Suruhanjaya Tenaga

STATISTIK INDUSTRI PENGAGIHAN GAS BERPAIP

STATISTICS OF PIPED GAS DISTRIBUTION INDUSTRY

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PENDAHULUAN
INTRODUCTION

TINJAUAN INDUSTRI
INDUSTRY OVERVIEW

Pembekalan gas asli dan gas petroleum cecair (LPG) berpaip merupakan industri yang agak baru di Malaysia. Paip LPG mula digunakan pada tahun 70'an manakala gas asli berpaip bermula dengan pentauliahan projek Peninsular Gas Utilisation (PGU) fasa satu pada tahun 1984. Kini, dengan beroperasinya projek PGU fasa 3 pada tahun 2001, sistem talian paip penghantaran PGU dan talian sisi telah melangkaui 2,505 km dan seterusnya menghasilkan rangkaian talian paip Sistem Pengagihan Gas Asli (NGDS) sehingga 1485 km.

Gas asli disalurkan daripada talian paip penghantaran untuk dibekalkan terus melalui talian sisi kepada pengguna di sektor tenaga dan bukan tenaga yang menggunakan gas melebihi dua juta kaki padu sehari. Pengguna sektor bukan tenaga termasuk industri petrokimia, perkilangan, *central utility facilities (CUF)* dan *district cooling plants* turut mendapat bekalan gas melalui talian sisi.

Gas asli juga disalurkan daripada talian paip penghantaran PGU melalui stesen pintu kota yang terdapat dibeberapa lokasi di semenanjung dan diagih melalui rangkaian talian paip NGDS kepada pengguna-pengguna di sektor industri kecil dan sederhana, sektor komersil dan sektor domestik. Sehingga tahun 2007, NGDS telah berkembang sehingga 1,485 km di 66 penempatan yang membekalkan gas kepada 642 pengguna industri, 438 pengguna komersil dan 8,887 pengguna perumahan. Di Malaysia Timur, lebih kurang 6.5 km talian paip telah beroperasi di Sabah dan Labuan bagi membekal gas kepada 11 pengguna industri. Sementara di Sarawak, lebih 450 km talian paip telah beroperasi bagi membekal gas kepada dua pengguna industri, 775 pengguna komersil dan 12,898 pengguna perumahan.

Pembekalan gas petroleum cecair (LPG) berpaip ke pengguna industri dan komersil telah wujud semenjak tahun 70-an, sementara pengagihan LPG bagi pengguna perumahan bermula pada tahun 80-an. Kini lebih 10,000 pengguna industri dan komersil, dan 25,000 pengguna perumahan mendapat bekalan LPG berpaip daripada kemudahan penstoran tangki pukal atau silinder.

The supply of piped natural gas and liquefied petroleum gas (LPG) to consumers is a relatively new industry in Malaysia. Piped LPG supply started in the 70's while the piped natural gas started with the commissioning of the first phase of the Peninsular Gas Utilisation (PGU) project in 1984. Today, with the completion of phase 3 of the PGU project in 2001, the PGU transmission and lateral pipeline system now spans over 2,505 km resulting the emergence of a Natural Gas Distribution System (NGDS) reaching 1485 km .

Natural gas is tapped from the transmission pipeline to supply directly via lateral lines to users in the power and non-power sectors who consume more than two million standard cubic feet per day (mmscfd). The non-power users receiving natural gas via lateral lines include the petrochemical, manufacturing, central utility facilities (CUF) and district cooling plants.

Natural gas is also tapped from the PGU transmission pipeline via city gate stations located at various areas in the peninsula and reticulated via the network of NGDS pipeline to small and medium-sized users in the industrial, commercial and domestic sectors. As at 2007, the NGDS covers 66 communities supplying natural gas to 642 industrial, 438 commercial and 8,887 residential users. In East Malaysia, about 6.5 km of pipeline is in operation in Sabah and Labuan serving 11 industrial customers and over 450 km of pipeline is in operation in Sarawak supplying natural gas to two industrial, 775 commercial and 12,898 residential users.

The supply of LPG via pipeline to industrial and commercial users has been in existence since the 70's whilst reticulated LPG for the residential users started in the 80's. Now over 10,000 industrial and commercial users and 25,000 residential users are receiving LPG piped from bulk tanks or manifolded cylinders storage facilities.

AKTA BEKALAN GAS 1993 (AKTA 501)
GAS SUPPLY ACT 1993 (ACT 501)

Kerajaan telah mewujudkan Akta Bekalan Gas 1993 (Akta 501) dan Peraturan-Peraturan Bekalan Gas 1997, (mula dikuatkuasakan sebahagiannya pada 17 Julai 1997, dan menguatkuasakan sepenuhnya satu tahun kemudian), bagi mengawalselia aktiviti pembekalan dan penggunaan gas berpaip. Matlamat utama adalah untuk melindungi kepentingan pengguna gas berpaip dan keselamatan orang awam, dan pada masa yang sama memastikan pembekalan gas adalah berdaya maju. Akta 501 menggariskan standard pengurusan dan standard teknikal daripada aspek keselamatan, keboleharapan, ekonomi, kecekapan dan kualiti.

Perkataan 'gas' didefinisikan di dalam Akta 501 sebagai 'metana, etana, propana, butana atau hidrokarbon yang mengandungi satu atau lebih gas yang di atas sama ada dalam bentuk gas atau cecair'. Kandungan utama gas asli ialah metana dengan peratusan kecil gas hidrokarbon dan bukan hidrokarbon manakala kandungan utama LPG ialah propana dan butana. Oleh itu, gas jenis lain seperti oksigen, nitrogen dan acetelina, yang digunakan oleh industri tidak terpakai di bawah Akta 501. Akta ini juga tidak terpakai ke atas keseluruhan rangkaian pembekalan gas. Skop akta hanya meliputi pembekalan gas asli melalui talian paip ke hilir dari bebibir penghujung stesen pintu kota; atau pembekalan LPG dari sambungan pengisian tangki atau silinder penstoran ke peralatan gas. Oleh itu, sistem talian paip penghantaran dan talian sisi (sebelum dan termasuk stesen pintu kota) adalah di luar skop Akta 501. Buat masa ini, Akta 501 hanya terpakai di Semenanjung dan Sabah.

The government introduced the Gas Supply Act 1993 (Act 501) and Gas Supply Regulations 1997, (which came into force partially on 17th July 1997, and fully; one year later), to regulate piped gas supply and utilisation activities. The main objective is to protect the interests of the consumers and the public who are affected by the supply activities whilst at the same time ensuring continued viability of the gas supply businesses. Act 501 prescribes the administrative and technical standards in the aspects of safety, reliability, economy, efficiency and quality.

In Act 501, the word 'gas' is defined as 'methane, ethane, propane, butane, or hydrocarbons which may consist of one or more of the above gases in the form of gas or liquid'. Natural gas is mainly methane with a small percentage of other hydrocarbons and non-hydrocarbon gases whereas LPG comprises of mainly propane and butane. Other types of gases, such as oxygen, nitrogen and acetylene, used in the industrial sector are not covered by Act 501. The Act also does not apply throughout the gas supply chain. Its scope covers only the supply of natural gas through pipeline downstream of the last flange of the city gate station, or the supply of LPG from the filling point of storage tanks or cylinders to gas appliances. Natural gas transmission and lateral pipeline systems (up to and including the city gate stations) are outside the scope of Act 501. Presently, Act 501 is applicable only in the Peninsular and Sabah.

FUNGSI SURUHANJAYA TENAGA DI BAWAH AKTA 501

FUNCTION OF ENERGY COMMISSION UNDER ACT 501

- Mempastikan bahawa pemegang lesen dapat memenuhi permintaan yang munasabah bagi gas yang dibekalkan melalui talian paip;
  To ensure a licensee satisfies all reasonable demands for gas through pipeline;

- Mempastikan pemegang lesen dapat membiayai perkhidmatan pembekalan gas;
  To ensure a licensee could finance the provision of gas supply services;

- Melindungi kepentingan pengguna gas yang dibekalkan melalui talian paip dari aspek :
  To protect the interests of consumers of gas supplied through pipeline in respect of:

  - harga yang dikenakan dan terma-terma pembekalan,
    the prices charged and the other terms of supply,
  - keberterusan bekalan,
    the continuity of supply,
  - kualiti perkhidmatan pembekalan gas;
    the quality of the gas supply services provided;

- Mengawalselia komposisi, tekanan, ketulenan dan isipadu gas yang dibekalkan;
  To regulate the composition, pressure, purity and volume of gas supplied through pipeline;

- Meningkatkan kecekapan dan ekonomi dalam pembekalan gas melalui talian paip dan penggunaan gas yang cekap melalui talian paip;
  To promote efficiency and economy to supply gas through pipeline and the efficient use of gas supplied through pipeline;

- Melindungi pengguna dan orang awam daripada bahaya yang berbangkit daripada aktiviti pengagihan dan penggunaan gas melalui talian paip;
  To protect the public from dangers arising from the distribution of gas through pipeline or from the use of gas supplied through pipeline;

- Membolehkan persaingan secara berkesan dalam pembekalan gas melalui talian paip; dan
  To enable persons to compete effectively in the supply of gas through pipeline; and

- Menyiasat kemalangan atau kebakaran yang melibatkan talian paip atau pepasangan gas.
  To investigate any accident or fire involving any gas pipeline or installation.

PEMBEKALAN GAS

GAS SUPPLY

SPESIFIKASI GAS
GAS SPECIFICATION

Semenanjung Malaysia
Peninsular Malaysia

Jadual 2.1 : Komposisi Purata Gas Asli yang di bekalkan oleh Gas Malaysia Sdn Bhd
Table 2.1 : Average composition of Natural Gas supply by Gas Malaysia Sdn Bhd

Gas	Mol (%)
CH_4	92.73
C_2H_6	4.07
C_3H_8	0.77
iC_4H_{10}	0.08
nC_4H_{10}	0.06
C_5H_{12} +	0.01
CO_2	1.83
N_2	0.45

Sifat-Sifat Tipikal Gas Asli
Typical Natural Gas Characteristics

Graviti Tentu *Specific Gravity*	0.61
Nilai Kalori Kasar *Gross Calorific Value* (kcal/Sm^3)	9530
Halaju Pembakaran *Burning Velocity* (m/s)	0.3
Had Atas Kemudahbakaran *Upper Flammability Limit* (%)	15.4
Had Bawah Kemudahbakaran *Lower Flammability Limit* (%)	4.5
Suhu Pengautocucuhan *Auto Ignition Temperature* (°C)	640
Teori Keperluan Udara *Theoretical Air Requirement* (m^3/m^3)	9.74

Jadual 2.2 : Komposisi Purata Gas Petroleum Cecair di Semenanjung Malaysia
Table 2.2 : Average composition of Liquefied Petroleum Gas in Peninsular Malaysia

Gas	Mol (%)
C_3H_8	40.0
iC_4H_{10}	30.0
nC_4H_{10}	30.0

Sifat-Sifat Tipikal Gas Petroleum Cecair
Typical Liquefied Petroleum Gas Characteristics

