to 112,064, i.e. a 51.3% from 74,058 in 2007. Interruptions due to fault in the network such as loose contacts, quality of work, overloading and inadequate maintenance recorded the highest cases at 47.1% and followed by interruptions due to unknown faults at 22.7%.

Based on analysis of unscheduled interruptions causes from the year 2005 to 2008, it can be seen that interruptions due to loose contact, quality of work, overloading and inadequate maintenance recorded the highest cases at 38.5% compared to others causes.

Punca Gangguan SESB

Gambarajah 47 : Punca-Punca Gangguan Bekalan Elektrik Tidak Berjadual Pada Sistem SESB



Nota :

a) * (angin, ribut, banjir, tanah runtuh dan lain-lain)

b) Jumlah gangguan bekalan elektrik tidak berjadual di Sabah dari tahun 2005 hingga 2007 :
Tahun 2005 : 19,379
Tahun 2006 : 22,436
Tahun 2007 : 20,006

Di Sabah, jumlah gangguan tidak berjadual telah berkurangan sedikit daripada 20,006 tahun 2007 kepada 19,484 tahun 2008. Gangguan yang paling banyak direkodkan adalah berpunca daripada punca yang tidak diketahui dengan 23.7%. Manakala punca kedua tertinggi disebabkan oleh kerosakan/kesalahan pemasangan iaitu 20.1%.

Daripada analisis punca-punca gangguan tidak berjadual dari tahun 2005 hingga 2008 menunjukkan gangguan yang berpunca daripada pokok telah merekodkan bilangan yang paling banyak dengan peratusan 19.5%. Sementara itu, punca kedua tertinggi disebabkan oleh kerosakan/ kesalahan pemasangan dengan peratusan 18.5%.

Causes of Interruptions – SESB

Figure 47 : Causes of Unscheduled Electricity Supply Interruptions in SESB's System

Notes :

*a) * (wind, storm, flood, land slides, etc.)*

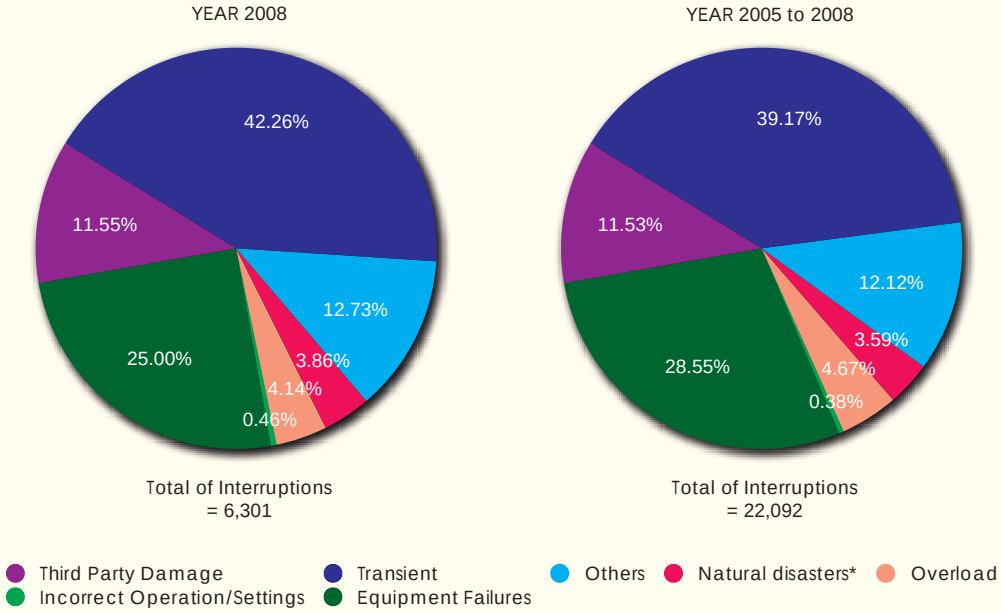
b) Total unscheduled interruptions in Sabah from Year 2005 to 2007 :
19,379 (Year 2005)
22,436 (Year 2006)
20,006 (Year 2007)

In Sabah, the total of unscheduled interruptions decreased slightly from 20,006 in 2007 to 19,484 in 2008. Interruptions due to unknown causes recorded the highest cases at 23.7% and followed by interruptions due to installation fault/ damage at 20.1%.

Analysis of unscheduled interruptions causes in 2005 to 2008 shows that the interruptions due to trees recorded the highest percentage at 19.5%. This was followed by interruptions due to installation fault/damage at 18.5%.

Punca Gangguan Sarawak Energy Berhad (SEB)

Gambarajah 48 : Punca-Punca Gangguan Bekalan Elektrik Tidak Berjadual SEB



Nota :

a) * (angin, ribut, banjir, tanah runtuh dan lain-lain)

b) Jumlah gangguan bekalan elektrik tidak berjadual di Sarawak dari tahun 2005 hingga 2007 :
Tahun 2005 : 3,023
Tahun 2006 : 6,279
Tahun 2007 : 6,489

Pada keseluruhannya, jumlah punca-punca gangguan tidak berjadual di Sarawak pada tahun 2008 telah berkurangan sedikit daripada 6,489 kepada 6,301. Gangguan yang paling banyak direkodkan adalah berpunca daripada ubahtika *(transient)* dengan peratusan 42.3%. Punca kedua tertinggi adalah disebabkan oleh kerosakan peralatan dengan peratusan 25.0%.

Daripada analisis punca-punca gangguan tidak berjadual dari tahun 2005 hingga 2008 menunjukkan gangguan yang berpunca daripada ubahtika *(transient)* telah merekodkan bilangan yang tertinggi dengan peratusan 39.2%. Manakala punca kedua tertinggi disebabkan oleh kerosakan peralatan sebanyak 28.6%.

Causes of Interruptions – Sarawak Energy Berhad (SEB)

Figure 48 : Causes of Unscheduled Electricity Supply Interruptions in Sarawak

Notes :

*a) * (wind, storm, flood, land slides, etc.)*

b) Total unscheduled interruptions in Sarawak from Year 2005 to 2007 :
3,023 (Year 2005)
6,279 (Year 2006)
6,489 (Year 2007)

Overall, the total unscheduled interruptions in Sarawak for the year 2008 decreased slightly from 6,489 to 6,301. Interruptions due to transient faults recorded the highest percentage at 42.3% and followed by interruptions due to equipment failures at 25.0%.

Analysis of unscheduled interruptions causes in 2005 to 2008 shows that the interruptions due to transient faults remained the highest cause at 39.2%. This was followed by interruptions due to equipment failures at 28.6%.

Punca Gangguan Pengagih Bekalan Elektrik Lain

Jadual 6 : Punca-Punca Gangguan Bekalan Elektrik Tidak Berjadual yang dilaporkan oleh Pelesen-Pelesen Pengagihan Elektrik Selain daripada TNB dan SESB Pada Tahun 2006 Hingga 2008

Causes of Interruptions – Other Electricity Distributors

Table 6 : Causes of Unscheduled Electricity Supply Interruptions Reported by Electricity Distribution Apart from TNB and SESB for Year 2006 to 2008

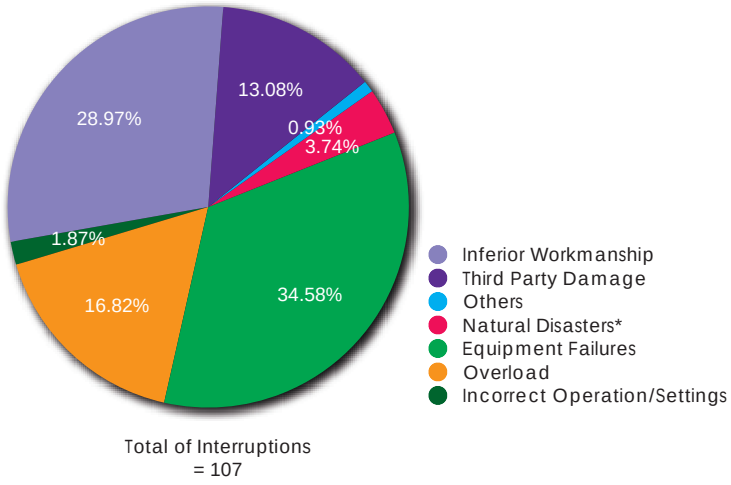
Unscheduled Causes of Interruptions	K.K.I.P Power Sdn. Bhd.			NUR Distribution Sdn. Bhd.		
	2006	2007	2008	2006	2007	2008
Natural Disasters (wind, storm, flood, land slides, etc.)	0	0	0	1	2	1
Equipment Failures	2	5	2	14	14	9
Overload	0	0	0	4	8	6
Incorrect Operation / Settings	0	0	1	1	1	0
Inferior Workmanship	0	0	0	7	9	15
Third Party Damage	25	23	23	5	5	4
Others	0	0	0	0	1	0
Total Number	27	28	26	32	40	35

Jumlah punca-punca gangguan tidak berjadual yang dilaporkan oleh K.K.I.P dan NUR Distribution telah gan daripada tahun sebelumnya. Pada tahun 2008, gangguan yang paling banyak direkodkan di K.K.I.P adalah berpunca daripada kerosakan oleh pihak ketiga, manakala gangguan yang disebabkan oleh *inferior workmanship* merupakan gangguan paling banyak dilaporkan oleh NUR.

The total unscheduled interruptions reported by K.K.I.P and NUR Distribution reduced slightly from the previous years. In 2008, the major causes reported in K.K.I.P were due to the work by third parties causing damage to the distribution system, while NUR recorded the highest of interruptions due to inferior workmanship.

Gambarajah 49 : Punca-Punca Gangguan Bekalan Elektrik Tidak Berjadual NUR Distribution Pada Tahun 2006 Hingga 2008

Figure 49 : Causes of Unscheduled Electricity Supply Interruptions of NUR Distribution for Year 2006 to 2008



Note : *(wind, storm, flood, land slides, etc.)

Daripada analisis punca-punca gangguan tidak berjadual dari tahun 2006 hingga 2008 menunjukkan gangguan yang berpunca daripada kerosakan peralatan telah merekodkan bilangan yang paling tinggi dengan peratusan 34.6%. Sementara itu, punca kedua tertinggi disebabkan oleh *inferior workmanship* sebanyak 29.0%.

From analysis of unscheduled interruptions causes in 2006 to 2008 shows that the interruptions due to equipment failures recorded the highest number percentage at 34.6%. This was followed by interruptions due to inferior workmanship at 29.0%.

KUALITI BEKALAN

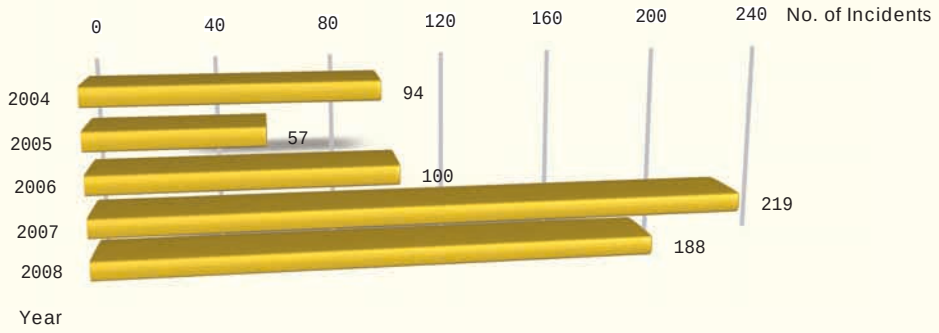
Kejadian Voltan Luarbiasa

Gambarajah 50 : Kejadian Voltan Luarbiasa yang di laporkan Pada Tahun 2004 hingga 2008

VOLTAGE QUALITY

Incidents of Overvoltage

Figure 50 : Overvoltage Incidents Reported for Year 2004 to 2008

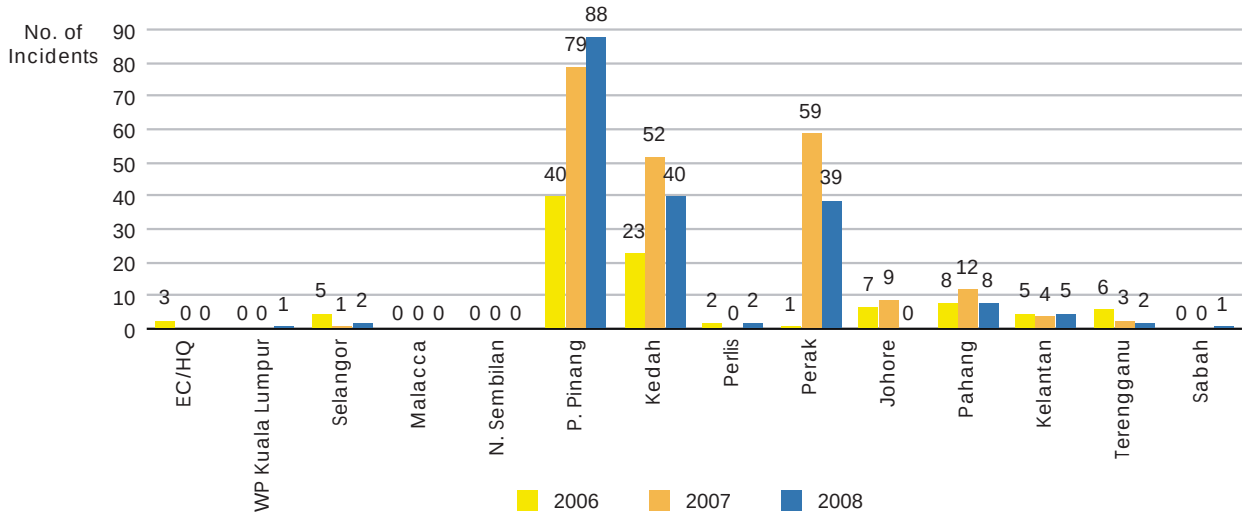


Kebanyakan punca-punca utama yang menyebabkan kejadian voltan luarbiasa adalah berpunca daripada *Insulation Piercing Connector* (IPC) pengalir neutral longgar dan terbakar di tiang, pengalir neutral tercabut/terputus akibat dilanggar oleh kenderaan atau dahan pokok patah dan menimpa talian serta pencawang elektrik telah diceroboh dan busbar neutral dicuri. Sehingga Disember 2008, sejumlah 188 kejadian voltan luarbiasa telah diterima oleh Suruhanjaya Tenaga melalui Pejabat-Pejabat Kawasan. Ini menunjukkan bilangan kejadian telah mencatatkan penurunan sebanyak 14.2% berbanding 219 tahun 2007.

Most of the major causes of overvoltage incidents were missing earth copper connection due to theft, fouling trees on the lines, loose connection due to poor insulating piercing connector etc. As of end December 2008, a total of 188 incidents of overvoltage complain were received by the Energy Commission through the region offices.

Gambarajah 51 : Bilangan Kejadian Voltan Luarbiasa yang dilaporkan bagi Negeri-Negeri di Semenanjung Malaysia dan Sabah Pada Tahun 2006 Hingga 2008

Figure 51 : Number of Incidents of Overvoltage Reported in Various States in Peninsular Malaysia and Sabah for Year 2006 to 2008



Pada keseluruhannya, Pulau Pinang masih lagi mencatatkan bilangan kejadian voltan luarbiasa yang paling banyak dalam tahun 2008 dengan 88 kejadian. Perak dan Kedah telah merekodkan bilangan kejadian yang banyak berbanding dengan negeri-negeri lain, namun begitu bilangan kejadian tersebut telah berkurangan daripada tahun sebelumnya.

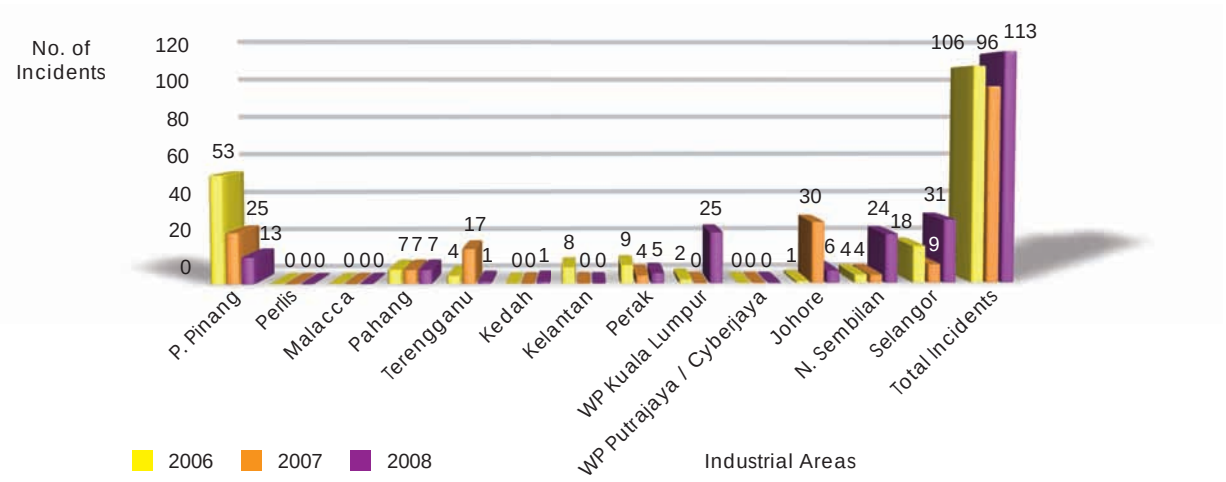
Overall, Pulau Pinang recorded the highest number of overvoltage incidents in 2008 with 88 incidents. Perak and Kedah recorded higher number of incidents compared to other states, nevertheless the number of incidents decreased from the previous year.

INSIDEN *VOLTAGE DIPS* DI SISTEM TNB

Voltage Dips in TNB's Supply System

Gambarajah 52 : Bilangan Insiden *Voltage Dips* yang dilaporkan di Kawasan-Kawasan Perindustrian Utama di Semenanjung Malaysia Pada Tahun 2006 Hingga 2008

Figure 52 : Number of Voltage Dip Incidents Reported in Major Industrial Estates in Peninsular Malaysia for Year 2006 to 2008

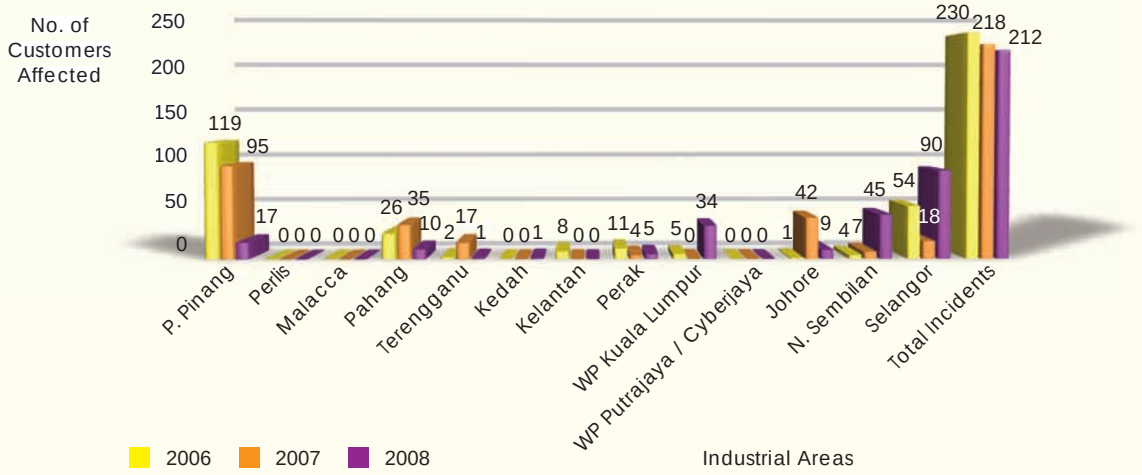


Bilangan insiden *voltage dips* yang dilaporkan di kawasan perindustrian utama di Semenanjung Malaysia pada tahun 2008 telah mencatatkan pertambahan 17.7% kepada 113 kejadian berbanding 96 kejadian tahun 2007. Selangor dan WP Kuala Lumpur telah mencatatkan bilangan insiden *voltage dips* yang paling banyak masing-masing 31 dan 25 kejadian.

The number of voltage dip incidents reported in major industrial areas in Peninsular Malaysia in 2008 was 113 incidents, which is an increase of 17.7% over the 96 incidents in 2007. Selangor and WP Kuala Lumpur recorded the highest number of voltage dip incidents with 31 and 25 incidents respectively.

Gambarajah 53 : Bilangan Pengguna Terlibat dalam Insiden *Voltage Dips* Pada Tahun 2006 Hingga 2008

Figure 53 : Number of Customers in the Major Industrial Estates Affected by Voltage Dips for Year 2006 to 2008



Sejumlah 212 pengguna terlibat dilaporkan semasa kejadian insiden *voltage dips* tahun 2008. Ini menunjukkan bilangan pengguna terlibat telah berkurangan sedikit berbanding 218 untuk tempoh yang sama tahun lepas.

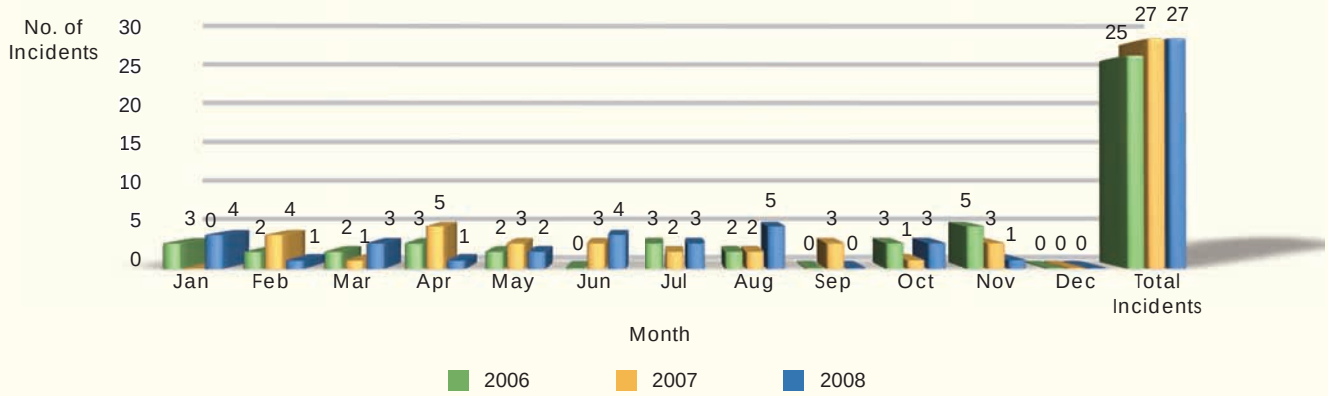
A total of 212 consumers were reported to be affected by the incidents in 2008, compared to 218 consumers for the same period in the previous year.

INSIDEN *VOLTAGE DIPS* KHTP

Voltage Dips In KHTP Supply System

Gambarajah 54 : Bilangan Insiden *Voltage Dips* di Kulim Hi Tech Park (KHTP) yang dilaporkan oleh NUR Distribution Sdn. Bhd. Dari Tahun 2006 Hingga 2008

Figure 54 : Number of Voltage Dip Incidents in Kulim Hi-Tech Park (KHTP) from the Year 2006 to 2008

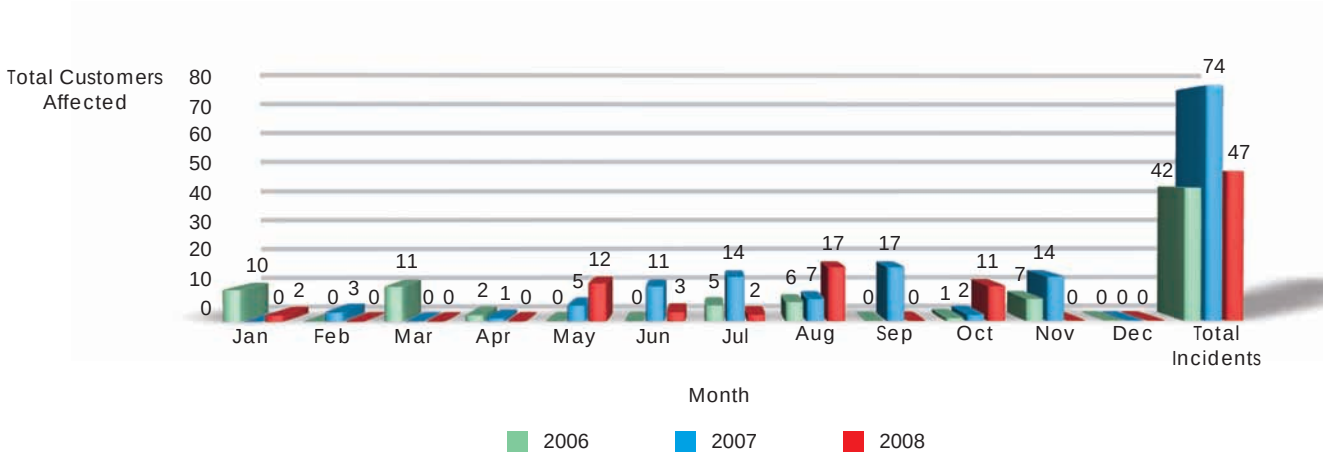


Pada tahun 2008, bilangan insiden *voltage dips* di KHTP yang dilaporkan tidak menunjukkan pertambahan daripada tahun 2007. Pada keseluruhannya, kebanyakan bilangan insiden bulanan telah menunjukkan pertambahan dengan insiden pada bulan Ogos telah mencatatkan bilangan yang tertinggi dengan 5 insiden berbanding dengan bulan-bulan yang lain.

