

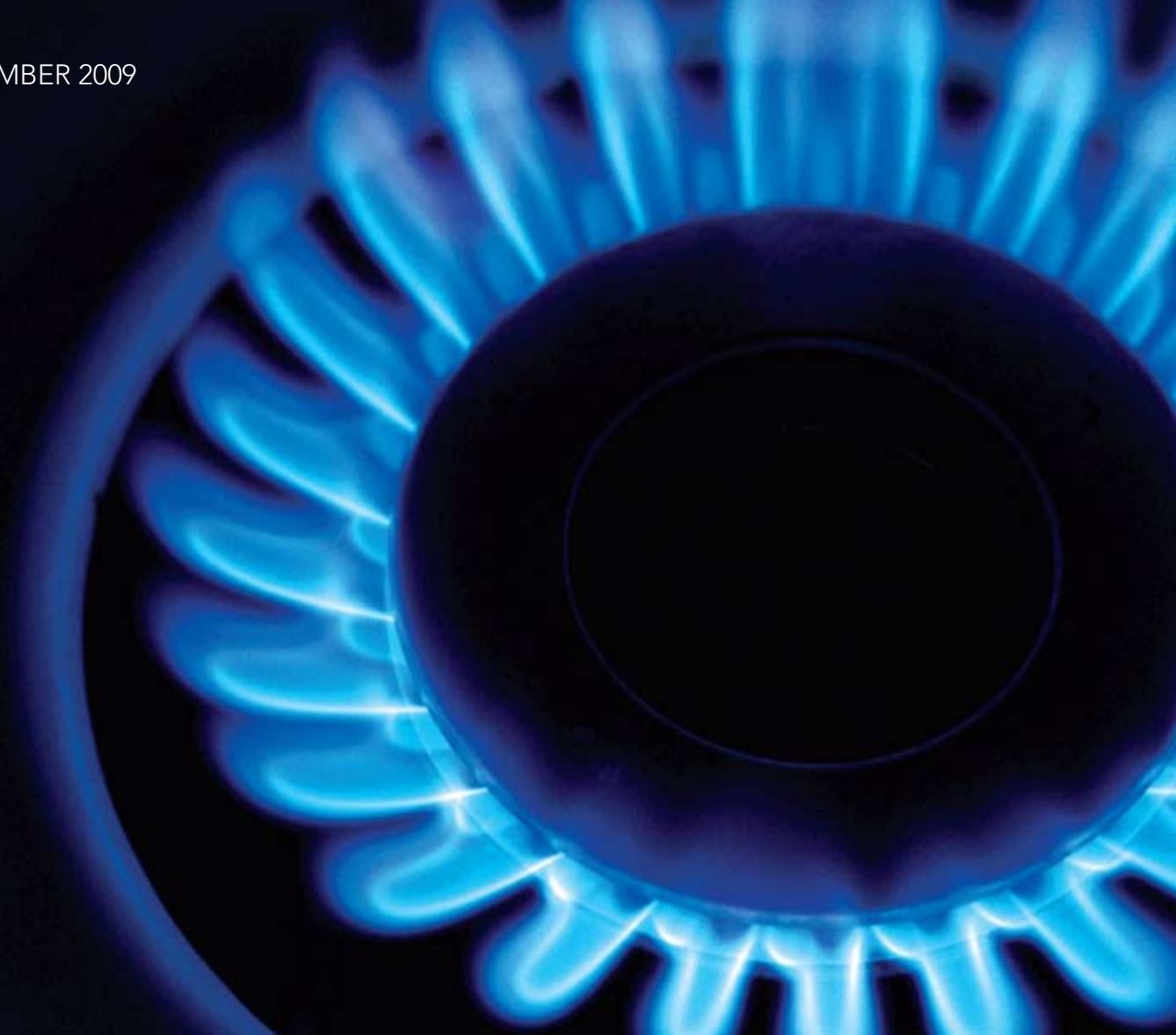


Government of **Western Australia**
Office of **Energy**

GAS SUPPLY AND EMERGENCY MANAGEMENT COMMITTEE REPORT TO GOVERNMENT



SEPTEMBER 2009





FOREWORD
BY THE MINISTER FOR ENERGY

Natural gas is a significant part of the Western Australian energy mix. It is an important fuel source for many of our State's industries, it is a key fuel input to our electricity generation, and it is used as a heating and cooking source for residential and small business consumers.

In 2008, Western Australia experienced two significant gas supply disruptions; the Karratha Gas Plant shutdown in January and the Varanus Island incident in June. Both of these events resulted in significant disruption to the State's gas supplies, with the Varanus incident reducing supplies by approximately 30 per cent until partial restoration in August 2008.

In response to these gas supply disruptions, and to ensure the State is prepared to manage any future supply emergency, the Government established the Gas Supply and Emergency Management Committee in February. The Committee was tasked with reviewing the security of the State's gas supplies and how any future gas supply disruptions are to be managed.

On behalf of the Government I would like to thank the members of the Gas Supply and Emergency Management Committee for their valuable time in addressing issues impacting the entire gas supply chain. Government looks forward to considering the committee's recommendations.

I also offer my thanks to the Coordinator of Energy, Mr Jason Banks, for his role as Chair of the Gas Supply and Emergency Management Committee, and to his staff within the Office of Energy.

A handwritten signature in black ink, appearing to read 'P. Collier'. The signature is written in a cursive, flowing style.

Hon Peter Collier MLC
Minister for Energy



Compressor Station on the Dampier to Bunbury Natural Gas Pipeline.

TABLE OF CONTENTS

FOREWORD	1
EXECUTIVE SUMMARY	4
Key Findings	4
Recommendations	5
1. INTRODUCTION	6
1.1. Composition of the Committee	6
1.2. Terms of Reference	6
1.3. Public Consultation	6
2. GAS SUPPLY DISRUPTION IMPACTS	8
2.1 NWS Gas Disruption	8
2.2 Varanus Island Disruption	9
2.3 Flow-through Impacts of a Gas Supply Disruption	11
3. ENERGY SECURITY	16
3.1 National Energy Security Assessment – WA Perspective	16
3.2 Operator Reports	17
4. GAS SUPPLY DISRUPTION MITIGATION MEASURES	18
4.1 Mitigation Measures	18
5. GAS SUPPLY DISRUPTION MANAGEMENT	26
5.1 Emergency Powers	26
5.2 Priority Allocation Guidelines	26
5.3 State Emergency Management Framework	28
5.4 Gas Supply Disruption Plans	29
6. MARKET ARRANGEMENTS	32
6.1 Efficient Market Arrangements – Consumer Price Signals	32
6.2 Gas Market Development Initiatives	34
APPENDIX 1	38
Gas Supply and Emergency Management Committee Final Terms of Reference	38

EXECUTIVE SUMMARY

As a result of two gas supply disruption incidents in 2008, the Western Australian Government established the Gas Supply and Emergency Management Committee (Committee) to review and provide advice to Government on the State's gas security, gas supply disruption management and mitigation options for gas supply disruptions.

The Committee regularly met over the period 5 March 2009 - 3 September 2009 to consider the key issues related to its Terms of Reference and received input through a number of energy industry and Government agency presentations as well as through a public consultation process. In addition, the Committee engaged the services of a consultant to provide specific advice on mitigation options for gas supply disruptions.

Key Findings

Major gas supply disruptions have significant flow-on effects on electricity and liquid fuel supplies, as well as the direct impact on gas consumers. The high penetration of gas in the electricity generation fuel mix in the State's electricity systems will cause considerable stress on these systems in the event of a major gas supply disruption. Liquid fuel use for electricity generation during such incidents is constrained by liquid fuel supply and transport capacity which could limit the level of liquid fuel substitution that can be achieved.

The State's Emergency Management framework does not provide additional powers to the existing energy-related powers to manage a major gas supply disruption, however, it does provide a best practice system that facilitates the planning and testing of gas supply disruption response plans and the mechanisms to assist the community to recover from such incidents.

A number of initiatives are currently being facilitated by industry and Government to meet the future energy needs of the State. The increasing number of gas supply points being developed over the coming years and the broadening of the pipeline gas specification will assist to enhance the State's energy security levels.

A number of potentially cost effective contingency options have been identified that could be undertaken to mitigate the impact of major gas supply disruptions on the electricity and gas markets.

Increasing the number of dual gas/liquids generators in the electricity markets would help to minimise the impact of a gas supply disruption through the ability to switch to liquid fuel. A strategic stock of liquid fuel would also be needed to ensure supply levels are maintained during a response to a gas supply disruption.

There is the potential for a gas storage facility close to Perth to provide a strategic supply of gas to residential and small business gas tariff customers. Economies of scale suggest that this option could be extended to larger distribution customers who seek a higher reliability of supply. At a minimum, a gas storage facility with an additional pipeline interconnect could provide adequate supply to the south west gas distribution networks to ensure that the networks do not collapse in the event of a major supply disruption.

Consumer demand reduction also plays an important role in the State's response to a gas supply disruption. Electricity consumers facing increased costs associated with liquid fuel generation would need to make informed decisions on their level of consumption at these higher prices. Similarly, gas consumers faced with increased costs during such events would need to consider their consumption options. Contract gas and electricity customers need to consider their risk exposure to energy supply during a gas supply disruption and take appropriate measures to manage or mitigate such risks.

An increased level of gas market information and transparency would facilitate a more competitive market, greater efficiencies in relation to energy consumption, assist gas industry stakeholders in identifying potential trading opportunities, foster risk mitigation or investment opportunities and will also inform Government in relation to policy development.

Recommendations

Gas Disruption Management

The Committee recommends that Government:

- + implements the strategic and operational plans endorsed by the Committee to respond to gas supply disruptions;
- + notes the importance of the inter-relationships between gas, electricity and liquid fuels in responding to energy shortages;
- + considers appropriate resourcing of the Office of Energy for strategic energy security policy development, advice and implementation and energy emergency management response roles; and
- + prescribes significant “Energy Supply Disruption” (gas, liquid fuels and electricity) as a hazard within the *State’s Emergency Management Regulations 2006*, with the Office of Energy as the designated hazard management agency.

Mitigation Measures

The Committee recommends that Government:

- + endorse implementation of necessary regulatory frameworks to facilitate development of gas disruption contingency services in the electricity and gas markets that:
 - provide an incentive for electricity generators to install or retrofit dual-fuel generation capacity and maintain an adequate strategic stock of diesel to meet abnormal fuel requirements associated with a gas supply disruption; and
 - require gas retailers to have adequate back-up supply arrangements to ensure continuity of supply for small use customers on standard contracts, with standard tariffs, (such as residential and small business customers) and offer such back-up supply arrangements as an opt-in service for other gas distribution system customers;
- + note that the Committee has identified at least two potential cost effective gas contingency service options, these being:
 - dual fuelling of the Cockburn and Kwinana high efficiency combined cycle gas turbines as a contingency service in the electricity market; and
 - additional gas storage capacity capable of withdrawal rates of between 35 terajoules per day and 100 terajoules per day from a gas reservoir, such as the Mondarra storage reservoir, and additional interconnection of the Parmelia pipeline with the Dampier to Bunbury Natural Gas Pipeline (DBNGP) to allow stored gas to flow into these pipelines and WA Gas Network’s distribution system;
- + note that the effective implementation of contingency service regulatory frameworks should provide for efficient pass-through of implementation and usage costs to those consumers (tariff or contract) that benefit from the improved reliability of supply, and allow for other cost effective mitigation options to be developed beyond those described above.

Gas Market Arrangements

To improve the security, reliability and competitiveness of the domestic gas supply market in Western Australia, the Committee recommends to Government:

- + implementation of a Gas Bulletin Board to provide web-based up-to-date gas system and market information, with consideration given to leveraging off the existing Australian Energy Market Operator Bulletin Board infrastructure;
- + that the Gas Bulletin Board include a non-compulsory facilitated trading market that provides for offers to sell and buy on standard transport and commodity contracts;
- + implementation of a Gas Statement of Opportunities (GSOO) that would provide long-term gas supply and demand forecasts to facilitate a competitive market and efficient investment, and inform Government policy development;
- + that the Bulletin Board and GSOO be administered by an independent Western Australian specific entity; and
- + future consideration be given to a compulsory Short Term Trading Market (STTM) following a review of the operation of the WA Bulletin Board and the gas market experiences in other Australian jurisdictions.

INTRODUCTION

On 29 January 2009 the Western Australian Government announced the establishment of the Gas Supply and Emergency Management Committee (Committee).

The Committee was asked to review the security of the State's gas supplies and how any future gas supply disruptions are to be managed. The Committee's Terms of Reference is outlined below.