Graviti Tentu *Specific Gravity*	1.65
Nilai Kalori Kasar *Gross Calorific Value* (kcal/Sm^3)	28059
Halaju Pembakaran *Burning Velocity* (m/s)	0.46
Had Atas Kemudahbakaran *Upper Flammability Limit* (%)	8.5
Had Bawah Kemudahbakaran *Lower Flammability Limit* (%)	1.9
Suhu Pengautocucuhan *Auto Ignition Temperature* (°C)	510
Teori Keperluan Udara *Theoretical Air Requirement* (m^3/m^3)	28.81

Sabah dan Labuan
Sabah and Labuan

Jadual 2.3 : Komposisi Purata Gas Asli yang dibekalkan oleh Sabah Energy Corporation Sdn Bhd di Sabah
Table 2.3 : Average Composition of Natural Gas supply by Sabah Energy Corporation Sdn Bhd in Sabah

Gas	Mol (%)
CH_4	92.43
C_2H_6	4.04
C_3H_8	1.64
iC_4H_{10}	0.30
nC_4H_{10}	0.29
iC_5H_{12}	0.13
nC_5H_{12}	0.06
C_6H_{14} +	0.24
CO_2	0.76
N_2	0.11

Sifat-Sifat Tipikal Gas Asli
Typical Natural Gas Characteristics

Graviti Tentu *Specific Gravity*	0.61
Nilai Kalori Kasar *Gross Calorific Value* (kcal/Sm^3)	9694.11
Halaju Pembakaran *Burning Velocity* (m/s)	> 0.39
Had Atas Kemudahbakaran *Upper Flammability Limit* (%)	14.0
Had Bawah Kemudahbakaran *Lower Flammability Limit* (%)	4.0
Suhu Pengautocucuhan *Auto Ignition Temperature* (°C)	> 630
Teori Keperluan Udara *Theoretical Air Requirement* (m^3/m^3)	9.87

Jadual 2.4 : Komposisi Purata Gas Asli yang dibekalkan oleh Sabah Energy Corporation Sdn Bhd di Labuan

Table 2.4 : Average Composition of Natural Gas supply by Sabah Energy Corporation Sdn Bhd in Labuan

Gas	Mol (%)
CH_4	89.10
C_2H_6	4.74
C_3H_8	2.88
iC_4H_{10}	0.59
nC_4H_{10}	0.78
iC_5H_{12}	0.28
nC_5H_{12}	0.23
C_6H_{14}	0.30
CO_2	1.06
N_2	0.04

Sifat-Sifat Tipikal Gas Asli
Typical Natural Gas Characteristics

Graviti Tentu *Specific Gravity*	0.62
Nilai Kalori Kasar *Gross Calorific Value* (kcal/Sm^3)	10156.03
Halaju Pembakaran *Burning Velocity* (m/s)	> 0.39
Had Atas Kemudahbakaran *Upper Flammability Limit* (%)	14.0
Had Bawah Kemudahbakaran *Lower Flammability Limit* (%)	4.0
Suhu Pengautocucuhan *Autoignition Temperature* (°C)	> 630
Teori Keperluan Udara *Theoretical Air Requirement* (m^3/m^3)	9.87

Sarawak

Jadual 2.5 : Komposisi Purata Gas Asli yang dibekalkan di Sarawak

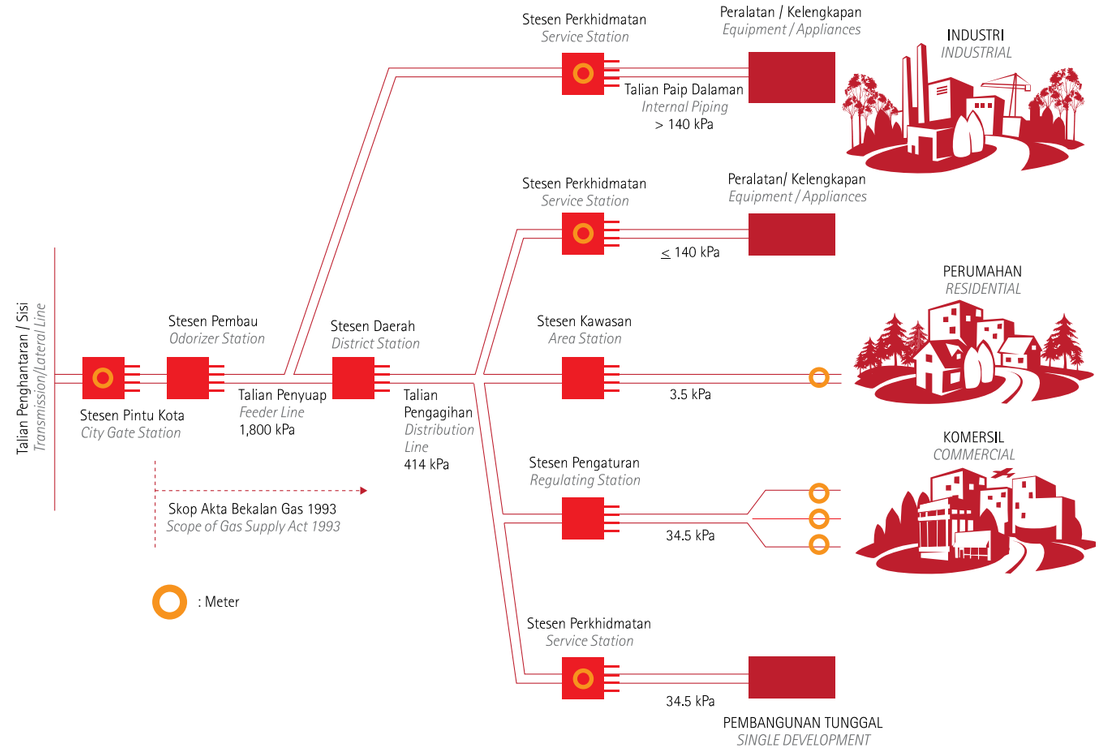
Table 2.5 : Average Composition of Natural Gas supply in Sarawak

Gas	Mol (%)
CH_4	85.09
C_2H_6	5.66
C_3H_8	3.97
iC_4H_{10}	0.86
nC_4H_{10}	1.10
iC_5H_{12}	0.37
nC_6H_{14}	0.27
C_8H_{16} +	0.48
CO_2	1.78
N_2	0.42

PENGAGIHAN GAS
GAS DISTRIBUTION

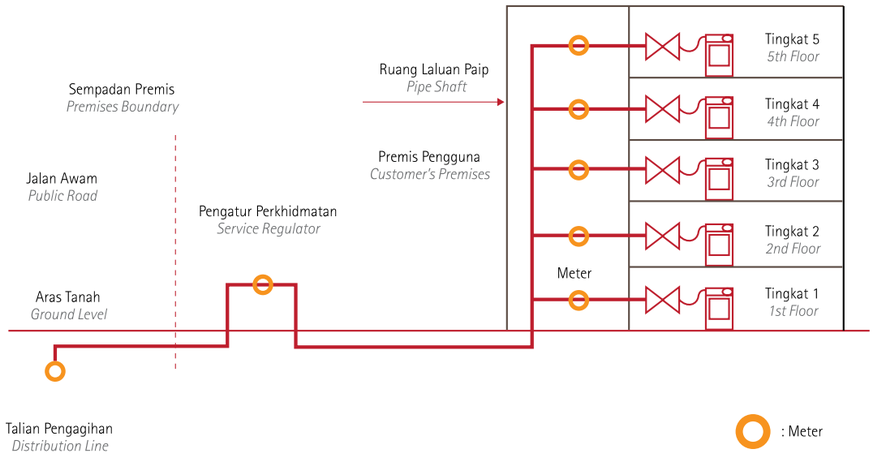
Rajah 2.1 : Sistem Pengagihan Gas Asli

Figure 2.1: Natural Gas Distribution System



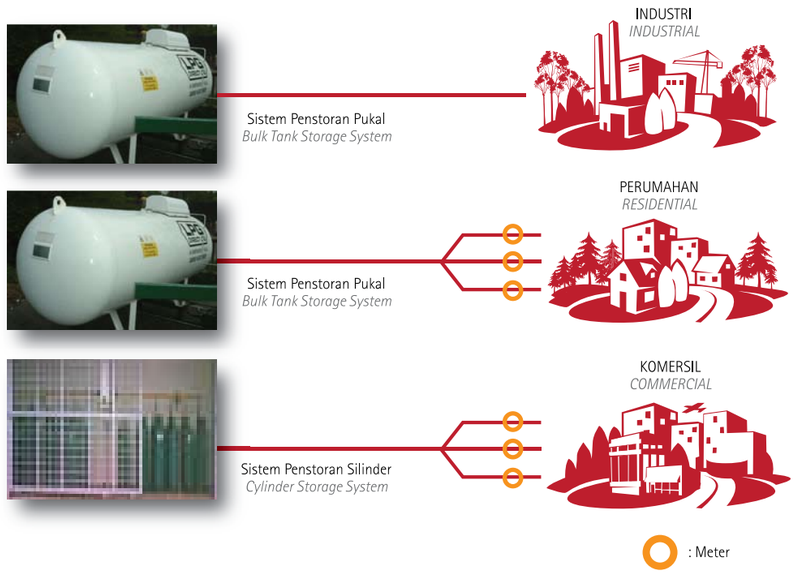
Rajah 2.2 : Sistem Perpaipan Gas Asli Ke Pengguna Perumahan

Figure 2.2 : Natural Gas Piping System To Residential Users



Rajah 2.3 : Sistem Pengagihan Gas Petroleum Cecair

Figure 2.3 : Liquefied Petroleum Gas Distribution System



Sehingga tahun 2007, sepanjang 1,485 km rangkaian talian paip agihan gas asli di Semenanjung Malaysia telah beroperasi. Rangkaian talian paip agihan gas asli ini telah meliputi kawasan utara, kawasan pantai timur, kawasan tengah dan kawasan selatan semenanjung seperti di Rajah 2.4.

Up to year 2007, over 1,485 km natural gas pipelines distribution network in Peninsular Malaysia has been in operation. The natural gas pipeline network covered north, east, central and southern region of peninsula as shown in Figure 2.4.

Rajah 2.4 : Kawasan yang dibekalkan oleh sistem Pengagihan Gas Asli di Semenanjung Malaysia

Figure 2.4 : Areas supplied by Natural Gas Distribution System in Peninsular Malaysia

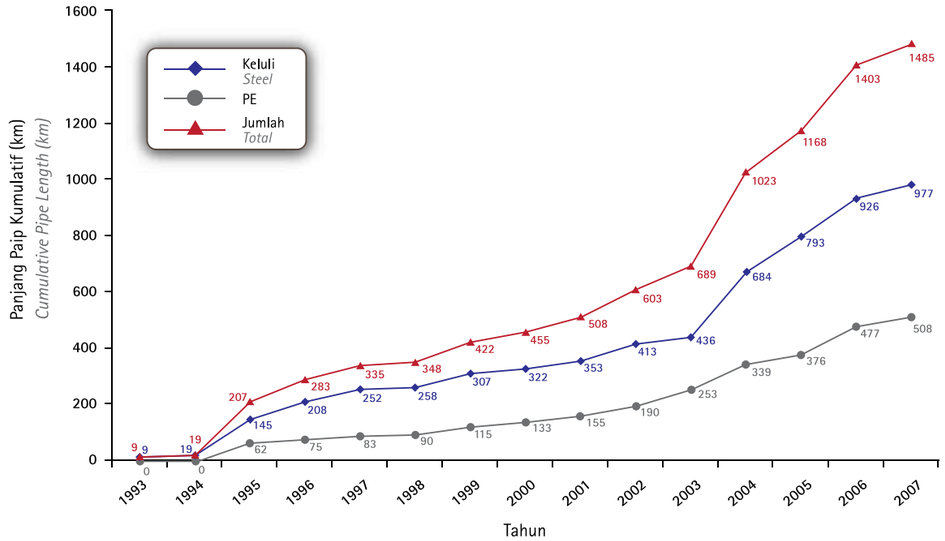
Rangkaian talian paip agihan gas asli turut dipasang di Sabah, Labuan dan Sarawak seperti di Rajah 2.5 dan 2.6. Sepanjang 4,032m talian paip agihan gas asli terdapat di Sabah di mana ia tertumpu di Kawasan Perindustrian Kota Kinabalu. Labuan pula memiliki 2,400m talian paip agihan gas asli, manakala di Sarawak sepanjang 451km talian paip pengagihan gas asli tertumpu di Miri.