In 2008, the number of voltage dip incidents in KHTP recorded approximately the same figure as in 2007. The highest number of incidents was recorded in August with 5 incidents.

Gambarajah 55 : Bilangan Pengguna Terlibat dalam Insiden *Voltage Dips* Dari Tahun 2006 Hingga 2008

Figure 55 : Number of Customers in KHTP Affected by Voltage Dips from the Year 2006 to 2008

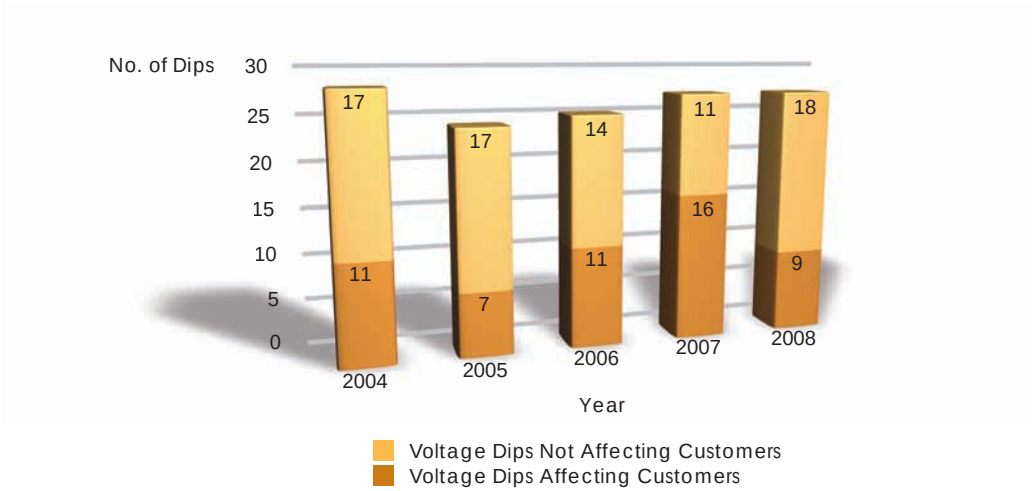


Walau bagaimanapun, bilangan pengguna yang terlibat di KHTP dalam insiden *voltage dips* telah berkurangan 36.5% daripada 74 tahun 2007 kepada 47. Bilangan pengguna terlibat yang paling tinggi telah direkodkan dalam bulan Ogos dengan 17 pengguna.

However, the number of customers affected by the voltage dip dropped by 36.5% to 47 from 74 in 2007. The highest number of customers affected was recorded in August at 17 customers.

Gambarajah 56 : Pecahan Bilangan Insiden *Voltage Dips* yang Melibatkan Pengguna dan Tidak Melibatkan Pengguna Pada Tahun 2004 Hingga 2008

Figure 56 : Number of Voltage Dips Incidents Affecting Customers and Not Affecting Customers from the Year 2004 to 2008

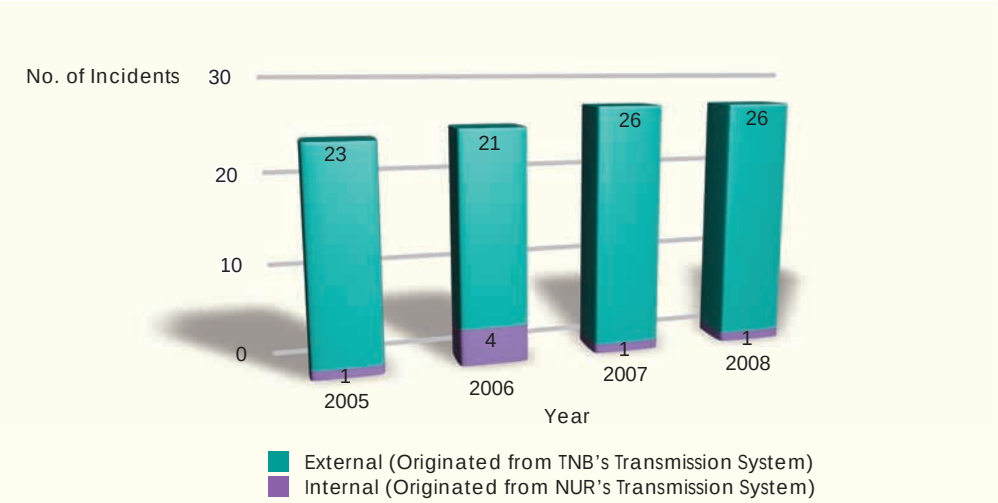


Sepanjang tahun 2008 menunjukkan bilangan insiden *voltage dips* yang melibatkan pengguna telah berkurangan sebanyak 43.8% daripada 16 insiden tahun 2007 kepada 9 insiden. Sementara itu, bilangan insiden *voltage dips* yang tidak melibatkan pengguna pula telah bertambah kepada 18 insiden berbanding 11 insiden tahun 2007.

In 2008, the number of voltage dip incidents affecting customers decreased by 43.8% to 9 incidents from 16 incidents in 2007. However, the number of voltage dip incidents not affecting customers increased to 18 incidents from 11 incidents in 2007.

Gambarajah 57 : Insiden *Voltage Dips* yang dilaporkan Menjejaskan Bekalan Kepada Pengguna

Figure 57 : Incidents of Voltage Dips Affecting Consumers in KHTP



Dalam tahun 2008, tiada pertambahan bilangan insiden *voltage dips* yang menjejaskan bekalan kepada pengguna dilaporkan di KHTP. Namun begitu, bilangan insiden *voltage dips* yang berpunca daripada sistem grid TNB masih merekodkan bilangan yang tertinggi berbanding dengan insiden pada sistem pengagihan NUR.

In 2008, there number of voltage dip incidents affecting consumers reported in KHTP remained the same with the figures in 2007. However, the number of voltage dips incidents originating from TNB's transmission system still recorded the highest number compared with the incidents originated from NUR's distribution system itself.

KUALITI PERKHIDMATAN

Laporan Pematuhan Standard-Standard Prestasi Perkhidmatan

Pihak utiliti terutamanya TNB (Syarat 15), SESB (Syarat 42) dan NUR (Syarat 34) perlu mengemukakan laporan prestasi perkhidmatan kepada Suruhanjaya Tenaga setiap tahun seperti yang dikehendaki dalam syarat-syarat dan terma-terma lesen yang ditetapkan seperti di Lampiran I, Lampiran II dan Lampiran III. Pada tahun 2008, SESB dan NUR telah mengemukakan laporan prestasi perkhidmatan pelanggan dengan menggunapakai standard prestasi yang baru yang mengandungi 20 perkara perkhidmatan. Namun begitu, laporan prestasi perkhidmatan pelanggan yang dikemukakan oleh TNB masih lagi menggunapakai standard prestasi perkhidmatan yang lama yang mengandungi 15 perkara perkhidmatan.

Pada keseluruhannya, berdasarkan kepada penilaian dan penganalisisan ke atas laporan prestasi perkhidmatan pelanggan yang dikemukakan oleh utiliti menunjukkan tahap prestasi pembekalan TNB, SESB dan NUR ada menunjukkan peningkatan serta semakin bertambah baik dibandingkan dengan prestasi tahun-tahun sebelumnya. Walau bagaimanapun, pihak utiliti perlu meningkatkan usaha serta memberi perhatian yang sewajarnya supaya dapat memberikan perkhidmatan yang bermutu serta berkualiti kepada pengguna-pengguna di Semenanjung Malaysia.

QUALITY OF SERVICES

Annual Performance Report on Customer Services

As stipulated under the license conditions, TNB (condition 15), SESB (condition 42) and NUR (condition 34) are required to submit annual report on the performance of customer services to the Energy Commission as shown in Appendix I, Appendix II and Appendix III. In 2008, SESB and NUR submitted annual report on the performance of customer services using the new standard which covers 20 types of services. However, the report submitted by TNB was still using the old standard of performance of customer services which covers 15 types of services.

Overall, based on the assessment and analysis of the report on the performance of customer services submitted by the major utilities showed that the performance level of services of TNB, SESB and NUR were improving compared with the performance of previous year.

ADUAN YANG DITERIMA OLEH SURUHANJAYA TENAGA

COMPLAINTS RECEIVED BY ENERGY COMMISSION

Jadual 7 : Bilangan dan Jenis Pengaduan yang diterima oleh Suruhanjaya Tenaga Pada Tahun 2005 Hingga 2008

Table 7 : Number and Type of Complaints Received by the Energy Commission for Year 2005 to 2008

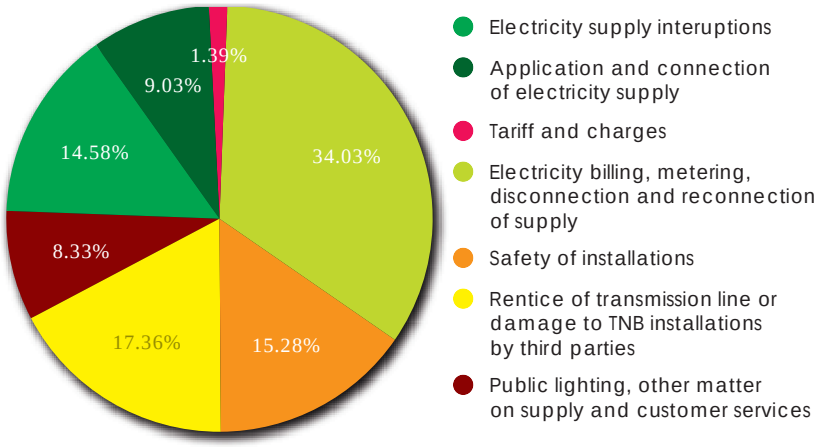
Electricity Supply Services				
Issues	No. of Complaints Received			
	2005	2006	2007	2008
Electricity supply interruptions	31	33	31	21
Application and connection of electricity supply	21	18	9	13
Tariff and charges	14	37	16	2
Electricity billing, metering, disconnection and reconnection of supply	12	39	16	49
Safety of installations	5	10	33	22
Rentice of transmission line or damage to TNB installations by third parties	16	19	19	25
Public lighting, other matter on supply and customer services	18	34	23	12
TOTAL	117	190	147	144
Quality of Supply				
Overvoltage	57	100	219	188
Power quality (dips, surges etc.)	3	4	6	2
TOTAL	60	104	225	190
OVERALL TOTAL	177	294	372	334

Sepanjang tahun 2008 Suruhanjaya menerima sebanyak 334 aduan iaitu merangkumi 144 aduan perkhidmatan pembekalan dan 190 aduan kualiti bekalan elektrik. Jumlah keseluruhan aduan yang dilaporkan pada tahun 2008 didapati telah berkurangan 10.2% daripada 372 aduan tahun 2007. Walau bagaimanapun, aduan berkaitan kualiti bekalan terutamanya aduan kejadian voltan luarbiasa telah mencatatkan bilangan paling banyak diterima pada setiap tahun berbanding aduan berkaitan perkhidmatan pembekalan TNB.

In the year 2008, the Energy Commission received a total of 334 complaints, of which 144 complaints were on supply services and 190 complaints were on quality of supply issues. The total complaints reported in 2008 reduced by 10.2% from 372 complaints in 2007. However, complaints regarding quality of supply issues mainly on overvoltage incidents were the highest number received in every years compared with other complaints.

Gambarajah 58 : Statistik Aduan Perkhidmatan Pembekalan Elektrik yang diterima Pada Tahun 2008

Figure 58 : Statistics of Complaints of Electricity Supply Services Received in 2008

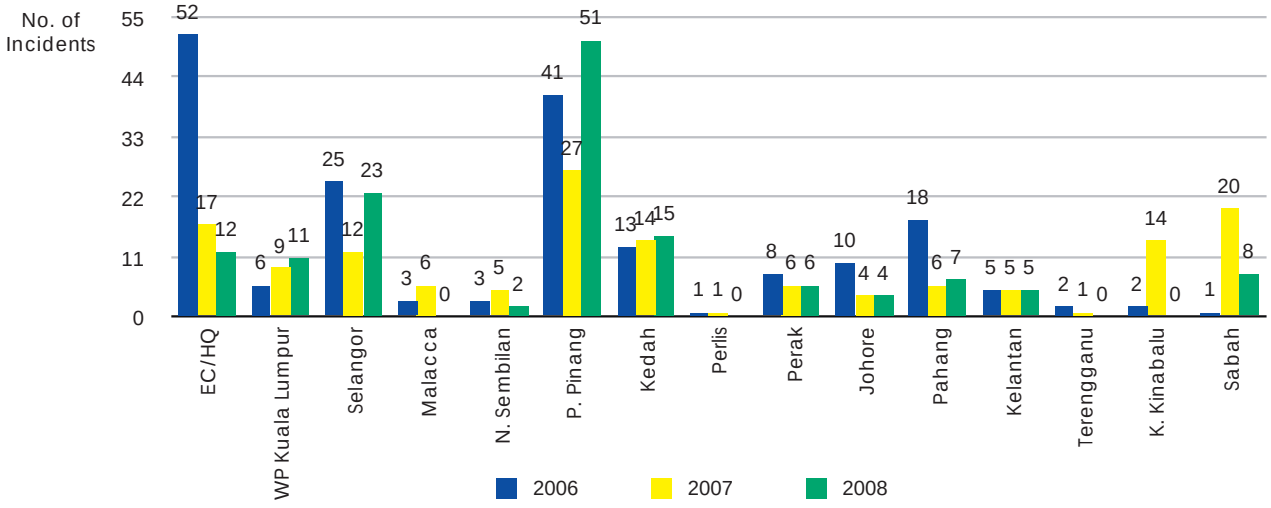


Aduan berkaitan bil elektrik, hal-hal pemeteran, pemotongan dan penyambungan semula bekalan telah mencatatkan peratusan tertinggi iaitu 34.0% daripada jumlah keseluruhan aduan perkhidmatan pembekalan TNB tahun 2008. Diikuti aduan berkaitan rentis talian penghantaran atau kerosakan pepasangan TNB yang disebabkan oleh pihak ketiga dengan peratusan 17.4% berbanding dengan lain-lain aduan.

The complaints on electricity billing, metering, disconnection and reconnection of supply recorded the highest percentage at 34.0% of the total complaints on electricity supply services of TNB in 2008, followed by the complaints on activities within transmission lines wayleave (rentice) or damage to TNB installation by third parties at 17.4%.

Gambarajah 59 : Statistik Aduan Perkhidmatan Pembekalan Elektrik yang dilaporkan Mengikut Negeri di Semenanjung Malaysia Pada Tahun 2006 Hingga 2008

Figure 59 : Statistics of Complaints of Electricity Supply Services Reported in Various States in Peninsular Malaysia for Year 2006 to 2008



Pada keseluruhannya, jumlah aduan yang diterima di negeri-negeri di Semenanjung Malaysia pada tahun 2008 telah menunjukkan pertambahan kecuali aduan yang diterima oleh Ibu Pejabat Suruhanjaya Tenaga, Melaka, N. Sembilan, Perlis, Terengganu dan Sabah. Walau bagaimanapun, Pulau Pinang dan Selangor telah mencatatkan pertambahan aduan yang amat ketara sekali berbanding tahun sebelumnya iaitu masing-masing sebanyak 51 dan 23 aduan.

Overall, the total complaints received according to the states in Peninsula showed that Pulau Pinang recorded the highest number of complaints received in 2008.

Jadual 8 : Status Aduan Pembekalan Elektrik Sehingga Disember 2008

Table 8 : Status of Resolution of Complaints in 2008

	Services	Supply
No. of Cases Resolved	125	187
No. of Cases not Resolved Yet	19	3
Total Cases	144	190

Sepanjang tahun 2008, sejumlah 312 atau 93% aduan daripada jumlah keseluruhan aduan telah berjaya disiasat dan diselesaikan dengan pengadu iaitu pengadu dimaklumkan kedudukan aduan atau utiliti diarah untuk mengambil tindakan yang sewajarnya. Bagi mencari penyelesaian kepada perkara yang diadukan, beberapa tindakan lanjutan telah dijalankan dan dilaksanakan dari semasa ke semasa oleh Suruhanjaya Tenaga bersama dengan pihak utiliti samada melalui perbincangan/ mesyuarat, surat-menyurat, lawatan siasatan, mengadakan majlis dialog atau forum bersama pengguna dan utiliti dan sebagainya. Kebanyakan tindakan-tindakan tersebut telah membawa kepada penyelesaian masalah yang diadukan oleh pengguna.

Selain itu, terdapat juga aduan-aduan yang memerlukan perhatian terus diperingkat atasan. Bagi menyelesaikan aduan-aduan sedemikian, perbincangan dengan agensi-agensi terbabit telah diadakan di Ibu Pejabat Suruhanjaya Tenaga. Aduan-aduan tersebut adalah aduan-aduan yang melibatkan implikasi kewangan yang tinggi, penyeragaman pada sesuatu tindakan, pertikaian dalam penafsiran Akta dan Peraturan yang digunapakai, keperluan tindakan penambahbaikan atau dasar kepada sesuatu kes yang diadu.

Beberapa kes aduan-aduan utama dalam tahun 2008 telah diselesaikan dan dibincangkan di peringkat ibu pejabat iaitu :

i. Aduan voltan berlebihan yang menyebabkan kelengkapan peralatan elektrik pengguna mengalami kerosakan;

ii. Aduan tuntutan hasil terkurang oleh TNB ke atas pengguna. TNB mengambil tindakan menuntut hasil terkurang ini apabila bil pengguna dikesan tidak merekodkan penggunaan tenaga yang sebenar;

iii. Aduan dari orang awam yang mendakwa kegagalan TNB melaksanakan penyelenggaraan rutin dan penyelenggaraan preventif ke atas pencawang-pencawang 11 kV di Kuala Lumpur dan Negeri Sembilan.

In the year 2008, a total of 312 complaints or 93% of the total complaints were investigated and resolved. In order to resolve the complaints from consumers, various actions were taken and carried out from time to time by the Energy Commission with the utilities, such as through discussion or meetings with the relevant parties, site investigation, conducting forum or dialogue with utilities and consumer and etc. In some cases, where the issues arising from the complaint needs attention at higher level or touches on policy matters, discussion with the relevant agencies were conducted before amicable solution could be achieved.

PURATA HARGA JUALAN ELEKTRIK

Purata Harga Jualan Elektrik TNB, SESB, Sarawak Energy Berhad (SEB) Dan Utiliti-Utiliti Lain

Jadual 9 : Purata Harga Jualan Elektrik TNB, SESB, SEB dan Utiliti-Utiliti lain Pada Tahun 2008

AVERAGE SELLING PRICES OF ELECTRICITY

Average Selling Prices of Utilities

Table 10 : Average Selling Prices of Electricity in Malaysia and Some Countries in Asia in 2008

Utility/ Country	Domestic (sen/kWh)	Commercial (sen/kWh)	Industrial (sen/kWh)	Public Lighting (sen/kWh)	Agriculture (sen/kWh)	Overall (sen/kWh)
PLN, Indonesia	20.19	28.09	21.81	22.37	N/A	22.43
SESB	22.47	28.74	23.44	47.08	N/A	25.23
Taipower, Taiwan	33.07	33.90	23.97	13.62	N/A	27.57
SEB	31.18	32.11	24.51	47.08	N/A	29.07
Egat, Thailand	31.22	34.86	27.11	N/A	N/A	29.33
TNB (New Rate)	28.03	38.97	29.40	20.71	38.02	32.11
CLP, Hong Kong	N/A	N/A	N/A	N/A	N/A	37.59
Meralco, Philippines	67.12	59.29	49.22	N/A	N/A	59.05
Tepco, Japan	66.10	71.33	71.33	N/A	N/A	66.69
Kepco, Korea	N/A	N/A	N/A	N/A	N/A	N/A

Nota :

1. Kadar purata harga elektrik untuk TNB (Kadar Baru) adalah untuk jualan elektrik bulan Ogos 2008 (lanya merupakan kadar baru tarif berkuatkuasa 1hb Julai 2008)
2. Kadar purata harga elektrik untuk Tepco (Jepun) adalah untuk tahun berakhir Mac 2008
3. Kadar purata harga elektrik untuk Taipower (Taiwan) adalah setakat Oktober 2008 (2 kenaikan sebanyak 25.2% pada Julai 2008 dan Oktober 2008)
4. Kadar purata harga elektrik untuk CLP (Hong Kong) adalah dari Januari 2008 hingga September 2008

N/A – Tidak diperolehi
Sumber : Tenaga Nasional Berhad

Notes :

1. *Average Selling Prices of TNB (New Rate) is for electricity sales in August 2008 (It was the new tariff is effective on 1st July 2008)*
2. *Average Selling Prices for Tepco (Japan) are for Year Ended of March 2008*
3. *Average Selling Prices for Taipower (Taiwan) is for October 2008 (2 increment by 25.2% in July 2008 and October 2008)*
4. *Average Selling Prices for CLP, Hong Kong are from 3rd Quarter Report January 2008 to September 2008*

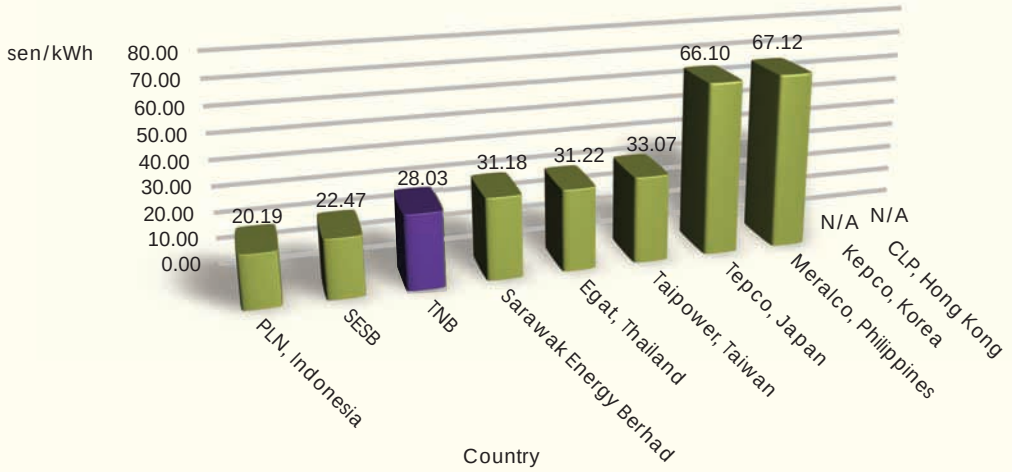
N/A – Not Available
Source : Tenaga Nasional Berhad

Ekoran daripada peningkatan kos pembekalan elektrik yang terpaksa ditanggung oleh TNB, Kerajaan telah meluluskan struktur tarif baru TNB yang akan diguna pakai oleh semua pengguna domestik, komersial dan industri di Semenanjung yang berkuatkuasa pada 1 Julai 2008. Selaras dengan kenaikan tarif elektrik dengan kenaikan purata hampir 20% berbanding 12% untuk kenaikan tarif yang berkuatkuasa pada 1 Jun 2006 menjadikan purata harga jualan elektrik TNB tahun 2008 telah bertambah kepada 32.1 sen/kWj daripada 26.1 sen/kWj pada tahun 2007.

The average selling prices of TNB in 2008 increased to 32.1 sen/kWh from 26.1 sen/kWh in 2007.