1.1 Composition of the Committee

Membership of the committee is drawn across Government and the gas supply chain, from upstream producers, transportation pipeline operators, distribution system operators, major downstream consumer representatives, electricity system operators and gas and electricity retailers.

A full list of organisations represented on the Committee can be found at the back of this report.

1.2 Terms of Reference

At its first meeting in March, the Committee agreed on the following Terms of Reference, which the Minister for Energy endorsed.

The Committee was tasked to review and provide advice to Government in regard to:

- › gas disruption emergency response;
- › gas supply security, both present and long-term;
- › the entire gas supply chain and the risk, duration and effect of potential supply disruptions;
- › alternative approaches to avoid or minimise gas supply disruption or mitigate its effect; and
- › lessons learnt from past gas supply disruptions.

The Committee's full Terms of Reference can be found at Appendix 1.

1.3 Public Consultation

A six week public consultation process by the Committee was launched by the Minister for Energy on 18 March 2009 and concluded on 1 May 2009.

A total of 14 submissions were received from a variety of stakeholders including industry bodies, major gas consumers, academic institutions and service industries.

The full list of organisations providing submissions, along with the publicly available submissions and a summary of key issues raised can be found on the Committee's web page at <http://www.energy.wa.gov.au>. These issues are further canvassed in the report.

Key issues identified by stakeholders include:

- + The importance of competitive supplies of natural gas to the State's economy.
- + The desire for a long-term energy policy to be developed and articulated.
- + The importance of the inter-relationships between gas and alternative fuels, and the impact of gas shortages for electricity supply security.
- + The emerging tightness in gas supply for domestic markets and its consequences.
- + The importance of increasing diversity across the gas supply chain.
- + The desire for improved emergency management processes to be established and placed in the public domain.
- + Support for markets as the preferred mechanism to manage the balance between demand and supply.
- + A desire for more market transparency, via enhancements such as a gas bulletin board.

GAS SUPPLY DISRUPTION IMPACTS

During 2008, there were two significant disruptions to natural gas supplies to Western Australia¹.

2.1 NWS Gas Disruption

On 2 January 2008, an electrical fault at the North West Shelf (NWS) Venture's Karratha gas plant resulted in a total production shutdown. Production from the plant recommenced on 4 January and domestic gas supply arrangements were largely re-established by 5 January. Full Liquefied Natural Gas (LNG) production was restored on 13 January. Condensate and Liquefied Petroleum Gas (LPG) production were restored progressively with steady production being achieved on 13 January.

The domestic gas plant was offline for a total of 53 hours. About 600 terajoules per day of domestic production was lost during this period.

Impacts

This shutdown cut Western Australia's gas supplies by two-thirds and restricted natural gas supplies to a significant number of large gas users and had flow-on effects to electricity supply.

In Western Australia, as in other Australian states, gas supply and transport operates under commercial arrangements to ensure the most economically efficient usage of supply and transport capacity. Gas is supplied through bilateral arrangements between producers and major users.

During the disruption, gas trading resulted in some reallocation of the available gas to parties otherwise reliant on the Karratha gas plant. Major gas users supplied by the Karratha gas plant procured gas and swapped to alternative liquid fuels where these options were available, but otherwise were forced to cease operations that relied on gas supply.

A significant portion of the State's electricity generation uses natural gas, although some of this capacity can use liquid fuels as a back up. This liquid fuel capability was a key to avoiding the need for electricity restrictions. To assist in managing the gas shortage Western Power called for voluntary restraint in electricity use. It was not necessary to invoke involuntary electricity load-shedding or emergency powers to ration electricity usage during the disruption.

Importantly, standing arrangements for priority gas supply ensured that sufficient gas was made available to the Perth gas distribution system to maintain its operating pressure. Consequently, it was not necessary for Government to invoke emergency powers to ration or redirect gas for this purpose.

Response Strategies

The Karratha gas plant disruption did not require convening a coordination group to manage the disruption. However, significant bilateral communications during the event occurred between gas and electricity infrastructure operators, Minister for Energy's office, Office of Energy, gas suppliers and gas customers.

The impact of the January 2008 gas outage was minimised through the effective operation of market arrangements supported by the cooperation of consumers and major industry players. Key to this achievement was:

- › the safe and prompt on-site response to secure the gas processing plant, determine and rectify the fault and recommence production;
- › effective curtailment of gas use in line with contract arrangements;
- › effective management and coordination of gas pipeline capacity and inventory;
- › exercise of various fuel swap arrangements;

¹ The information in this report as to the impacts of these supply disruptions has not been independently verified by the Committee.

- › the use of strategic liquid fuel generating capability within the electricity market; and
- › the application of contracted and voluntary electricity demand management.

If the production disruption had been longer, the possibility of an energy emergency and/or establishment of a coordination group may have been required.

2.2 Varanus Island Disruption

On 3 June 2008, an explosion at Apache Energy's Varanus Island gas plant shut down operations completely for more than two months. About 30 per cent of Western Australia's gas supply (~350 terajoules per day) was lost.

Partial production was resumed in early August. It achieved 200 terajoules per day on 28 August 2008 and approximately 290 terajoules per day by late December 2008. Production rates have progressively increased over the first half of 2009 as repaired facilities were brought back into service and production rates in excess of 400 terajoules per day were achieved during July 2009.

Investigation into the cause of the explosion and follow-on actions are not a matter for this report but for the safety and technical regulatory organisations and portfolio.

Impacts

The impacts of the Varanus Island incident were widespread. It was reported that:

- › Mining and industry in the Pilbara experienced an approximate 45 per cent drop in gas supply.
- › Mining and industry in the Goldfields experienced around a 20 per cent drop in gas supply.
- › Large industry/commerce and mining in the south west experienced an estimated 20 per cent reduction in gas supply.
- › Mid-sized industry and commerce in the south west experienced around a 25 per cent drop in gas supply.

As industry implemented strategies to mitigate the impact of this widespread gas shortage, a number of businesses reported that they had:

- › curtailed operations and use of gas with additional costs;
- › switched to diesel fuel with additional costs; and
- › sourced alternative gas supply with additional costs.

To assist with the gas shortage, North West Shelf Venture, within tolerable non-firm capability that did not jeopardise its firm capacity commitments, increased the production and supply of domestic gas but on an interruptible basis.

As a result of some businesses swapping to diesel to replace gas, it was reported that demand for diesel grew to an additional 3.0 to 3.3 megalitres per day. This is around 30 to 40 per cent above normal supply.

As occurred for the NWS Gas Disruption, standing arrangements for priority gas supply ensured that sufficient gas was made available to the Perth gas distribution system to maintain its operating pressure. Consequently, it was not necessary for Government to invoke emergency powers to ration or redirect gas for this purpose.

Response Strategies

Aside from having significant bilateral communications between the Minister for Energy's office, Office of Energy, gas and electricity infrastructure operators, suppliers and gas customers in the early stages following the explosion, the incident involved the creation of various committees to manage and respond to the supply disruption.

The Office of Energy convened a meeting of industry on 5 June 2008 for the purpose of ensuring that all parties were best prepared to manage any extended outage and organised a meeting of industry with the previous Premier on 8 June 2008. Outcomes included the creation of several joint industry/Government committees outlined below, in particular a Gas Supply Coordination Committee (GSCC) which resulted in a five-point action plan to mitigate the supply disruption.

The key committees established to manage the incident were the:

- › GSCC as the main body responsible for managing the response to the energy supply disruption who met on regular occasions to work through the five-point action plan, which was designed to minimise the impact of the incident;
- › Gas Supply Disruption Recovery Committee to provide emerging intelligence regarding the consequences of the gas supply disruption in order to inform GSCC decision making. In particular this committee was formed to support industry, business and communities affected by the incident, to return as quickly as possible to normal function; and
- › Communications Sub-Committee of the GSCC, to manage the communication requirements and maintain consistency of messages to the public, industry and other Government agencies.

The five-point plan implemented by the GSCC to mitigate the impact of this gas supply disruption involved:

- › accessing gas from the North West Shelf Venture and other smaller gas suppliers;
- › accessing energy from other sources to free-up gas;
- › encouraging gas and electricity customers not to waste energy;
- › working with industry to shift demand to low peak times; and
- › ensuring diesel is available to replace natural gas where possible.

The following principles were adopted by the GSCC for the priority allocation of limited energy resources:

- › protect the health, safety and property of the community;
- › minimise broad community disruption; and
- › minimise economic impact.

To ensure that the allocation of limited energy supply is in the public interest and consistent with all of the above principles, the following priority schedule (Figure 1) was agreed by the GSCC:

1. **Energy infrastructure** is to be given top priority to maintain the State's capability to supply gas and electricity to users.
2. **Essential Services** are defined as those critical services that have the potential to seriously impact on the health and safety of the community and include essential public transport and communications.
3. **Essential Supply to Residential Customers** will minimise the potential for health impacts and disruption to the community. Consumers are encouraged to reduce energy consumption.
4. **Industries providing essential goods and services to the State's community** will have a higher priority in the allocation of energy than those that do not. This is to minimise disruption to the community and recognise the important services that these industries provide.
5. **For all other industries**, every effort will be made to maximise the availability of supply, recognising their importance to the State and National economy.

Figure 1: GSCC Priority Allocation Schedule

It was also agreed that the priority schedule would not override contractual arrangements. In assessing allocation to industries, consideration was also given as to whether they had alternative supplies, and the schedule may not have applied where these customers had viable alternatives.

While secondary gas trading on a bilateral basis was occurring and market auctioning of the additional North West Shelf Venture gas production enabled allocation of the limited supply at the wholesale and large consumer end of the market, issues arose regarding the ability of smaller market participants to access additional gas supplies that were being made available.

In response to gas supply constraints and curtailments, a gas Bulletin Board was implemented by the Government at short notice to facilitate gas trading. The Bulletin Board commenced on 3 July 2008 and was administered by the Independent Market Operator. This Bulletin Board was used to introduce potential suppliers and buyers², with quantities and prices for the gas buy or sell offer being posted on the Bulletin Board website.

The Bulletin Board ceased operating on 13 October 2008 as a result of partial resumption of gas supplies from Varanus Island and no gas being offered for sale on the Bulletin Board since 29 August 2008. Despite the limited time the Bulletin Board operated there were 27 registered traders, 14 active traders, and total trading volumes of 47.8 terajoules at between \$15.50 and \$18.50 per gigajoule. The Independent Market Operator has reported that given the limited operating duration, it appeared that a number of gas traders, once introduced through the Bulletin Board, continued to trade bilaterally outside of these arrangements.

² Minimum trades for the gas Bulletin Board were initially set at 0.5 terajoules, but were lowered to 0.1 terajoules in response to concerns expressed by smaller gas consumers

2.3 Flow-through Impacts of a Gas Supply Disruption

The two gas supply disruption events in 2008 demonstrated the importance of understanding the flow-through effects on supplies of electricity, liquid fuels and LPG and in adequately managing these impacts.

Electricity

South West Interconnected System (SWIS)

Natural gas accounts for about 60 per cent of the fuel used for electricity generation, with coal, renewables and petroleum products accounting for the rest.

The high penetration of natural gas in the electricity generation fuel mix has the potential to cause considerable stress on the electricity system in the event of a gas supply disruption. Figure 2 highlights the electricity generation fuel mix in the SWIS.

During a gas supply disruption, in addition to the supply shortfall and expected period of the outage, other factors – such as seasonal influences on electricity consumption and the maintenance programs of power generators – play a role in determining the extent of the impact on the electricity system.

Electricity consumption is higher during summer than other periods. During the winter/spring season, some generation is also under maintenance.

Given the potential for significant impacts on the electricity system, the Committee considered the flow-through impacts of two rare, worst-case potential situations for the electricity system.

- › Situation 1: Loss of the DBNGP for three to five days in summer; and
- › Situation 2: Total Loss of North West Shelf Gas (600 terajoules per day) for two to three months in summer.

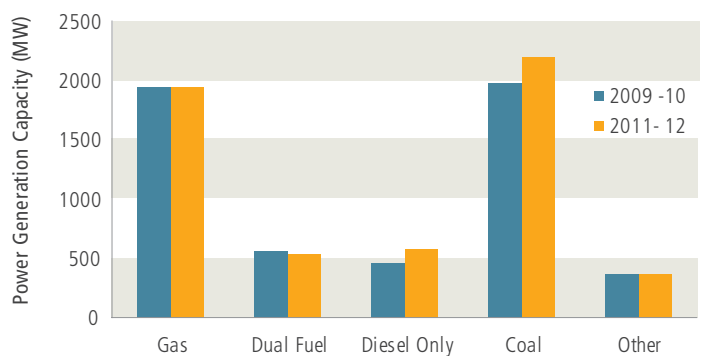


Figure 2: Distribution of SWIS Generation Capacity by Fuel Type: Evans and Peck Report, p.14

Given the potential impact of these rare events, the Committee also recognised these among the scenarios used by the consultants engaged to advise on mitigations options, to consider. Mitigation options for such events are outlined in Chapter 4 of this report.