Natural gas pipelines network is also installed in Sabah, Labuan and Sarawak as shown in Figure 2.5 and 2.6. Over 4,032m gas pipeline network installed at Sabah where it is convergent in Kota Kinabalu Industrial Park.Labuan had 2,400m of natural gas pipeline network, while Sarawak had over 451km gas pipeline network convergent in Miri.

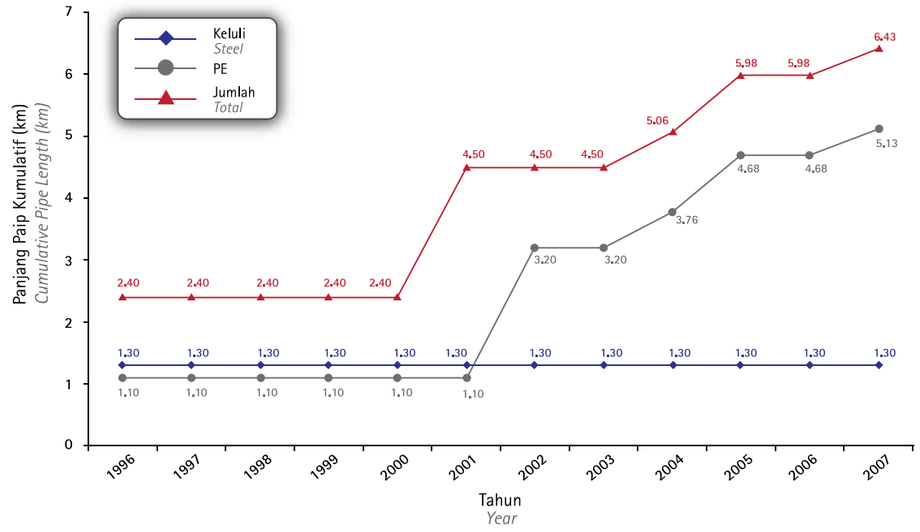
Rajah 2.5 : Kawasan yang dibekalkan oleh sistem Pengagihan Gas Asli di Sabah dan Labuan
Figure 2.5 : Areas supplied by Natural Gas Distribution System in Sabah and Labuan

Rajah 2.6 : Kawasan yang dibekalkan oleh sistem Pengagihan Gas Asli di Sarawak
Figure 2.6 : Areas suppiled by Natural Gas Distribution System in Sarawak

Rajah 2.7 : Perkembangan Talian Paip Gas Asli di Semenanjung Malaysia
Figure 2.7 : Development of Natural Gas Pipeline in Peninsular Malaysia



Rajah 2.8 : Perkembangan Talian Paip Gas Asli di Sabah dan Labuan
Figure 2.8 : Development of Natural Gas Pipeline in Sabah and Labuan



LESEN PENGGUNAAN GAS
GAS UTILITY LICENSE

Sehingga tahun 2007, tiga pemegang Lesen Penggunaan Gas yang beroperasi iaitu Gas Malaysia Sdn. Bhd. (GMSB), Gas Malaysia Sdn. Bhd. – LPG dan Sabah Energy Corp. Sdn. Bhd. (SEC). GMSB membekalkan gas asli dan LPG di Semenanjung Malaysia manakala SEC membekalkan gas asli di Sabah dan Labuan.

Up to 2007, three Gas Utility Licensees are in operation namely Gas Malaysia Sdn Bhd (GMSB), Gas Malaysia Sdn. Bhd. – LPG and Sabah Energy Corp. Sdn Bhd (SEC). GMSB supplies natural gas and LPG in Peninsular Malaysia while SEC supplies natural gas in Sabah and Labuan.

Jadual 2.6 : Senarai Pemegang Lesen Penggunaan Gas dan Tempoh Lesen
Table 2.6 : List of Gas Utilities Licensee and Licence Duration

Pemegang Lesen Penggunaan Gas *Gas Utility Licensee*	**Tempoh Lesen** *Duration of Licence*
GMSB - Gas Asli *Natural Gas*	30 Tahun – Berkuatkuasa pada 1 September 1998 *30 Years – In force on 1 September 1998*
GMSB – LPG *Liquefied Petroleum Gas*	20 Tahun – Berkuatkuasa pada 15 Disember 2000 *20 Years – In force on 1 December 2000*
SEC - Gas Asli *Natural Gas*	30 Tahun – Berkuatkuasa pada 1 September 1998

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GAS UTILITY LICENSEE ADDRESS

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PENGGUNAAN GAS
GAS UTILISATION

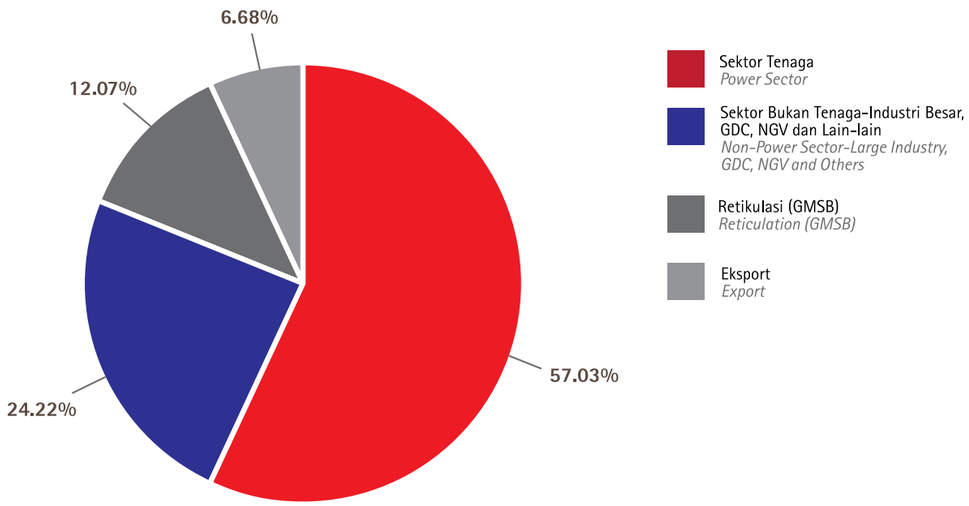
Gas asli dari pesisir pantai timur Semenanjung Malaysia diproses di enam loji pemprosesan gas yang terletak di Kerteh dan Paka, Terengganu. Loji-loji tersebut berkapasiti pengeluaran gas sejumlah 2,060 juta kaki padu sehari di samping mengeluarkan produk sampingan seperti etena, propana, butana dan condensates. Bermula pada tahun 2005, penyaluran tambahan berjumlah 330 juta kaki padu sehari gas telah dibawa melalui talian paip daripada Malaysia Thailand Joint Development Area (MT-JDA) ke sistem talian paip penghantaran PGU di Changlun, Kedah.

Jumlah keseluruhan penggunaan gas asli di Semenanjung Malaysia pada tahun 2007 adalah 882,773,221 mmBtu (atau 2246 juta kaki padu sehari). Rajah 3.1 menunjukkan pecahan penggunaan gas asli di Semenanjung Malaysia berdasarkan sub sektor pada tahun 2007.

Natural gas from offshore in the east coast of Peninsular Malaysia is treated at six gas processing plants located at Kerteh and Paka, Terengganu. These plants have a combined gas production capacity of 2,060 mmscfd, beside producing by-products such as ethane, propane, butane and condensates. Beginning from year 2005, an additional of 330 mmscfd gas is being transported through pipeline from Malaysia Thailand Joint Development Area (MT-JDA) to the PGU transmission and lateral pipeline system at Changlun, Kedah.

Total natural gas utilization in Peninsular Malaysia in year 2007 was 882,773,221 mmBtu (or 2246 mmscfd). Figure 3.1 shows breakdown of natural gas utilisation in Peninsular Malaysia by sub sector in year 2007.

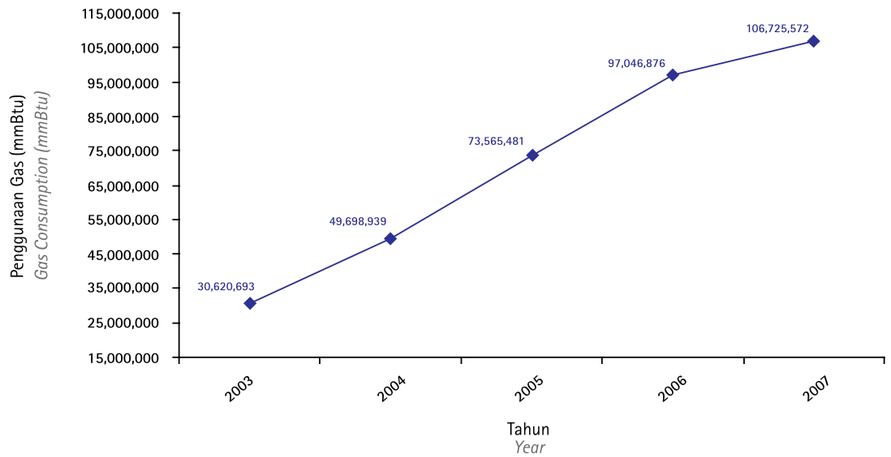
Rajah 3.1 : Penggunaan Gas Asli di Semenanjung Malaysia Pada Tahun 2007
Figure 3.1 : Utilisation Of Natural Gas In Peninsular Malaysia In Year 2007



Jumlah isipadu gas asli dan LPG yang dibekalkan oleh pemegang-pemegang lesen penggunaan gas meningkat sebanyak 9.97% kepada 106,725,572 mmBtu (atau 271 juta kaki padu sehari) pada tahun 2007 berbanding dengan 97,046,876 mmBtu (atau 246.9 juta kaki padu sehari) pada tahun sebelumnya seperti di Rajah 3.2. Sektor industri merupakan pengguna utama gas asli dan LPG yang menggunakan 105,654,355 mmBtu (atau 268.8 juta kaki padu sehari) atau bersamaan dengan 99% jumlah isipadu gas yang dibekalkan seperti di Rajah 3.3. Rajah 3.4 hingga Rajah 3.12 menunjukkan bilangan pengguna dan isipadu penggunaan gas asli dan LPG bagi sektor industri, komersil dan perumahan.