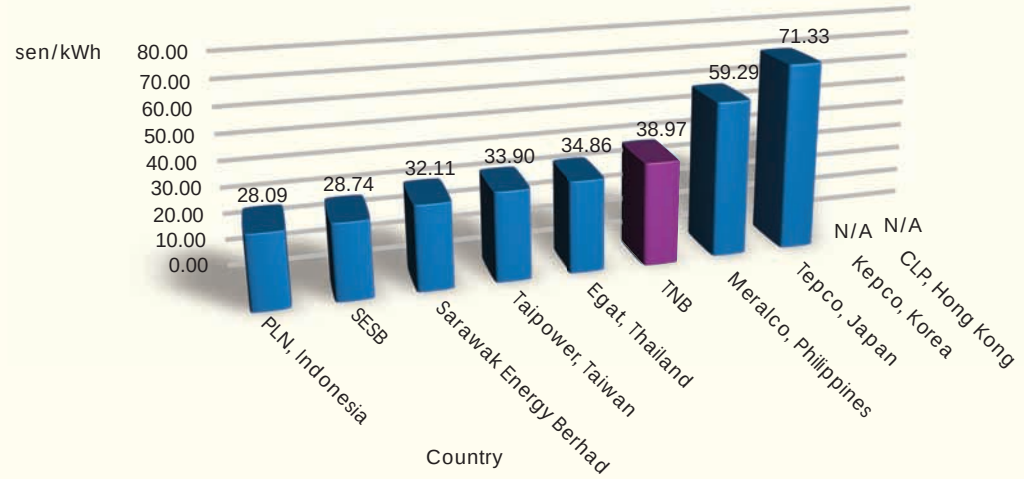
Gambarajah 60 : Perbandingan Purata Harga Jualan Elektrik Bagi Pengguna Domestik Pada Tahun 2008

Figure 60 : Comparison of Average Selling Prices of Electricity for Domestic Customers in 2008



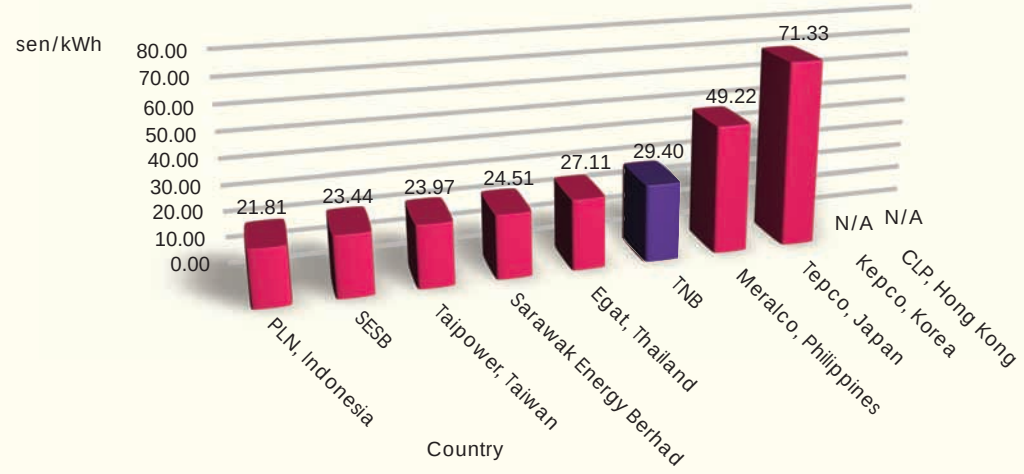
Gambarajah 61 : Perbandingan Purata Harga Jualan Elektrik Bagi Pengguna Komersial Pada Tahun 2008

Figure 61 : Comparison of Average Selling Prices of Electricity for Commercial Customers in 2008



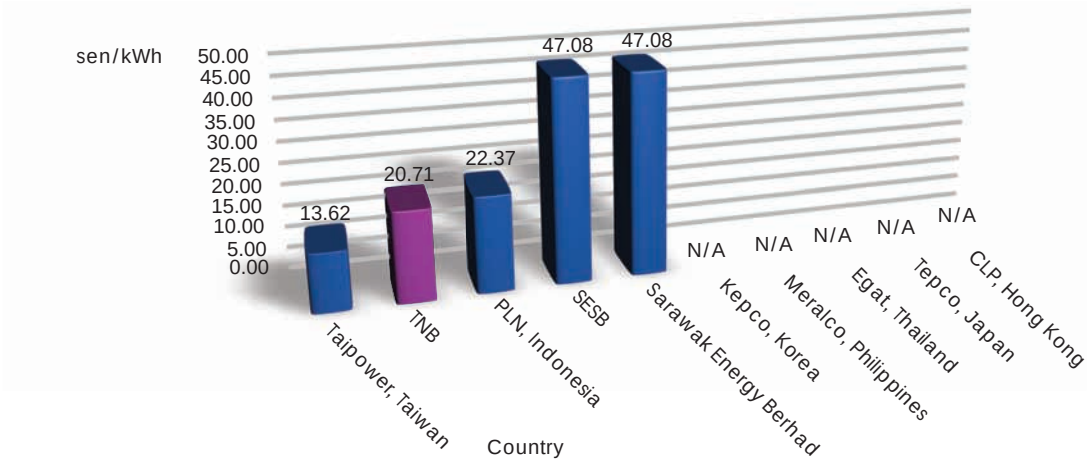
Gambarajah 62 : Perbandingan Purata Harga Jualan Elektrik Bagi Pengguna Industri Pada Tahun 2008

Figure 62 : Comparison of Average Selling Prices of Electricity for Industrial Customers in 2008



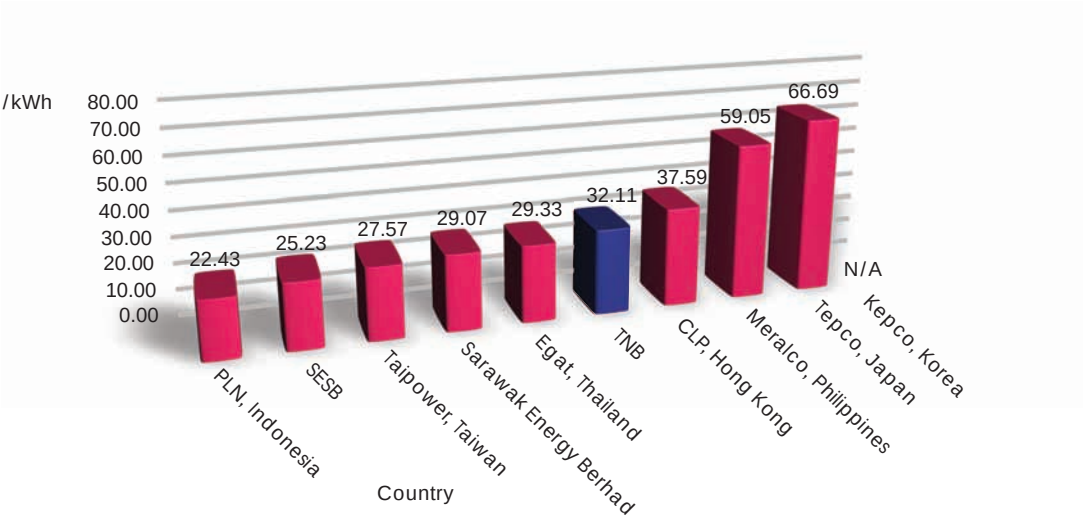
Gambarajah 63 : Perbandingan Purata Harga Jualan Elektrik Bagi Lampu Awam Pada Tahun 2008

Figure 63 : Comparison of Average Selling Prices of Electricity for Street Lighting Customers in 2008



Gambarajah 64 : Perbandingan Purata Harga Jualan Elektrik Pada Tahun 2008

Figure 64 : Comparison of Average Selling Prices of Electricity in 2008



LAMPIRAN I • *APPENDIX I*

LAPORAN PRESTASI PERKHIDMATAN TNB UNTUK TAHUN 2004 HINGGA 2008
REPORT ON THE PERFORMANCE OF CUSTOMER SERVICES OF TNB FOR YEARS 2004 TO 2008

Details	Performance in 2004	Performance in 2005	Performance in 2006	Performance in 2007	Performance in 2008
1. Connection of Electricity Supply					
A. Change Of Consumers					
No. of applications	131,723	175,887	109,159	87,870	121,530
Connection within 2 working days after an appointment for connection (%)	97	98	98	99	98.6
B. New Supply (Low Voltage)					
i. Individual Applications Under Normal Conditions					
No. of applications	247,984	277,347	218,872	210,258	200,093
Connection within 2 working days after an appointment for connection (%)	96	96	97	99	98.7
ii. Individual Applications Under Abnormal Conditions					
No. of applications	12,174	15,786	4,275	2,585	4,278
Connection within 2 weeks after an appointment for connection (%)	100	95	99	97	99.9
iii. Bulk Supply Application And Housing Schemes					
No. of applications	106,819	156,606	125,466	111,692	122,016
Connection within 1 month after an appointment for connection (%)	100	99	98	100	99.9
2. Supply Restoration After Breakdowns					
i. Reports					
No. of reports	1,156,186	2,616,759	1,367,415	985,508	2,556,739
Consumers being given report numbers (%)	84	92	87	92	98.9
ii. Minor Breakdowns					
No. of minor breakdowns	84,203	115,226	152,175	206,533	288,058
Breakdown rectified within 4 hours (%)	96	91	99	98	97.6
iii. Major/Extra Ordinary Breakdowns					
No. of major breakdowns	8,440	19,469	13,728	14,232	13,840
Restoration within 2 working days (%)	97	48	100	99	99.9

Details	Performance in 2004	Performance in 2005	Performance in 2006	Performance in 2007	Performance in 2008
3. Supply Reconnection After Disconnection					
No. of supply disconnections	654,946	864,208	807,729	983,033	1,044,441
Bills paid before 1:00 p.m. on disconnection day	355,150	556,397	484,600	572,163	541,062
Supply reconnection on the same day for bills paid before 1:00 p.m. (%)	100	98	100	95	99.2
4. Supply Interruptions Which Are Planned / Scheduled					
No. of scheduled interruptions	8,831	8,117	14,807	11,273	11,487
Consumers given 24 hours notice (%)	90	86	98	98	94.03
Consumers not given notice (%)	2	6	2	2	5.9
5. Meter Reading					
No. of consumers with estimated readings exceeding 3 consecutive months	355,318	353,369	447,339	599,834	839,478
Notice given to customers with estimated readings exceeding 3 consecutive months (%)	97	98	99	100	99.9
6. Enquiries / Written Complaints From Consumers					
i. Written enquiries including questions regarding accounts/bills					
No. of written complaints received	7,009	8,601	9,210	7,140	8,921
Reply within 7 working days (%)	98	99	99	100	99.2
7. Complaints Through Telephone					
No. of complaints through telephone which could not be settled	29,145	22,555	75,065	53,918	67,380
Consumers recontacted within 24 hours (%)	99	97	100	100	100
8. Appointment For Meter Accuracy Check					
No. of appointments for meter accuracy check	10,057	10,884	12,067	21,760	19,016
Meter accuracy check carried out within 2 working days (%)	99	98	98	100	99.8

Details	Performance in 2004	Performance in 2005	Performance in 2006	Performance in 2007	Performance in 2008
9. Meter Replacement					
No. of meters replacement	97,935	122,472	100,763	104,587	112,292
Meter replacement within 2 weeks (%)	98	99	99	98	99.1
10. Appointment With Consumers					
i. For Appointments Outside TNB Premises					
Arrival of TNB officers not later than 30 minutes from agreed time (%)	100	100	100	100	99.45
ii. Postponement by TNB					
Subsequent appointment made within 2 working days (%)	97	93	100	99	100
11. Deposits					
No. of consumers found after 6 months that their deposits exceed average consumption of 2 months	28,239	4,635	1,343	2,469	2,504
Consumers who have the excess deposits returned (%)	94	99	100	99	98.0
12. Refund of Consumer Deposits					
No. of consumers who have forwarded all required documents for refund of deposits	87,330	107,362	96,043	185,178	109,878
Consumers who have their deposits refunded within 2 months (%)	97	97	98	100	99.6
13. Collection					
Proof of payment sent to payment via mail within 7 working days (%)	97	100	100	98	100
14. Supply Disconnection					
i. With 24 hours Notice	1,714	32,598	15,709	65,520	369
No. of disconnections due to dangerous consumer installations	1,103	29,455	1,103	62,977	215
No. of disconnections due to suspicion of theft of electricity	609	3,105	14,089	79	153
No. of disconnections due to electricity meter being damaged	2	38	517	2,464	1

Details	Performance in 2004	Performance in 2005	Performance in 2006	Performance in 2007	Performance in 2008
ii. Without Any Notice	235,338	369,386	200,003	114,163	164,870
No. of disconnections due to failure to pay the bills within 15 days after issuance of bill	211,032	317,527	193,735	104,572	156,899
No. of disconnections due to failure to pay additional deposits within 7 days from the date of notice.	22,136	50,998	5,278	9,587	7,965
No. of disconnections of installations which are dangerous.	2,70	861	990	4	6
15. Special Consumers Who Face Problems In Paying Electric Bills	599	782	522	354	370
No. of handicapped consumers who appealed to avoid disconnection.	65	95	44	19	19
No. of senior consumers who appealed to avoid disconnection.	77	227	248	111	104
No. of handicapped consumers who were assisted in payment of bills.	195	203	126	98	116
No. of senior consumers who were assisted in payment of bills.	262	257	104	126	131

Source : Tenaga Nasional Berhad

LAMPIRAN II • *APPENDIX II*

LAPORAN PRESTASI PERKHIDMATAN SESB UNTUK TAHUN 2004 HINGGA 2008
REPORT ON THE PERFORMANCE OF CUSTOMER SERVICES OF SESB FOR YEARS 2004 TO 2008

Details	Performance in 2004	Performance in 2005	Performance in 2006	Performance in 2007	Performance in 2008
1. Connection of Electricity Supply					
A. Change of Consumers					
No. of applications	9,597	7,600	11,410	13,213	7,638
Connection within 1 working day after an appointment for connection (%)	92.3	92.0	88.5	90.3	90.0
B. New Supply (Low Voltage)					
i. Individual Applications Under Normal Conditions					
No. of applications	7,513	16,571	17,130	10,466	11,741
Connection within 2 working days after an appointment for connection (%)	60.2	70.0	96.3	83.0	68.6
ii. Bulk Supply Application And Housing Schemes					
No. of applications	653	5,342	6,165	5,712	6,352
Connection within 2 weeks after an appointment for connection (%)	56.5	69.9	58.2	77.6	89.9
2. Supply Restoration After Breakdowns					
i. Reports					
No. of report	157,866	223,354	260,572	247,927	248,957
The information could not being given in that times was contacted again within 15 minutes (No. of Consumers)	3,126	2,628	3,500	2,060	2,819
Consumers being given report numbers (%)	97.7	95.0	95.9	95.5	95.0
The consumers where the information could not being given in that was contacted again within 15 minutes (%)	1.98	1.18	1.34	0.83	1.13
ii. Minor Breakdowns					
No. of minor breakdowns	11,467	14,919	21,584	20,857	20,268
Breakdown rectified within 2 hours (%)	94.9	80.0	81.5	78.9	92.8

Details	Performance in 2004	Performance in 2005	Performance in 2006	Performance in 2007	Performance in 2008
iii. Major/Extra Ordinary Breakdowns					
No. of major breakdowns	791	3,124	928	2,993	404
Restoration within 12 hours (%)	89.9	90.0	81.9	79.3	96.5
3. Supply Reconnection After Disconnection					
No. of supply disconnections	52,126	56,746	74,474	77,350	86,317
Bills paid before 1:00 p.m. on disconnection day	26,793	55,611	70,510	42,681	60,421
Supply reconnection on the same day for bills paid before 1:00 p.m. (%)	98.2	98.0	94.7	55.2	70.0
4. Supply Interruptions Which Are Planned / Scheduled					
i) Scheduled Interruptions					
No. of scheduled interruptions	1,003	1,659	2,010	618	3,020
Consumers being given notice within 7 days before interruptions (%)	72.9	80.0	80.0	66.4	70.0
ii) Planning of Scheduled Interruptions					
No. of scheduled interruptions planning of yearly and monthly	70	231	154	320	332
No. of large consumers which was expected affecting	9,393	30,052	120,099	164,790	78,625
No. of large consumers which was expected affecting informed about the planning of scheduled interruptions (%)	90.7	90.0	82.5	100.0	93.8
5. Meter Reading					
No. of consumers with estimated readings exceeding 3 consecutive months	12,215	13,251	4,398	5,525	6,762
Notice given to customers with estimated readings exceeding 3 consecutive months (%)	47.5	49.5	1.32	50.0	50.0

Details	Performance in 2004	Performance in 2005	Performance in 2006	Performance in 2007	Performance in 2008
6. Enquiries / Written Complaints From Consumers					
i. Written Enquiries					
No. of written enquiries received	364	262	228	310	2,695
Reply within 5 working days (%)	49.7	51.5	58.3	85.5	80.0
ii. Enquiries Through Telephone					
No. of complaints through telephone which could not be settled	1,620	7,017	2,291	1,682	1,598
Consumers recontacted within 24 hours (%)	15.4	41.6	11.3	8.0	7.1
iii. Enquiries in Counter					
No. of complaints through counter which could not be settled	3,229	9,237	1,457	1,158	5,009
Consumers recontacted within 24 hours (%)	11.30	16.9	3.55	3.05	11.6
7. Service Counter					
No. of consumers who were getting the services in counter	230,389	153,360	177,060	323,427	268,142
Consumers that the waiting time should not exceed 15 minutes (%)	81.7	80.0	81.9	87.0	75.0
8. Appointment For Meter Accuracy Check					
No. of appointments for meter accuracy check	2,328	2,025	1,251	2,226	1,425
Meter accuracy check carried out within 2 working days (%)	62.1	51.9	40.1	49.2	45.9
9. Meter Replacement					
No. of meters replacement	1,358	3,704	3,681	4,629	6,446
Meter replacement within 2 working days from the date of made application (%)	66.9	67.3	61.3	51.03	51.9

Details	Performance in 2004	Performance in 2005	Performance in 2006	Performance in 2007	Performance in 2008
10. Appointment With Consumers					
i. For Appointments Outside SESB Premises					
Arrival of SESB officers not later than from agreed time (%)	87.9	82.6	83.5	90.4	90.5
ii. Postponement by SESB					
Subsequent appointment made within 1 working day (%)	84.2	79.7	79.8	48.9	61.5
11. Deposits					
No. of consumers found after 6 months that their deposits exceed average consumption of 2 months	2,035	1,244	1,351	5,797	11,515
Consumers who have the excess deposits returned (%)	91.2	89.9	89.9	27.9	11.0
12. Refund of Consumer Deposits					
No. of consumers who have forwarded all required documents for refund of deposits	4,579	5,820	5,660	6,214	7,675
Consumers who have their deposits refunded within 1 month (%)	74.3	75.0	79.5	86.3	80.0
13. Collection					
Proof of payment sent to payment via mail within 2 working days (%)	0.0	73.6	75.0	92.3	93.0
14. Supply Disconnection					
i. With 24 hours Notice					
No. of disconnections due to dangerous consumer installations	415	500	480	286	613
No. of disconnections due to suspicion of theft of electricity	227	492	410	89	90
No. of disconnections due to electricity meter being damaged	320	310	250	10	19

Details	Performance in 2004	Performance in 2005	Performance in 2006	Performance in 2007	Performance in 2008
ii. With More Than 24 hours Notice					
No. of disconnections due to failure to pay the bills within 15 days after issuance of bill	52,126	56,746	36,003	25,583	28,578
No. of disconnections due to failure to pay additional deposits within 7 days from the date of notice	1,478	315	231	195	115
iii. Without Any Notice					
No. of disconnections of installations which are dangerous	21	30	25	162	258
15. Special Consumers Who Face Problems In Paying Electric Bills					
No. of handicapped consumers who appealed to avoid disconnection.	28	40	1	0	0
No. of senior consumers who appealed to avoid disconnection.	34	105	63	3	12
No. of handicapped consumers who were assisted in payment of bills.	12	1	1	26	25
No. of senior consumers who were assisted in payment of bills.	1	35	1	70	30
16. Voltage Outside Standard					
i. No enhancement Work on Network is Required					
No. of complaints	26	1,274	2,998	815	62
Complaints was settled within 2 days from the date of made complaint(%)	92.3	98.7	95.0	95.7	64.5
ii. Network Enhancement Work is Required					
No. of Complaints	19	53	20	72	166
Complaints was settled within 3 months from the date of made complaint (%)	68.4	88.7	35.0	51.4	98.2

Details	Performance in 2004	Performance in 2005	Performance in 2006	Performance in 2007	Performance in 2008
17. New / Increase of Supply Application Reply					
i. No New Substation Required					
No. of applications	2,295	1,759	1,744	2,797	1,897
Applications being reply within 1 weeks from the date of made application (%)	69.3	73.9	76.8	79.0	72.9
ii. New Substation Required					
No. of applications	20	79	50	59	114
Applications being reply within 2 weeks from the date of made application (%)	90.0	70.9	70.0	81.4	86.8
18. Transferring of Meter Location Upon Consumer Request					
Transferring of meter location upon consumer which was felt an necessary and applicable (No. of application)	33	110	49	23	11
Applications which was necessary and being felt an applicable was settled within 3 working days (%)	72.7	83.6	34.7	69.6	68.8
19. Education of Energy Efficiency					
Consumers education of energy efficiency and electricity accident, including the activities that nearest of installation and electricity line (No. of programmes)	10	8	6	10	11
20. Power Quality Improvement					
No. of activities to improve of power quality	142	84	214	581	379

Note : (N/A) Not Available

Source : Sabah Electricity Sdn. Bhd.

LAMPIRAN III • *APPENDIX III*

LAPORAN PRESTASI PERKHIDMATAN NUR DISTRIBUTION SDN. BHD.
PADA TAHUN 2005 HINGGA 2008
REPORT ON THE PERFORMANCE OF CUSTOMER SERVICES OF NUR DISTRIBUTION SDN BHD
FOR THE YEARS 2005 TO 2008

Details	Performance in 2005	Performance in 2006	Performance in 2007	Performance in 2008
1. Connection of Electricity Supply				
A. Change of Consumers				
No. of applications	26	11	20	21
Connection within 1 working day after an appointment for connection (%)	100	100	100	100
B. New Supply (Low Voltage)				
i. Individual Applications Under Normal Conditions				
No. of applications	170	249	117	117
Connection within 1 working day after an appointment for connection (%)	100	100	100	100
ii. Bulk Supply Application And Housing Schemes				
No. of applications	0	0	0	0
Connection within 1 weeks after an appointment for connection (%)	N/A	N/A	N/A	N/A
2. Supply Restoration After Breakdowns				
i. Reports				
No. of reports	N/A	N/A	N/A	N/A
Consumers being given report numbers (%)	N/A	N/A	N/A	N/A
ii. Minor Breakdowns				
No. of minor breakdowns	19	15	16	20
Breakdown rectified within 2 hours (%)	90	100	100	100
iii. Major/Extra Ordinary Breakdowns				
No. of major breakdowns	30	15	24	15
Restoration within 24 hours (%)	100	93	100	100
3. Supply Reconnection After Disconnection				
No. of supply disconnections	46	128	152	92
Bills paid before 1:00 p.m. on disconnection day	46	128	152	92
Supply reconnection on the same day for bills paid before 1:00 p.m. (%)	100	100	100	100

Details	Performance in 2005	Performance in 2006	Performance in 2007	Performance in 2008
4. Supply Interruptions Which Are Planned / Scheduled				
No. of scheduled interruptions	52	28	39	32
Consumers given 7 days notice (%)	81	100	92	88
5. Meter Reading				
No. of consumers with estimated readings exceeding 2 consecutive months	60	51	47	59
Notice given to customers with estimated readings exceeding 2 consecutive months (%)	95	92	100	100
6. Enquiries / Written Complaints From Consumers				
i. Written enquiries including question regarding accounts/bills				
No. of written complaints received	66	51	54	61
Reply within 5 working days (%)	99	100	100	100
7. Service Counter				
Consumers that the waiting time should not exceed 20 minutes (%)	N/A	N/A	N/A	N/A
8. Appointment for Meter Accuracy Check				
No. of appointments for meter accuracy check	21	9	14	14
Meter accuracy check carried out within 1 working day (%)	100	100	100	100
9. Meter Replacement				
No. of meter replacement	19	6	5	9
Meter replacement within 2 working days (%)	100	100	100	100
10. Appointment With Consumers				
i. For appointments Outside NUR Premises				
Arrival of NUR officers not later than 15 minutes from agreed time (No. of appointments)	280	328	193	316
ii. Postponement by NUR				
Subsequent appointment made within 1 working day (%)	100	100	100	100

Details	Performance in 2005	Performance in 2006	Performance in 2007	Performance in 2008
11. Deposits				
No. of consumers found after 6 months that their deposits exceed average consumption of 2 months	0	0	0	0
Consumers who have the excess deposits returned (%)	N/A	N/A	N/A	N/A
12. Refund of Consumer Deposits				
No. of consumers who have forwarded all required documents for refund of deposits	51	65	88	81
Consumers who have their deposits refunded within 15 working days (%)	43	48	88	100
13. Collection				
Proof of payment sent to payment via mail within 5 working days (%)	93	92	98	100
14. Supply Disconnection				
i. With 24 hours Notice				
No. of disconnections due to dangerous consumer installations	N/A	N/A	N/A	N/A
No. of disconnections due to suspicion of theft of electricity	N/A	N/A	N/A	N/A
No. of disconnections due to electricity meter being damaged	N/A	N/A	N/A	N/A
ii. Without Any Notice				
No. of disconnections due to failure to pay bills within 15 days after issuance of bill	N/A	N/A	N/A	N/A
No. of disconnections due to failure to pay additional deposits within 7 days from the date of notice	39	124	162	94
No. of disconnections of installations which are dangerous	1	N/A	N/A	N/A
15. Special Consumers Who Face Problems in Paying Electric Bills				
Special arrangement by NUR to collect from handicapped and senior consumers (No. of consumers)	0	0	0	0