In both of these examples, contract restrictions will be invoked and as a result large gas industry users and gas-only generators will be curtailed. This means that a significant portion of generation that can operate only on gas is no longer available to supply electricity.

In this first example of a rupture of the DBNGP, it is expected that the pipeline can be repaired within three to five days. The impact on the electricity system is expected to be severe, but short. On a high demand day, this could lead to rolling blackouts in suburbs twice a day for about 40 minutes each time.

In the second example of the total loss of North West Shelf Gas, it is assumed that gas production from the Varanus Island plant is not impacted, and that some supply is available for electricity generation from this source. The impact is expected to be severe and prolonged. On a high demand day, this could lead to rolling blackouts in suburbs twice a day for about 40 minutes each time.

An overview of these examples is provided in Figures 3 and 4.

Figure 3: Flow-through Impacts on the Electricity System

Example 1: Loss of the DBNGP for three to five days in summer

A rupture of the pipeline is expected to be repaired within three to five days. Contractual restrictions will be invoked and as a result large gas industry users and gas-only generators will be curtailed.

About 1,600 megawatts of gas-only electricity generation is no longer available for service due to contractual restrictions. Even if all coal, renewable and distillate generators are available, the supply shortfall will require electricity rationing to be implemented to protect the security of the power system.

On a high demand day, this may result in rolling-blackouts that could impact 350,000 to 500,000 customers twice a day for about 40 minutes each time. There will also be significant electricity contractual restrictions for industry.

Figure 4: Flow-through Impacts on the Electricity System

Example 2: Total Loss of the North West Shelf Gas (600 terajoules per day) for two to three months in summer

This assumes that gas production from the Varanus Island plant is not impacted, and that some supply is available for generation from this source. Contractual restrictions will be invoked and as a result large gas industry users and gas-only generators will be curtailed.

About 1,240 megawatts of gas-only electricity generation is no longer available for service due to contractual restrictions. Even if all coal, renewable and distillate generators are available, the supply shortfall will require electricity rationing.

On a high demand day, this may result in rolling black-outs that could impact 200,000 to 400,000 customers twice a day for about 40 minutes each time. There will also be significant electricity contractual restrictions for industry.

The case examples demonstrate that a diversity of fuels in the generation mix and the capability of generators to use alternative fuels are critical to ensuring the security of the electricity system.

Dual-fuel and liquids-only generators played an important part in maintaining the reliability and security of the electricity system during the Varanus Island gas outage. The Independent Market Operator is currently investigating ways to incentivise greater investment in dual-fuel.



Above: Pinjarra gas-fired cogen units.
Left: Transmission line.

An important mitigation strategy available to power system operators in a gas supply disruption is the use of distillate in dual-fuel (gas/liquid) generation units. However, liquid fuel use for electricity generation during such events is constrained by production, transport and storage capacity constraints.

A 320 megawatt plant at full load consumes around 80,000 litres per hour. A road tanker can carry 70,000 litres. Supply constraints in trucking resources in an emergency pose serious difficulties where prolonged hourly refuelling is required.

Most of the dual-fuel (gas/liquids) plants have limited storage facilities for distillate. During the Varanus Island gas supply disruption, it was reported that this posed an additional burden on the power system operator to monitor and conserve distillate stocks and coordinate distillate delivery timing closely to maximise generation capacity to avoid power restrictions.

Regional Electricity Systems

A gas supply disruption is expected to have flow-through effects on regional electricity systems – the North West Interconnected System (NWIS) and the Regional Non-Integrated Systems (RNIS) which have a total installed capacity of 1,805 megawatts, comprising renewable and non-renewable generation.

While Horizon Power owns and operates some generation and transmission assets, most are privately owned.

In the NWIS, all the 540 megawatts of installed capacity – Paraburdoo, Port Hedland, Cape Lambert and Dampier – are gas-fired generation, although Paraburdoo and Port Hedland have limited capacity for distillate substitution.

In the event of a gas supply disruption, Horizon Power has limited alternatives other than hiring and deploying some portable generation units. This could mean severe electricity rationing and blackouts in the NWIS.

In the RNIS, approximately 23 per cent of the generation in the West Kimberley and all generation in the Carnarvon and Esperance areas have diesel back-up capability. This can cover residential demand for a limited period of time although it is critical to ensure that transportation and replenishment of diesel stocks keep pace with consumption.

Exmouth receives trucked Compressed Natural Gas and has LPG and diesel back-up. Other generation in the RNIS in Leonora, Onslow and Mt Magnet use pipeline gas. Depending on their gas supply source, they could be affected by a gas supply disruption. These areas have limited diesel back-up, and are likely to experience significant electricity rationing and black-outs.

Liquid Fuels

Liquid fuel, specifically diesel, is widely used where gas is not available for mining, industrial activity and electricity generation.

A significant gas supply disruption that impacts on electricity supply could have secondary impacts on liquid fuel supply, contributing to a sharp increase in demand. This could put pressure on the liquid fuel supply chain including liquid fuel production, transportation, storage and price.

There is also a time lag (of between two to four weeks) for additional liquid fuel supplies to be imported.

This makes it important to ensure that the critical energy infrastructure such as the BP Refinery, which supplies about 85-95 per cent of Perth's liquid fuels, can sustain liquid fuel production through a priority allocation of gas until additional liquid fuel supplies can be imported.

During the Varanus Island gas supply disruption, it was reported that an extra three to four million litres of distillate was in demand per day. Liquid fuel suppliers responded quickly to the situation on a commercial basis and were successful in securing supplies against firm new orders, without requiring Government intervention. Pre-existing supply commitments were honoured.

Liquefied Petroleum Gas (LPG)

A gas supply disruption could also significantly reduce supplies of LPG to the domestic market.

The Wesfarmers LPG plant removes LPG (propane and butane) fractions for sale from gas flowing through the DBNGP via Kwinana. Wesfarmers supplies its LPG to the domestic market through its subsidiary, Kleenheat Gas Pty Ltd. Although the quantity extracted varies, depending on total gas flows and the LPG content in the natural gas stream, about 30 terajoules per day of LPG is removed through the plant.

BP Refinery's LPG production is based on refining crude oil to supply petrol for the domestic automotive market. It is a secondary product of the refining process, and therefore its production is associated with the level of crude oil imports required to supply petroleum demand. If a gas supply disruption results in gas and electricity curtailment at the BP Refinery, this will impact on the production of LPG and liquid fuels.

The Committee recommends that Government note the importance of the inter-relationships between gas, electricity and liquid fuels in responding to energy shortages.

ENERGY SECURITY

3.1 National Energy Security Assessment – WA Perspective

Responses to the Committee's public consultation process, beside providing comments on the gas disruption, indicated significant concerns for longer term matters relating to energy security. Key issues raised by stakeholders in this regard were:

- › the importance of natural gas for the Western Australian economy with prices and volumes determined within a competitive market;
- › the desire for a long-term energy policy to be developed and articulated;
- › the importance of the inter-relationships between gas and alternative fuels, and the impact of gas shortages for electricity supply security;
- › the emerging tightness in gas supply for domestic markets and its consequences; and
- › the importance of increasing diversity across the supply chain.

Many of these issues are captured in the Commonwealth Government's Energy White Paper process and have been articulated at a national level in the National Energy Security Assessment 2009 (the NESAs). The issues raised in the Committee's public consultation process are addressed in the context of the NESAs as many of these issues must be resolved in the national context.

The NESAs, produced by the Commonwealth Department of Resources, Energy and Tourism (DRET), provides a national perspective on energy security – it examines the issues impacting the adequacy, reliability and affordability of natural gas, liquid fuels and electricity. The current level of energy security for each of these sectors is assessed and given a rating as Low, Medium or High. The trend outlook is also assessed in five year intervals for the next 15 years.

The NESAs is intended to be the first step in the consultative process for developing a comprehensive energy policy. The policy development process, including outcomes from the Henry Review into taxation, will culminate in an Energy White Paper³ expected to be released in late 2009 or 2010.

The NESAs process identifies the key influences on the level of energy security in each sector. Driving factors for each area of influence are identified, and their impact over time estimated to derive a view of the overall level of energy security by sector. High level trends with particular relevance to the State have been identified for each area of influence.

In the short term, the overall level of energy security outlook in Western Australia is lower than the national level, reflecting current affordability and availability issues in the domestic gas sector. Within five years though, electricity and gas supply security are both assessed as moderate, consistent with the NESAs, taking into account the identified short term risks surrounding these sectors that may alter this assessment. Western Australia though has different but no less significant, challenges and uncertainties to those affecting energy markets in the eastern states.

New domestic gas supplies are dependent on aggregating significant demand at prices that support domestic gas dedicated new offshore developments, or linkage of domestic gas projects with new large-scale LNG developments. The costs of developing these new gas supplies have increased substantially.

The uncertain timing and pricing of new gas developments increases risk to continuity, and growth, in economic activity. The supply security risks in the Western Australian electricity sector, as an isolated grid, are different to those in its eastern states counterparts. The high level of exposure to gas as a generation fuel is likely to impose new cost pressures; and system reliability characteristics and network connection issues present additional challenges in diversifying to a more renewable base.

³ It is understood that the Energy White Paper process is closely linked to the passage of the Commonwealth's Carbon Pollution Reduction Scheme (CPRS) legislation and any delays in the CPRS may impact on the release of the Energy Green and White Papers

The policy issues arising, and raised in the public consultation process, are being addressed in specific activities noted below:

Issue Raised in Public Consultation:	Actions:
<p>The importance of competitive supplies of natural gas to the State's economy.</p> <p>The emerging tightness in gas supply for domestic markets and its consequences.</p>	<p>NESA/Energy White Paper.</p> <p>Commonwealth DRET Review of administration of Retention Leases.</p> <p>State Domestic Gas Reservation Policy.</p> <p>New domestic gas projects being developed.</p> <p>State tight gas royalty concessions.</p>
<p>The importance of fuel inter-relationships and the impact of gas shortages on electricity supply security.</p> <p>The importance of diversity across the supply chain (strengthening infrastructure security).</p>	<p>Committee report addresses options to mitigate risk to both gas and electricity systems.</p> <p>Office Of Energy developing legislation for broadening gas specification for transmission pipelines.</p>
<p>The desire for a long-term energy policy to be developed and articulated.</p>	<p>NESA/Energy White Paper.</p>
<p>The importance of diversity across the supply chain – New investment in supply and processing facilities.</p>	<p>Energy White Paper – address investment frameworks for new investment in gas production and processing facilities, renewable energy options, and enhancement of coal fired generation via carbon capture and storage.</p>

The Committee notes the importance of issues such as competitive supplies of natural gas, diversity in the gas supply chain and concerns with the potential shortage of domestic gas supply and its consequences. These, along with the issue of a long-term energy policy, are matters beyond the scope of the Committee and matters for State and Commonwealth Government policy consideration.

The Committee's response to the NESA can be found on its web page at: <http://www.energy.wa.gov.au>.

3.2 Operator Reports

As part of the Committee's Terms of Reference, members operating key gas supply infrastructure facilities in the State were invited to provide reports on their facilities and operations covering matters on design philosophy, reliability performance, supply disruption risks, risk prevention and risk management strategies.

The following members provided reports, which can be found on the Committee's web page <http://www.energy.wa.gov.au>:

- › Woodside Energy – Operator of the North West Shelf Venture's Karratha domestic gas facilities.
- › Apache Energy – Operator of the Varanus Island domestic gas facilities.
- › DBP – Operator of the Dampier to Bunbury Natural Gas Pipeline.
- › APA Group – Owner and operator of the Goldfields Gas Pipeline.
- › WA Gas Networks – Operator of the main south west gas distribution systems.

GAS SUPPLY DISRUPTION MITIGATION MEASURES

4.1 Mitigation Measures

The Committee engaged the services of consultants, Evans & Peck, to provide advice to the Committee in regard to the alternative approaches to avoid or minimise gas supply disruptions and to mitigate its effect. The Evans & Peck report can be found on the Committee’s web page at <http://www.energy.wa.gov.au>.

The Committee required Evans & Peck to review the effect of gas supply disruptions to different customer classes arising from the following low probability events:

- Scenario 1 - total loss of production from the Karratha domestic gas processing plant for three months;
- Scenario 2 - loss of the equivalent of half of the production, i.e. about 350 terajoules per day, for six months;
- Scenario 3 - complete loss of gas flow in the DBNGP for seven days resulting from an interruption north of Perth; and
- Scenario 4 - complete loss of gas flow in the DBNGP for seven days resulting from an interruption in the Perth metropolitan area.