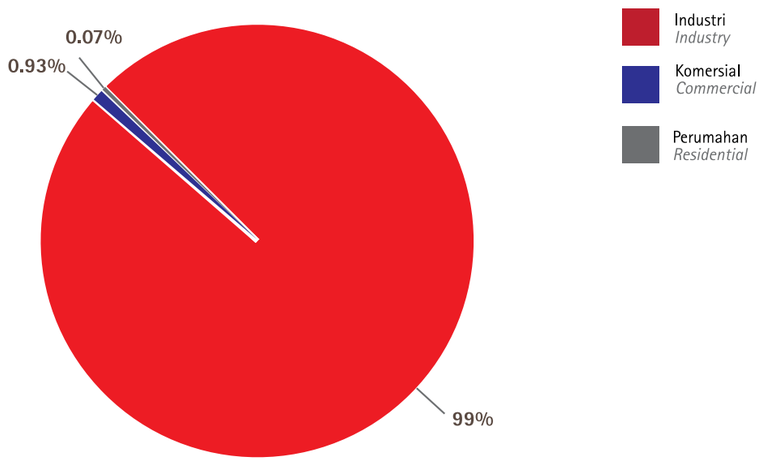
Total volume of natural gas and LPG supplied by gas utility licensees increased by 9.97% to 106,725,572 mmBtu (or 271 mmscfd) in year 2007 compared to 97,046,876 mmBtu (or 246.9 mmscfd) in the year before as shown in figure 3.2. Industrial sector was the main user of natural gas and LPG with gas consumption of 105,654,355 mmBtu (or 268.8 mmscfd) or 99% of the total gas volume supplied as shown in Figure 3.3. Figure 3.4 to 3.12 illustrates number of natural gas and LPG users and their consumption breakdown by industrial, commercial and residential sectors.

Rajah 3.2 : Jumlah Penggunaan Gas Asli Dan LPG Yang Dibekalkan Oleh Pemegang Lesen
Figure 3.2 : Natural Gas And LPG Total Consumption Supplied By Licensee



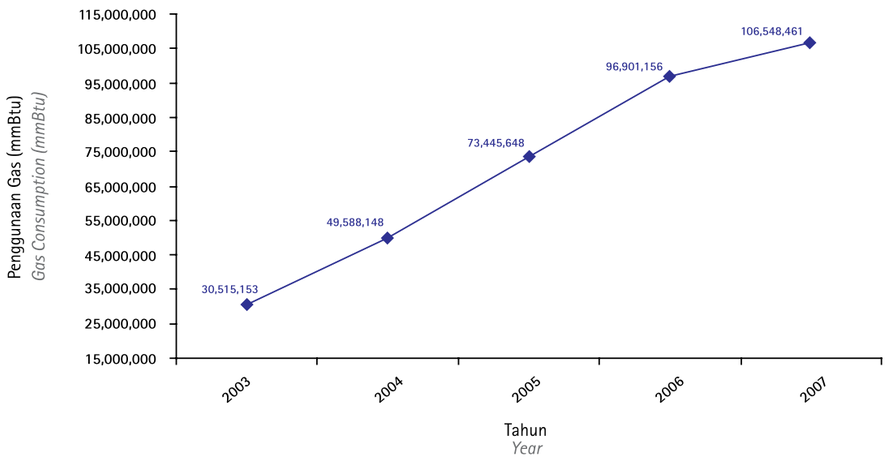
Rajah 3.3 : Peratusan Penggunaan Gas Asli Dan LPG Mengikut Sektor Bagi Tahun 2007

Figure 3.3 : Percentage Of Natural Gas And LPG By Sectors In Year 2007



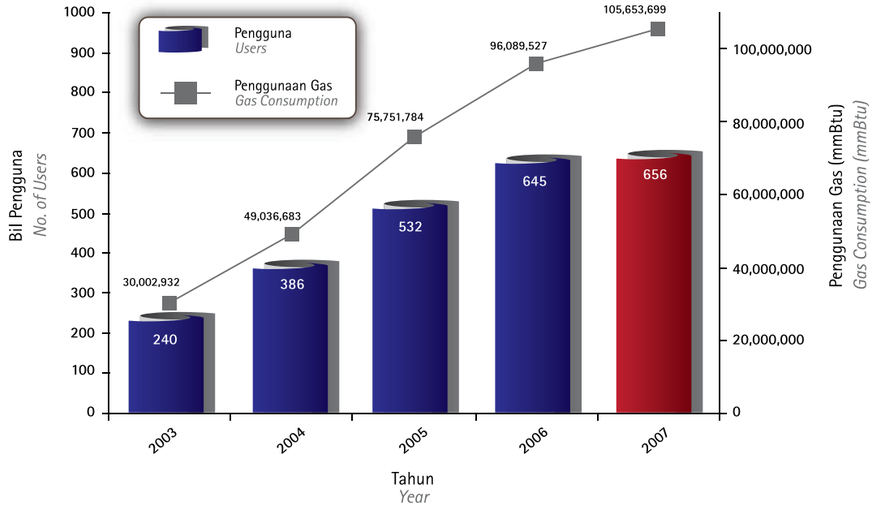
Rajah 3.4 : Penggunaan Gas Asli Oleh Semua Sektor Yang Dibekalkan Oleh Pemegang Lesen

Figure 3.4 : Natural Gas Consumption By Sectors Supplied By Licensee



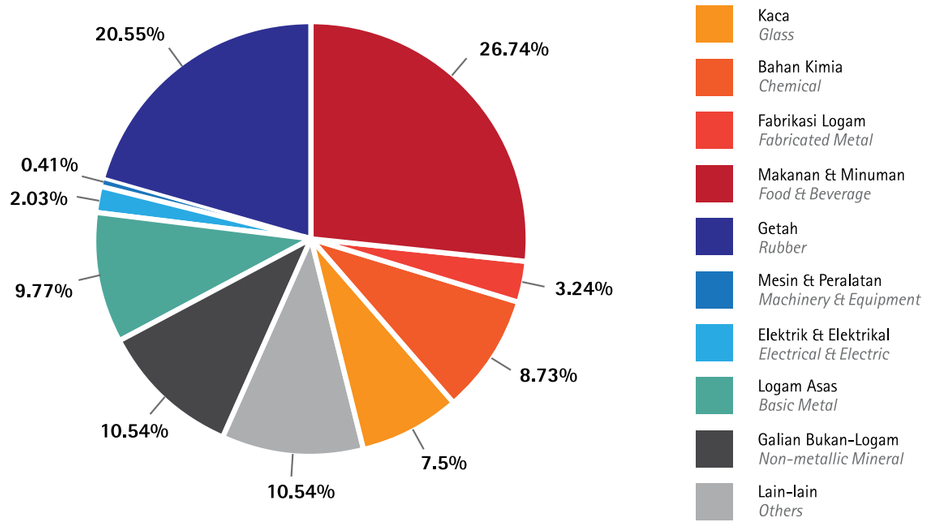
Rajah 3.5 : Penggunaan Gas Asli Oleh Sektor Perindustrian Yang Dibekalkan Oleh Pemegang Lesen

Figure 3.5 : Natural Gas Consumption By Industrial Sector Supplied By Licensee



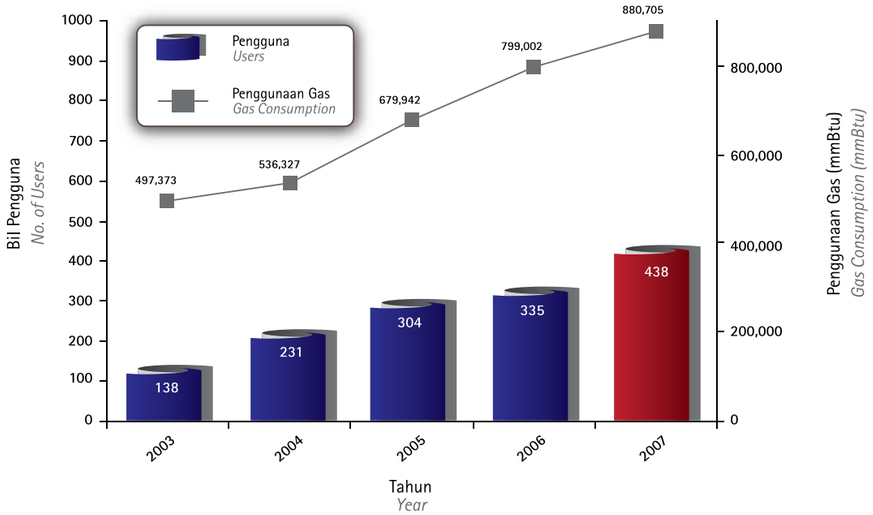
Rajah 3.6 : Peratus Penggunaan Gas Asli Sektor Industri Mengikut Sub-Sektor Yang Dibekalkan Oleh GMSB

Figure 3.6 : Industrial Sector Natural Gas Consumption Percentage By Sub-Sector Supplied By GMSB



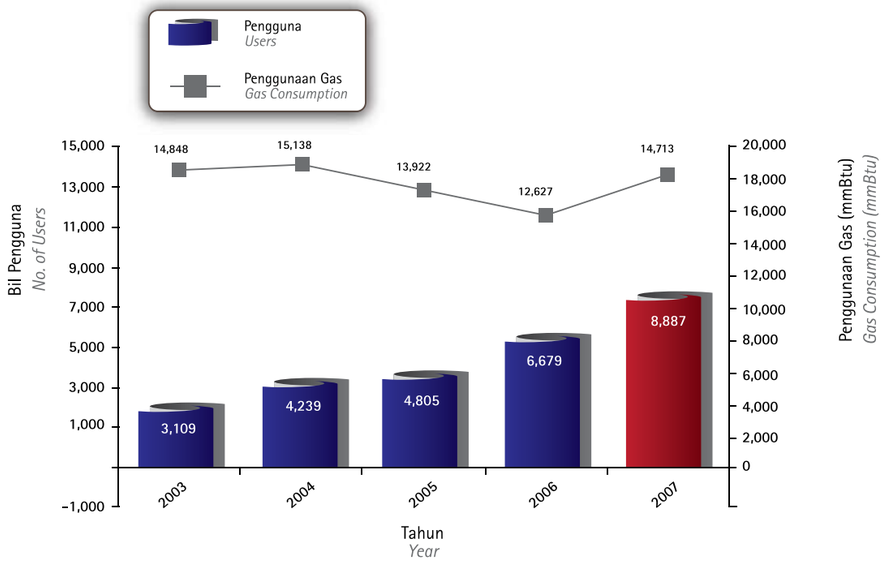
Rajah 3.7 : Penggunaan Gas Asli Oleh Sektor Komersil Yang Dibekalkan Oleh Pemegang Lesen