Details	Performance in 2005	Performance in 2006	Performance in 2007	Performance in 2008
16. Voltage Outside Standard				
i. No enhancement Work on Network is Required				
No. of complaints	0	2	2	1
Complaints was settled within 2 days from the date of made complaint (%)	N/A	100	100	100
ii. Network Enhancement Work is Required				
No. of Complaints	0	0	0	0
Complaints was settled within 6 months from the date of made complaint (%)	N/A	N/A	N/A	N/A
17. New / Increase of Supply Application Reply				
i. No New Substation Required				
No. of applications	13	25	8	10
Applications being reply within 1 weeks from the date of made application (%)	100	100	100	100
ii. New Substation Required				
No. of applications	0	0	0	3
Applications being reply within 2 weeks from the date of made application (%)	N/A	N/A	N/A	100
18. Transferring of Meter Location Upon Consumer Request				
Transferring of meter location upon consumer which was felt an necessary and applicable (No. of application)	2	3	1	9
Applications which was necessary and being felt an applicable was settled within 7 working days (%)	100	100	100	100
19. Education of Energy Efficiency				
Consumers education of energy efficiency and electricity accident , including the activities that nearest of installation and electricity line (No. of programmes)	4	4	4	4
20. Power Quality Improvement				
No. of activities to improve of power quality	63	68	67	49

Note : (N/A) Not Available

MAKLUMAT DAN STATISTIK INDUSTRI

- Kadar Tarif Di Malaysia
- Statistik Tenaga Nasional Berhad (TNB)
- Statistik Sabah Electricity Sdn. Bhd. (SESB)
- Statistik Sarawak Energy Berhad (SEB)
- Senarai Penjana Kuasa Bebas
- Senarai Penjana Kuasa Menggunakan Sumber Tenaga Yang Boleh Diperbaharui
- Senarai Pengagih Elektrik
- Senarai Co-Generators Utama
- Statistik Penjanaan Persendirian
- Statistik Dan Maklumat Lain Yang Penting Untuk Industri Bekalan Elektrik
- Alamat Perhubungan

INDUSTRY STATISTICS AND INFORMATION

- *Tariff Rates in Malaysia*
- *Statistics of Tenaga Nasional Berhad (TNB)*
- *Statistics of Sabah Electricity Sdn. Bhd. (SESB)*
- *Statistics of Sarawak Energy Berhad (SEB)*
- *List of Independent Power Producers (IPPs)*
- *List of Small Renewable Energy Power Producers (SREP)*
- *List of Electricity Distributors*
- *List of Major Co-Generators*
- *Statistics of Self-Generation*
- *Other Important Statistics and Information of the Electricity Supply Industry*
- *Key Contacts*

Kadar Tarif Di Malaysia

Tariff Rates in Malaysia

KADAR-KADAR TARIF ELEKTRIK YANG BARU TENAGA NASIONAL BERHAD (BERKUATKUASA 1 JULAI 2008)
NEW TARIFF RATES FOR TENAGA NASIONAL BERHAD (EFFECTIVE FROM 1 JULY 2008)

No.	Tariff Category	Unit	Rates
1.	Tariff A – Domestic Tariff For monthly consumption between 0 – 400 kWh per month: For the first 200 kWh (1 - 200 kWh) per month For the next 200 kWh (201 -400 kWh) per month The minimum monthly charge is RM3.00 For Monthly Consumption More Than 400 kWh per month: For the first 500kWh (1-500kWh) per month For the next 100 kWh (501-600kWh) per month For the next 100 kWh (601-700kWh) per month For the next 100 kWh (701-800kWh) per month For the next 100 kWh (801-900kWh) per month For the next kWh (901 kWh onwards) per month The minimum monthly charge is RM3.00	 sen/kWh sen/kWh sen/kWh sen/kWh sen/kWh sen/kWh sen/kWh sen/kWh	 21.80 34.50 30.00 39.00 40.00 41.00 43.00 46.00
2.	Tariff B - Low Voltage Commercial Tariff For Overall Monthly Consumption Between 0-200 kWh per month: For all kWh The minimum monthly charge is RM7.20 For Overall Monthly Consumption More Than 200 kWh per month: For all kWh (From 1kWh and above) The minimum monthly charge is RM7.20	 sen/kWh sen/kWh	 38.00 40.80
3.	Tariff C1 - Medium Voltage General Commercial Tariff For each kilowatt of maximum demand per month For all kWh The minimum monthly charge is RM600.00	 RM/kW sen/kWh	 24.60 29.60
4.	Tariff C2 - Medium Voltage Peak/Off-Peak Commercial Tariff For each kilowatt of maximum demand per month during the peak period For all kWh during the peak period For all kWh during the off-peak period The minimum monthly charge is RM600.00	 RM/kW sen/kWh sen/kWh	 36.60 29.60 18.20
5.	Tariff D - Low Voltage Industrial Tariff For Overall Monthly Consumption Between 0-200 kWh per month: For all kWh The minimum monthly charge is RM7.20 For Overall Monthly Consumption More Than 200 kWh per month: For all kWh (From 1 kWh and above) The minimum monthly charge is RM7.20	 sen/kWh sen/kWh	 34.20 36.60

No.	Tariff Category	Unit	Rates
	Tariff Ds – Special Industrial Tariff (for consumers who qualify only) For all kWh The minimum monthly charge is RM7.20	 sen/kWh	 34.40
6.	Tariff E1 - Medium Voltage General Industrial Tariff For each kilowatt of maximum demand per month For all kWh The minimum monthly charge is RM600.00 Tariff E1s – Special Industrial Tariff (for consumers who qualify only) For each kilowatt of maximum demand per month For all kWh The minimum monthly charge is RM600.00	 RM/kW sen/kWh RM/kW sen/kWh	 24.60 28.00 19.10 27.20
7.	Tariff E2 - Medium Voltage Peak/Off-Peak Industrial Tariff For each kilowatt of maximum demand per month during the peak period For all kWh during the peak period For all kWh during the off-peak period The minimum monthly charge is RM600.00 Tariff E2s – Special Industrial Tariff (for consumers who qualify only) For each kilowatt of maximum demand per month during the peak period For all kWh during the peak period For all kWh during the off-peak period The minimum monthly charge is RM600.00	 RM/kW sen/kWh sen/kWh RM/kW sen/kWh sen/kWh	 30.80 29.60 18.20 26.50 27.20 15.50
8.	Tariff E3 - High Voltage Peak/Off-Peak Industrial Tariff For each kilowatt of maximum demand per month during the peak period For all kWh during the peak period For all kWh during the off-peak period The minimum monthly charge is RM600.00 Tariff E3s – Special Industrial Tariff (for consumers who qualify only) For each kilowatt of maximum demand per month during the peak period For all kWh during the peak period For all kWh during the off-peak period The minimum monthly charge is RM600.00	 RM/kW sen/kWh sen/kWh RM/kW sen/kWh sen/kWh	 29.60 28.00 16.80 23.40 25.60 14.10
9.	Tariff F - Low Voltage Mining Tariff For all kWh The minimum monthly charge is RM120.00	 sen/kWh	 30.90
10.	Tariff F1 - Medium Voltage General Mining Tariff For each kilowatt of maximum demand per month	 RM/kW	 17.20

No.	Tariff Category	Unit	Rates
	For all kWh The minimum monthly charge is RM120.00	sen/kWh	25.40
11.	Tariff F2 - Medium Voltage Peak/Off-Peak Mining Tariff For each kilowatt of maximum demand per month during the peak period For all kWh during the peak period For all kWh during the off-peak period The minimum monthly charge is RM120.00	 RM/kW sen/kWh sen/kWh	 24.20 25.40 14.00
12.	Tariff G - Street Lighting Tariff For all kWh (including maintenance) For all kWh (excluding maintenance) The minimum monthly charge is 15% of the calculated bill in a month	 sen/kWh sen/kWh	 24.80 15.50
13.	Tariff G1 - Neon & Floodlight Tariff For all kWh The minimum monthly charge is 15% of the calculated bill in a month	 sen/kWh	 16.90
14.	Tariff H – Low Voltage Specific Agriculture Tariff For all kWh The minimum monthly charge is RM7.20	 sen/kWh	 38.30
15.	Tariff H1 - Medium Voltage General Specific Agriculture Tariff For each kilowatt of maximum demand per month For all kWh The minimum monthly charge is RM600.00	 RM/kW sen/kWh	 24.60 28.50
16.	Tariff H2 - Medium Voltage Peak/Off-Peak Specific Agriculture Tariff For each kilowatt of maximum demand per month during the peak period For all kWh during the peak period For all kWh during the off-peak period The minimum monthly charge is RM600.00	 RM/kW sen/kWh sen/kWh	 33.10 29.60 18.20

KADAR-KADAR 'TOP-UP' DAN 'STANDBY' (Untuk 'Co-Generators' Sahaja)
TARIFF RATES FOR TOP-UP AND STANDBY SERVICES (Only for Co-Generators)

No.	Tariff Category	Unit	Rates		
			Top-up	Standby	
				Firm	Non-Firm
1.	Tariff C1 - Medium Voltage General Commercial Tariff Maximum demand charge per month For all kWh	 RM/kW sen/kWh	 24.60 29.60	 28.00	 10.40
2.	Tariff C2 - Medium Voltage Peak/Off-Peak Commercial Tariff For each kilowatt of maximum demand per month during the peak period For all kWh during the peak period For all kWh during the off-peak period	 RM/kW sen/kWh sen/kWh	 36.60 29.60 18.20	 28.00	 11.80
3.	Tariff E1 - Medium Voltage General Industrial Tariff Maximum demand charge per month For all kWh	 RM/kW sen/kWh	 24.60 28.00	 28.00	 9.90
4.	Tariff E2 – Medium Voltage Peak/Off-Peak Industrial Tariff For each kilowatt of maximum demand per month during the peak period For all kWh during the peak period For all kWh during the off-peak period	 RM/kW sen/kWh sen/kWh	 30.80 29.60 18.20	 28.00	 9.70
5.	Tariff E3 – High Voltage Peak/Off-Peak Industrial Tariff For each kilowatt of maximum demand per month during the peak period For all kWh during the peak period For all kWh during the off-peak period	 RM/kW sen/kWh sen/kWh	 29.60 28.00 16.80	 28.00	 8.50
6.	Tariff F1 – Medium Voltage General Mining Tariff Maximum demand charge per month For all kWh	 RM/kW sen/kWh	 17.20 25.40	 28.00	 5.40

No.	Tariff Category	Unit	Rates		
			Top-up	Standby	
				Firm	Non-Firm
7.	Tariff F2 – Medium Voltage Peak/Off-Peak Mining Tariff				
	For each kilowatt of maximum demand per month during the peak period	RM/kW	24.20	28.00	7.50
	For all kWh during the peak period	sen/kWh	25.40		
	For all kWh during the off-peak period	sen/kWh	14.00		

KADAR-KADAR TARIF UNTUK SABAH ELECTRICITY SENDIRIAN BERHAD (SESB)

TARIFF RATES FOR SABAH ELECTRICITY SENDIRIAN BERHAD (SESB)

No.	Tariff Category	Unit	Rates
1.	Domestic		
	0-40 units per month	sen/kWh	24
	41-200 units per month	sen/kWh	16
	Above 200 units per month	sen/kWh	28
	Minimum monthly change	RM	5.00
2.	Commercial Class 1		
	0-1,000 units per month	sen/kWh	32
	Above 1,000 units per month	sen/kWh	27
	Minimum monthly change	RM	15.00
3.	Commercial Class 2		
	(For consumers with maximum demand above 500 kW)		
	Maximum demand change per month	RM/kW	15.00
	All units per month	sen/kWh	25
	Minimum monthly change	RM	1,000.00
4.	Industrial Class 1		
	0-2,000 units per month	sen/kWh	32
	Above 2,000 units per month	sen/kWh	26
	Minimum monthly charge	RM	15.00
5.	Industrial Class 2		
	(For consumers with maximum demand above 500 kW)		
	Maximum demand charge per month	RM/kW	15.00
	All units per month	sen/kWh	20
	Minimum monthly charge	RM	1,00.00
6.	Public Lighting		
	All units per month	sen/kWh	30

KADAR-KADAR TARIF UNTUK WILAYAH PERSEKUTUAN LABUAN
KADAR-KADAR DAN STRUKTUR TARIF
TARIFF RATES FOR WILAYAH PERSEKUTUAN LABUAN
TARIFF STRUCTURE AND RATES

No.	Tariff Category	Unit	Rates
1.	Domestic (DM)		
	0-40 kWh per month	sen/kWh	24
	41-200 kWh per month	sen/kWh	16
	201-above kWh per month	sen/kWh	28
	Minimum change	RM	5.00
2.	Low Voltage Commercial (B)		
	For all units	sen/kWh	24
	Minimum change	RM	6.00
3.	Medium Voltage General Commercial (C1)		
	For each kilowatt of maximum demand per month	RM/kW	12.00
	All units	sen/kWh	18
	Minimum charge	RM	500.00
4.	Medium Voltage Peak/Off Peak Commercial (C2)		
	For each kilowatt of maximum demand per month during the peak period	RM/kW	19.00
	All units during the peak period	sen/kWh	18
	All units during the off-peak period	sen/kWh	8
	Minimum charge	RM	500.00
5.	Low Voltage Industrial Tariff (D)		
	For all units	sen/kWh	21
	Minimum charge	RM	6.00
6.	Medium Voltage General Industrial (E1)		
	For each kilowatt of maximum demand per month	RM/kW	12.00
	All units	sen/kWh	16
	Minimum charge	RM	500.00
7.	Medium Voltage Peak / Off-Peak Industrial (E2)		
	For each kilowatt of maximum demand per month during the peak period	RM/kW	17.00
	All units during the peak period	sen/kWh	16
	All units during the off-peak period	sen/kWh	8
	Minimum charge	RM	500.00
8.	Low Voltage Mining (F)		
	For all units	sen/kWh	19
	Minimum charge	RM	100.00
9.	Medium Voltage Mining (F1)		
	For each kilowatt of maximum demand per month	RM/kW	12.00
	All units	sen/kWh	16
	Minimum charge	RM	100.00
10.	Public Lighting		
	All units	sen/kWh	30

KADAR-KADAR TARIF UNTUK SARAWAK ENERGY BERHAD (SEB)

TARIFF RATES FOR SARAWAK ENERGY BERHAD (SEB)

No.	Tariff Category	Unit	Rates
1.	Tariff C1 - Commercial		
	For the first 100 units per month	sen/kWh	40
	For the next 4900 units per month	sen/kWh	34
	For each additional unit per month	sen/kWh	30
	Minimum monthly change	RM	10.00
2.	Tariff C2 – Commercial Demand		
	For each kilowatt of maximum demand per month	RM/kW	16.00
	For each unit	sen/kWh	25
	Minimum monthly charge	RM/kW	16.00 per kilowatt X Billing Demand
3.	Tariff C3 – Commercial Peak/Off - Peak Demand		
	For each kilowatt of maximum demand per month during the peak period	RM/kW	20.00
	For each unit during the peak period	sen/kWh	25
	For each unit during the off-peak period	sen/kWh	14.4
	Minimum monthly charge	RM/kW	20.00 per kilowatt X Billing Demand
4.	Tariff D - Domestic		
	For the first 100 units per month	sen/kWh	34
	For the next 300 units per month	sen/kWh	29
	For each additional unit per month	sen/kWh	33
	Minimum monthly charge	RM	5.00
5.	Tariff I1 - Industrial		
	For the first 100 units per month	sen/kWh	40
	For the next 2900 units per month	sen/kWh	30
	For each additional unit per month	sen/kWh	27
	Minimum monthly charge	RM	10.00
6.	Tariff I2 – Industrial Demand		
	For each kilowatt of maximum demand per month	RM/kW	16.00
	For each unit	sen/kWh	22.2
	Minimum monthly charge	RM/kW	16.00 per kilowatt X Billing Demand
7.	Tariff I3 – Industrial Peak/Off – Peak Demand		
	For each kilowatt of maximum demand per month during the peak period	RM/kW	20.00
	For each unit during the peak period	sen/kWh	23.4
	For each unit during the off peak period	sen/kWh	14.4
	Minimum monthly charge	RM/kW	20.00 per kilowatt X Billing Demand
8.	Tariff PL – Public & Street Lighting		
	For each unit	sen/kWh	47
	Minimum monthly charge	RM	10.00

Statistik Tenaga Nasional Berhad (TNB)

Statistics of Tenaga Nasional Berhad (TNB)

Tenaga Nasional Berhad (TNB)

A.	Sales of Energy (GWh)	2002	2003	2004	2005	2006	2007	2008
(1)	Domestic	10,939	11,765	12,530	13,497	14,132	15,048	15,810
(2)	Commercial	17,032	18,367	19,967	21,675	23,284	25,123	26,939
(3)	Industrial	31,371	33,440	35,732	37,115	37,142	38,320	40,511
(4)	Public Lighting	629	663	682	767	838	884	956
(5)	Mining	64	56	54	48	42	34	34
(6)	Export	19	193	605	1,694	2,323	2,477	1,152
(7)	Others	-	-	-	-	10	166	214
	Total***	60,054	64,484	69,570	74,796	77,771	82,052	85,616

*** Total energy sales includes own generation and purchase from IPPs

B.	Generation Mix (GWh)	2002	2003	2004	2005	2006	2007	2008
(1)	Hydro	4,444	4,032	4,656	4,908	5,301	4,879	6,669
(2)	Natural Gas	& 21,636	16,719	15,859	18,569	21,293	20,473	20,979
(3)	Coal	8,953	7,599	6,129	##	-	-	-
(4)	MFO	3,573	330	185	5	111	-	-
(5)	Diesel	-	-	-	-	41	35.8	43
(6)	Others	-	-	-	-	-	-	-
	Total***	38,606	28,680	26,842	23,482	26,746	25,388	27,691

Starting from the year 2005, TNB Janamanjung and KEV are classified as IPPs
*** Own generation only

C.	No. of Consumers	2002	2003	2004	2005	2006	2007	2008
(1)	Domestic	4,569,628	4,788,255	5,009,377	5,210,747	5,397,799	5,563,951	5,750,325
(2)	Commercial	862,826	903,981	940,359	976,368	1,014,907	1,056,954	1,110,718
(3)	Industrial	21,382	21,317	21,249	24,064	24,843	24,929	25,330
(4)	Public Lighting	27,793	37,391	39,071	42,032	39,233	41,796	45,037
(5)	Mining	45	32	31	28	18	14	13
(6)	Others (Agriculture)	-	-	-	-	481	782	906
	Total	5,481,674	5,750,976	6,010,087	6,253,239	6,477,281	6,688,426	6,932,329

D.	Generation Capacity (MW)	2002	2003	2004	2005	2006	2007	2008
(1)	Hydro	1,911	1,911	1,911	1,881	1,911	1,911	1,911
(2)	Natural Gas	3,302	3,430	3,156	3,871	4,367	4,367	4,367
(3)	Coal	1,447	1,421	3,670	##	-	-	-
(4)	MFO	1,396	1,402	574	266	-	-	-
(5)	Diesel	-	-	-	-	68	68	68
(6)	Others	-	-	-	-	-	-	-
(7)	Total Generation	8,056	8,164	9,311	6,018	6,346	6,346	6,346
(8)	Overall Availability (%)	N/A	85	83	86	91	91	90
(9)	Cost Of Generation (sen/kWh)							
	a) Own Generation	11.25	10.20	9.30	9.80	9.38	8.18	13.22
	b) Energy Purchased	15.26	14.95	N/A	17.78	15.32	15.30	17.50
	c) Overall Cost - (a) & (b)	13.05	11.69	N/A	14.33	N/A	13.40	16.29

Tenaga Nasional Berhad (TNB)

E.	Transmission System Capacity	2002	2003	2004	2005	2006	2007	2008
(1)	Transmission System Lines/Cables (km)							
	i. 500 KV	* 890	* 890	* 890	* 890	* 890	* 890	* 890
	ii. 275 KV	5,736	6,103	6,180	6,248	6,730	6737	7616
	iii. 132 KV	9,164	9,943	10,161	10,672	10,436	11,009	11,299
	iv. 66 KV	346	171	171	171	171	68.7	-
(2)	Transmission Substations							
	i. Number	349	@ 407	366	375	@ 435	441	386
	ii. Capacity (MVA)	56,673	61,335	65,476	69,381	@ 75,189	76,223	83,808
(3)	Performance							
	a) Number of Incidents of Trippings	118	418	104	90	525	66	392
	b) Unsupplied Energy (MWh)	3,662	2,734	9,232	21,939	1,586	2,121	1,532

F.	Distribution System Capacity	2002	2003	2004	2005	2006	2007	2008
(1)	Distribution System Lines/Cables (km)							
	i. Overhead Lines	199,920	168,731	218,282	155,281	159,483	161,080	191,714
	ii. Underground Cables	228,804	273,700	315,197	322,856	327,238	343,665	357,267
(2)	Distribution Substations							
	i. Number	47,483	48,916	50,509	56,679	58,265	58,905	61,238
	ii. Capacity (MVA)	41,231	41,954	44,579	48,377	48,906	48,961	66,696
(3)	Performance							
	Number of Interruption of Supply	31,328	27,047	29,932	⁎ 85811	57,808	54,479	103,876

G.	Performance Highlights	2002	2003	2004	2005	2006	2007	2008
(1)	Maximum Demand (MW)	10,783	11,329	12,023	12,493	12,990	13,620	14,007
(2)	Total Units Generated (GWh)	38,606	28,680	26,842	23,482	26,746	25,402	27,208
(3)	Total Units Sold (GWh)	60,054	64,484	69,570	74,796	77,771	82,052	85,616
(4)	Sales of Electricity (RM million)	14,097	15,050	16,224	17,009	N/A	20,696	22,555
(5)	Installed Generation Capacity (MW)**	8,055	8,163	9,311	6,018	6,346	6,346	6,346
(6)	Total Number of Employees	23,589	24,124	24,887	24,259	¤24,429	¤24,950	¤24,927
(7)	Revenue Per Employee (RM/Employee)	0.60	0.62	0.65	0.70	N/A	0.82	0.77
(8)	Units Sold Per Employee (GWh/Employee)	2.55	2.67	2.80	3.08	3.18	3.29	2.93
(9)	Generation Capacity Per Employee (MW/Employee)	0.34	0.34	0.37	0.25	0.26	0.25	0.21
(10)	Total Units Purchased (GWh)	31,391	43,200	54,755	60,409	61,916	67,225	68,091
(11)	Total Units Exported (GWh)	19	193	605	1,694	2,323	2,477	1,152
(12)	Total Units Imported (GWh)	9	0.4	-	1.2	3.8	2.4	0.11

Notes :

1. & Inclusion of generation using distillate
2. * 252.2km operated at 275kV
3. ** Generation capacities of TNB Generation Sdn. Bhd. and TNB Hidro Sdn. Bhd.
4. @ Including 48 Consumer's Substation
5. ¤ TNB Employees excluding TNB Wholly Owned Subsidiaries and TNB Majority Owned Subsidiaries
6. Years indicated are financial years
7. ⁎ This figure includes interruptions experienced by single consumer for a period more than 1 minute.