A number of mitigation options were then identified and a model was developed to analyse the impacts of implementing each of the mitigation options in the event of the above gas supply disruption events.

Each scenario was run through the model to identify the amount of energy required in the electricity and gas markets that was not delivered. This is expressed as unserved energy. The mitigation measures were then run through the model with each of the above scenarios.

A comparison of the impact and cost of each mitigation option in reducing the amount of unserved energy is presented at Figure 5.

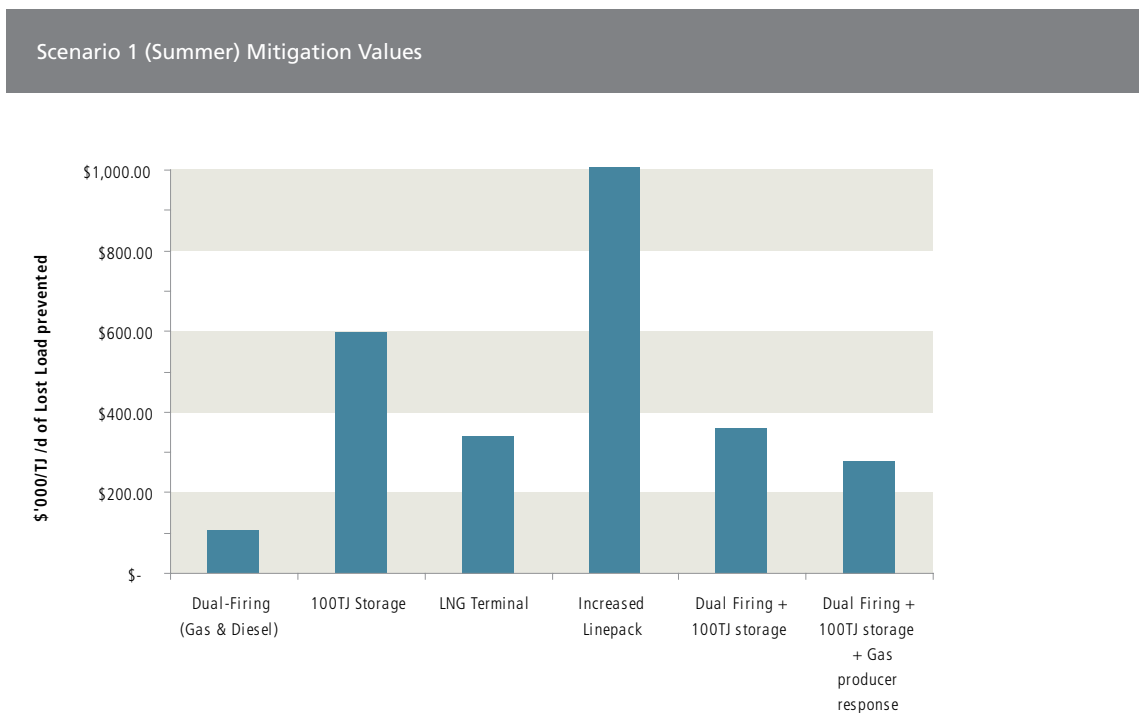


Figure 5: Evans & Peck Mitigation Options Comparative Costs



Verve Energy's gas-fired Cockburn Power Station.

Evans & Peck identified three mitigation options which they consider to be cost-effective.

A dual-fuel option for the electricity market achieved through the conversion of the high efficiency combined cycle gas plants at Cockburn and NewGen Kwinana to dual firing capability (gas and diesel).

A gas storage option for the gas market utilising between 35 terajoules per day and 100 terajoules per day from a gas reservoir such as the Mondarra storage reservoir.

A 500 terajoules per day LNG terminal and refrigerated storage facility located at Kwinana.

Dual Firing Conversion

The dual firing conversion of the Cockburn and NewGen Kwinana Power Stations was identified as a particularly cost-effective mitigation option with an annual charge for development estimated to be \$8.9 million per year. This mitigation option's capital cost for each scenario equates to around \$100 – \$150 per terajoule per day for each terajoule of unserved energy mitigated.

Energy demand supplied under the scenario
 Energy demand supplied because of existing responses

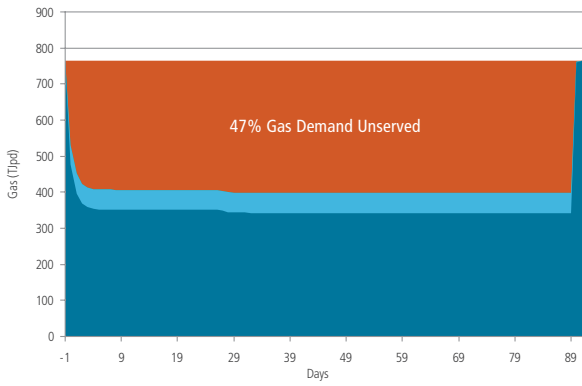
Additional energy supplied as a result of the mitigation strategy
 Remaining unserved energy

Dual Firing Conversion Mitigation - Summer

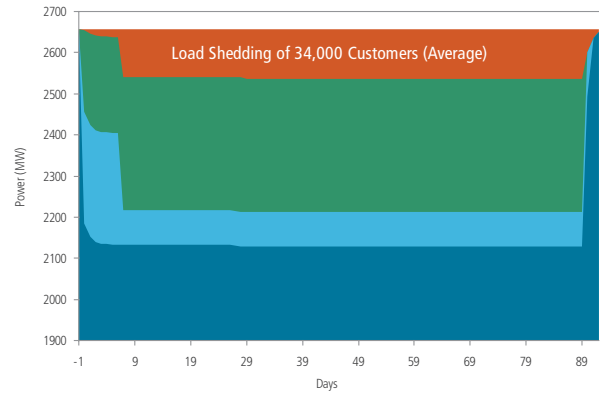
SCENARIO

1

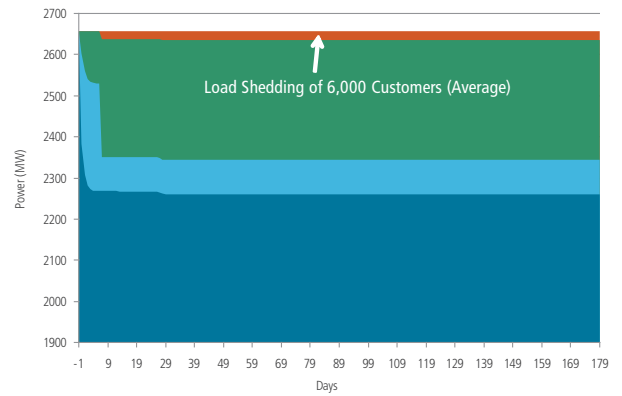
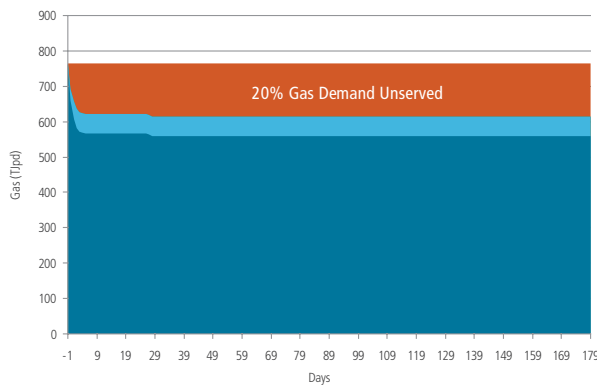
GAS SUPPLY



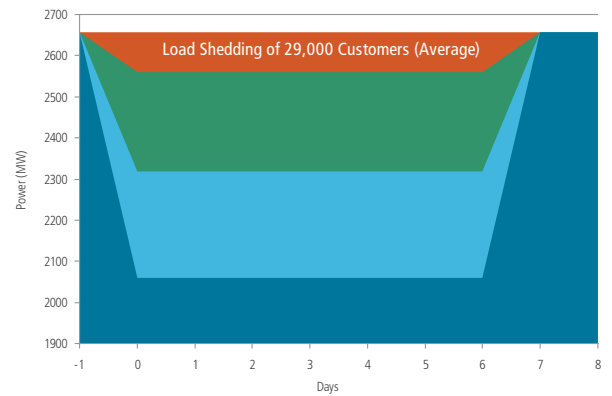
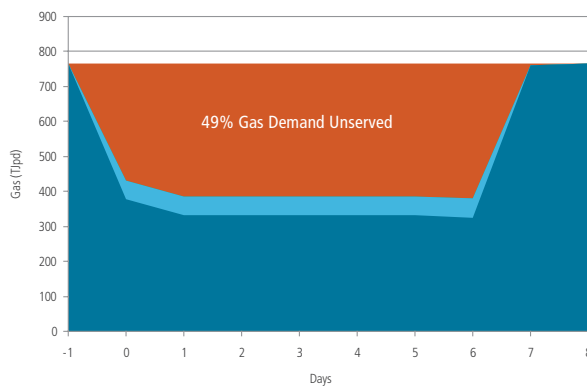
SWIS POWER SUPPLY



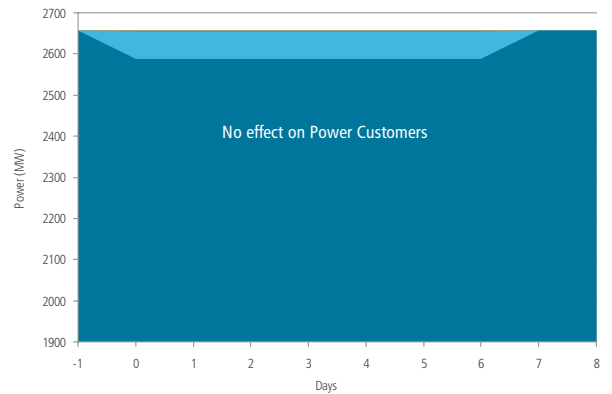
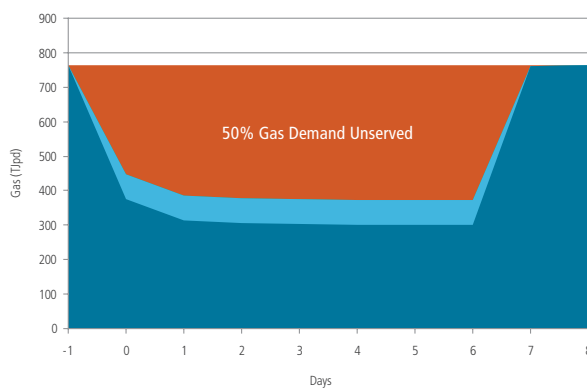
2