Figure 3.7 : Natural Gas Consumption By Commercial Sector Supplied By Licensee



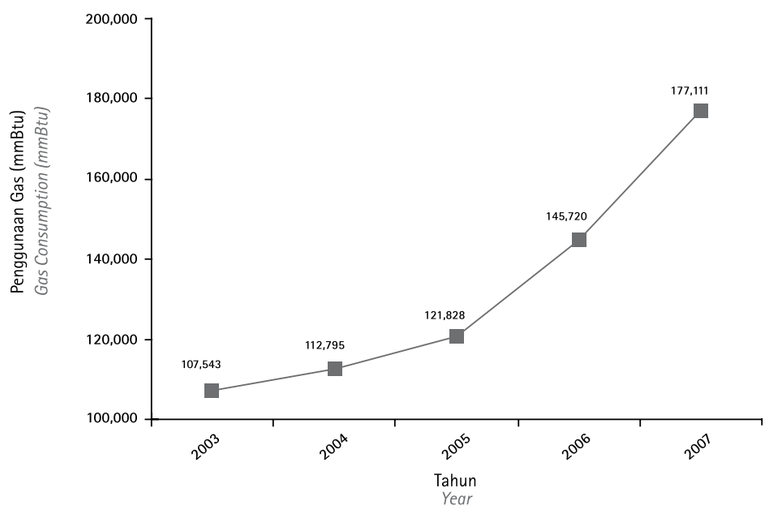
Rajah 3.8 : Penggunaan Gas Asli Oleh Sektor Perumahan Yang Dibekalkan Oleh Pemegang Lesen

Figure 3.8 : Natural Gas Consumption by Residential Sector Supplied By Licensee



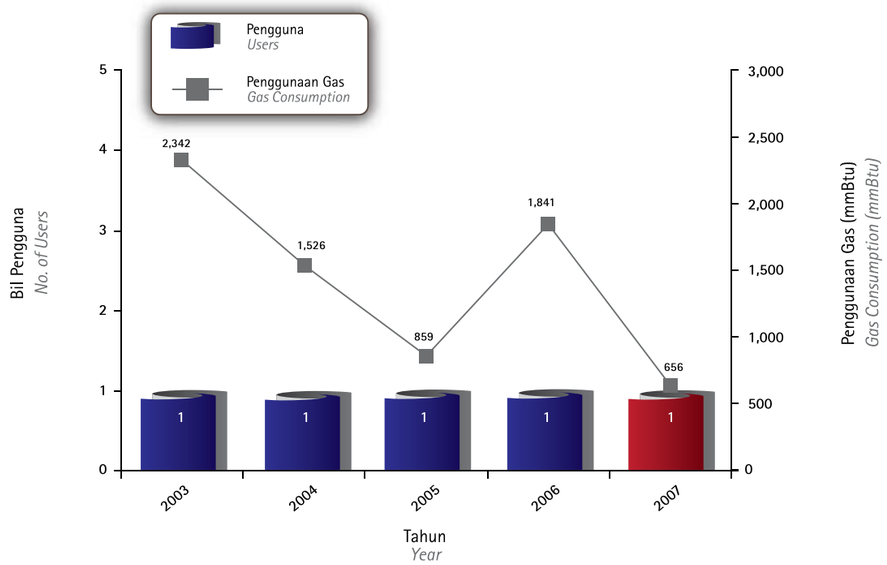
Rajah 3.9 : Penggunaan LPG Oleh Semua Sektor Yang Dibekalkan Oleh Pemegang Lesen

Figure 3.9 : LPG Consumption By All Sectors Supplied By Licensee



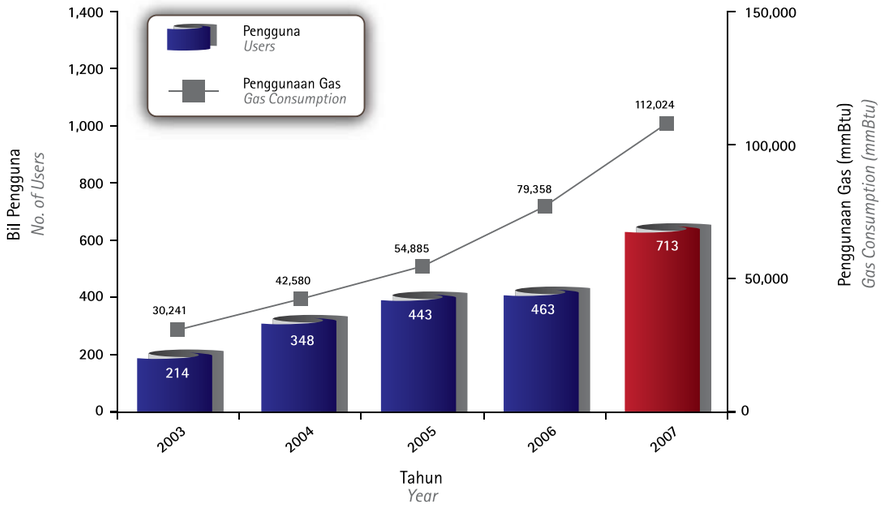
Rajah 3.10 : Penggunaan LPG Oleh Sektor Industri Yang Dibekalkan Oleh Pemegang Lesen

Figure 3.10 : LPG Consumption by Industrial Sector Supplied By Licensee



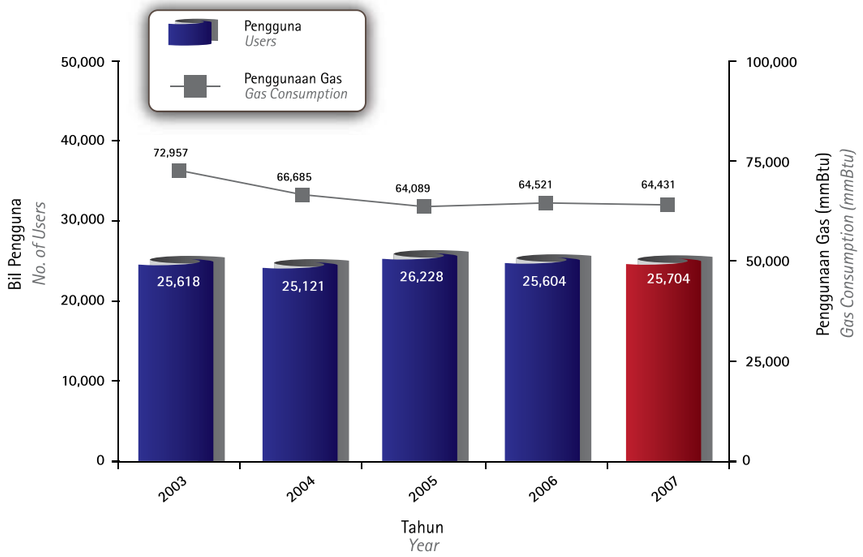
Rajah 3.11 : Penggunaan LPG Oleh Sektor Komersil Yang Dibekalkan Oleh Pemegang Lesen

Figure 3.11 : LPG Consumption by Commercial Sector Supplied By Licensee



Rajah 3.12 : Penggunaan LPG Oleh Sektor Perumahan Yang Dibekalkan Oleh Pemegang Lesen

Figure 3.12 : LPG Consumption by Residential Sector Supplied By Licensee



TARIF GAS ASLI DAN HARGA GAS PETROLEUM CECAIR

NATURAL GAS TARIFF AND LIQUEFIED PETROLEUM GAS PRICE

TARIF GAS ASLI
NATURAL GAS TARIFF

Kerajaan telah meluluskan tarif gas asli bagi pengguna-pengguna GMSB seperti Jadual 4.1 yang berkuatkuasa dari 1 Oktober 2002 sehingga 31 Disember 2005. Namun begitu, ia telah dilanjutkan sehingga tarif gas asli yang baru diluluskan oleh kerajaan.

The Government has approved natural gas tariff for the customers of GMSB effective from 1 October 2002 to 31 December 2005 as shown in Table 4.1, and it was extended until a new natural gas tariff to be approved by government.

Jadual 4.1 : Tarif Gas Asli Bagi Pengguna-Pengguna GMSB Berkuatkuasa Sehingga 31 Disember 2005
Table 4.1 : Natural Gas Tariff for GMSB Effective until 31 December 2005

Kategori *Category*	Julat Penggunaan Gas (mmBtu/Tahun) *Gas Consumption Range (mmBtu/Year)*	Kadar RM/meter padu (RM/mmBtu) *Rate RM/cubic meter (RM/mmBtu)*	Kuantiti Minimum Bulanan (meter padu) *Monthly Minimum Quantity (cubic meter)*
Tarif A (pengguna domestik) *Tariff A (residential user)*	-	0.75* (19.72)	-
Tarif B (pengguna perdagangan) *Tariff B (commercial user)*	Sehingga 600	0.58 (15.25)	210
Tarif C (pengguna perdagangan dan industri) *Tariff C (commercial and industrial users)*	601 – 5,000	0.51 (13.41)	980
Tarif D (pengguna perdagangan dan industri) *Tariff D (commercial and industrial users)*	5,001 - 50,000	0.50 (13.15)	1,600
Tarif E & F (pengguna industri) *Tariff E & F (industrial user)*	50,001 - 750,000	0.49 (12.87)	25,000

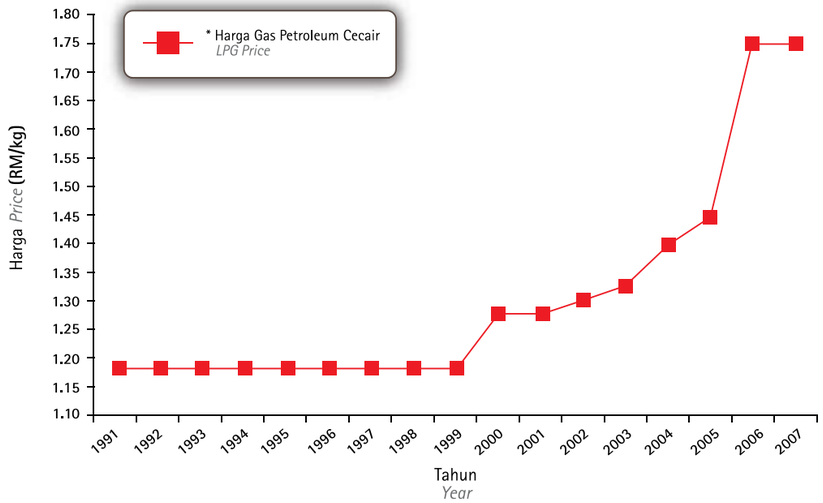
* Bayaran minimum bulanan bagi Tarif A ialah RM 5.00
** Minimum monthly charges for Tariff A is RM 5.00*

HARGA GAS PETROLEUM CECAIR
LIQUEFIED PETROLEUM GAS (LPG) PRICE

Harga LPG bagi sektor industri dan komersil bergantung kepada harga pasaran semasa LPG manakala harga LPG bagi sektor perumahan adalah berdasarkan harga subsidi iaitu harga siling yang dikawal secara pentadbiran oleh kerajaan seperti Rajah 4.2.

Industrial and commercial LPG prices are market driven whereas LPG price for residential sector is based on subsidised price, which is controlled by government as shown in Figure 4.2.