Source : Tenaga Nasional Berhad (TNB)

Statistik Sabah Electricity Sdn. Bhd (SESB)

Statistics of Sabah Electricity Sdn. Bhd (SESB)

Sabah Electricity Sdn. Bhd. (SESB)

A.	Sales of Energy (GWh)	2002	2003	2004	2005	2006	2007	2008
(1)	Domestic	691	725	801	899	937	1039	1090
(2)	Commercial	839	874	950	1,034	1,104	1240	1321
(3)	Industrial	622	699	771	797	889	993	1017
(4)	Public Lighting	30	34	35	39	39	45	47
(5)	Mining	-	-	-	-	-	-	-
(6)	Export	-	-	-	-	-	-	-
(7)	Others	-	-	-	-	-	-	-
	Total***	2,182	2,332	2,557	2,769	2,969	3,317	3,475

*** Total energy sales includes own generation and purchase from IPPs

B.	Generation Mix (GWh)	2002	2003	2004	2005	2006	2007	2008
(1)	Hydro	437	453	450	469	547	538	489
(2)	Gas	388	471	466	539	591	664	675
(3)	Coal	-	-	-	-	-	-	-
(4)	Oil	-	-	-	-	159	123	123
(5)	Diesel	427	477	478	131	311	307	202
(6)	Others	-	-	-	-	50	63	66
	Total***	1,252	1,401	1,394	1,139	1,658	1,695	1,555

*** Own generation only

C.	No. of Consumers	2002	2003	2004	2005	2006	2007	2008
(1)	Domestic	261,447	265,795	280,325	292,025	305,527	318,955	332,861
(2)	Commercial	46,797	47,550	49,888	52,010	54,843	58,345	62,012
(3)	Industrial	2,613	2,598	2,628	2,634	2,653	2,706	2,799
(4)	Public Lighting	2,524	2,672	2,959	3,088	3,357	3,710	3,918
(5)	Mining	-	-	-	-	-	-	-
(6)	Others	-	-	-	-	-	-	-
	Total	313,381	318,585	335,800	349,757	366,380	383,716	401,590

D.	Generation Capacity (MW)	2002	2003	2004	2005	2006	2007	2008
(1)	Hydro	66	66	66	51	51	51	51
(2)	Gas	104	104	104	104	106	106	107
(3)	Coal	-	-	-	-	-	-	-
(4)	Oil	-	-	-	-	108	81	79
(5)	Diesel	302	290	290	194	88	97	97
(6)	Others [Rural Electrifications - Diesel & Mini-Hydro]	*6	*6	*6	-	-	-	-
(7)	Total Generation	478	466	466	349	353	335	334
(8)	Overall Availability (%)	82.32	83.50	78.40	77.60	85.20	82.90	73.30
(9)	Cost Of Generation (sen/kWh)							
	a) Own Generation	18.10	17.62	21.02	24.30	12.90	12.20	12.80
	b) Energy Purchased	26.70	23.35	25.79	25.80	20.40	20.60	17.80
	c) Overall Cost - (a) & (b)	21.04	20.90	24.00	25.20	16.90#	17.00#	16.00#

*Mini-hydro
The cost lower effected of SESB's getting oil subsidies

Sabah Electricity Sdn. Bhd. (SESB)

E.	Transmission System Capacity	2002	2003	2004	2005	2006	2007	2008
(1)	Transmission System Lines/ Cables (km)							
	i. 500 KV	-	-	-	-	-	-	-
	ii. 275 KV	-	-	-	-	640	492	492
	iii. 132 KV	542	1,870	1,227	1,552	927	1,587	1,672
	iv. 66 KV	123	122	123	123	123	123	123
(2)	Transmission Substations							
	i. Number	17	23	26	31	30	34	34
	ii. Capacity (MVA)	1,005	1,410	2,258	2,332	2,299	3,603	3,793
(3)	Performance							
	b) Number of Incidents of Trippings	31	22	25	18	36	136	12
	c) Unsupplied Energy (MWh)	548	660	573	476	866	763	162

F.	Distribution System Capacity	2002	2003	2004	2005	2006	2007	2008
(1)	Distribution System Lines/							
	Cables (km)							
	i. Overhead Lines	13,020	13,500	* 4,987	* 5,167	* 5,180	* 5,893	* 6,431
	ii. Underground Cables	1,281	1,400	* 455	* 471	* 468	* 623	* 762
(2)	Distribution Substations							
	i. Number	4,453	4,196	4,687	4,727	4,929	5,008	5,214
	ii. Capacity (MVA)	2,296	2,265	2,500	2,803	3,852	3,937	4,179
(3)	Performance							
	Number of Interruption of Supply	9,457	10,083	14,308	23,441	25,778	23,590	21,911

* Only 33 and 11 kV

G.	Performance Highlights	2002	2003	2004	2005	2006	2007	2008
(1)	Maximum Demand (MW)	391	448	481	548	594	625	673
(2)	Total Units Generated (GWh)	1,252	1,401	1,394	1,139	1,658	1,695	1,555
(3)	Total Units Sold (GWh)	2,182	2,332	2,557	2,769	2,969	3,317	3,474
(4)	Sales of Electricity (RM million)	598	591	640	697	638	838	836
(5)	Installed Generation Capacity (MW)	478	466	466	349	353	335	334
(6)	Total Number of Employees	2,097	2,096	2,084	2,058	2,200	2,315	2,272
(7)	Revenue Per Employee (RM/Employee)	0.29	0.28	0.31	0.34	0.29	0.36	0.37
(8)	Units Sold Per Employee (GWh/Employee)	1.04	1.11	1.23	1.35	1.35	1.43	1.53
(9)	Generation Capacity Per Employee (MW/Employee)	0.23	0.22	0.22	0.17	0.16	0.14	0.15
(10)	Total Units Purchased (GWh)	1,457	1,583	1,863	1,999	2,058	2,363	2,788
(11)	Total Units Exported (GWh)	-	-	-	-	-	-	-
(12)	Total Units Imported (GWh)	-	-	-	-	-	-	-

Note : Years indicated are financial years
Source :Sabah Electricity Sdn. Bhd. (SESB)

Statistik Sarawak Energy Berhad (SEB)

Statistics of Sarawak Energy Berhad (SEB)

Sarawak Energy Berhad

A.	Sales of Energy (GWh)	2002	2003	2004	2005	2006	2007	2008
(1)	Domestic	805	864	919	992	1,040	1,098	1,132
(2)	Commercial	1,025	1,107	1,165	1,242	1,324	1,421	1,497
(3)	Industrial	1,381	1,463	1,553	1,661	1,627	1,691	1,726
(4)	Public Lighting	37	37	41	47	54	62	66
(5)	Mining	-	-	-	-	-	-	-
(6)	Export	-	-	-	-	-	-	-
(7)	Others	-	-	-	-	-	-	-
	Total***	3,248	3,471	3,678	3,942	4,045	4,272	4,421

*** Total energy sales includes own generation and purchase from IPPs

B.	Generation Mix (GWh)	2002	2003	2004	2005	2006	2007	2008
(1)	Hydro	388	454	371	527	363	428	527
(2)	Gas	1,460	1,449	1,438	1,466	1,665	1,790	1,672
(3)	Coal	-	-	-	-	-	-	-
(4)	Oil	124	-	-	-	-	-	-
(5)	Diesel	319	499	251	217	291	334	356
(6)	Others	-	-	-	-	-	-	-
	Total***	2,291	2,402	2,060	2,210	2,319	2,552	2,555

*** Own generation only

C.	No. of Consumers	2002	2003	2004	2005	2006	2007	2008
(1)	Domestic	302,571	323,659	336,439	348,377	364,586	376,137	391,875
(2)	Commercial	53,993	56,069	58,259	60,336	62,399	64,787	67,480
(3)	Industrial	831	838	867	879	882	889	900
(4)	Public Lighting	4,150	4,437	4,783	5,175	5,534	5,937	6,149
(5)	Mining	-	-	-	-	-	-	-
(6)	Others	-	-	-	-	-	-	-
	Total	361,545	385,003	400,348	414,767	433,401	447,750	466,404

D.	Generation Capacity (MW)	2002	2003	2004	2005	2006	2007	2008
(1)	Hydro	101	101	101	101	101	101	101
(2)	Gas	289	288	274	271	271	271	271
(3)	Coal	-	-	-	-	-	-	-
(4)	Oil	50	-	-	-	-	-	-
(5)	Diesel	117	171	170	174	175	177	174
(6)	Others	-	-	-	-	-	-	-
(7)	Total Generation	557	560	545	546	547	549	546
(8)	Overall Availability (%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A
(9)	Cost Of Generation (sen/kWh)							
	a) Own Generation	11.48	12.16	14.0	14.5	16.6	14.9	19.2
	b) Energy Purchased	15.83	11.81	10.7	12.9	12.7	12.5	13.6
	c) Overall Cost - (a) & (b)	13.2	12.02	12.3	13.7	14.6	13.6	16.2

Sarawak Energy Berhad

E.	Transmission System Capacity	2002	2003	2004	2005	2006	2007	2008
(1)	Transmission System Lines/Cables (km)	-	-	-	-	-	-	-
	i. 500 KV	765	765	765	765	765	765	765
	ii. 275 KV	136	136	138	138	138	138	138
	iii. 132 KV	-	-	-	-	-	-	-
(2)	iv. 66 KV							
	Transmission Substations							
	i. Number	17	17	18	20	21	20	22
	ii. Capacity (MVA)	3,251	3,251	3,491	3,811	4,166	4,166	4,726
(3)	Performance							
	a) System Minutes	37	2	21	8	14.5	0.5	49.8
	b) Number of Incidents of Trippings	34	21	9	3	9	1	9
	c) Unsupplied Energy (MWh)	517	17.5	269	103	289	9.6	661.7

F.	Distribution System Capacity	2002	2003	2004	2005	2006	2007	2008
(1)	Distribution System Lines/Cables (km)							
	i. Overhead Lines	15,208	16,072	16,790	16,470	17,002	17,126	18,565
	ii. Underground Cables	3,553	3,757	4,173	4,426	4,753	5,040	5,422
(2)	Distribution Substations							
	i. Number	5,554	6,249	6,893	7,508	7,588	7,926	8,290
	ii. Capacity (MVA)	3,933	4,200	4,668	5,329	5,295	5,642	6,217
(3)	Performance							
	Number of Interruption of Supply	4,167	6,590	4,244	4,489	7,409	7,915	8,124

G.	Performance Highlights	2002	2003	2004	2005	2006	2007	2008
(1)	Maximum Demand (MW)	604	643	685	743	773	834	860
(2)	Total Units Generated (GWh)	2,291	2,402	2,060	2,210	2,319	2,552	2,555
(3)	Total Units Sold (GWh)	3,248	3,471	3,678	3,942	4,045	4,272	4,421
(4)	Sales of Electricity (RM million)	864	927	977	1047	1,090	1,216	1,289
(5)	Installed Generation Capacity (MW)	557	560	545	546	547	549	546
(6)	Total Number of Employees	2,025	2,028	2,058	2,042	2,037	2,054	2,143
(7)	Revenue Per Employee (RM/Employee)	0.43	0.46	0.47	0.51	0.54	0.59	0.60
(8)	Units Sold Per Employee (GWh/Employee)	1.60	1.71	1.79	1.92	1.99	2.08	2.06
(9)	Generation Capacity Per Employee (MW/Employee)	0.28	0.28	0.26	0.27	0.27	0.27	0.25
(10)	Total Units Purchased (GWh)	1,506	1,657	1,840	2,400	2,537	2,639	2,851
(11)	Total Units Exported (GWh)	-	-	-	-	-	-	-
(12)	Total Units Imported (GWh)	-	-	-	-	-	-	-

Note : Years indicated are financial years
Source :Sarawak Energy Berhad

Senarai Penjana Kuasa Bebas

List of Independent Power Producers (IPPs)

Independent Power Producers (IPPs)

No.	Licensee	Type of Plant	Licensed Capacity (MW)	Units Generated (GWh)	Units Sold (GWh)	Date of Issue of Licence
1.	YTL Power Generation Sdn. Bhd. (a) Paka, Terengganu (b) Pasir Gudang, Johor	 2x390MW (Combined Cycle) 1x390MW (Combined Cycle)	 780 390	7,639	7,508	07-04-1993
2.	Genting Sanyen Power Sdn. Bhd. Kuala Langat, Selangor	1x762MW (Combined Cycle)	762	5,257	5,175	01-07-1993
3.	Segari Energy Ventures Sdn. Bhd. Lumut, Perak	2x651.5MW (Combined Cycle)	1303	4,507	4,455	15-07-1993
4.	Powertek Bhd. Alor Gajah, Melaka	4x110MW (Gas Turbines)	440	111	110	01-12-1993
5.	Port Dickson Power Bhd. Tanjung Gemuk, Port Dickson	4x110MW (Gas Turbines)	440	501	496	01-12-1993
6.	ARL Tenaga Sdn. Bhd. Melawa, Sabah	4x12.5MW (Diesel Engines)	50	125	116	14-06-1994
7.	Musteq Hydro Sdn. Bhd. Sg. Kenerong, Kelantan	2x10MW (Mini Hydro)	20	122	122	18-11-1994
8.	Serudong Power Sdn. Bhd. Tawau, Sabah	3x12MW (Diesel Engines)	36	230	220	01-04-1995
9.	Stratavest Sdn. Bhd. Sandakan, Sabah	4x15MW (Diesel Engines)	60	292	284	01-10-1996

Independent Power Producers (IPPs)

No.	Licensee	Type of Plant	Licensed Capacity (MW)	Units Generated (GWh)	Units Sold (GWh)	Date of Issue of Licence
10.	Ranhill Powertron Sdn. Bhd. Karambunai, Sabah	2x95MW (Combined Cycle)	190	1,177	1,149	13-06-2006
11.	TNB Generation Sdn. Bhd. **	4,435MW (Various types of thermal plants)	4,435	20,357	19,961	01-09-1997
12.	Sandakan Power Corporation Sdn. Bhd. Sandakan, Sabah	4x8.5MW (Diesel Engines)	34	183	175	29-11-1997
13.	TNB Janamanjung Sdn. Bhd. **	3x700MW (Coal)	2100	11,891	10,897	21-05-1998
14.	Teknologi Tenaga Perlis Consortium Sdn. Bhd. Kuala Sungai Baru, Perlis	1x650MW (Combined Cycle)	650	5,558	5,479	26-08-1998
15.	Nur Generation Sdn. Bhd. Kulim High-Tech Industrial Park, Kedah	2x220MW (Combined Cycle)	440	813	804	17-09-1998
16.	Pahlawan Power Sdn. Bhd. Stesen Janakuasa Melaka, Tanjung Keling, Melaka.	1x334MW (Combined Cycle)	334	2,405	2,367	26-05-1999
17.	TNB Hidro Sdn. Bhd. **	1,911MW (Hydro)	1,911	6,718	6,323	01-09-2000
18.	Prai Power Sdn. Bhd. Daerah Seberang Perai Tengah Pulau Pinang	1x350MW (Combined Cycle)	350	2,472	2,410	20-02-2001

Independent Power Producers (IPPs)

No.	Licensee	Type of Plant	Licensed Capacity (MW)	Units Generated (GWh)	Units Sold (GWh)	Date of Issue of Licence
19.	GB3 Sdn. Bhd. Lumut, Perak.	1x640MW (Combined Cycle)	640	3,785	3,670	07-08-2001
20.	Panglima Power Sdn. Bhd. Alor Gajah, Melaka.	1x720MW (Combined Cycle)	720	5,078	4,983	07-08-2001
21.	Tanjung Bin Power Sdn. Bhd. Tanjung Bin, Mukim Serkat, Daerah Pontian, Johor.	3x700MW (Coal)	2,100	10,931	10,285	26-09-2003
22.	Kapar Energy Ventures Sdn Bhd Mukim Kapar, Daerah Klang Selangor.	2x300MW (Thermal) 2x300MW, 2x500MW (Coal) 2x110MW (Gas Turbines)	2,420	9,722	8,871	01-07-2004
23.	Sepangar Bay Corporation Sdn Bhd Kota Kinabalu Industrial Park Kota Kinabalu, Sabah	1x100MW (Combined Cycle)	100	641	625	18-05-2006
24.	Jimah Energy Ventures Sdn. Bhd. Mukim Jimah, Port Dickson, Negeri Sembilan.	2x700MW (Coal)	1,400	*	*	22-03-2005
25.	Sejingkat Power Corporation Sdn Bhd Kuching, Sarawak ***	100MW (Coal)	100	732	640	N/A

Independent Power Producers (IPPs)

No.	Licensee	Type of Plant	Licensed Capacity (MW)	Units Generated (GWh)	Units Sold (GWh)	Date of Issue of Licence
26.	Sarawak Power Generation Sdn Bhd Bintulu, Sarawak ***	220MW (Combined Cycle)	220	1,471	1,459	N/A
27.	PPLS Power Generation	110MW (Coal)	110	749	682	N/A
28.	Mukah Power Generation	135MW (Coal)	135	61	61	N/A

Notes :

* Under Construction

** Wholely Owned Subsidiaries of TNB

*** Wholely Owned Subsidiaries of SESCO

All the datas above based on Calendar Year

Senarai Penjana Kuasa Menggunakan Sumber Tenaga Yang Boleh Diperbaharui

List of Small Renewable Energy Power Producers (SREP)

Renewable Energy Power Producers

No.	Licensee and Location	Contact Address	Type of Plant	Licensed Capacity (MW)	Energy Sources or Types of Fuel	Units Generated (MWh)	Units Sold (MWh)	Date of Issue of Licence
1.	Bumibiopower Sdn Bhd Pantai Remis, Perak.	No. 5B, Block 2, 2nd Floor Worldwide Business Centre Jalan Tinju 13/50, Seksyen 13 40675 Shah Alam, Selangor. Tel : 03-5512 7818 / 5512 7819 Fax : 03-5512 7817	Steam Turbines	6	Empty Fruit Bunch	*	*	13-10-2001
2.	Jana Landfill Sdn Bhd Air Hitam Sanitary Landfill, Seri Kembangan, Selangor.	Aras 5, Wisma TNB No. 19, Jalan Timur 46000 Petaling Jaya Selangor. Tel : 03-7960 0296 Fax : 03-7960 0294	Gas Turbines	2	Landfill Gas	N/A	N/A	13-10-2001
3.	TSH Bio Energy Sdn Bhd Km 65, Jalan Tawau-Kunak, Tawau, Sabah.	TB 9, KM 7, Apas Road TSH Industrial Estate 91000 Tawau Sabah. Tel : 089-912 020 / 911 056 Fax : 089-913 000	Steam Turbines	14	Waste from Palm Oil	91,462	65,320	14-10-2003
4.	Potensi Gaya Sdn Bhd Sungai Burong Palm Oil Mill, Km 44, Tawau-Lahad Datu Highway, Tawau, Sabah.	1022 Jalan Dunlop P.O. Box No. 33 91007 Tawau Sabah.	Steam Turbines	7	Empty Fruit Bunch	*	*	14-10-2003
5.	Alaf Ekspresi Sdn Bhd Apas Balung Mill, Tawau-Lahad Datu Highway, Km 35, Locked Bag 28, Borneo Samudra, 91009 Tawau, Sabah.	Lot 66, Shoplot 18 2nd Floor, Block G Ruang Singgah Mata 4 Asia City, P.O. box No. 12707 88830 Kota Kinabalu Sabah. Tel : 088-234 323 / 234 324 Fax : 088-236 754	Steam Turbines	8	Waste from Palm Oil	*	*	14-10-2003
6.	Naluri Ventures Sdn. Bhd. PLO 808, Jalan Keluli 11, Kaw Perindustrian Pasir Gudang, Mukim Plentong, Daerah Johor Bahru, 81700 Pasir Gudang, Johor.	No. 58, 2nd Floor, Block 2 Worldwide Bussiness Centre Jalan tinju 13/50, Seksyen 13 40575 Shah Alam Selangor. Tel : 03-5512 7818 / 5512 7819 Fax : 03-5512 7817	Steam Turbines	12	Waste from Palm Oil	*	*	17-03-2005
7.	Seguntor Bioenergy Sdn. Bhd. Lot NT.073020309, Mukim Seguntor, 90736 Sandakan, Sabah.	Peti Surat 212 Pejabat Pos Mini Bandar Sibuga Jaya, Batu 8 90000 Sandakan Sabah. Tel : 089-214 891 / 214 698 Fax : 089-214 701	Steam Turbines	11.5	EFB	0.120	0.103	30-11-2007

Renewable Energy Power Producers

No.	Licensee and Location	Contact Address	Type of Plant	Licensed Capacity (MW)	Energy Sources or Types of Fuel	Units Generated (MWh)	Units Sold (MWh)	Date of Issue of Licence
8	Kina Biopower Sdn. Bhd. Lot 16359, Mukim Seguntor, 90736 Sandakan, Sabah.	Peti Surat 212 Pejabat Pos Mini Bandar Sibuga Jaya, Batu 890000 Sandakan, Sabah. Tel : 089-214 891 / 214 698 Fax : 089-214 701	Steam Turbines	11.5	EFB	0.37	0.32	30-11-2007
9	Recycle Energy Sdn. Bhd. Resource Recovery Centre/Refuse Derived-Fuel Waste To Energy Plant, Lot 3041 & 3042,Mukim Semenyih, Kajang, Selangor.	Lot 3041 & 3042 Jalan Sg. Lalang, Kg. Pasir 43500 Semenyih, Selangor. Tel : 03-8724 2628 Fax : 03-8723 2627	Steam Turbines	8.9	Refuse Derived Fuel	*	*	11-12-2007
10	Syarikat Esajadi Power Sdn. Bhd. Sungai Pangpuyan Kota Marudu Sabah.	1st Floor, Lot 12 Sedco Industrial Estate Lorong Tomato, Jalan kolombong 88450 kota Kinabalu, Sabah. Tel : 088-386 502 / 389 502 Fax : 088-387 205	Mini Hydro	4.5	Water	*	*	31-03-2008
11	Syarikat Esajadi Power Sdn. Bhd. Sungai Kaingaran Tambunan Sabah.	1st Floor, Lot 12 Sedco Industrial Estate Lorong Tomato, Jalan kolombong 88450 kota Kinabalu, Sabah. Tel : 088-386 502 / 389 502 Fax : 088-387 205	Mini Hydro	2.5	Water	*	*	31-03-2008
12	Syarikat Esajadi Power Sdn. Bhd. Sungai Kadamaian Kota Belud Sabah.	1st Floor, Lot 12 Sedco Industrial Estate Lorong Tomato, Jalan kolombong 88450 kota Kinabalu, Sabah. Tel : 088-386 502 / 389 502 Fax : 088-387 205	Mini Hydro	2.0	Water	*	*	31-03-2008
13	MHES Asia Sdn. Bhd. HSD (D) 12572 Lot PT 3226 Mukim Serting Ilir Jempol Negeri Sembilan.	Wisma MHES No. 61, Jalan SS25/2 Taman Bukit Emas 47301 Petaling Jaya, Selangor. Tel : 03-7803 7117 Fax : 03-7803 3425	Steam Turbines	13.0	Waste from Palm Oil	*	*	05-05-2008
14	Sunquest Sdn. Bhd. Lot 227, Mukim Jimah Daerah Port Dickson Negeri Sembilan.	3A-11, Block F Phileo Damansara 1 No. 9, Jalan 16/11, 4650 Petaling Jaya, Selangor. Tel : 03-7956 5268 Fax : 03-7954 5268	Steam Turbines	6.5	Waste from Palm Oil	*	*	16-10-2008

* Not Operated Yet

Senarai Pengagih Elektrik

List of Electricity Distributors

List of Electricity Distributors

No.	Licensee and Contact Address	Area of Supply	Licensed Capacity (MW)	Date of Issue of Licence
1	MTBE Malaysia Sdn. Bhd. Lot 111, Kawasan Perindustrial Gebeng, Peti Surat 1, Balok, 26080 Kuantan, Pahang. Tel : 09 - 585 6700 Fax : 09 - 583 4743 / 583 4090	Lot 111 Gebeng Industrial Estate 26080 Kuantan Pahang.	5.6	18-05-1992
2	Kuantan Port Consortium Sdn. Bhd. Wisma KPC, KM. 25, Tanjung Gelang, Peti Surat 199, 25720 Kuantan, Pahang. Tel : 09 - 585 6700 Fax : 09 - 583 4743 / 583 4090	Kawasan Pelabuhan Kuantan, Kuantan Pahang.	3.5	01-07-1994
3	C3 Power Sdn. Bhd. Block F, Lot 51, Ground Floor, Jati Commercial Centre, P.O. Box 80737, 87017 F.T. Labuan, Sabah. Tel : 087 - 411 175 Fax : 087 - 419 731	Temporary Settlement in some areas in Labuan, Sandakan and Semporna.	5.85	15-03-1995
4	Sunway Pyramid Sdn. Bhd. Lot LL1.10 Sunway Pyramid, No. 3, Jalan PJS 11/15, Bandar Sunway, 46150 Petaling Jaya, Selangor. Tel : 03 - 7494 3000 Fax : 03 - 7492 8666	Atas Sebahagian PT 9312 dan 9313 Mukim Damansara Daerah Petaling 47400 Petaling Jaya, Selangor.	15	30-05-1995
5	Gas District Cooling (KLIA) Sdn. Bhd. Jalan KLIA S5 (KLIA Selatan), Southern Support Zone 64000 KLIA, Sepang, Selangor. Tel : 03 - 8787 4326 Fax : 03 - 8787 4282	Kuala Lumpur linternational Airport Daerah Sepang, Selangor.	60 *	01-01-1996
6	Kelang Port Authority Beg Berkunci 202, Jalan Pelabuhan Utara, 42005 Pelabuhan Klang, Selangor. Tel : 03 - 3168 8211 Fax : 03 - 3167 0211 / 3168 9117	Klang Port Authority Premis Jalan Pelabuhan 42005 Port Klang Selangor.	5.8	25-03-1997
7	Pengkalan Bekalan Kemaman Sdn Bhd Peti Surat 64, 24007 Kemaman, Terengganu. Tel : 09 - 863 1566 Fax : 09 - 863 1716	Kawasan Pangkalan Bekalan Kemaman Kemaman, Terengganu.	3.31	01-12-1997
8	See Sen Chemical Bhd PT 3940, Kawasan Perindustrian Teluk Kalong 24000 Kemaman, Terengganu. Tel : 09 - 863 2142 / 863 2304 Fax : 09 - 863 2143	Lot 3940 Kawasan Perindustrian Telok Kalong Mukim Kemaman Terengganu.	6 *	01-01-1998