3



4

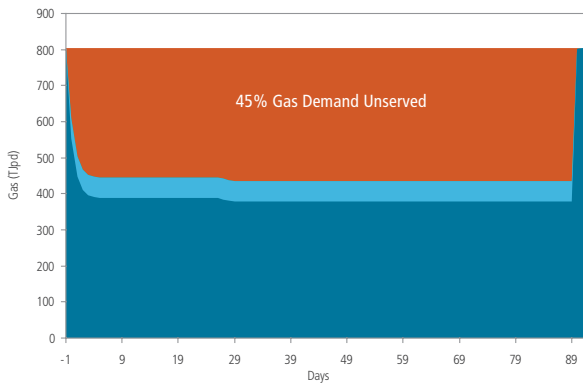


Dual Firing Conversion Mitigation - Winter

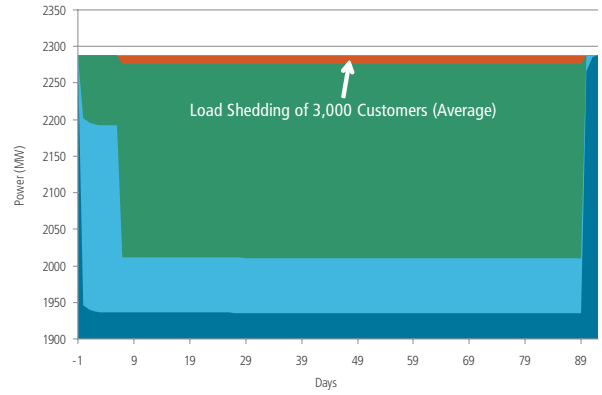
SCENARIO

1

GAS SUPPLY

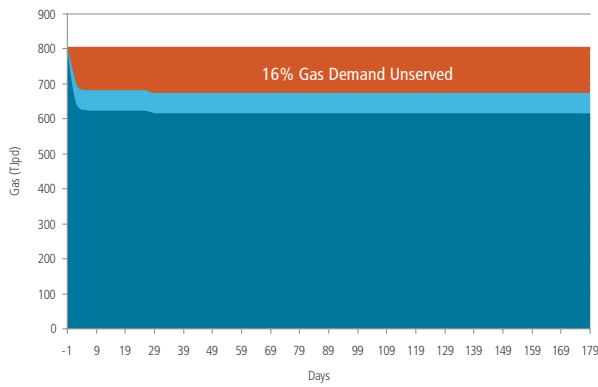


SWIS POWER SUPPLY

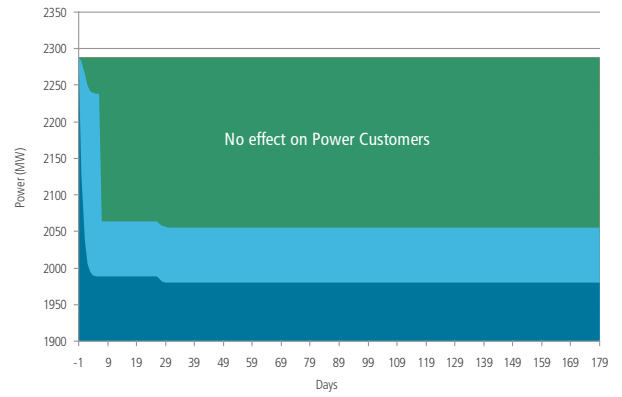


2

16% Gas Demand Unserved

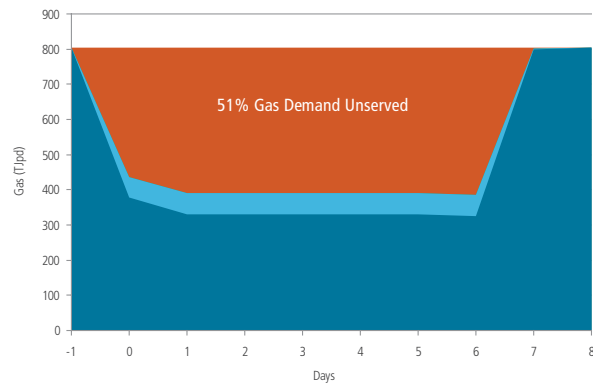


No effect on Power Customers

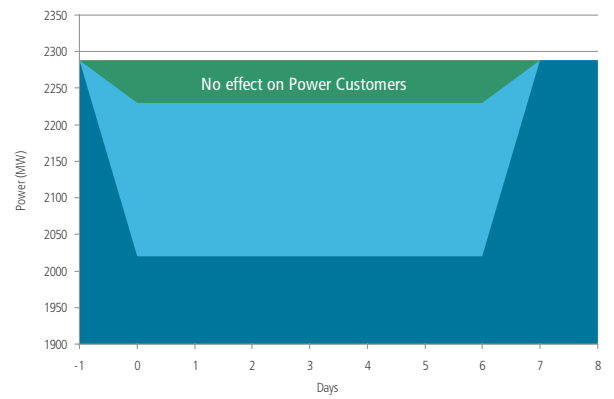


3

51% Gas Demand Unserved

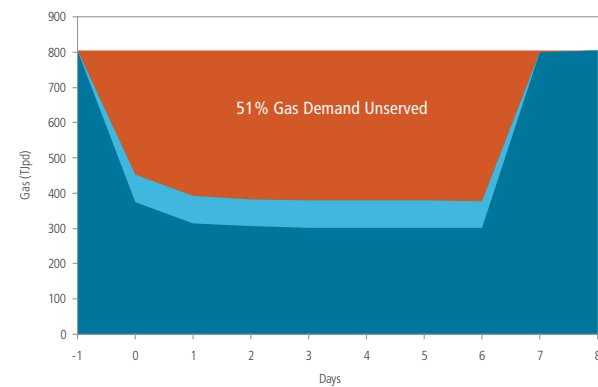


No effect on Power Customers



4

51% Gas Demand Unserved



No effect on Power Customers

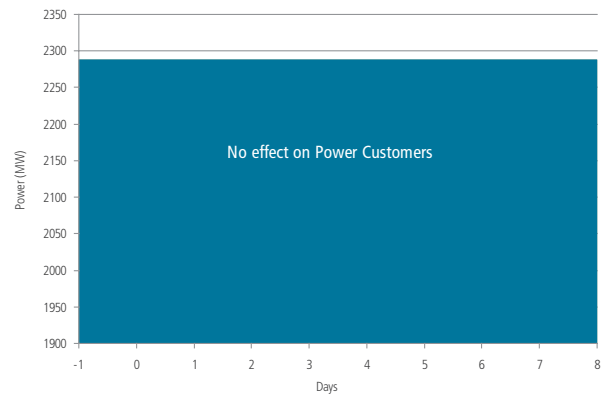


Figure 6: Dual Firing Conversion Mitigation Option Impact on Scenarios: Evans & Peck

As the benefit of this mitigation option flows across the entire electricity market (through reduced load shedding during a disruption), Evans & Peck suggest that this annual cost may be recovered using a mechanism like that of the Ancillary Services market in the Wholesale Electricity Market (WEM). Evans & Peck estimate that such a charge would add around \$0.54 per megawatt hour sold in the WEM. This equates to around \$4–\$5 per year to a typical residential customer's annual electricity bill.

Evans & Peck recommend the development of a gas contingency service for the electricity market to facilitate the implementation of this mitigation option. Further discussion on the electricity market gas contingency service is presented at Chapter 6 of this report.

The Committee recommends that Government endorse implementation of necessary regulatory frameworks to facilitate development of a gas disruption contingency service in the electricity market that provides an incentive for electricity generators to install or retrofit dual-fuel generation capacity and maintain an adequate strategic stock of diesel to meet abnormal fuel requirements associated with a gas supply disruption.

Gas Storage

The storage of gas at a location close to the main load centre for gas usage is another mitigation option that the Evans & Peck modelling and analysis has indicated is cost-effective.

A strategic factor in the selection of suitable gas storage sites is the access that contractors for the storage service have to that gas at the time of a disruption event. If Perth distribution customers contract for a storage service from the Mondarra Gas Storage facility, an essential part of obtaining supply to all areas of the south west gas networks would be the interconnection of the DBNGP and Parmelia pipelines.

The annual charge for development of the 35 terajoules per day mitigation option has been estimated to be \$20.8 million per year and for the 100 terajoules per day option has been estimated to be \$50.8 million per year. These charges reflect the interconnection of the Parmelia and DBNGP pipelines in order to facilitate delivery of stored gas to distribution customers under all scenarios.

Figure 7 highlights the impacts of the identified gas storage mitigation option on each of the modelled scenarios.

This mitigation option's capital cost for Scenarios 1, 3 and 4 is around \$600 per terajoule per day for each terajoule of unserved energy mitigated and is only slightly more expensive for Scenario 2.

Evans & Peck suggest that it is possible for the benefit of this mitigation option to be focussed on particular customer classes (unlike the proposed option for the electricity market). This option can be directed towards those residential, commercial and small industrial customers who would otherwise find it impossible to implement their own gas disruption mitigation strategy and serves the additional benefit of maintaining pressure and supply to the south west gas distribution networks.

Evans & Peck expects that this service could be funded on the basis of an increased consumption charge resulting in an estimated increase of around \$1.40 per gigajoule to gas prices or around \$25 per year to the average residential customer.

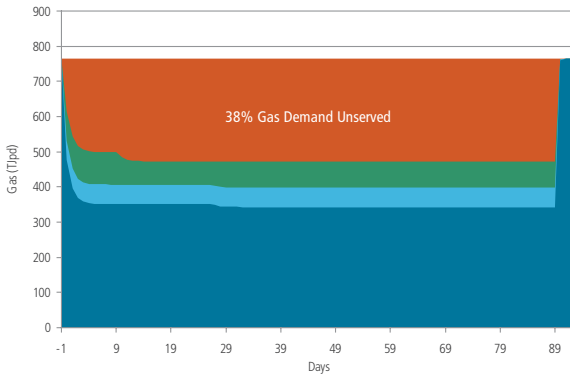
Evans & Peck recommend the development of a gas contingency service for the gas market to facilitate the implementation of this mitigation option. Further discussion on the gas market gas contingency service is presented at Chapter 6 of this report.

Gas Storage Mitigation - Summer

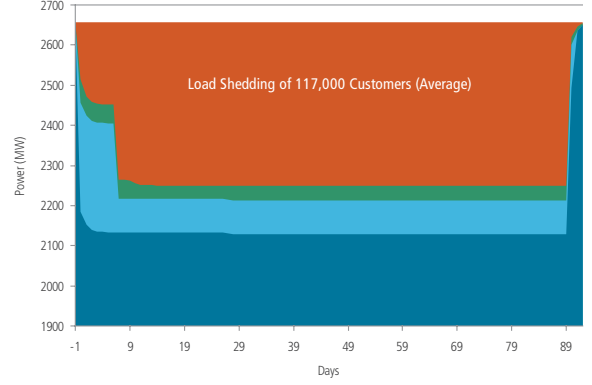
SCENARIO

1

GAS SUPPLY

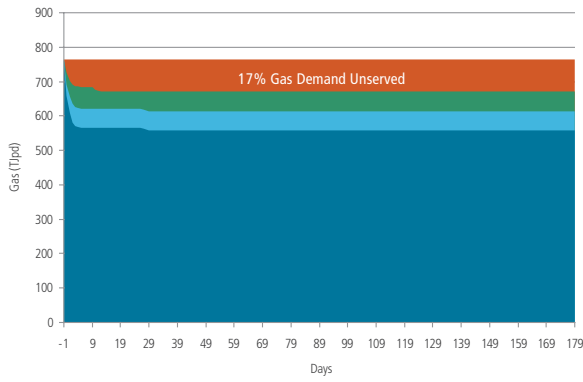


SWIS POWER SUPPLY

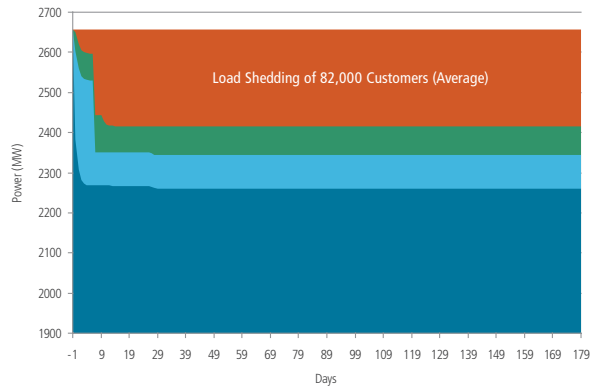


2

17% Gas Demand Unserved

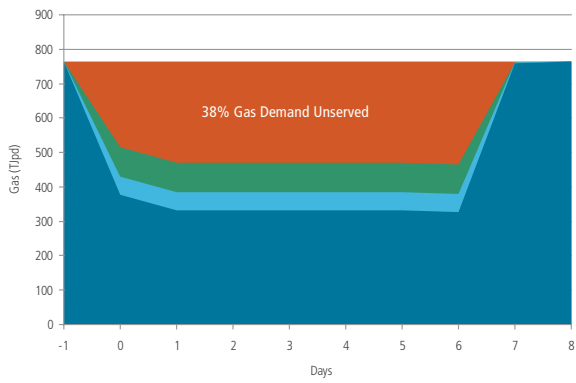


Load Shedding of 82,000 Customers (Average)

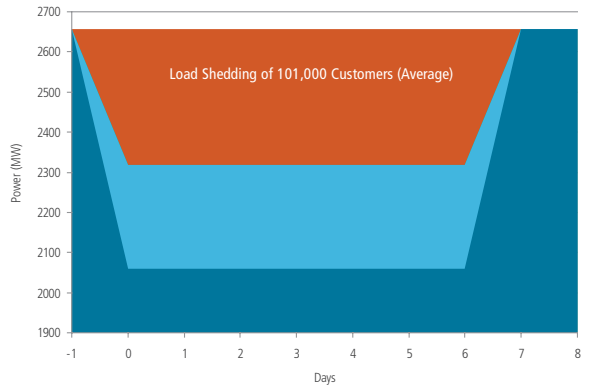


3

38% Gas Demand Unserved

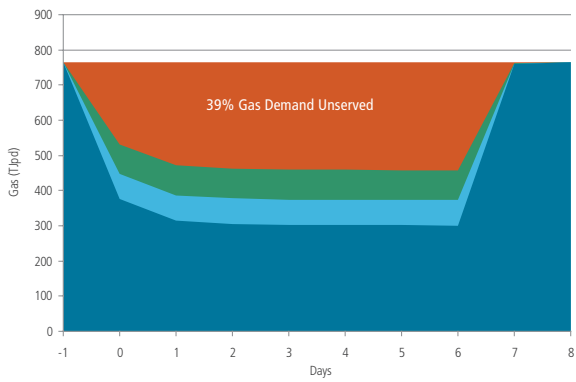


Load Shedding of 101,000 Customers (Average)