Rajah 4.2 : Harga Siling LPG Bagi Pengguna Domestik Yang Ditetapkan Oleh Kerajaan
Figure 4.2 : LPG Ceiling Price For Residential Sector Set By Government



* Sumber : Kementerian Perdagangan Dalam Negeri dan Hal Ehwal Pengguna
** Source : Ministry of Domestic Trade and Consumer Affairs*

PIAGAM PELANGGAN
CLIENT CHARTER

STANDARD KUALITI PERKHIDMATAN PELANGGAN
CUSTOMER SERVICES QUALITY STANDARD

Jadual 5.1 : Standard Kualiti Perkhidmatan Pelanggan Gas Malaysia Sdn Bhd (GMSB)
Table 5.1 : GMSB Customer Services Quality Standard

Bil. *No.*	Perkhidmatan *Services*	Penyata Prestasi *Statement Of Performance*
1	Waktu Perniagaan *Business Hours*	8.30 pagi – 5.30 petang Isnin - Jumaat *8.30 a.m. – 5.30 p.m. Monday - Friday*
2	Menangani Aduan *Complaints Handling*	Aduan bertulis - 5 hari bekerja dari tarikh penerimaan. Aduan & pertanyaan menerusi telefon - 24 jam dari masa panggilan dibuat. *Written complaint - 5 working days receipt. Complaint & telephone enquiries - 24 hours upon receiving the call.*
3	Bayaran Bil *Billings*	Pertanyaan/Aduan mengenai ketepatan bil - 5 hari bekerja. *Enquiries/Complaints on the accuracy of the gas bills - 5 working days.*
4	Pemulangan *Refunds*	Pelanggan Komersil/Industri - Deposit dipulangkan dalam tempoh 1 bulan selepas pemotongan/ pemberhentian bekalan. Pelanggan Perumahan - Deposit dipulangkan dalam tempoh 2 bulan selepas pemotongan/pemberhentian bekalan. Jaminan Bank - Dilepaskan dalam tempoh 1 bulan selepas pemotongan/pemberhentian bekalan. *Commercial/Industrial Customers - Deposits will be refunded within 1 month of termination/ disconnection of supply.* *Residential Customers - Deposits will be refunded within 2 months of termination/ disconnection of supply.* *Bank guarantees - discharged within 1 month or termination or disconnection of supply.*
5	Tindakan Kecemasan *Emergency Responds*	Menghantar Pasukan Tindakan Kecemasan dalam tempoh 90 minit selepas menerima sebarang panggilan yang berkaitan dengan hal kecemasan. *Dispatch the Emergency Response Team within 90 minutes of receiving any calls of an emergency nature.*

Bil. *No.*	Perkhidmatan *Services*	Penyata Prestasi *Statement Of Performance*
6	Pengawasan Pihak Ketiga *Third Party Supervision*	Notis bertulis daripada kontraktor sekurang-kurangnya 3 hari sebelum bermulanya kerja. Notis yang tidak cukup boleh mengakibatkan arahan berhenti kerja. *Written notice from the contractor at least 3 days before work commences. Inadequate notice may result in a stop work order.*
7	Mengenalpasti Lokasi Paip *Identification of Pipeline Location*	Permohonan bertulis - 4 hari selepas permohonan. *Written request - 4 working days after application.*
8	Pusat Panggilan 24 jam *24-Hour Call Centre*	1-800-88-5656 & 1-800-88-9119
9	Gangguan Terancang *Planned Interruptions*	Pelanggan akan diberitahu sekurang-kurang 48 jam sebelum dilakukan sebarang gangguan yang terancang. *Customers will be informed at least 48 hours before a planned interruption is carried out.*
10	Penukaran Meter *Replacement of Meters*	Ditukar - 3 hari selepas dijalankan siasatan. *Replacement - 3 days prior to investigation.*

Jadual 5.2 : Nombor Perhubungan GMSB
Table 5.2 : GMSB Contact Number

Lokasi *Location*	Alamat *Address*	Telefon *Telephone*	Faksmili *Facsmile*
Ibu Pejabat *Head Office*	No. 5, Jalan Serendah 26/17 Seksyen 26, Peti Surat 7901 40732 Shah Alam Selangor	03 5192 3000	03 5192 6766
Pusat Kawalan Operasi *Operation Control Room*	No. 5, Jalan Serendah 26/17 Seksyen 26, Peti Surat 7901 40732 Shah Alam Selangor	1 800 88 9119	03 5192 6751
Pusat Perkhidmatan Pelanggan *Customer Service Unit*	No. 27 & 27-1, Jalan 3/76D Desa Pandan 55100, Kuala Lumpur	1 800 88 5656	03 9282 9818
Pejabat Wakil Daerah Selatan *Southern Regional Office*	PL0343, Jalan Emas Tiga Kawasan Perindustrian Pasir Gudang 81700 Pasir Gudang Johor	07 252 2314	07 252 2561
Pejabat Cawangan Kerteh *Kerteh Branch Office*	No. 77, Bandar Baru Kerteh 24300 Kerteh, Kemaman Terengganu	09 826 3661 / 7	09 826 3672
Pejabat Wakil Daerah Kuala Lumpur *Kuala Lumpur Regional Office*	No. 27 & 27-1, Jalan 3/76D Desa Pandan 55100 Kuala Lumpur	03 4142 8401	03 4143 9527

Jadual 5.3 : Standard Kualiti Perkhidmatan Pelanggan Sabah Energy Corporation Sdn. Bhd. (SEC)
Table 5.3 : SEC Customer Services Quality Standard

Bil. *No.*	Perkhidmatan *Services*	Penyata Prestasi *Statement Of Performance*
1	Waktu Perniagaan *Business Hours*	7.45 pagi – 5.00 petang Isnin – Jumaat *7.45 a.m. – 5.00 p.m. Monday to Friday*
2	Menangani Aduan/Pertanyaan *Complaints/Enquiry Handling*	Aduan/pertanyaan bertulis - 5 hari bekerja dari tarikh penerimaan. Pertanyaan melalui telefon - 1 hari bekerja. *Written complaint/enquiry - 5 working days upon receipt.* *Telephone enquiry - 1 working day.*
3	Bayaran Bil *Billings*	Apa-apa pertanyaan berkenaan bil gas - 5 hari bekerja. *For any enquiry in regard to the gas bill - 5 working days.*
4	Pemulangan *Security Deposits and Refund*	Pelanggan bukan perumahan - Deposit dipulangkan dalam tempoh 1 bulan jika bekalan tidak lagi diperlukan. Pelanggan perumahan - Deposit dipulangkan dalam tempoh 2 bulan jika bekalan gas tidak lagi diperlukan. *Non-residential customers – Deposits will be returned within 1 month if supply is no longer required.* *Residential customers - Deposits will be returned within 2 months if supply is no longer required.*
5	Tindakan Kecemasan *Emergency Response*	Satu pasukan akan dihantar ke tapak binaan dalam tempoh 45 minit jika kecemasan berlaku di sepanjang atau di sekitar talian atau pepasangan paip gas. *A team will be dispatched to the site of the emergency within 45 minutes in the event of an emergency along or in the vicinity of gas pipeline or installation.*
6	Talian Kecemasan 24-Jam *24-Hour Emergency Lines*	019 882 1480, 019 882 0850, 013 864 6079, 019 860 0860, 013 874 4973 Waktu Perniagaan *Office Hours* — Nombor Telefon *Telephone Number* Kota Kinabalu — 088-440600 Labuan — 087-417162
7	Pengawasan Pihak Ketiga *Third Party Supervision*	Notis bertulis daripada kontraktor sekurang-kurangnya 3 hari sebelum bermulanya kerja. Notis yang tidak cukup boleh mengakibatkan arahan berhenti kerja. *Written notice from the contractor at least 3 days before work commences. Inadequate notice may result in a stop work order.*
8	Lokasi Talian Paip Gas *Location of Gas Pipeline*	Maklumat akan disampaikan kepada pihak ketiga dalam tempoh 4 hari bekerja. *Information would then be conveyed to the third party within 4 working days.*
9	Gangguan Terancang *Planned Interruptions*	Pelanggan akan diberitahu sekurang-kurang 48 jam sebelum dilakukan sebarang gangguan yang terancang. *Customer will be informed 48 hours before a planned interruption is carried out.*
10	Penukaran Meter *Replacement of Meters*	Meter gas akan diganti dalam tempoh 3 bulan – Pengguna Domestik. Meter gas akan diganti dalam tempoh 6 bulan – Pengguna Industri dan Komersil. *A gas meter will be replaced within 3 months – Domestic User* *A gas meter will be replaced within 6 months – Industrial and Commercial Users*

Jadual 5.4 : Nombor Perhubungan SEC
Table 5.4 : SEC Contact Number

Lokasi *Location*	Alamat *Address*	Telefon *Telephone*	Faksmili *Facsmile*
Ibu Pejabat *Head Office*	1st, 2nd and 3rd Floors, 62A Wisma Bandaraya Jalan Masjid Lama Locked Bag No. 2 88990 Kota Kinabalu, Sabah	088 311 290 - 299	088 311 361
Jualan dan Bekalan Gas Asli: Unit Pembangunan Perniagaan & Perancangan Korporat/Hartanah *Sale and Supply of Natural Gas* *Business Development &* *Corporate Planning/Property Unit*	1st, 2nd and 3rd Floors, 62A Wisma Bandaraya Jalan Masjid Lama Locked Bag No. 2 88990 Kota Kinabalu, Sabah	088 311 379	088 311 367
Operasi Gas Asli: Unit Tenaga *Natural Gas Operation:* *Energy Unit*	1st, 2nd and 3rd Floors, 62A, Wisma Bandaraya Jalan Masjid Lama Locked Bag No. 2 88990 Kota Kinabalu, Sabah	088 311 381	088 311 370
Kecemasan *Emergency* Unit Tenaga *Energy Unit* Talian Kecemasan 24-Jam *24-Hours Emergency Lines* Ketika Waktu Pejabat *During Office Hours* Kota Kinabalu Labuan Telefon Sebelum Menggali *Call Before You Dig*		019 882 1480 019 864 6079 019 860 0860 019 882 0850 013 874 4973 088 440 600 / 656 / 657 / 658 / 659 088 417 162	088 440 657

PRESTASI PERKHIDMATAN PERBEKALAN DAN RELIABILITI

SUPPLY SERVICES AND RELIABILITY PERFORMANCE

PRESTASI PERKHIDMATAN PERBEKALAN DAN RELIABILITI

SUPPLY SERVICES AND RELIABILITY PERFORMANCE

Aspek-aspek utama yang dipantau dan dianalisis bagi menilai keadaan sistem pembekalan gas oleh pemegang-pemegang lesen penggunaan gas adalah seperti berikut :

The main aspects being monitored and analysed to assess the condition of gas supply system by Gas Utility Licensee are as follows:

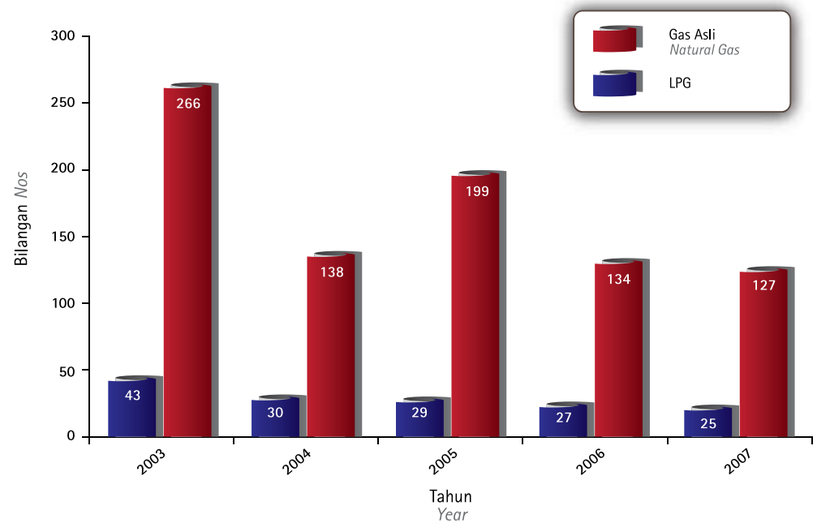
- Bilangan gangguan bekalan
  Number of supply interruption
- Tempoh dan punca gangguan bekalan
  Duration and causes of supply interruption
- Indeks Tempoh Purata Gangguan Bekalan (SAIDI)
  Supply Average Interruption Duration Index (SAIDI)
- Indeks Purata Kekerapan Gangguan Bekalan (SAIFI)
  Supply Average Interruption Frequency Index (SAIFI)
- Indeks Tempoh Purata Gangguan Pelanggan (CAIDI)
  Customer Average Interruption Duration Index (CAIDI)
- Aduan pengguna
  Customer complaint