List of Electricity Distributors

No.	Licensee and Contact Address	Area of Supply	Licensed Capacity (MW)	Date of Issue of Licence
9	Malaysia Airports (Sepang) Sdn. Bhd. 3rd & 4th Floor, Airport Management Centre, KL International Airport, 64000 KLIA, Selangor. Tel : 03 - 8776 2000 Fax : 03 - 8926 5510 / 8926 5209	Kuala Lumpur International Airport Sepang, Selangor.	46	14-02-1998
10	Petronas Gas Bhd. Centralized Utility Facilities(CUF), Integrated Petrochemical Complex, KM 105, Jalan Kuantan/Kuala Terengganu, 24300 Kertih, Kemaman, Terengganu. Tel : 09 - 830 5000 Fax : 09 - 830 5514 / 827 2508	Petrochemical Complex Kerteh Industrial Area Terengganu.	210 *	28-05-1998
11	Petronas Gas Bhd. Centralized Utility Facilities(CUF), Integrated Petrochemical Complex, Lot 139A, Gebeng Industrial Area Phase III, 26080 Kuantan, Pahang. Tel : 09 - 583 6200 Fax : 09 - 583 9949 / 586 3311	Petrochemical Complex Gebeng Industrial Area Pahang.	105 *	28-05-1998
12	K.K.I.P. Power Sdn. Bhd. No. G21 & G22, KKIP Amenity Centre, Lot 11B, Export Oriented Industrial Zone Phase 1, Kota Kinabalu Industrial Park, Menggatal, 88460 Kota Kinabalu, Sabah. Tel : 088 - 471 800 / 471 801 Fax : 088 - 498 17711	Kota Kinabalu Industrial Park (KKIP), Sabah.	20 - 210	15-06-1998
13	Nur Distribution Sdn. Bhd. (Receivers and Managers Appointed), Central Control Building(CCB), Lot 30, Jalan Hi-Tech 4, Kulim Hi-Tech Park, 09000 Kulim, Kedah. Tel : 04 - 401 0100 Fax : 04 - 401 0344 / 401 0311	Kulim Hi-Tech Industrial Park, Kedah.	440	17-09-1998
14	Shell Refining Company (FOM) Berhad Sdn. Bhd. Batu 1, Jalan Pantai, 71000 Port Dickson, Negeri Sembilan. Tel : 06 - 647 1311 Fax : 06 - 647 4780	Batu 1, Jalan Pantai 71000 Port Dickson Negeri Sembilan.	35 *	10-08-1999
15	Gas District Cooling (KLCC) Sdn. Bhd. c/o KLCC Urusharta Sdn. Bhd. Level 36, Tower 2, Petronas Twin Tower, Kuala Lumpur City Centre, 50088 Kuala Lumpur. Tel : 03 - 2382 8000 Fax : 03 - 2382 8795	Bangunan DCC 1 / DCC 2 / KLCC DCS/ Co Generation Plant Persiaran KLCC, Jalan Ampang 50088 Kuala Lumpur.	40 *	30-08-2000

List of Electricity Distributors

No.	Licensee and Contact Address	Area of Supply	Licensed Capacity (MW)	Date of Issue of Licence
16	Jaya Jusco Stores Sdn. Bhd. Jusco Taman Maluri Shopping Centre, 1st. Floor, Jalan Jejaka, Taman Maluri, Cheras, 55100 Kuala Lumpur. Tel : 03 - 9285 5222 Fax : 03 - 9285 9999	Lot 33, 2386, 2595, 2596 dan 2388, Jalan Jejaka, Taman Jaya Maluri, Cheras, Seksyen 90A, Kuala Lumpur.	3.4	2-10-2000
17	Genting Utilities & Services Sdn. Bhd. Tingkat 24, Wisma Genting, Jalan Sultan Ismail, 50250 Kuala Lumpur. Tel : 03 - 2161 2288 Fax : 03 - 2161 5304	Genting Highlands Area Negeri Pahang/ Selangor.	48	17-10-2000
18	TCL Industries (M) Sdn. Bhd. Plot No: 4248, Teluk Kalong Industrial Estate, 24007 Kemaman, Terengganu. Tel : 09 - 863 3029 Fax : 09 - 863 3085 / 863 2340	Plot No. 4248 Telok Kalong Industrial Estate 24007 Kemaman Terengganu.	7 *	15-09-2003
19	Ikano Corporation Sdn. Bhd. No. 2, Jalan PJU 7/2, Mutiara Damansara, 47800 Petaling Jaya, Selangor. Tel : 03 - 7726 9999 Fax : 03 - 7726 6277	Lot PT 400038 Mutiara Damansara, Petaling Jaya, Selangor.	7.936	23-12-2003
20	Jaya Jusco Stores Berhad Jusco Taman Universiti Shopping Centre, No. 4, Jalan Pendidikan, Taman Universiti, 81300 Skudai, Johor. Tel : 07 - 520 8700 Fax : 07 - 521 3000	PTD 62861, Jalan Pendidikan Taman Universiti, Mukim Pulai, Daerah Johor Bahru, Johor.	3.11	28-02-2004
21	Makmuran Sdn. Bhd. Mile 2 1/2, Jalan Ulu Patikang, 89008 Keningau, Sabah. Tel : 087 - 333 335 / 331 791 Fax : 087 - 331 064	Batu 2 1/2, Jalan Ulu Patikang Keningau, Sabah.	1.8 *	27-03-2004
22	Intitute of Technology Petronas Sdn Bhd Bandar Seri Iskandar, 31750 Tronoh, Perak. Tel : 05 - 368 8000 Fax : 05 - 365 4075 / 365 4093	Kampus Universiti Technologi Petronas Tronoh, Perak.	8.4 *	26-01-2006
23	Eng Lian Enterprise Sdn. Bhd. 9, Jalan Ampang #05-00, 50450 Kuala Lumpur. Tel : 03 - 2056 0600 Fax : 03 - 2056 0700	Lot 51533 Mukim Kuala Lumpur Kuala Lumpur.	2.29	01-03-2006

List of Electricity Distributors

No.	Licensee and Contact Address	Area of Supply	Licensed Capacity (MW)	Date of Issue of Licence
24	Aeon Co. (M) Bhd. AEON Metro Prima Shopping Centre, 1st. Floor, Management Office, No. 1, Jalan Metro Prima, 52100 Kepong, Kuala Lumpur. Tel : 03 - 6259 1122 Fax : 03 - 6259 2805	Lot 20954 Mukim Batu Kuala Lumpur.	4.83	15-3-2006
25	Fawanis Sdn. Bhd. 13th Floor, Wisma Denmark, 86, Jalan Ampang, 50450 Kuala Lumpur. Tel : 03 - 2032 2111 Fax : 03 - 2078 4679 / 2078 3450	Queen's Park Retail Centre Lot 392, Batu 2 - 2 1/2 Jalan Cheras Kuala Lumpur.	0.94	11-5-2006
26	Evergreen Intermerge Sdn Bhd Teck Guab Regency, 318, Jalan St Patrick , off Jalan Belunu, P.O. Box No. 33, 91007 Tawau, Sabah. Tel : 089 - 772 275 / 772 276 Fax : 089 - 769 955	Cacao Paramount Sdn. Bhd. Lot CL 1053 23797, Km 3 Tanjung Batu Laut Tawau, Sabah.	6 ⊗	10-10-2006
27	Seo Energy Sdn. Bhd. KM 8, Jalan Batu Sapi, Karamunting, P.O. Box 2605, 90729 Sandakan, Sabah. Tel : 089 - 611 011 Fax : 089 - 611 014 / 617 355	Sandakan Edible Oils Sdn. Bhd. KM 8, Jalan Batu Sapi Karamunting, Sandakan Sabah.	1.2 ⊗	10-10-2006
28	Wirazone Sdn. Bhd. Level 13A, Block 3B, Plaza Sentral, Jalan Stesen Sentral 5, 50470 Kuala Lumpur. Tel : 03 - 2263 3388 Fax : 03 - 2263 3366	Kaw. Pembangunan Kuala Lumpur Sentral Kuala Lumpur.	100 ⊗	15-10-2006
29	Sunway Carnival Sdn. Bhd. LG-68 management Office, Sunway Carnival Mall, 3068, Jalan Todak, Pusat Bandar Seberang Jaya, 13700 Seberang Jaya, Pulau Pinang. Tel : 04 - 397 9888 Fax : 04 - 397 9883	Lot 5497, 5498 dan 5499 Daerah Seberang Perai Tengah Pulau Pinang.	5	01-11-2006
30	Asian Supply Base Sdn. Bhd. Ranca-Ranca Industrial Estate, P.O. Box 80751, 87017 Labuan F.T., Sabah. Tel : 087 - 411 611 / 411 614 Fax : 087 - 415 477	Asian Supply Base Lot 206291581, Daerah Labuan Wilayah Persekutuan Labuan, Sabah.	7.5	13-11-2006
31	ASM Properties Sdn. Bhd. Suite 5.4, Tingkat 5, Maju Junction Mall, 1001 Jalan Sultan Ismail, 50250 Kuala Lumpur. Tel : 03 - 2772 8500 Fax : 02 - 2772 8501	Maju Junction Mall Lot PT 19, Seksyen 46 Kuala Lumpur.	10.8	24-11-2006

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No.	Licensee and Contact Address	Area of Suppl	Licensed Capacity (MW)	Date of Issue of Licence
32	Profound Heritage Sdn. Bhd. 1, Lorong Grace Square, Jalan Pantai Sembulan, 88100 Kota Kinabalu, Sabah. Tel : 088 - 318 801 / 318 802 Fax : 088 - 233 362	Sutera Harbour Resort Lot2, LA. 93010260 Kota Kinabalu Sabah.	38 *	01-10-2006
33	Lembaga Tabung Haji Bangunan Lembaga Tabung Haji, 201, Jalan Tun Razak, 50400 Kuala Lumpur. Tel : 03 - 2161 2233 Fax : 03 - 2161 4450	Menara TH Perdana Lot 101, Mukim Kuala Lumpur Kuala Lumpur.	3	29-12-2006
34	Bio Fuel Asia Sdn Bhd d/a TSH-Wilmar (BF) Sdn. Bhd., TB9, KM 7, Apas Road, TSH Industrial Estate, 91000 Tawau, Sabah. Tel : 089 - 912 020 / 911 056 Fax : 089 - 913 000	TSH Edible Oils Sdn Bhd PL 26166110 & 246290228 Kunak, Lahad Datu Sabah.	10	29-12-2006
35	AEON Co. (M) Bhd. AEON Cheras Selatan Shopping Centre, Aras 1, Lebuh Tun Hussien Onn, 43200 Balakong, Selangor. Tel : 03 - 9080 3498 Fax : 03 - 9080 3598	AEON Cheras Selatan Shopping Centre PT 41977 (Sebahagian Lot 2225) Mukim Cheras, Daerah Hulu Langat Selangor.	3.85	05-02-2007
36	Bahagaya Sdn. Bhd. TB 4327, Block 31, 2nd Floor, Fajar Complex, Jalan Haji Karim, 91000 Tawau, Sabah. Tel : 089 - 757 911 Fax : 089 - 761 022	Rajang Plywood (Sabah) Sdn. Bhd. CLS 105486762, 105486771 dan PT2000100538 Sungai Umas, Umas Mukim Merotai, Tawau 91000 Sabah.	3 *	07-03-2007
37	Urusharta Cemerlang Sdn. Bhd. Level 20 Menara Uni. Asia, 1008 Jalan Sultan Ismail 50250 Kuala Lumpur. Tel : 03 - 2716 1088 Fax : 03 - 2711 8988 / 2711 6288	Pavilion Kuala Lumpur Lot 174, 185, 187, 188, 281 (Lot Baru : 332) dan 260 Jalan Bukit Bintang/ Jalan Raja Chulan Seksyen 67, Kuala Lumpur.	22.1	14-03-2007
38	AEON Co. (M) Bhd. Jusco Seremban 2 Shopping Centre, 112 Persiaran S2 B1, Seremban 2, 70300 Seremban, Negeri Sembilan. Tel : 06 - 601 5643 Fax : 06 - 601 5645	AEON Seremban 2 Lot PT 10787 HS(D) 97966 & PT 10790 HS(D) 97969, Mukim Rasah Daerah Seremban Negeri Sembilan.	7.05	30-03-2007

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No.	Licensee and Contact Address	Area of Supply	Licensed Capacity (MW)	Date of Issue of Licence
39	Mid Valley City Energy Sdn. Bhd. Penthouse Menara IGB Mid Valley City, Lingkaran Syed Putra, 59200 Kuala Lumpur. Tel : 03 - 2289 8989 Fax : 03 - 2289 8802	The Gardens (Phase 2) Lot PT13, Mukim Kuala Lumpur Daerah Kuala Lumpur 59200 Wilayah Persekutuan.	40	03-05-2007
40	Bandar Utama City Corporation Sdn. Bhd. 1, Persiaran Bandar Utama, Bandar Utama, 47800 Petaling Jaya, Selangor. Tel : 03 - 7728 8878 Fax : 03 - 7728 9978	Kawasan Pembangunan Bandar Utama, Township Petaling Jaya.	100	01-03-2007
41	Perbadanan Memajukan Iktisad Negeri Terengganu. Tingkat 14, Menara Permint, Jalan Sultan Ismail, 20200 Kuala Terengganu, Terengganu. Tel : 09 - 622 2155 Fax : 09 - 623 3880	Pulau Kapas, Mukim Rusila, Daerah Marang 21600 Terengganu.	0.45 &	01-06-2007
42	Fusion Energy Sdn. Bhd. Lot 2319, Kaw. Perindustrian Olak Lempit, Mukim Tanjung 12, 42700 Banting, Selangor. Tel : 03 - 3182 2000 Fax : 03 - 3182 2382 / 3182 2279	Lion Group Complex Lot 2319, 2320, 2321, 2323, 2582, 2823 dan 2824, Mukim Tanjung Dua Belas Daerah Kuala Langat 42700 Selangor.	418 #	12-06-2007
43	Petronas Methanol (Labuan) Sdn. Bhd. Kawasan Perindustrian Ranca-Ranca, Peti Surat No. 80079, 87010 Wilayah Persekutuan Labuan. Tel : 087 - 411 211 Fax : 088 - 417 304	Kawasan Perindustrian Ranca-Ranca, Labuan 87010 Wilayah Persekutuan Labuan.	41.8	18-07-2007
44	Powertraco Sdn. Bhd. 95A, Jalan Bunga Raya, Kepayan, 88200 Kota Kinabalu, Sabah. Tel : 088 - 240 853 Fax : 088 - 260 853	Tawau Plywood Manufacturing Sdn.Bhd. CL 105362614, 105362623, 105451385 dan 105527875, KM 289, Jalan Merotai, Kg. Manusi, 91017 Tawau, Sabah.	3	19-07-2007 (Cancelled of Licence 12/12/2008)
45	Eng Lian Entreprise Sdn. Bhd. 9 Jalan Ampang #05-00, 50450 Kuala Lumpur. Tel : 03 - 2056 0600 Fax : 03 - 2056 0700	Bangsar Village II Lot 43872, 43873 dan 43874 Mukim Kuala Lumpur, Daerah Kuala Lumpur 59100 Wilayah Persekutuan	3.12	03-09-2007

List of Electricity Distributors

No.	Licensee and Contact Address	Area of Supply	Licensed Capacity (MW)	Date of Issue of Licence
46	Y.S. Tang Holdings Sdn. Bhd. 1-888, KB Mall, Jalan Hamzah, 15050 Kota Bharu, Kelantan. Tel : 09 - 747 6622 Fax : 09 - 747 5225 / 747 5900	KB Mall, PT 101, Jalan Hamzah, Seksyen 16, Bandar Kota Bharu 15050 Kelantan.	3.16	18-09-2007
47	Jurus Kota Sdn. Bhd. 2nd Floor, Alor Star Mall, Kawasan Perusahaan Tandop Baru, 06400 Alor Star, Kedah. Tel : 04 - 772 9233 Fax : 04 - 771 2033 / 772 1233	Alor Star Mall, Lot 801 & 802, Dalam Kawasan Perniagaan Dan Industri Kecil Sri Tandop 1, Mukim Pengkalan Kundor, Daerah Kota Setar, Kedah.	3.59	18-09-2007
48	Astral Realty Sdn. Bhd. AIM Point Plaza, Aras Podium, Jalan Emas 15, 42700 Banting, Selangor. Tel : 03 - 3181 3703 Fax : 03 - 3187 8003 / 3187 8066	PUTRA Square, Lot 423 (PN 5596) Mukim Kuantan, 25000 Kuantan, Pahang.	4.79	10-10-2007
49	C S Khin Developments Sdn. Bhd. Suite 601, 6th Floor, Wisma Mirama, Jalan Wisma Putra, 50460 Kuala Lumpur. Tel : 03 - 2142 1666 Fax : 03 - 2148 1229	Wisma Mirama, Lot 888, Section 69 50460 Kuala Lumpur Wilayah Persekutuan.	0.85	10-10-2007
50	Wisma Central Management Corporation Box #198, lot 2, 142A, 1st Floor, Wisma Central, Jalan Ampang, 50450 Kuala Lumpur. Tel : 03 - 2161 7522 / 2161 7721 Fax : 03 - 2161 9721	Wisma Central, Geran 10015, Lot 150 Seksyen 58, Bandar Kuala Lumpur 50450 Wilayah Persekutuan.	2.2	31-10-2007
51	AEON Co. (M) Bhd. AEON Bukit Tinggi Shopping Centre, Management Office Level 1, No. 1 Persiaran Batu Nilam 1/KS6, Bandar Bukit Tinggi 2, 41200 Klang, Selangor. Tel : 03 - 3326 2370 Fax : 03 - 3326 2371	AEON Co. (M) Bhd. Mall Lot PT 2042 HS(D) 105957 dan PT 2043 HS(D) 105958, Mukim Klang, Daerah Klang, Selangor.	12	11-12-2007
52	Tradewinds Properties Sdn. Bhd. 21st Floor, Wisma Zelan, No. 1, Jalan Tasik Permaisuri 2, Bandar Tun Razak, Cheras, 56000 Kuala Lumpur. Tel : 03 - 9106 3166 Fax : 03 - 9106 3177	Kompleks Antarabangsa Lot 1158, Seksyen 57 Mukim Bandar Kuala Lumpur Daerah Kuala Lumpur 50250 Wilayah Persekutuan.	4.97	11-12-2007

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No.	Licensee and Contact Address	Area of Supply	Licensed Capacity (MW)	Date of Issue of Licence
53	GCH Retail (Malaysia) Sdn. Bhd. Giant Hypermarket Kuala Terengganu (Complex Division) Lot PT 1485 Jalan Padang Hiliran 21100 Chabang Tiga, Kuala Terengganu, Terengganu. Tel : 09-631 9220 Fax : 09-631 9230	GCH Retail (Malaysia) Sdn. Bhd. Mall HS(D) 5917, PT 1485 Mukim Cabang Tiga Daerah Kuala Terengganu 21100 Terengganu.	3.3	09-01-2008
54	Pusat Tenaga Malaysia No. 2, Jalan 9/10, Persiaran Usahawan Seksyen 9, 43650 Bandar Baru Bangi Selangor. Tel : 03-8921 0800 Fax : 03-8921 0801	No. 2, Jalan 9/10 Persiaran Usahawan Seksyen 9, Bandar Baru Bangi 43650 Kajang Selangor.	0.09	29-02-2008
55	Awona Land Sdn. Bhd. Suite 4.09.03, 4th Floor, Central Square No. 23, Jalan Kampung Baru 08000 Sungai Petani, Kedah. Tel : 04-423 9288 / 423 8288 Fax : 04-422 4552	Central Square Shopping Centre Lot 134 HS(D) 759/95 Mukim Sungai Petani Daerah Kuala Muda 08000 Kedah.	4.1	14-03-2008
56	Aeon Co. (M) Bhd. Jusco Kinta City Shopping Centre, No. 2 Jalan The Lean Swee, Off Jalan Sultan Azlan Shah Utara 31400 Ipoh, Perak. Tel : 05 - 548 4668 Fax : 05 - 546 0899	AEON Kinta City Shopping Centre Lot 51150 Mukim Ulu Kinta, Daerah Kinta 31400 Ipoh, Perak.	7.65	18-03-2008
57	Rakyat Holdings Sdn. Bhd. Tingkat 4, Bangunan Angkasa Raya Jalan Ampang, 50450 Kuala Lumpur. Tel : 03-2148 6255 / 6623 Fax : 03-2151 5500	Bangunan Angkasa Raya Lot 149, Seksyen 58 Mukim Kuala Lumpur Daerah Kuala Lumpur.	2.44	19-03-2008
58	Menara Hap Seng Sdn. Bhd. 19th Floor, Menara Hap Seng Letter Box No. 83, Jalan P. Ramlee, 50250 Kuala Lumpur. Tel : 03-2145 1363 / 9363 Fax : 03-2145 7818	Menara Hap Seng Lot 593 & 594, Mukim Bandar Kuala Lumpur Daerah Kuala Lumpur 50250 Kuala Lumpur Wilayah Persekutuan.	4.82	19-03-2008
59	1 Borneo Management Corporation Sdn. Bhd. Lot No. A-05-11, 5th Floor, Block A Warisan Square, Jalan Tun Fuad Stephens 88000 Kota Kinabalu, Sabah. Tel : 088-447 777 Fax : 088-447 799	Kompleks Beli-Belah 1 Borneo Hypermall CL 015607057, Mukim Kuala Menggatal Dearah Kota Kinabalu 88450 Sabah.	20	08-04-2008

List of Electricity Distributors

No.	Licensee and Contact Address	Area of Supply	Licensed Capacity (MW)	Date of Issue of Licence
60	GCH Retail (Malaysia) Sdn. Bhd. Giant Hypermarket Kuantan Lot 5197, Jalan Tanah Putih, Seksyen 124 25100 Kuantan, Pahang. Tel : 09-515 6999 Fax : 09-515 6466	Lot 5197 Mukim Kuantan Daerah Kuantan 25100 Pahang.	2.96	10-04-2008
61	AEON Co. (M) Bhd. Aeon Seberang Prai City Shopping Centre 1st Floor, Management Office Perdana Wawasan Trade Centre, Jalan Perda Timur 14000 Bukit Mertajam, Seberang Prai Tengah, Pulau Pinang. Tel : 04-537 8055 Fax : 04-537 9022	Lot H.S.(M): 378 / PT 802, Mukim 6 & 7 Daerah Seberang Perai Tengah 14000 Pulau Pinang.	14	28-04-2008
62	Malaysia Airline System Berhad 2nd Floor, Administration Building Southern Support Zone, KLIA 64000 Sepang, Selangor. Tel : 03-7846 7777 Fax : 03-7846 3300	Kompleks Kampus MAS Lot PT 19 Mukim Dengkil Daerah Sepang 64000 Selangor.	25	29-04-2008
63	GCH Retail (Malaysia) Sdn. Bhd. Lot 13793 & 13796 Jalan Changkat Permata, Taman Permata 53300 Kuala Lumpur. Tel : 03-4106 2275 Fax : 03-4106 7414	Lot 13793 dan 13796 Mukim Setapak Daerah Gombak 53300 Selangor.	2.68	20-05-2008
64	Amtrustee Berhad. 17th Floor, Bangunan AmBank Group 55, Jalan Raja Chulan, 50200 Kuala Lumpur. Tel : 03-2078 2633 / 2078 2644 Fax : 03-2032 4303	Subang Parade Lot 14193, Mukim Bandar Subang Jaya Daerah Petaling 47500 Selangor.	10	07-05-2008
65	Reliable Capacity Sdn. Bhd. Suite 3.03, Block B, HP Towers No. 12, Jalan Gelenggang, Bukit Damansara 50490 Kuala Lumpur. Tel : 03-2711 0077 Fax : 03-2711 1762	Parcel 1 Perdagangan 'Axis Atrium' No. Lot 27985, Mukim Ampang, Daerah Hulu Langat, Selangor.	3.6	13-06-2008
66	GCH Retail (Malaysia) Sdn. Bhd. Giant Hypermarket Tampoi Complex Management Division Lot 54, Jalan Skudai, 81200 Tampoi Johor Bahru, Johor. Tel : 07-238 2353 Fax : 07-238 2354	Lot 54, Mukim Tampoi Daerah Johor Bharu 81200 Johor.	2.86	08-07-2008
67	GCH Retail (Malaysia) Sdn. Bhd. (Complex Division - Plentong) 3 Jalan Masai Lama, Mukim Plentong, 81750 Johor Bharu. Tel : 07-358 1402 Fax : 07-352 6532	Lot P.T.D. 116058 dan 116059 Mukim Plentong Daerah Johor Bharu Johor.	4.2	17-07-2008