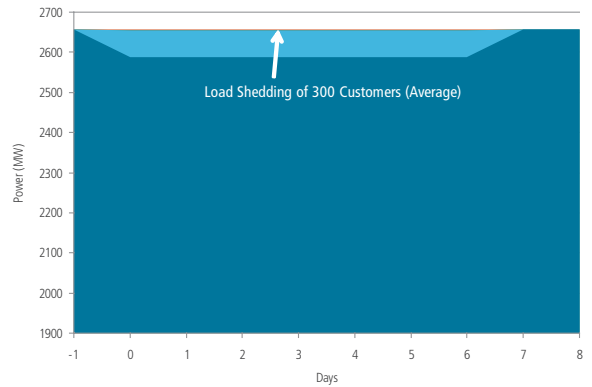


4

39% Gas Demand Unserved



Load Shedding of 300 Customers (Average)

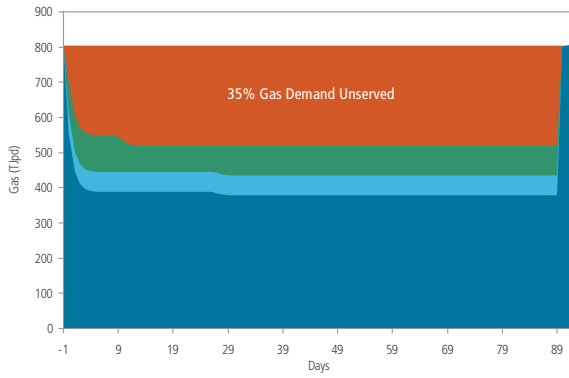


Gas Storage Mitigation - Winter

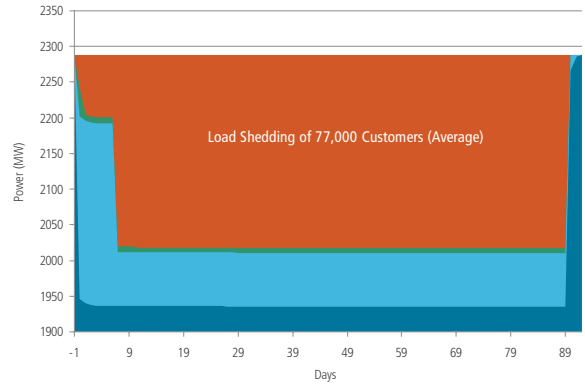
SCENARIO

1

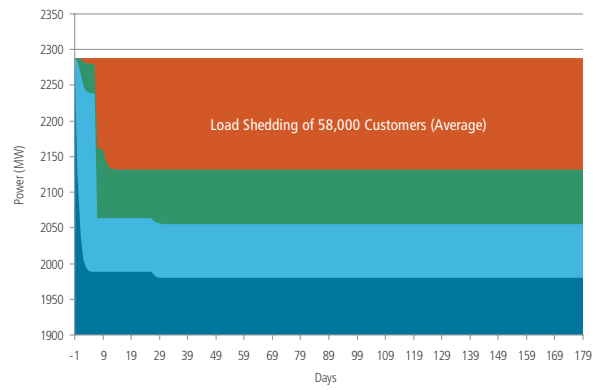
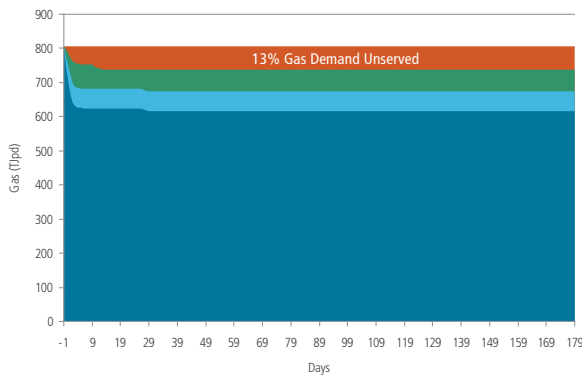
GAS SUPPLY



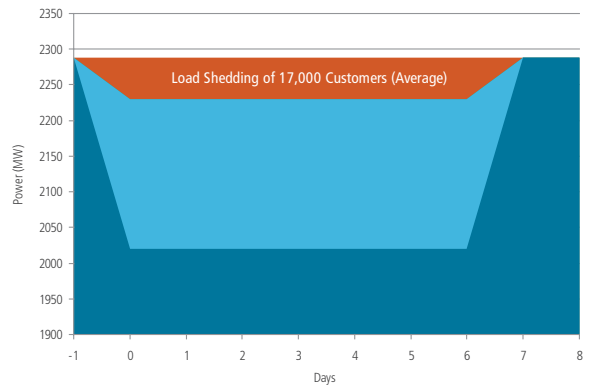
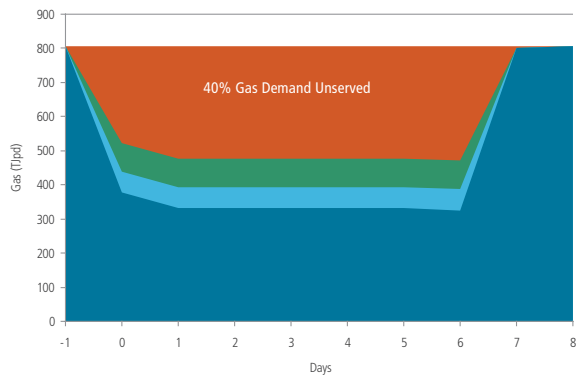
SWIS POWER SUPPLY



2



3



4

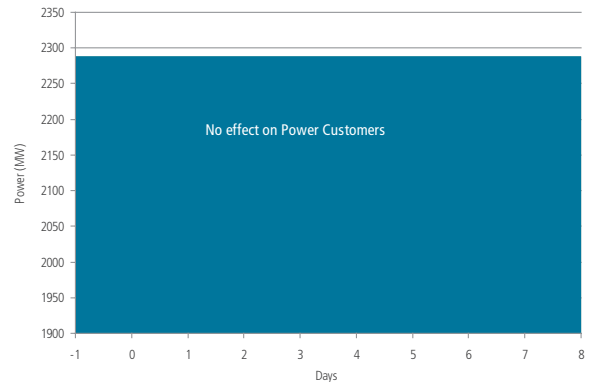
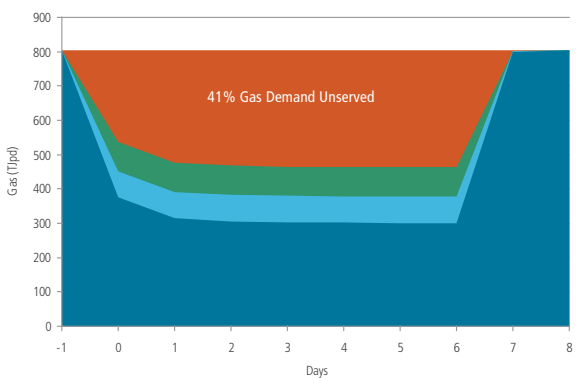


Figure 7: Gas Storage Mitigation Option Impact on Scenarios: Evans & Peck

The Committee recommends that Government endorse implementation of necessary regulatory frameworks to facilitate development of a gas disruption contingency service in the gas market that requires gas retailers to have adequate back-up supply arrangements to ensure continuity of supply for small use customers on standard contracts, with standard tariffs, (such as residential and small business customers) and offer such back-up supply arrangements as an opt-in service for other gas distribution system customers.

LIQUEFIED NATURAL GAS (LNG)

The development of an LNG terminal with storage facilities is another mitigation option that the Evans & Peck modelling and analysis has indicated is cost effective due to its economies of scale.

This mitigation option's capital cost for each scenario ranges from \$350–\$800 per terajoule per day for each terajoule of unserved energy mitigated. The annual charge for development of a 500 terajoules per day mitigation option has been estimated to be \$161 million per year. As seen below in Figure 8, this option mitigates against all identified scenarios.



Figure 8: Evans & Peck LNG Mitigation Option Impact on Scenario 1

Like gas storage, it is also possible for the benefit of this mitigation option to be directed to particular customer classes. However this requires a significant number of high gas demand customers (totalling around 500 terajoules per day) to underwrite such a facility.

Evans & Peck has estimated that this mitigation service could be funded by an estimated increase of around \$0.88 per gigajoule to gas prices. Whilst this only adds around \$20 per year to an average residential electricity bill and \$16 per year to an average residential gas bill, this would add significant costs to gas supplied to large industrial customers.

The Committee considered that this option is not cost effective unless supported by a large industrial customer with significant demand to enable turnover of the LNG inventory. However, variations on the theme of LNG import have been presented to the Committee and could be further considered by gas market participants.

GAS SUPPLY DISRUPTION MANAGEMENT

5.1 Emergency Powers

The Committee considered the legislative powers available to Government in an energy emergency and concluded that adequate powers are available to it to intervene to protect the health and safety of the community.

Government, through the Minister for Energy, has emergency powers to limit the consumption of energy and to redirect energy supplies. These powers reside under the *Energy Coordination Act 1994*, the *Energy Operators (Powers) Act 1979* and the *Fuel, Energy and Power Resources Act 1972*.

The primary objective of a gas emergency order is to help avoid depressurisation of the gas distribution system by restricting gas consumption when gas supply has been interrupted. However, a gas emergency order may only be used when there is endangerment of life and property, or disruption of supply to a substantial portion of gas users.

Gas and electricity operators also have legislated powers to take immediate steps to mitigate an emergency without any order.

Due to the integrated energy needs of the State's economy, the powers vested in the *Fuel, Energy and Power Resources Act 1972* may also be implemented to re-allocate gas towards electricity generation.

5.2 Priority Allocation Guidelines

The Committee reviewed and further refined the Priority Allocation Guidelines used during the Varanus Island disruption response to allocate a limited supply of energy to priority uses to protect the health, safety and property of the community and minimise community disruption.

The revised guidelines provide greater clarity to energy retailers by identifying and prioritising customer classes within each priority category. Energy retailers in the Committee are also investigating other strategies in proactively identifying sensitive customer classes.

The revised Priority Allocation Guidelines are presented in Figure 9.



Figure 9: Prioritisation Allocation Guidelines

The aim of the guidelines in priority order is to:

- › protect the health, safety and property of the community;
- › minimise broad community disruption; and
- › minimise economic impact.

The following are considered to be Government priorities in Western Australia during a gas supply disruption:

1. Energy infrastructure:

- › production, supply and distribution of energy resources and liquid fuel supplies to support:
 - the natural gas and LPG transmission and distribution networks;
 - the South West Interconnected System (SWIS);
 - the North West Interconnected System (NWIS); and
- › production, supply and distribution of liquid fuel supplies.

2. Essential Services:

- › production, supply and distribution of water supplies;
- › health services including hospitals, ambulance services, aged care facilities, quarantine facilities and primary care services;
- › waste and wastewater management;
- › energy and water services to populations at risk (e.g., in group homes, priority home care services, people who are carer-dependent);

3. Essential Supply to Residential Customers.

4. Industries providing essential goods and services to the community:

- › production, supply and distribution of basic food supplies;
- › child protection, children in care and community well-being;
- › maintenance of emergency service provision;
- › maintenance of law and order (including police services), the judicial system and the correctional system;
- › intensive and 'just in time' production animal industries and processing where gas disruption would result in significant harm to animal welfare and the environment, including milk processing, pork and chicken meat production and animal waste rendering;
- › maintenance of mortuary services (identification, certification, religious practices, storage, burials and cremations);
- › maintenance of communication networks;
- › maintenance of banking and financial services;
- › continuity of Government.

5. All other industries:

- › supporting business continuity and minimising economic impacts; and
- › recovery of Government, business and community services from a gas supply disruption.

Except where statutory powers have been invoked, the priority allocation schedule will not override contractual arrangements.

The priority allocation schedule may not apply where customers have other technically viable alternatives to manage the consequences of a reduction in gas supply.

It is important to note that physical limitations to the operations of the gas and electricity supply system may impact on the application of the schedule.

5.3 State Emergency Management Framework

The Committee considered the governance arrangements for the management of gas supply disruption events under the State Emergency Management Framework, a best practice benchmark established under the *Emergency Management Act 2005* (the Act).

The Act sets up arrangements to provide for the management and organisation of the prevention, preparedness, response and recovery phases of emergencies.

Specific hazards that threaten the health and safety of persons or which endanger property and environment are prescribed in the *Emergency Management Regulations 2006*. The Regulations also prescribe the Hazard Management Agencies (HMAs) responsible for developing, maintaining and implementing the State Emergency Management Plans or 'Westplans' for the respective hazards. These agencies have the legislative responsibility, specialised knowledge, expertise and resources to undertake the lead role in coordinating the response to the hazards.