Bilangan Gangguan Bekalan
Number Of Supply Interruption

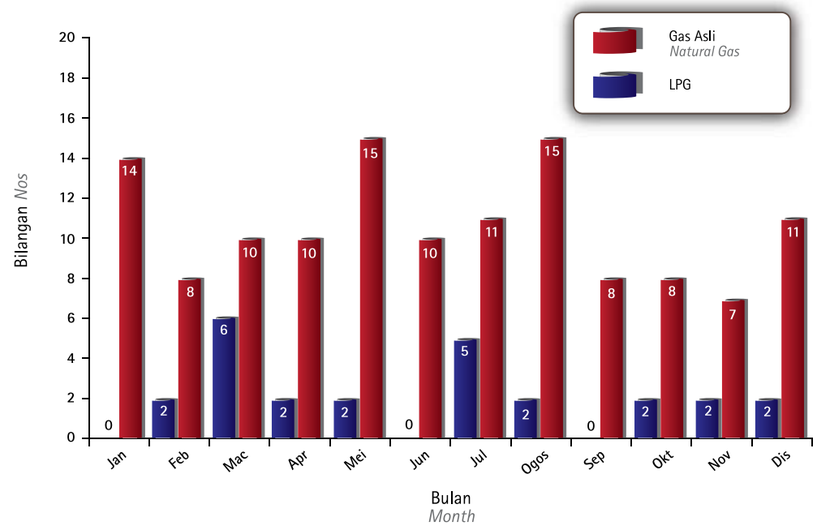
Pada tahun 2007, jumlah gangguan bekalan gas (gas asli dan LPG) yang dilaporkan oleh pemegang lesen penggunaan gas adalah 152 gangguan iaitu penurunan sebanyak 5.9% berbanding 161 gangguan pada tahun 2006. Rajah 6.1 menunjukkan jumlah gangguan bekalan gas yang dilaporkan dari tahun 2003 hingga 2007. Rajah 6.2 menunjukkan bilangan gangguan bekalan gas setiap bulan dalam tahun 2007.

In year 2007, the total of gas supply interruption (natural gas and LPG) reported by Gas Utility Licensee was 152 interruptions. This represents a 5.9% reduction compared to 161 interruptions recorded in year 2006. Figure 6.1 shows the total of gas supply interruption from the year 2003 to 2007. Figure 6.2 shows the number of gas supply interruption in 2007 on monthly basis.

Rajah 6.1 : Gangguan Bekalan Gas Yang Dilaporkan Dari Tahun 2003 – 2007
Figure 6.1 : Gas Supply Interruption Reported From Year 2003 – 2007



Rajah 6.2 : Bilangan Gangguan Bekalan Gas Pada Tahun 2007
Figure 6.2 : Number Of Gas Supply Interruption In Year 2007



Tempoh Dan Punca Gangguan Bekalan
Duration And Cause Of Supply Interruption

Jadual 6.1 : Tempoh Dan Punca Gangguan Bekalan Bagi Tahun 2007
Table 6.1 : Duration And Causes of Supply Interruption In Year 2007

Lokasi *Location*	Tempoh Gangguan Bekalan (minit) *Duration of Supply Interruption (minutes)*					
	Gas Asli *Natural Gas*			LPG *LPG*		
	Industri *Industry*	Komersil *Commercial*	Perumahan *Residential*	Industri *Industry*	Komersil *Commercial*	Perumahan *Residential*
Gangguan berpunca daripada kegagalan Kemudahan Pemegang Lesen Penggunaan Gas *Interruption due to Gas Utility Licensee's facility failure*	0	5,540	1,340	0	3,632	66,522
Gangguan berpunca daripada kegagalan Bukan Di Kemudahan Pemegang Lesen Penggunaan Gas *Interruption due to Non-Gas Utility Licensee's facility failure*	12,270	109	10,856	0	3,923	57,781

Indeks-Indeks *Supply Average Interruption Duration* (SAIDI), *Supply Average Interruption Frequency Index* (SAIFI) dan *Customer Average Interruption Duration* (CAIDI)

Tiga indeks yang digunakan bagi mengukur kualiti perkhidmatan perbekalan gas adalah Supply Average Interruption Duration Index (SAIDI), Supply Average Interruption Frequency Index (SAIFI) dan Customer Average Interruption Duration Index (CAIDI = SAIDI/SAIFI). Jadual 6.2 menunjukkan prestasi perkhidmatan perbekalan Gas Malaysia Sdn Bhd. Petunjuk prestasi berkaitan kebocoran gas pula ditunjukkan dalam Jadual 6.3. Jadual 6.4 dan 6.5 menunjukkan aduan-aduan yang diterima oleh pemegang lesen penggunaan gas.

The three indices used for assessing the supply service quality are namely SAIDI, SAIFI and CAIDI. Table 6.2 shows the supply service performance of GMSB and performance indicator pertaining to gas leak is shown in Table 6.3.Table 6.4 and 6.5 show the complaints received by Gas Utility Licensee.

Jadual 6.2 : Petunjuk Prestasi Gas Malaysia Sdn Bhd (GMSB)
Table 6.2 : Gas Malaysia Sdn Bhd (GMSB) Reliability Indicator

Petunjuk Prestasi *Reliability Indicator*	Formula Pengiraan *Measurement Formula*	Unit *Unit*	Penanda Aras *Bench-Mark*	Tahun *Year*				
				2003	2004	2005	2006	2007
SAIDI (Supply Average Interruption Duration Index)	*Total Minutes Per Year / Average Total No of Customer*	Minit/Pelanggan/Tahun *Minutes/Customer/Year*	0.81	0.0013	0.0186	0.0012	1.0812	2.2140
SAIFI (Supply Average Interruption Frequency Index)	*Total No of Customer Interruptions Per Year / Average Total No of Customers*	Gangguan/Pelanggan/Tahun *Interruptions/Customer/Year*	6.7	0.00003	0.00020	0.00010	0.01280	0.02830
CAIDI (Customer Average Interruption Duration Index) (SAIDI/SAIFI)	*Total Customer Minutes / Total No of Customer Interruptions*	Minit/Gangguan *Minutes/Interruption*	41.2	40.0	93.3	20.0	84.3	78.1

Jadual 6.3 : Petunjuk Prestasi Berkaitan Kebocoran Gas
Table 6.3 : Performance Indicator Related to Gas Leaks

Petunjuk Prestasi *Reliability Indicator*	Unit *Unit*	Penanda Aras *Bench-Mark*	Tahun *Year*				
			2003	2004	2005	2006	2007
Kebocoran di sepanjang talian paip gas bagi setiap 1000km *Leak along gas pipeline for every 1000km*	Bilangan / 1000km *Nos. / 1000km*	0.7	0	4.24000	0	0.00072	0.00480
Kebocoran di kemudahan gas bagi setiap 1000 pelanggan *Leak at gas facilities for every 1000 customers*	Bilangan / 1000 pelanggan *Nos. / 1000 customers*	14.95	4	1.43000	4.52410	0.03303	0.00412

Jadual 6.4 : Statistik Aduan Pengguna Kepada Pemegang Lesen Penggunaan Gas Mengikut Sektor

Table 6.4 : Statistic of Customer Complaints to Gas Utility Licensee by Sector

Lokasi *Location*	Industri *Industry*					Komersil *Commercial*					Perumahan *Residential*				
	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007
Semenanjung Malaysia (Gas Asli) *Peninsular Malaysia (Natural Gas)*	15	21	42	41	34	13	6	1	9	13	85	25	46	21	16
Sabah (Gas Asli) *(Natural Gas)*	0	0	0	2	0	*N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Semenanjung Malaysia *Peninsular Malaysia (LPG)*	0	0	0	0	0	46	22	5	23	38	531	167	345	260	203

* N/A : Tiada pengguna komersil dan perumahan di Sabah

There are no commercial and residential consumers in Sabah.

Jadual 6.5 : Statistik Aduan Pengguna Kepada Pemegang Lesen Penggunaan Gas Mengikut Kategori Aduan

Table 6.5 : Statistic Of Customer Complaints To Gas Utility Licensee by Complaint Category

Lokasi *Location*	Gangguan Bekalan *Supply Distruption*					Kebocoran *Leaking*					*Lain-Lain *Others*				
	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007	2003	2004	2005	2006	2007
Semenanjung Malaysia (Gas Asli) *Peninsular Malaysia (Natural Gas)*	43	30	29	26	25	31	22	60	45	38	39	0	0	0	0
Sabah (Gas Asli) *(Natural Gas)*	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
Semenanjung Malaysia *Peninsular Malaysia (LPG)*	266	138	199	134	127	209	51	151	149	114	102	0	0	0	0

* Lain-lain adalah aduan yang diterima oleh pemegang lesen seperti aduan berkenaan bil gas, penyambungan semula, pembayaran dll.

Others are complaints received by licensee such as complaint on gas bill, reconnection, payment etc.

PRESTASI KESELAMATAN
SAFETY PERFORMANCE

Bilangan kes-kes kemalangan yang dilaporkan kepada Suruhanjaya Tenaga (ST) sehingga tahun 2007 ditunjukkan dalam Jadual 7.1.

Number of accident cases reported to Energy Commission (EC) up to 2007 is shown in Table 7.1.

Jadual 7.1 : Punca-Punca Bagi Kemalangan Yang Dilaporkan (1993-2007)

Table 7.1 : Cause Of accident Reported (1993-2007)

Punca Kejadian *Cause of Incident*	Sistem Gas Berpaip[1] *Piped Gas System*		*Non-piped gas system*[2]	
	Bil. *No.*	%	Bil. *No.*	%
Pemasangan / senggaraan sistem paip gas tidak memuaskan *Installation / Maintenance of gas piping system not satisfactory*	16	40	6	60
Kerja / Tindakan berbahaya pihak ketiga berdekatan / di talian paip *Dangerous work / action by third party near / on piping network*	17	42.5	0	0
Penggunaan kelengkapan gas secara tidak selamat *Unsafe uses of gas appliance.*	7	17.5	4	40
Jumlah *Total*	40	100	10	100

Nota: [1]Sistem gas berpaip gas asli dan LPG
Natural gas and LPG piped system
[2]Ini merujuk kepada silinderLPG (kurang daripada 15kg) disambungkan terus melalui hos ke perkakasan gas.
This refers to LPG cylinder (less than 15kg) directly connected to gas appliances through hose.