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No.	Licensee and Contact Address	Area of Supply	Licensed Capacity (MW)	Date of Issue of Licence
68	GCH Retail (Malaysia) Sdn. Bhd. Giant Hypermarket Skudai Lot 3066 & 3067, Mukim Tebrau 81200 Johor Bharu, Johor. Tel : 07-554 9130 Fax : 07-554 9130	Lot 3066 & 3067 Mukim Terbau Daerah Johor Bharu 81200 Johor.	3.7	12-08-2008
69	Lianbang Ventures Sdn. Bhd. F4-40, Level 4, Dataran Pahlawan Melaka Megamall Jalan Merdeka, 75000 Bandar Hilir, Melaka. Tel : 06-282 1828 Fax : 06-283 1827	Dataran Pahlawan Melaka Megamall Lot 14, 141 dan 142 Mukim Kawasan Bandar XXVII, Daerah Melaka Tengah, Melaka.	5.52	29-10-2008
70	Panglobal Insurance Berhad Level 12B, Menara PanGlobal, No. 8 Lorong P. Ramlee, P.O. Box 12448, 50778 Kuala Lumpur. Tel : 03-2078 2090 Fax : 03-2072 5534	PanGlobal Building Lot 53 Section 20 Bandar Petaling Jaya Daerah Petaling Selangor.	1.7	24-10-2008
71	GCH Retail (Malaysia) Sdn. Bhd. Giant Mall Kelana Jaya Complex Management Office No. 33, Jalan SS 6/12, SS 6, Kelana Jaya 47301 Petaling Jaya, Selangor. Tel : 03-7880 3742 / 7880 4714 Fax : 03-7803 7858	Giant Mall Kelana Jaya Lot PT 67 Seksyen 40 Mukim Bandar Petaling Jaya Daerah Petaling 47301 Selangor.	6.11	05-11-2008
72	GCH Retail (Malaysia) Sdn. Bhd. Giant Hypermarket Shah Alam Lot 2, Persiaran Sukan, Seksyen 13 40100 Shah Alam, Selangor. Tel : 03-5544 8888 Fax : 03-5511 9681	Lot 2, Seksyen 13 Daerah Shah Alam Selangor.	4.2	05-11-2008
73	Dijaya Land Sdn. Bhd. Lot 301, 3rd Floor, Wisma Dijaya No. 1A Jalan SS20/1, Damansara Utama 47400 Petaling Jaya Fax : 03-7710 1025	Tropicana City Lot 45821, Mukim Damansara Utama Daerah Petaling Jaya Selangor.	11.03	05-11-2008
74	GCH Retail (Malaysia) Sdn. Bhd. Giant Superstore Sandakan Lot 3, Jalan lJM, Bandar Utama, Batu 6 Off Jalan Utara, 90000 Sandakan, Sabah. Tel : 089-214 219 Fax : 089-214 207	Lot CL075477584 Mukim Sandakan Daerah Sandakan Negeri Sabah.	1.7	17-11-2008
75	BR Property Holdings Sdn. Bhd. 31st Floor, Menara Multi-Purpose, Capital Square No. 8, Jalan Munshi Abdullah, 50100 Kuala Lumpur. Tel : 03-2694 6622 Fax : 03-2694 1922	Bangsar Shopping Centre, Lot 41274 Daerah Kuala Lumpur Wilayah Persekutuan Kuala Lumpur.	8.51	18-11-2008

List of Electricity Distributors

No.	Licensee and Contact Address	Area of Supply	Licensed Capacity (MW)	Date of Issue of Licence
76	Dream Property Sdn. Bhd. 2-12, 2nd Floor, Batu Pahat Mall, Jalan Kluang 83000 Batu Pahat, Johor. Tel : 07-433 7733 Fax : 07-438 7773	Batu Pahat Mall Lot 2566 Mukim Simpang Kanan Daerah Batu Pahat Johor.	7.35	18-11-2008
77	AEON Co. (M) Bhd. AEON Bukit Indah Lot PTD 90606, Nusajaya, Mukim Pulai Daerah Johor Bahru, Johor. Tel : 07-234 6301 Fax : 07-234 6331	AEON Nusajaya LOT PTD 90606 Mukim Pulai Daerah Johor Bahru Johor.	8	26-11-2008
78	Tesco Stores (M) Sdn. Bhd. Mezzanine Floor, No. 8, Jalan PJU 7/4 Mutiara Damansara, 47800 Petaling Jaya, Selangor. Tel : 03-7726 1600 Fax : 03-7726 9628	Kompleks Perniagaan TESCO Lot 1 PT 1053 dan Lot 2 PT 111 Mkm Peringgit Lot 3 PT2 Mkm Town Area XXXII dan Lot 4 PT 70 Mukim Town Area XXXIII Daerah Melaka Tengah 75400 Negeri Melaka.	3.01	26-11-2008
79	GCH Retail (Malaysia) Sdn. Bhd. Giant Hypermarket Klang Persiaran Batu Nilam, Bandar Bukit Tinggi 1 41200 Klang, Selangor. Tel : 03-3323 5518 Fax : 03-3323 5863	Lot PT 62366(HSD 63350), PT 62367(HSD 63351) dan PT 75234A (HSD 68651) Mukim Kelang Daerah Kelang, Selangor.	3.3	03-12-2008
80	Tanah Sutera Development Sdn. Bhd. No. 2, Jalan Sutera Merah 2 Taman Sutera, 81200 Johor Bharu. Tel : 07-289 9009 Fax : 07-289 9119	Kompleks Perniagaan Sutera Mall, Lot Sebahagian PTD 67962 Mukim Pulai, Daerah Johor Bharu, Johor.	5.98	03-12-2008
81	GCH Retail (Malaysia) Sdn. Bhd. Giant Hypermarket Senawang Lot 1571 Jalan Senawang 70450 Seremban, Negeri Sembilan. Tel : 06-678 0719 / 678 0720 Fax : 06-678 2360	Lot PT 1571 HS(D) 133690 Pekan Senawang Daerah Seremban Negeri Sembilan.	2.12	03-12-2008
82	Malaysia Airports Sdn. Bhd. Lapangan Terbang Sultan Abdul Aziz Shah 47200 Subang, Selangor. Tel : 03-7846 7777 Fax : 03-7846 3300 / 7846 3300	Kompleks Lapangan Terbang Sultan Ismail Petra Lot 833 (Sek 40), Mukim Pengkalan Chepa Dan lot 2209 (Sek 39), Mukim Baung, Daerah kota Bharu, Kelantan.	2.56	19-12-2008

Notes :

\# Project Development Not Commenced Yet

* Generates Electricity by Co-Generation

@ Co-Generation Plant Not Operationed Yet

⊗ Generates Electricity

& Generates Electricity by Hybrid

Senarai Co-Generators Utama

List of Major Co-Generators

List of Major Co-Generators

No.	Licensee and Location	Capacity (MW)	Type of Licence	Fuels	Generation (MWh)
1	Perwaja Steel Sdn. Bhd. Loji Besi Penurunan Terus, Tanjung Berhala, Kemaman, Terengganu.	9.5	Private	Waste Heat From Industrial Process	31,674
2	Bernas Production Sdn. Bhd. Kompleks Mengering dan mengilang Padi LPN, Sekinchan, Selangor.	0.23	Private	Agriculture Waste	*
3	PadiBeras Nasional Bhd. Kompleks Bernas Sg. Ranggam (Ulu Dedap), Kg. Gajah, Perak.	0.65	Private	Agriculture Waste	650
4	Padiberas Nasional Bhd Kompleks Bernas Changkat Lada, Kg. Gajah, Perak.	0.65	Private	Agriculture Waste	37 Up to Jan08 Cancelled of Licence 11/10/08
5	Sime Plantations Sdn. Bhd. Tennamaran Palm Oil Mill, Batang Berjuntai, Selangor.	4.10	Private	Agriculture Waste	4,310
6	Sime Plantations Sdn. Bhd. Seri Intan Palm Oil Mill, Batu 5, Jalan Maharaja Lela, Teluk Intan, Perak.	3.42	Private	Agriculture Waste	12,162
7	Tractors Malaysia (1982) Sdn. Bhd. Lot 2, Section 2 dan Sebahagian Tanah lot 3410, Kampung Puchong, Mukim Daerah Petaling, Selangor.	1.25	Private	Natural Gas	2,046
8	Malaysian Mosaics Berhad Lot 641, 642 & 643, Mukim Kluang, Batu 3, Jalan Batu Pahat, Kluang, Johor.	4.21	Private	Natural Gas	*
9	Malaysian Newsprint Industries Sdn. Bhd. Lot 3771, Jalan Lencongan Mentakab-Temerloh, Temerloh Industrial Park, Mentakab, Pahang.	79.2	Private	Oil	32,714
10	Titan Petchem (M) Sdn. Bhd. PLO 257, 312, 425 dan 426, Jalan Tembaga 4, Pasir Gudang Industrial Estate, Pasir Gudang, Johor.	56	Private	Natural Gas	297,480
11	Titan Petrochemicals (M) Sdn. Bhd. PLO 8, Tanjung Langsat Industrial Park, Mukim Sg. Tiram, Johor Bharu, Johor.	42.6	Private	Natural Gas	162,584

List of Major Co-Generators

No.	Licensee and Location	Capacity (MW)	Type of Licence	Fuels	Generation (MWh)
12	CCM Chemicals Sdn. Bhd. Pasir Gudang Works, Plot 411, Kaw. 4, Jalan Perak Satu, Pasir Gudang, Johor.	15	Private	Natural Gas	Cancelled of Licence 1/15/08
13	Amoco Chemical (Malaysia) Sdn. Bhd. Lot 116, Gebeng Industrial Estate, Balok, Kuantan, Pahang.	21.6	Private	Natural Gas	Cancelled of Licence 1/15/08
14	Tian Siang Oil Mill (Perak) Sdn. Bhd. Lot 2161, Beruas, Perak.	4.76	Private	Agriculture Waste	14
15	Central Sugars Refinery Sdn. Bhd. Batu Tiga, Shah Alam, Selangor.	9.23	Private	Natural Gas	36,319
16	BASF Petronas Chemicals Sdn. Bhd. Lot 139, Kawasan Perindustrian Gebeng, Kuantan, Pahang.	27.4	Private	Natural Gas	N/A
17	Penfibre Sdn. Bhd. Lot 109-114, Kawasan Perindustrian Bebas, Prai Zon 1, Prai, Pulau Pinang.	35.4	Private	Natural Gas	Cancelled of Licence 1/15/08
18	Nibong Tebal Paper Mill Sdn. Bhd. 886, Jalan Bandar Baru, Sg. Kecil, Nibong Tebal, Pulau Pinang.	0.8	Private	Wood Dust	*
19	Gas District Cooling (Putrajaya) Sdn. Bhd. Plot 2U1, Putrajaya Precint 2, Wilayah Persekutuan Putrajaya.	10.74	Private	Natural Gas	33,263
20	Petronas Penapisan (Melaka) Sdn Bhd Kompleks Petronas Penapisan Melaka, Mukim Sungai Udang, Melaka.	145	Private	Natural Gas	616,291
21	Gas District Cooling (Putrajaya) Sdn. Bhd. Plot 12371, Precint 1, WP Putrajaya, Lebuh Perdana Timur, Pusat Pentadbiran Kerajaan Persekutuan Putrajaya, Putrajaya.	6.5	Private	Natural Gas	23,444
22	Muda Paper Mills Sdn. Bhd. Lot 11207, Mukim Kajang, Daerah Hulu Langat, Selangor.	9.6	Private	Natural Gas	77,126
23	Ban Heng Bee Rice Mill (1952) Sdn. Bhd. Lot 2171,Jalan Bukit Raya, Mukim Bukit Raya Pendang, Kedah.	0.5	Private	Agriculture Waste	2,331

List of Major Co-Generators

No.	Licensee and Location	Capacity (MW)	Type of Licence	Fuels	Generation (MWh)
24	Petronas Fertilizer (Kedah) Sdn. Bhd. Lot 10750, Bandar Gurun, Daerah Kuala Muda, Kedah.	18.31	Private	Natural Gas	Not In Operation
25	Felda Palm Industries Sdn. Bhd. Kompleks Sahabat, Mukim Tungku, Lahad Datu, Sabah.	7.5	Private	EFB	16,680
26	Palm Energy Sdn. Bhd. Kwantas Oil Sdn. Bhd. Lot CL 115311138, Mukim Lahad Datu, Lahad Datu, Sabah.	6.5	Private	Agriculture Waste	22,195
27	Sabah Forest Industries Sdn. Bhd. Mukim Kg. Sebubuh, Daerah Sipitang, Sabah.	57	Private	Wood Waste/ Diesel	302,804
28	TCL Industries (Malaysia) Sdn. Bhd. Plot No. 4248, Teluk Kalong Industrial Estate, Kemaman, Terengganu.	7	Public	Waste Heat from Industrial Process	3,916
29	Gas District Cooling (KLCC) Sdn. Bhd. Bangunan DCC 1/DCC 2, KLCC DCS/Cogeneration Plant, Persiaran KLCC, Jalan Ampang, Kuala Lumpur.	40	Public	Natural Gas	58,516
30	Gas District Cooling (KLIA) Sdn. Bhd. Kuala Lumpur International Airport, Daerah Sepang, Selangor.	60	Public	Natural Gas	289,145
31	See Sen Chemical Bhd. Lot 3940, Kawasan Perindustrian Telok Kalong, Mukim Kemaman, Terengganu.	6	Public	Waste Heat from Industrial Process	31,600
32	Shell Refining Company (FOM) Berhad Batu 1, Jalan Pantai, Port Dickson, Negeri Sembilan.	35	Public	Waste Gas from Industrial Process	61,202
33	Petronas Gas Bhd. Petrochemical Complex, Kerteh Industrial Area, Terengganu.	210	Public	Natural Gas	1,245,100
34	Petronas Gas Bhd. Petrochemical Complex, Gebeng Industrial Area, Kuantan, Pahang.	105	Public	Natural Gas	613,170
35	Institute of Technology Petronas Sdn Bhd Kampus Universiti Teknologi Petronas, Tronoh, Perak.	8.4	Public	Natural Gas	35,122
36	Fusion Energy Sdn. Bhd. Lion Group Complex, Lot 2319, 2320, 2431, 2323,, 2582, 2823 dan 2824, Mukim Tanjung 12, Banting, Selangor.	418	Public	Waste Gas from Industrial Process	Not In Operation

List of Major Co-Generators

No.	Licensee and Location	Capacity (MW)	Type of Licence	Fuels	Generation (MWh)
37	Bahagaya Sdn. Bhd. Rajang Plywood (Sabah) Sdn. Bhd. CLS 105486762, 105486771 dan PT2000100538, Sg. Umas, Umas, Mukim Merotai, Tawau, Sabah.	3	Public	EFB	18,701
38	Powertraco Sdn. Bhd. Kompleks Tawau Plywood Manufacturing Sdn. Bhd. CL 105362614, 105362623, 105451385 dan 105527875, KM 289, Jalan Merotai, Kg. Manusi, Tawau, Sabah.	3	Public	Waste Gas from Industrial Process	Cancelled of Licence 12/12/08
39	Bio Fuel Asia Sdn Bhd TSH Edible Oils Sdn. Bhd. PL26166110 & 246290228 Kunak, Lahad Datu, Sabah.	10	Public	Wood Waste	26,768
40	Evergreen Intermerge Sdn Bhd Cacao Paramount Sdn. Bhd. Lot CI 105323797, KM 3, Tanjung Batu Laut, Tawau, Sabah.	6	Public	EFB	*
41	Makmuran Sdn Bhd. Batu 2 1/2, Jalan Ulu Patikang, Keningau, Sabah.	1.8	Public	Agriculture Waste/Diesel	3,011
42	Seo Energy Sdn. Bhd. Sandakan Edible Oils Sdn. Bhd. KM 8,Jalan Batu Sapi Karamunting, Sandakan, Sabah.	1.2	Public	EFB	2,322
43	Petronas Methanol (Labuan) Sdn. Bhd. Kawasan Perindustrian Ranca-Ranca, Labuan, 87010 Wilayah Persekutuan Labuan, Sabah.	41.8	Public	Natural Gas	118,882
44	Profound Heritage Sdn. Bhd. Sutera Harbour Resort, Lot 2, LA. 93010260, Kota Kinabalu, Sabah.	38	Public	Diesel	134,286

Notes :

1. a) Total capacity of major projects licensed

- Public	993.2 MW
- Private	577.7 MW
Total	1,570.9 MW

b) Total capacity of major projects Planned

- Public	424.0 MW
- Private	18.3 MW
Total	442.3 MW

c) Total capacity of major projects in Operation

- Public	569.2 MW
- Private	482.1 MW
Total	1051.3 MW

2. a) Public Licence - The licensee generates for his own use and for supply to other persons.

   b) Private Licence - The licensee generates for his own use only.

3. * No generation / not in operation

Statistik Penjanaan Persendirian

Statistics of Self-Generation

Statistics of Self-Generation

No. Self-Generation Licences	Generation Plant Mix (MW)				
	Gas	Diesel	Biomass	Others	Total
1,646	16	890	447	13	1,365

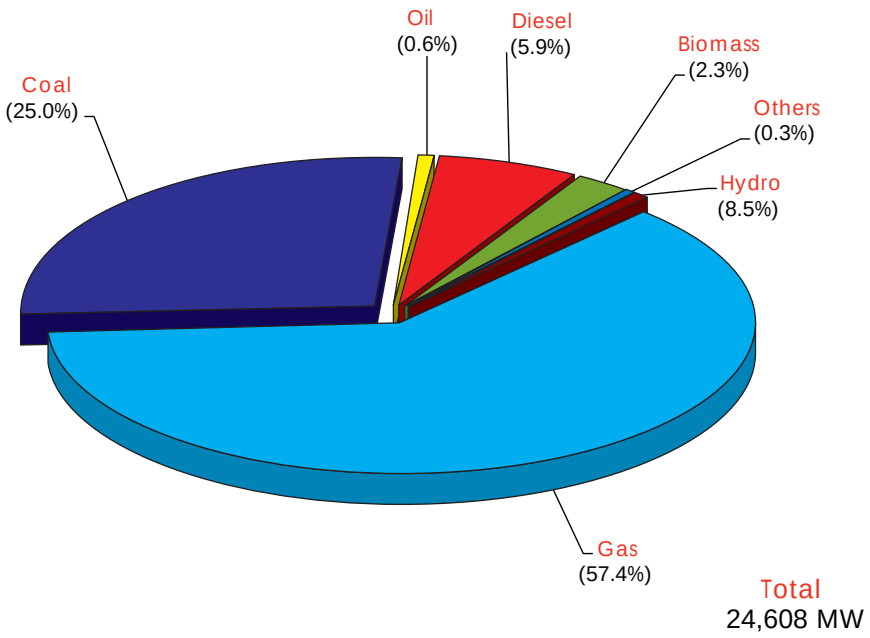
Statistik Dan Maklumat Lain Yang Penting Untuk Industri Bekalan Elektrik

Other Important Statistics and Information of the Electricity Supply Industry

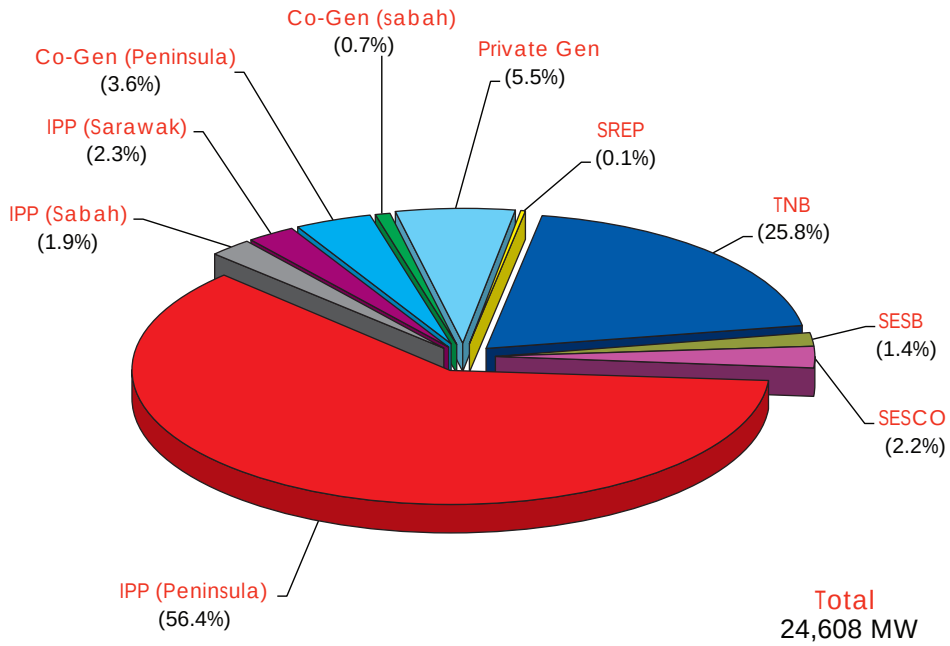
Statistics of Approved Projects According to Energy Sources For Year 2008

No.	Energy Sources		Application Approved	Generation Capacity (MW)	Grid Connected Capacity (MW)	Percentage Connected to Grid (%)
1.	Biomass	Empty Fruit Bunch Wood Chips Rice Husk Municipal Solid Waste	4 - - -	45.5 - - -	40 - - -	66.5 - - -
2.	Landfill Gas		-	-	-	-
3.	Biogas		4	8.25	5.65	9.4
4.	Mini Hydro		2	15	15	24.1
5.	Wind & Solar		-	-	-	-
	Total		10	68.25	60.15	100

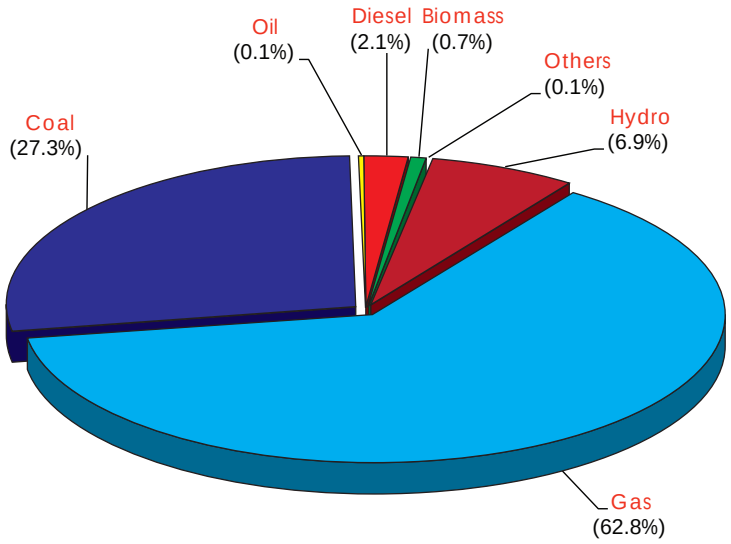
Generation Capacity Mix (by Type of Plant) in Malaysia