HMAs are required to comply with several statutory obligations under the State Emergency Management Framework. These include the ongoing development and maintenance of the strategic and operational emergency response plans, annual simulation testing and reporting to the State Emergency Management Committee and biannual reviews and updating of the plans. These obligations require dedicated resources.

Other benefits of coming under the State Emergency Management Framework include access to:

- › the State Emergency Coordinator and State Emergency Coordination Group where multi-agency co-ordination is required for the response and recovery from an emergency;
- › "Westplan – Recovery Coordination" where State-level support is required to support affected communities, a role undertaken by the Department of the Premier and Cabinet; and
- › "Westplan – Public Information" which provides state wide arrangements for the provision of the emergency public information during state-level emergencies, a role undertaken by the State Emergency Management Public Information Coordinator.

Energy supply disruption (gas, liquid fuels and electricity) is not prescribed as a hazard, and the Office of Energy is not identified as the responsible Hazard Management Agency under the *Emergency Management Regulations 2006*.

The Committee recommends that Government prescribe significant "Energy Supply Disruption" (gas, liquid fuels and electricity) as a hazard within the State's *Emergency Management Regulations 2006*, with the Office of Energy as the designated hazard management agency.

A severe gas supply disruption could have significant flow-on effects on electricity and liquid fuel supplies. The Office of Energy needs to be resourced to coordinate an integrated response to an energy disruption. To enable effective coordination, regular response planning, testing and review is required.

The Committee recommends that Government consider appropriate resourcing of the Office of Energy for strategic energy security policy development, advice and implementation, and energy emergency management planning and response roles.

5.4 Gas Supply Disruption Plans

The Committee reviewed and provided input into the proposed “Westplan – Gas Supply Disruption” (strategic plan) and the “Gas Supply Disruption Response Plan” (operational plan) prepared by the Office of Energy.

The proposed “Westplan – Gas Supply Disruption” is modelled on the best practice State Emergency Management Framework, but requires amendments to the framework’s statutory foundation (regulatory or otherwise) to officially come under this.

Key lessons learnt during the 2008 gas supply disruption events were to have a consistent approach in the assessment of these events, and to improve communication among stakeholders to enable the effective management of these events.

The Committee, through a working group, developed a consistent colour-coded alert warning system (Figure 10) for inclusion in the strategic and operational plans, which provides a common understanding among stakeholders on the severity of an event, and establishes effective communication protocols amongst operators and key stakeholders in the management of gas supply disruption events.

Figure 10: Alert Warning System			
LEVELS	ALERT STATUS	TRIGGERS	COMMUNICATION PROTOCOLS
LEVEL 1	GREEN ALERT: NORMAL OPERATING STATE	Can be dealt with by gas producers’ and/or transporters’ site resources. No or minimal impacts on large contract customers.	Gas producers and transporters communicate to resolve short demand and supply imbalances.
LEVEL 2	AMBER ALERT: LIMITED DEMAND CURTAILMENT	Significant restrictions in production or transportation. Limited demand curtailment expected to extend between 1-2 gas days ⁴ .	The affected gas producer is to notify the pipeline operator and Coordinator of Energy, Office of Energy. If there is a pipeline rupture, the pipeline operator notifies gas producers, the Coordinator of Energy and Minister for Energy. The Coordinator of Energy convenes a teleconference with gas producers and pipeline operators.
LEVEL 3	RED ALERT: WIDESPREAD DEMAND CURTAILMENT; THREAT TO ENERGY INFRASTRUCTURE AND THE PROVISION OF ESSENTIAL SERVICES	Widespread demand curtailment expected to extend beyond 2 gas days. There is a broad threat to the provision of essential services and to the operations of businesses that provide essential services to the community. The safe minimum supply to the gas distribution system is under threat.	Gas producer to notify pipeline operator and Coordinator of Energy, Office of Energy. If there is a pipeline rupture, the pipeline operator notifies gas producers and the Coordinator of Energy and Minister for Energy. The Operations Management Group is convened to coordinate the response to the incident.

⁴ A gas day is a 24 hour period commencing at 8am each day.

The Committee agreed on the establishment and core membership of the Gas Emergency Planning Committee and the Operations Management Group which will both be chaired by the Coordinator of Energy as part of the strategic and operations plan.

The Gas Emergency Planning Committee will establish a program to test the gas supply disruption management plans, participate in simulation exercises, and contribute to response planning and regular reviews of the plans.

The Operations Management Group will be the principal group responsible for coordinating the response to gas supply disruption events.

The core membership of each of these groups include the Office of Energy, Western Power – System Management, DBP Transmission, APA Group, Apache Energy, Woodside Energy Ltd, Verve Energy, Synergy, Horizon Power, Alinta Sales Ltd, WA Gas Networks Pty Ltd, Alcoa, Chamber of Commerce and Industry WA and the Chamber of Minerals and Energy.

Depending on the nature of the incident, the Chair may invite other relevant organisations to be part of the planning or operational response teams.

An incident management framework (Figure 11) was developed as part of the Gas Supply Disruption Response Plan to describe the relationships between the organisations responsible for the operational response in these events.

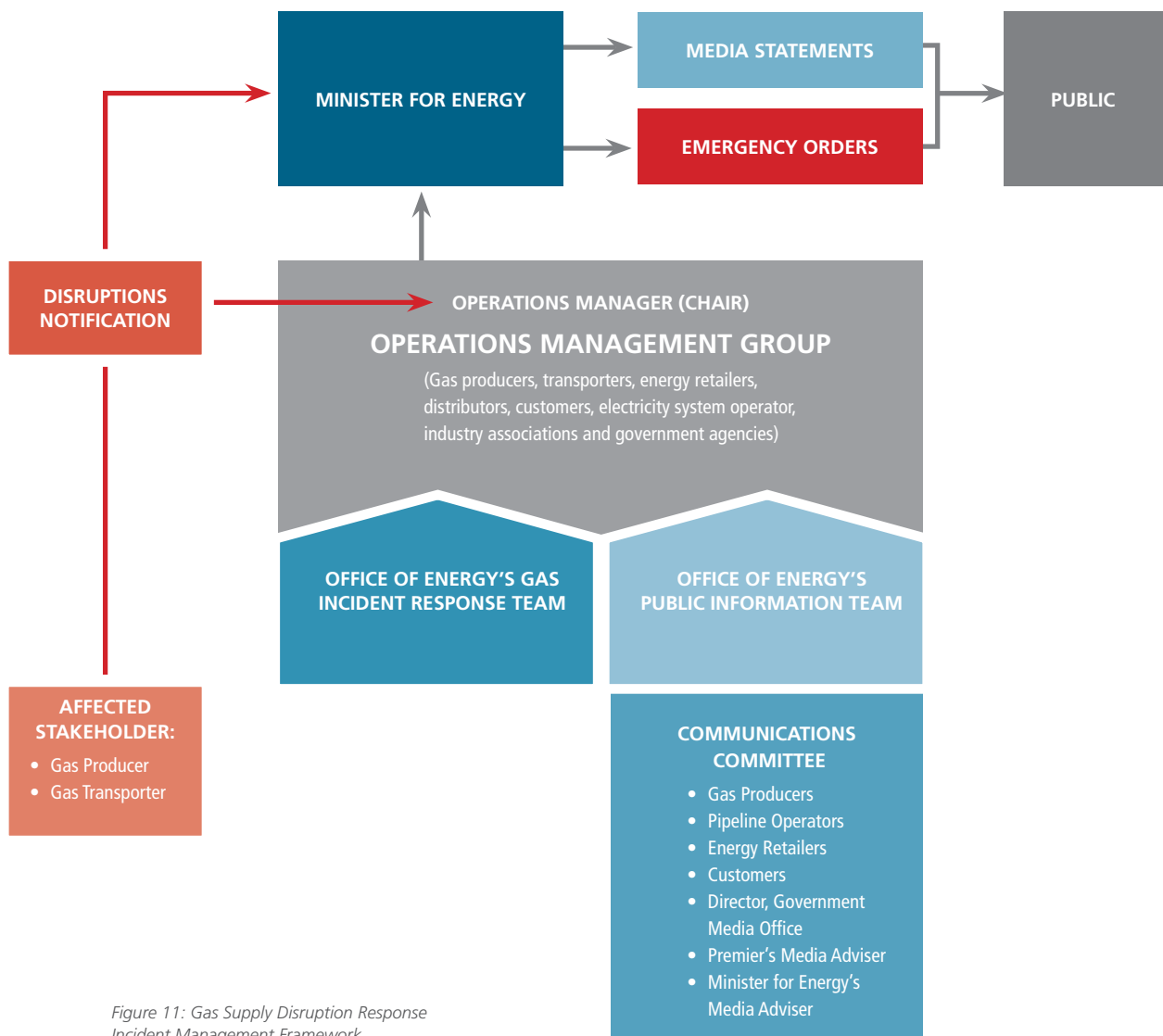


Figure 11: Gas Supply Disruption Response Incident Management Framework



IMAGE: WOODSIDE ENERGY

Emergency training exercise at Karratha Gas plant.

How the framework operates:

- › During a gas supply disruption incident, the affected gas supply producer or transporter notifies the Coordinator of Energy (who is also the Operations Manager).
- › For severe (red alert) gas supply disruption incidents, the Coordinator of Energy, in consultation with relevant stakeholders convenes the Operations Management Group (OMG) to develop and implement an Action Plan to respond to the incident.
- › The Office of Energy's Gas Incident Response Team and Public Information Team are activated.
 - The Gas Incident Response Team supports the OMG with incident monitoring, information gathering and analysis, organises OMG meetings and prepares briefing materials for the OMG, the Minister for Energy and the Premier.
 - The Public Information Team works with the Communications Committee (comprising of Communications representatives of the OMG, and additionally including the Director, Government Media Office, Minister for Energy's Media Adviser and Premier's Media Adviser) to develop an integrated media and public information campaign.
- › The Operations Manager makes recommendations to the Minister for Energy/Premier on the proposed Action Plan and Public Information Plan and makes recommendations on the need for electricity and gas rationing (if required).
- › The Minister for Energy endorses the recommended Action Plan, Public Information Plan and electricity and/or gas rationing proposals (if required) which are then implemented.
- › The Department of the Premier and Cabinet's Recovery Services Committee coordinates State-level recovery arrangements.

The Committee recommends that Government implement the proposed "Westplan – Gas Supply Disruption" and the "Gas Supply Disruption Response Plan", which provide strategic and operational direction for the management of gas supply disruption incidents in Western Australia.

MARKET ARRANGEMENTS

6.1 Efficient Market Arrangements – Consumer Price Signals

Principles

Consumers have an expectation of reasonable levels of security in their gas and electricity supply systems which are built into normal market operating conditions.

In the rare event of a major disruption to gas supply, significant additional and unplanned costs are likely to be incurred to mitigate the severity of impacts on consumers.

In these circumstances, consumers should have adequate information to influence their own demand levels, and therefore the costs, that could be incurred on their behalf. Market price signals are the most efficient and preferred mechanism to achieve this outcome.

Electricity Market Distortions during the Varanus Incident

As identified throughout this report, the electricity system in the State is highly dependent on gas for power generation. Any major disruption to gas supply therefore flows through quickly to the electricity system, resulting in the substitution of gas with large quantities of expensive diesel fuel.

During the Varanus Island incident large quantities of diesel were consumed by those electricity generating plants that were able to switch fuels. However not all generators were able to pass these costs on to retailers creating a situation where many consumers were not aware of the true costs of consuming electricity.

As a result Verve Energy reported that it had incurred additional costs of around \$83 million which have not been passed on to consumers. The Independent Market Operator is considering a number of further measures as part of its Market Rules Evolution Plan which will assist in improving efficiency in the Wholesale Electricity Market and allowing for these costs to flow through to the retail market.

Gas Disruption Contingency Services

Evans & Peck recommend that the mitigation options identified in their report should be implemented through the development of gas contingency services in the State's energy markets. The gas and electricity retail markets in the State consist of four segments:

- › small use gas customers;
- › small use electricity customers;
- › contestable contract gas customers; and
- › contestable contract electricity customers.

Consumer price signalling in each market segment and implementation of gas disruption contingency services could be achieved as follows:

Gas Market – Gas Contingency Service – Gas retail market operators will be required to procure these services for small use customers on standard contracts, with standard tariffs, (such as residential and small business customers) and offer an opt-in service for contract customers. Costs incurred by Retailers will be reflected in prices in both market segments through normal price setting mechanisms over time with likely changes to force majeure clauses in contestable customer contracts to enable disruption event price resetting to occur in this segment.