Jadual 7.2 : Akibat Kemalangan Yang Dilaporkan (1993-2007)

Table 7.2 : Consequence of accident Reported (1993-2007)

Akibat Kejadian *Consequence of Incident*	Bilangan Kejadian *No. of Incident*		Jumlah *Total*
	Sistem Gas Berpaip[1] *Piped Gas System*	*Non-piped gas system*[2]	
Kematian *Fatality*	11	5	16
Kecederaan *Injury*	23	16	39
Kerosakan harta benda *Property damage*	40	10	50

Nota: [1]Sistem gas berpaip gas asli dan LPG
Natural gas and LPG piped system
[2]Ini merujuk kepada silinder LPG (kurang daripada 15kg) disambungkan terus melalui hos ke perkakasan gas.
This refers to LPG cylinder (less than 15kg) directly connected to gas appliances through hose.

PENDAFTARAN KONTRAKTOR GAS DAN PERAKUAN ORANG KOMPETEN

REGISTRATION OF GAS CONTRACTOR AND CERTIFICATION OF COMPETENT PERSON

Pendaftaran kontraktor gas diklasifikasikan kepada empat kategori iaitu Kelas A, B, C dan D. Setiap kelas mempunyai ruang lingkup kerja yang berbeza berdasarkan kelas pepasangan gas.

Perakuan kekompetenan pula terbahagi kepada lima kategori iaitu Jurutera Gas, Penyelia Kejuruteraan Gas, Jurugegas Gas Kelas I, Jurugegas Gas Kelas II dan Jurugegas Gas Kelas III. Setiap kategori turut mempunyai ruang lingkup kerja yang berbeza berdasarkan kelas pepasangan gas.

Rajah 7.1 menunjukkan bilangan pendaftaran kontraktor gas dan orang kompeten dari tahun 2003 sehingga tahun 2007 manakala Rajah 7.2 dan Rajah 7.3 menunjukkan pecahan pendaftaran kontraktor gas dan orang kompeten berdasarkan kelas dan kategori.

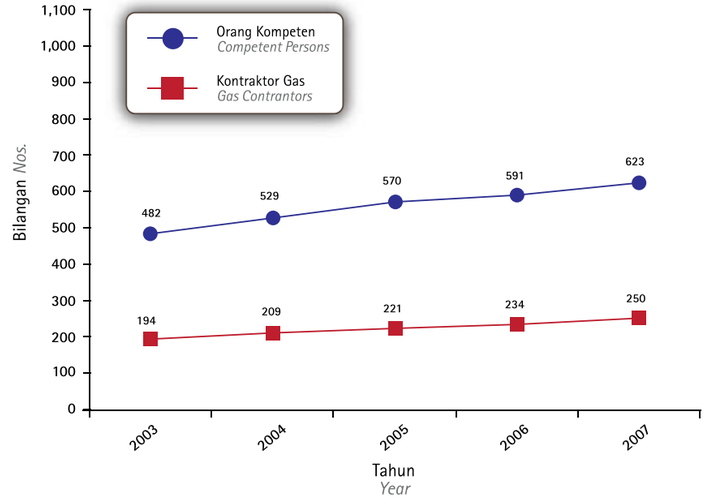
The registration of gas contractor is classified into four categories namely Class A, B, C and D. Each class has different scopes of work based on class of gas installation.

Certification of Competent Person is classified into five categories namely Gas Engineer, Gas Engineering Supervisor, Gas Fitter Class I, Gas Fitter Class II and Gas Fitter Class III. Each category has different scopes of work based on class of gas installation.

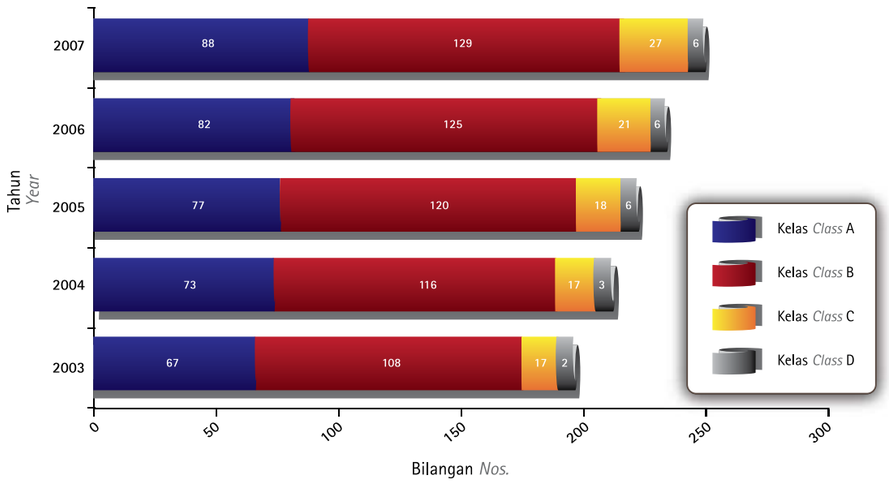
Figure 7.1 shows the total number of registered gas contractors and certified competent persons from year 2003 until year 2007 while Figure 7.2 and Figure 7.3 show the breakdown of registered gas contractors and certified competent persons in various classes and categories.

Rajah 7.1 : Bilangan kumulatif Kontraktor Gas dan Orang Kompeten

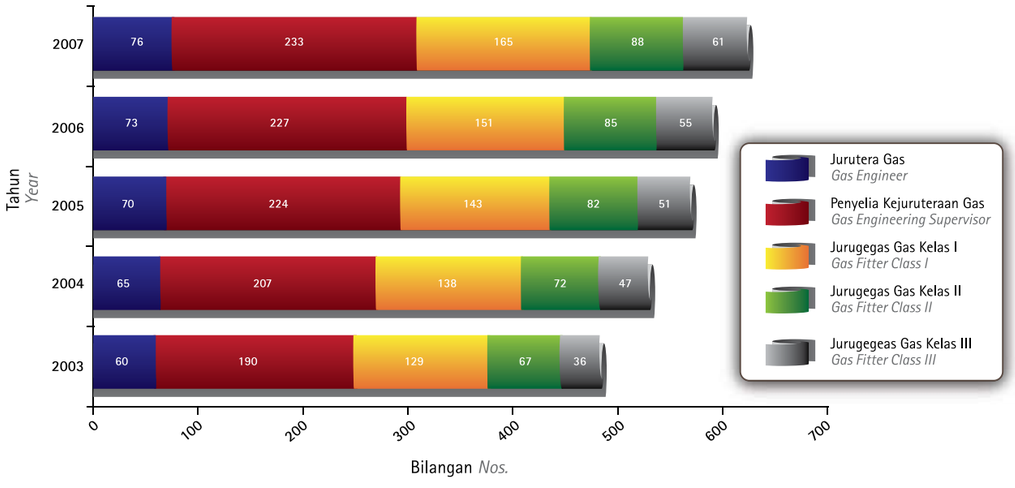
Figure 7.1 : Cumulative number of Gas Contractors and Competent Persons



Rajah 7.2 : Bilangan Kumulatif Kontraktor Gas Mengikut Kelas
Figure 7.2 : Cumulative Number of Gas Contractors By Classes



Rajah 7.3 : Bilangan Kumulatif Orang Kompeten Mengikut Kategori Kompetenan
Figure 7.3 : Cumulative Number of Competent Persons By Competency Categories



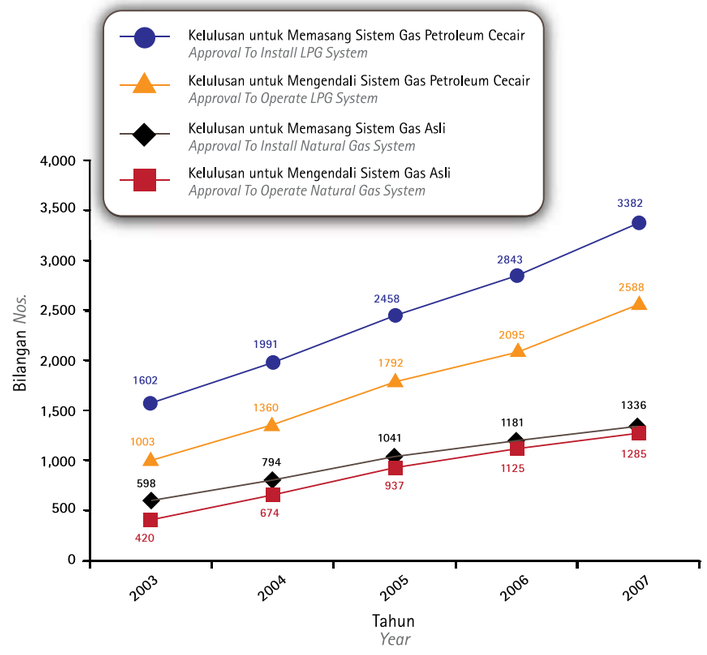
KELULUSAN UNTUK MEMASANG DAN MENGENDALI

APPROVAL TO INSTALL AND OPERATE

Bagi menjamin keselamatan pepasangan talian paip gas (gas asli dan LPG), Suruhanjaya Tenaga (ST) mengeluarkan dua jenis kelulusan iaitu kelulusan untuk memasang dan kelulusan untuk mengendali . Sehingga tahun 2007, jumlah Kelulusan (untuk memasang dan untuk mengendali) adalah 5,970 dan 2,621. Jumlah kelulusan yang dikeluarkan dari tahun 2003 hingga 2007 seperti ditunjukkan dalam Rajah 7.4.

To ensure the safety of piped gas (natural gas and LPG), Energy Commission (EC) issues two types of approvals, these are approval to install and approval to operate. Up to 2007, the total number of approvals (to install and to operate) issued for LPG and natural gas system were 5970 and 2621 respectively. The total number of approvals issued from year 2003 to year 2007 is shown in Figure 7.4.

Rajah 7.4 : Bilangan kumulatif Kelulusan Untuk Memasang/ Mengendali Sistem Talian Paip Gas Asli Dan LPG
Figure 7.4 : Cumulative number of Approvals To Install/Operate Natural Gas And LPG System



PENDAFTARAN GEGASAN, PERKAKAS DAN KELENGKAPAN GAS

GAS FITTINGS, EQUIPMENT AND APPLIANCES REGISTRATION

Bagi mengawal selia keselamatan gegasan, perkakas dan kelengkapan gas, Suruhanjaya Tenaga (ST) mengeluarkan kelulusan untuk mengilang atau mengimport barangan gas di samping meluluskan jenis atau model gegasan, perkakasan atau kelengkapan gas. Bilangan kelulusan yang telah dikeluarkan adalah seperti yang ditunjukkan dalam Rajah 7.5.

To regulate the safety of gas equipment, fittings and appliances, Energy Commission (EC) issues approvals to manufacture or import gas equipment, fittings and appliances, as well as type or model of these equipment, fittings and appliances. The number of approvals issued is shown in Figure 7.5.

Rajah 7.5 : Bilangan kumulatif kelulusan Pengilang/Pengimport, Gegasan,Perkakas dan Kelengkapan Gas

Figure 7.5 : Cumulative number of approvals to Manufacturer/Importer, Gas Fitting, Equipment and Appliance