Generation Capacity of Major Producers in Malaysia

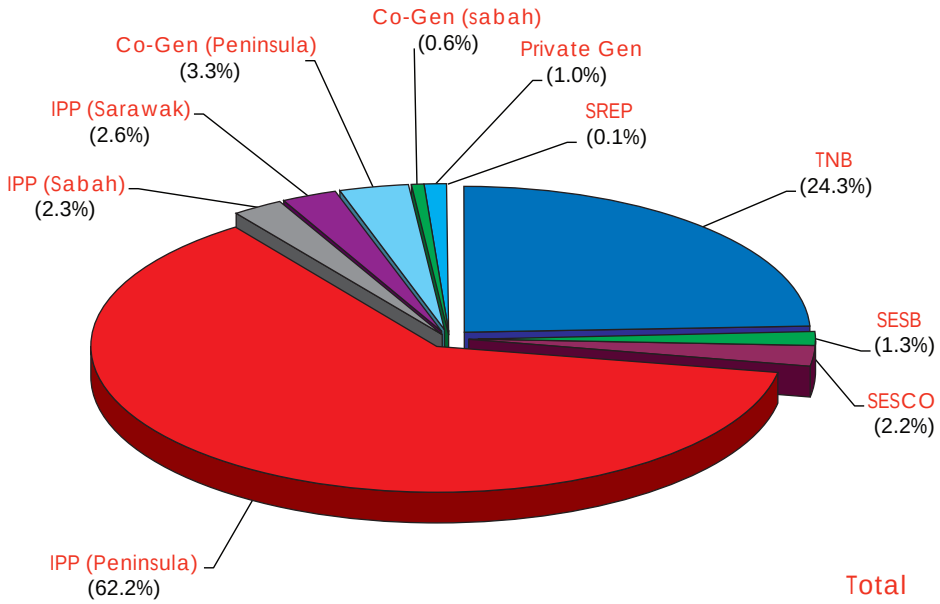


Generation Mix (by Type of Fuel) in Malaysia



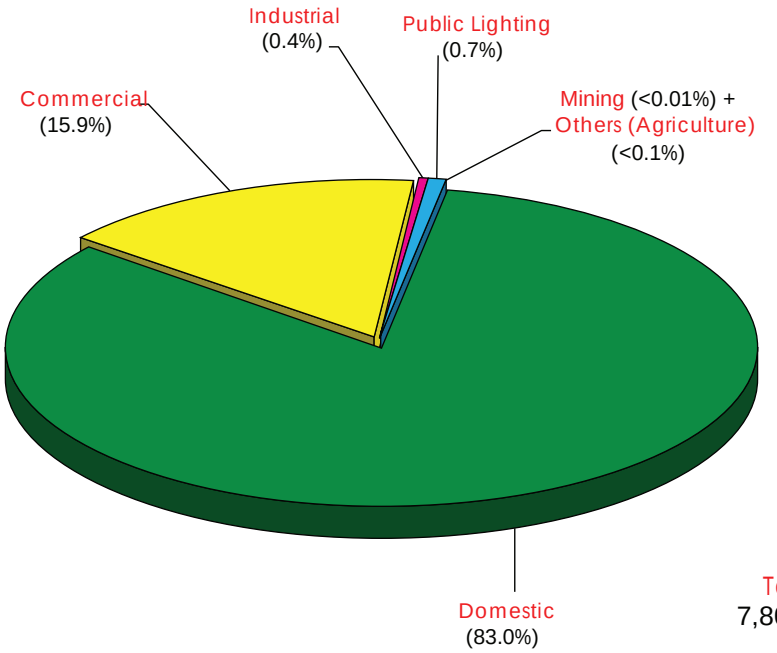
Total
113,823 GWh

Generation by Major Power Producers in Malaysia



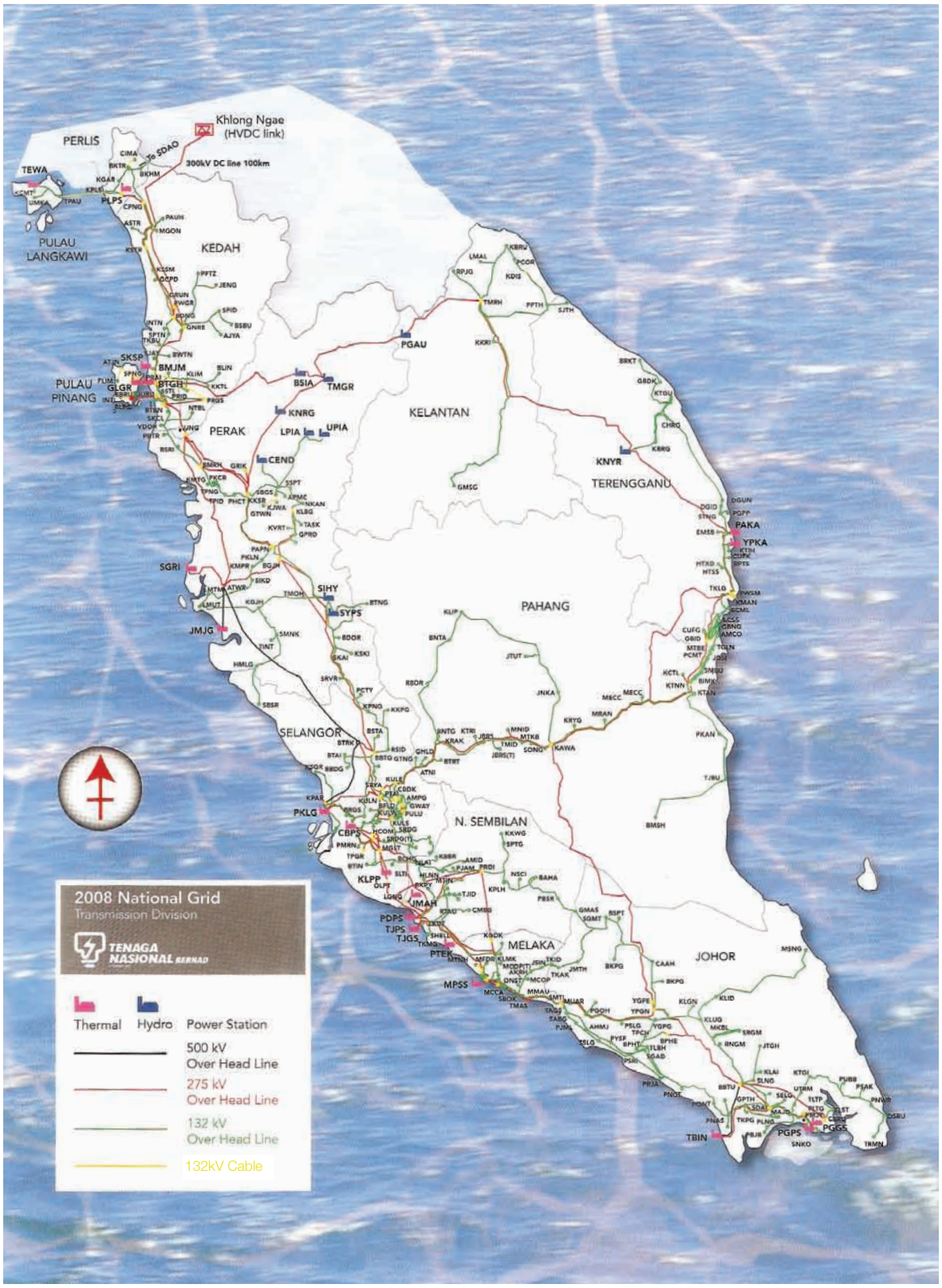
Total
113,823 GWh

Electricity Consumer of TNB, SESB and Sarawak Energy Berhad According to Sectors

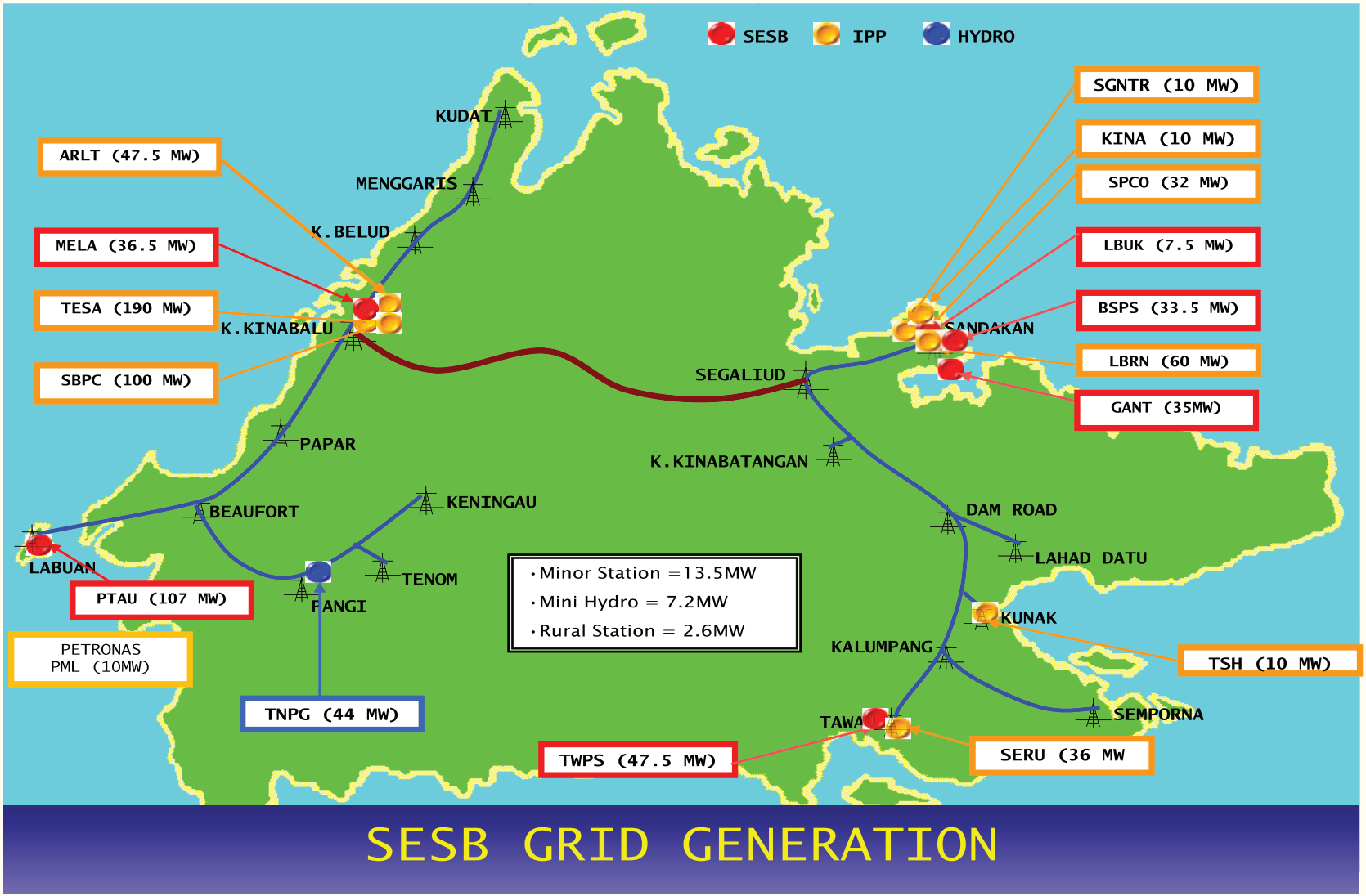


MAJOR GENERATION STATIONS IN PENINSULAR MALAYSIA

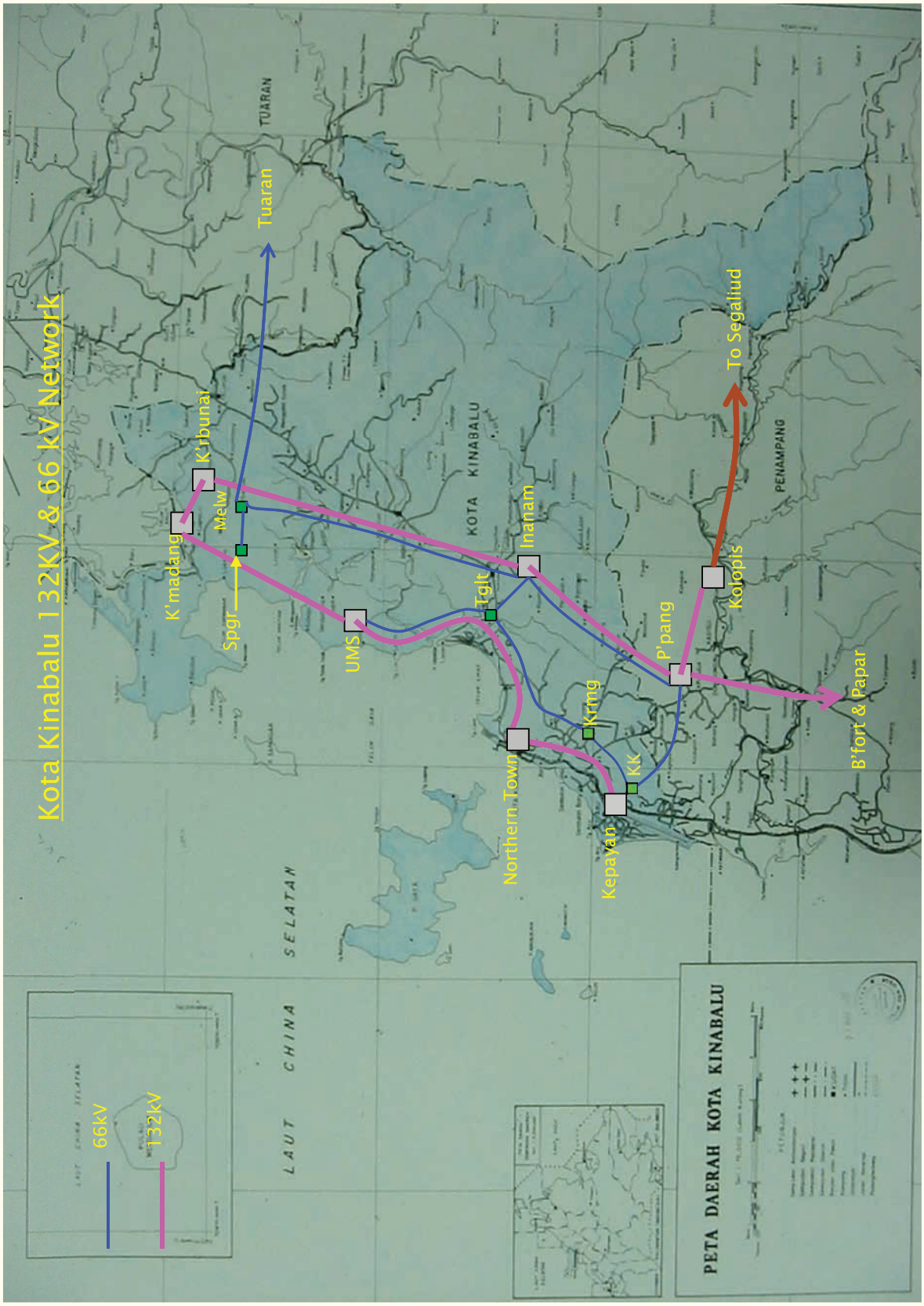
TNB GRID SYSTEM 2008



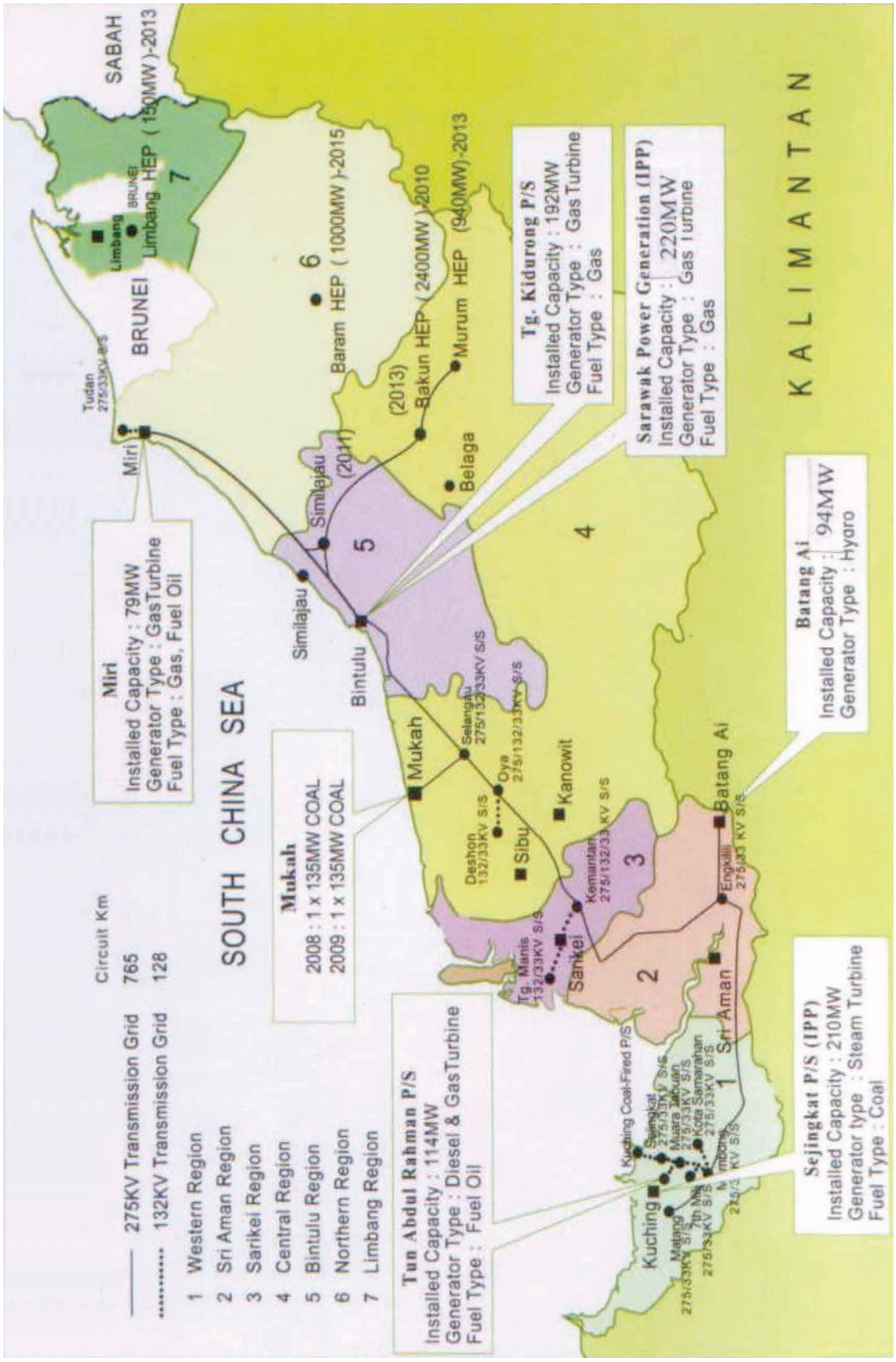
MAJOR GENERATION STATION IN SABAH



SESB GRID SYSTEM 2008


Kota Kinabalu 132KV & 66 kV Network
Tuaran
To Segaliud
B'fort & Papar
K'madang
K'bunai
Melw
Spgr
UMS
Tglt
Inanam
Krmg
P'pang
Kolopis
Kepayan
KK
Northern Town
TUARAN
KOTA KINABALU
PENAMPANG
LAUT CHINA SELATAN
PETA DAERAH KOTA KINABALU
66kV
132kV

MAJOR GENERATION STATIONS AND GRID SYSTEM IN SARAWAK 2008



Alamat Perhubungan

Key Contacts

KEY CONTACTS
GOVERNMENT MINISTRIES AND DEPARTMENTS

MINISTRY OF ENERGY, GREEN TECHNOLOGY AND WATER
Block E4/5, Government Complex Parcel E
Federal Government Administrative Centre
62668 Putrajaya
Tel : 03-8883 6000 Fax : 03-8889 3712

MINISTRY OF INTERNATIONAL TRADE AND INDUSTRY (MITI)
Block 10, Government Offices Complex
Jalan Duta, 50622 Kuala Lumpur
Tel : 03-6203 3022 Fax : 03-6201 2337

MINISTRY OF FINANCE
Ministry of Finance Complex
No. 5, Persiaran Perdana, Presint 2
Federal Government Administrative Centre
62592 Putrajaya
Tel : 03-8882 3000 Fax : 03-8882 3893 / 8882 3894

MINISTRY OF PLANTATION INDUSTRIES AND COMMODITIES
No 15, Level 6-13, Persiaran Perdana, Presint 2
Federal Government Administrative Centre
62654 Putrajaya
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MINISTRY OF RURAL AND REGIONAL DEVELOPMENT
Blok D9, Kompleks D
Federal Government Administrative Centre
62606 Putrajaya
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ENERGY COMMISSION
Level 13, Menara TH Perdana
Maju Junction, 1001, Jalan Sultan Ismail
50250 Kuala Lumpur
Tel : 03-2612 5400 Fax : 03-2691 4584

MALAYSIAN INDUSTRIAL DEVELOPMENT AUTHORITY (MIDA)
Block 4, Plaza Sentral, Jalan Stesen Sentral 5
Kuala Lumpur Sentral
50470 Kuala Lumpur
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ECONOMIC PLANNING UNIT
Prime Minister's Department
Block B5 & B6
Federal Government Administrative Centre
62502 Putrajaya
Tel : 03-8888 3333 Fax : 03-8888 3755

STATISTICS DEPARTMENT
Block C6, Complex C
Federal Government Administrative Centre
62514 Putrajaya
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MALAYSIA EXTERNAL TRADE DEVELOPMENT CORPORATION (MATRADE)
Menara MATRADE
Jalan Khidmat Usaha,
Off Jalan Duta
50480 Kuala Lumpur
Tel : 03-6207 7077 Fax : 03-6203 7037 / 6203 7033

KEY CONTACTS
UTILITIES AND MAJOR POWER PRODUCERS

TENAGA NASIONAL BERHAD
Ibu Pejabat
No. 129, Jalan Bangsar
Peti Surat 11003, 50732 Kuala Lumpur
Tel : 03-2282 5566/ 2296 2121 Fax : 03-2282 6754

TNB GENERATION SDN. BHD.
d/a Naib Presiden (Penjanaan)
Tenaga Nasional Berhad
Ibu Pejabat
No. 129, Jalan Bangsar
Peti Surat 11003, 59732 Kuala Lumpur
Tel : 03-2284 0680/ 2284 0711 Fax : 03-2282 1073 / 2282 6886

POWERTEK BERHAD
Level 43, Menara MAXIS
Kuala Lumpur City Centre,
50088 Kuala Lumpur
Tel : 03-2381 6666 Fax : 03-2381 6677

GENTING SANYEN POWER SDN. BHD.
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28, Jalan Sultan Ismail,
50250 Kuala Lumpur
Tel : 03-2333 2211 Fax : 03-2162 4032

ARL POWER SDN. BHD.
Taman Ekuestrian Putrajaya
Presint 5, 62200 Putrajaya
Wilayah Persekutuan Putrajaya.
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SARAWAK ENERGY BERHAD
7th Floor, Wisma SESCO
Jalan Bako, Petra Jaya
93673 Kuching, Sarawak
Tel : 082-441 188 Fax : 082-444 433

SABAH ELECTRICITY SDN. BHD.
Wisma SESB
Jalan Tuanku Abdul Rahman
88673 Kota Kinabalu, Sabah
Tel : 088-282 699 Fax : 088-223 320

PORT DICKSON POWER BERHAD
Batu 2, Jalan Seremban
71000 Seremban, Negeri Sembilan
Tel : 06-651 4100 Fax : 06-651 4236

YTL POWER GENERATION SDN. BHD.
8th Floor, Menara ING
84, Jalan Raja Chulan,
50200 Kuala Lumpur
Tel : 03-2711 1581 Fax : 03-2732 0560

SEGARI ENERGY VENTURES SDN. BHD.
Level 12, Block 3B, Plaza Sentral
Jalan Stesen Sentral 5,
50470 Kuala Lumpur
Te : 03-2263 3388 Fax : 03-2263 3333

MUSTEQ HYDRO SDN. BHD.
1501, 15th Floor, Amcorp Tower
Amcorp Trade Centre
18, Jalan Persiaran Barat
46050 Petaling Jaya, Selangor
Tel : 03-7957 7781 Fax : 03-7957 4793

SERUDONG POWER SDN. BHD.
Lot 8-05, Level 8, Menara Milenium
8, Jalan Damanlela, Bukit Damansara
50490 Kuala Lumpur
Tel : 03-2093 8818 Fax : 03-2093 7818

RANHILL POWERTRON SDN. BHD.
32nd Floor, Empire Tower
No. 182, Jalan Tun Razak
50400 Kuala Lumpur
Tel : 03-2171 2020 / 2170 6000 Fax : 03-2171 1149

STRATAVEST SDN. BHD.
15th Floor, Amcorp Tower
Amcorp Trade Centre
No. 18, Jalan Persiaran Barat
46050 Petaling Jaya, Selangor
Tel : 03-7957 7781 Fax : 03-7957 4793

TEKNOLOGI TENAGA PERLIS CONSORTIUM SDN. BHD.
5th Floor, East Wing & Centrelink
Wisma Consplant 2
No. 7, Jalan SS 16/1
47500 Subang Jaya, Selangor
Tel : 03-5632 3633 Fax : 03-5631 3270 / 5631 0470 / 5632 6737

KEY CONTACTS
UTILITIES AND MAJOR POWER PRODUCERS

NUR GENERATION SDN. BHD.
Receiver And Managers Appointed
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Lot 30, Jalan Hi-Tech 4, Kulim Hi-Tech Park
09000 Kulim, Kedah
Tel : 04-401 0100 Fax : 04-401 0150 / 401 0319

SANDAKAN POWER CORPORATION SDN. BHD.
Lot D20, 2nd Floor, Damai Plaza Phase III
Jalan Kayu Manis
88300 Kota Kinabalu, Sabah
Tel : 088-269 831 / 269 832 Fax : 088-267 517

TNB JANAMANJUNG SDN. BHD.
Stesen Janakuasa Sultan Azlan Shah
Manjung, Jalan Semarak Api
Teluk Rubiah 32040 Seri Manjung, Perak
Tel : 05-689 8000 Fax : 05-688 4309

PAHLAWAN POWER SDN. BHD.
Stesen Janakuasa Elektrik Tanjung Kling
76400 Tanjong Kling, Melaka
Tel : 06-351 5942/ 351 3048 Fax : 06-351 7107

TNB HIDRO SDN. BHD.
d/a Naib Presiden (Penjanaan)
Tenaga Nasional Berhad
Bahagian Penjanaan
4-8th Floor, Bangunan Penjanaan
129, Jalan Bangsar 59200 Kuala Lumpur
Tel : 03-2284 0680 / 2284 0711 Fax : 03-2282 1073 / 2282 6886

PANGLIMA POWER SDN. BHD.
Stesen Janakuasa Elektrik Teluk Gong
78200 Kuala Sungai Baru, Melaka
Tel : 06-384 1782 Fax : 06-384 1890

KAPAR ENERGY VENTURES SDN. BHD.
Stesen Janaelektrik Sultan Salahuddin Abdul Aziz
Peti Surat 220, 42200 Kapar, Selangor
Tel : 03-3250 8801 Fax : 03-3250 7617

JIMAH ENERGY VENTURES SDN. BHD.
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