Electricity Market – Gas Contingency Service – The Independent Market Operator may procure the capability to deliver this service through a new ancillary service charge in the Wholesale Electricity Market Rules. This will result in a small incremental unit cost at the wholesale level, which will flow into retail prices in both market segments.

In the rare event of a major gas disruption where the electricity market gas contingency service is called upon to operate, the additional costs incurred by electricity generators, pursuant to informed consumer demand choices, will be passed through to electricity retailers or directly to contracted loads.

In the tariff segment – Amendment to Schedule 4 of the Tariff By-laws made pursuant to the *Energy Operators (Powers) Act 1972* to include provision for a special surcharge to be applied at the discretion of the Minister or the relevant tariff setting authority.

This is consistent with the July 2009 decision by Government to increase Gas Tariff Caps to allow the retailer to recoup unplanned additional costs associated with supplying gas to small use customers on regulated retail tariffs during the 2008 Varanus Island disruption.

In the contestable segment – Additional costs will be passed to consumers through supply contracts. These will be amended by negotiation between retailers and their customers, where necessary, to allow these costs to be passed through where customers choose to incur them.

Contestable customers should be aware of risks to their supply by developing an understanding of force majeure clauses in their contracts. Where such clauses present forward supply challenges, customers should consider their operational requirements along with any need to mitigate against potential supply disruptions.

The Committee recommends that Government note that the effective implementation of contingency service regulatory frameworks should provide for efficient pass-through of implementation and usage costs to those consumers (tariff or contract) that benefit from the improved reliability of supply, and allow for other cost effective mitigation options to be developed beyond those described above.

6.2 Gas Market Development Initiatives

Business and industry arguably experienced significant loss as a consequence of the Varanus Island gas supply disruption.

⁵ The Senate Standing Committee on Economics (Commonwealth), *Matters relating to the gas explosion at Varanus Island, Western Australia*, December 2008.

The Commonwealth's Senate Standing Committee on Economics has indicated that energy supplies in Western Australia are prone to serious dislocation due to the lack of a mature, diverse and competitive market⁵. The Senate Committee recommended that the Western Australian Government establish a permanent gas Bulletin Board and outlined a need for improved transparency and accountability from the gas and energy industry during periods of supply disruption.

As outlined earlier, the temporary gas Bulletin Board operated by the Independent Market Operator facilitated the trading of gas and provided improved information to the market. Benefits were appreciable for smaller consumers, who may lack the information and knowledge of larger and more experienced participants, noting that 22 per cent of trades occurred in lot sizes between 0.1 and 0.5 terajoules.

In recognition of a need for improved transparency and competition in the gas market, particularly during times of gas supply disruptions, a Gas Market Development Working Group (the Working Group) was established by the Committee to consider the implementation of a:

- › Permanent Gas Bulletin Board;
- › Gas Statement of Opportunities (GSOO); and
- › Facilitated Trading Market.

The Working Group's Report to the Committee is available on the Committee's web page at <http://www.energy.wa.gov.au>.

The Working Group considered the merits of the above arrangements, taking into account objectives of security, reliability and competitiveness of supply, and the structure of the Western Australian gas market.

Gas Bulletin Board

The Bulletin Board will aim to improve information transparency and symmetry across the gas supply chain, including for existing and potential market participants. The Bulletin Board would also be expected to assist Government and industry in relation to notification and management of gas supply disruptions.

The Bulletin Board will be based on mandatory information requirements, taking into account consistency with eastern states arrangements and the unique circumstances of the WA domestic gas market.

The Committee considers that the following may encapsulate the minimum informational requirements for the Bulletin Board, to be published three days ahead of the actual gas day:

- › near term supply/demand balance to ensure economic use of gas supply infrastructure;
- › near term system capacity (production, storage and transmission);
- › near term delivery capacity at demand hubs;
- › the impact of maintenance periods for gas production, storage and pipeline facilities on capacity;
- › near term alternative fuel demand capacity (capacity for fuel substitution);
- › near term alternative fuel supply capacity;
- › near term spare/available gas;

- › near term spare/available pipeline delivery capacity;
- › spare/available delivery capacity at demand hubs⁶;
- › near term spare/available gas available for purchase;
- › near term spare/available pipeline delivery capacity available for purchase;
- › willingness to buy near term spare/available gas available; and
- › willingness to buy near term spare/available pipeline delivery capacity.

⁶ Provided that aggregate capacity is only provided at the Perth Metro hub, and that participants at the gate stations and Perth Metro hub are able to resolve confidentiality constraints.

Information requirements will be further developed in the course of implementing detailed design of the Bulletin Board, in close consultation with stakeholders. This process will take into account the ability of the Bulletin Board to provide a single platform for coordination and provision of information for Government and stakeholders regarding short term and longer term gas supply disruptions.

In addition, whilst information is intended to be published on an aggregated basis, consideration will need to be given to upholding industry confidentiality requirements.

It is expected that the Bulletin Board will be deployed via the same platform as that for the bulletin board arrangements administered by the Australian Energy Market Operator in the eastern states. This would provide efficiencies for the gas market taking into account economies of scale and will reduce barriers to entry across jurisdictions, although other options can be considered as part of the detailed design of the Bulletin Board subject to their feasibility.

The Bulletin Board will be operated by a Western Australian specific entity that is independent of Government and industry. Allocation of this role will be assessed as part of the detailed design phase. The Independent Market Operator is a possible candidate recognising its independent status, experience and responsibilities, and the important synergies between natural gas and electricity in the South West Interconnected System.

Recovery of costs associated with administering the Bulletin Board and GSOO (discussed below) will be assessed, in close consultation with industry, as part of the detailed design phase.

It is recommended that a permanent gas Bulletin Board is established to provide web-based up-to-date gas system and market information, with consideration given to leveraging off the existing Australian Energy Market Operator Bulletin Board infrastructure.

The Bulletin Board should be administered by an independent Western Australian specific entity.

Gas Statement of Opportunities (GSOO)

The GSOO will facilitate a competitive market and efficient investment, and inform Government policy development by providing long-term supply and demand forecasts across all stages of the gas market supply and demand chain.

Market participants will provide information to the GSOO market operator based on mandatory requirements. Information requirements will be refined as part of the process for detailed design of the Bulletin Board, with confidentiality issues to be taken into account. However, the Committee has considered the following parameters for the GSOO:

- › supply/demand balance over the long term to ensure sufficient and economic investment in gas supply to meet projected demand;
- › annual demand growth projections over the long-term distinguishing between residential, commercial, industrial and gas-fired powered generation demand;
- › firm supply capacity over the long-term, distinguishing between production, storage and transport supply segments;
- › known (leased) undeveloped supply capacity and when it can be made available over the long-term; and
- › alternative fuel demand capacity over the long-term (capacity for fuel substitution).

Whilst the design of GSOO arrangements to be administered by the Australian Energy Market Operator for the eastern states has been taken into account, the Committee has agreed that the information requirements and methodology for estimating the supply/demand balance take into account the nature of the Western Australian gas market (e.g. is largely project driven) and is developed in close consultation with stakeholders.

The Committee recommends to Government implementation of a Gas Statement of Opportunities (GSOO) that would provide long-term gas supply and demand forecasts to facilitate a competitive market and efficient investment, and inform Government policy development.

The GSOO should be administered by the same independent Western Australian specific entity as the Bulletin Board.

Gas Facilitated Trading Market

The Independent Market Operator has indicated a number of impediments that impacted trades on the temporary gas Bulletin Board. These included:

- › the ability to negotiate commercially acceptable gas transport agreements;
- › the logistics of arranging gas transport on the DBNGP and the Perth metropolitan distribution network;
- › a restriction on the ability of some gas users, under the terms of their gas supply contracts, to on-sell surplus gas to other parties; and
- › competition concerns which prevented a major gas industry participant from aggregating their customer's gas supply requirements and buying from the gas Bulletin Board on their behalf.

Options for facilitating the trade of gas were considered by the Working Group, noting the benefits and constraints experienced in relation to the temporary gas Bulletin Board.

It was also considered that the Short Term Trading Market (STTM) arrangements being implemented for Sydney and Adelaide, to be administered by the Australian Energy Market Operator from mid-2010, are not appropriate for the Western Australian market. Whilst the STTM will serve as a mandatory price-based balancing mechanism for gas delivered to, and withdrawn from the respective market hubs across the interconnected eastern states' jurisdictions, there is limited interconnection in Western Australia and pipeline balancing is often settled by the major transmission pipelines.

However, the Committee has agreed that there is value in having a facilitated trading market for separate gas commodity and transport, recognising that there may be more limited opportunities for smaller and new entrants to trade outside longer term bilateral arrangements.

The facilitated trading market is envisaged to consist of the following basic requirements:

- › Will be based on secondary bilateral trades.
- › Trades for gas commodity to be independent of the point of injection into the transmission pipeline system.
- › Trades for gas transmission that allow parties to buy and sell the ability to transport gas from any injection point to any delivery point along the relevant transmission pipeline system.
- › Facilitated trading market to be compatible with existing long term gas supply and transportation service contracts.

The Committee recommends to Government that:

- + the Gas Bulletin Board include a non-compulsory facilitated trading market that provides for offers to sell and buy on standard transport and commodity contracts; and
- + future consideration be given to a compulsory Short Term Trading Market (STTM) following a review of the operation of the Western Australian Bulletin Board and the gas market experiences in other Australian jurisdictions.

APPENDIX 1

Gas Supply and Emergency Management Committee Final Terms of Reference

Background

In 2008, two significant gas supply disruptions impacted on Western Australia's energy supplies:

- › On 2 January 2008, an electrical fault at the North West Shelf Venture's Karratha Gas Plant resulted in a production shutdown. Production from the plant recommenced on 4 January and normal gas supply arrangements had largely been re-established by 6 January.
- › On 3 June 2008, an explosion at the Varanus Island gas plant shut down operations completely for more than two months. Around two thirds of the lost production was re-established by September 2008.
- › On 3 December 2008 the Senate Standing Committee on Economics released its report *Matters relating to the gas explosion at Varanus Island*, Western Australia. Amongst its recommendations was that the Western Australian Government conduct a review of gas security and that a forum of stakeholders be convened to consider improvements to the management of gas supply disruptions.

The Committee will be tasked to review and provide advice to Government in regard to:

- › gas disruption emergency response;
- › gas supply security, both present and long term;
- › the entire gas supply chain and the risk, duration and effect of potential supply disruptions;
- › alternative approaches to avoid or minimise gas supply disruption or mitigate its effect; and
- › lessons learnt from past gas supply disruptions.

Review of Gas Security and Mitigating Options for Gas Supply Disruptions

The review is to assess and provide advice to Government in regard to:

- › the security of gas supply in Western Australia; and
- › options for increasing the level of gas supply security, including the costs and benefits of alternatives to mitigate the impacts of gas supply disruptions when they occur including how such strategies would best be implemented and funded.

Gas Supply Disruption Management

The Committee is to advise Government on areas for improvement in the management of gas supply disruptions, taking into account lessons learnt from past gas supply disruptions.

The objective is to identify areas of improvement in regard to governance, systems and processes to manage plausible future gas supply shortage events.

The Committee is to examine options and provide advice to Government in regard to a strategy or strategies to mitigate the impact of gas supply disruptions when they occur, including:

- › options for maximising gas supply and for improving the operation of the gas supply chain during times of supply shortages;
- › the availability, access to and use of alternative energy supplies;
- › a framework for determining the priority for allocation of limited energy resources during a period of gas supply disruption including roles, responsibilities and processes necessary for implementation;
- › the management of emergency response, consequential impacts and recovery from gas supply disruptions;
- › arrangements to optimise the overall management of gas supply disruptions, including but not limited to an incident management plan and incident communication plan;
- › the applicability of the Emergency Management Act 2005 to the management of gas supply disruptions;

- › the role of market mechanisms and price in response to gas disruptions;
- › Government intervention generally and in particular the use of emergency powers;
- › the coordination of responses and optimal administrative arrangements under emergency related legislation;
- › the feasibility and cost associated with reserve or increased capacity or alternative energy supplies and the management of disruptions; and
- › the flow through effect of gas supply disruptions on electricity supply.

General Advice on the Senate Standing Committee's Recommendations

The review is to provide advice to Government on the Senate Standing Committee's recommendations as they are relevant to the State Government.

Consultation

It is expected that the review will take note of the work of the Senate Standing Committee on Economics and will consult with the energy industry, small and large energy consumers, community and Government as appropriate.

Reporting

The Committee is to provide a final report to Government in September 2009.

MEMBERSHIP OF GAS SUPPLY AND EMERGENCY MANAGEMENT COMMITTEE

