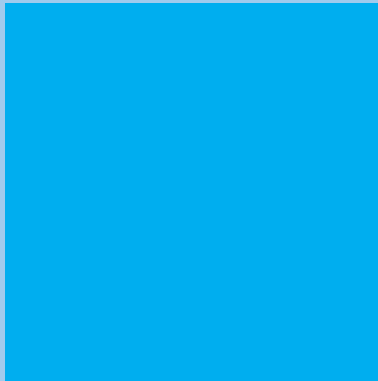
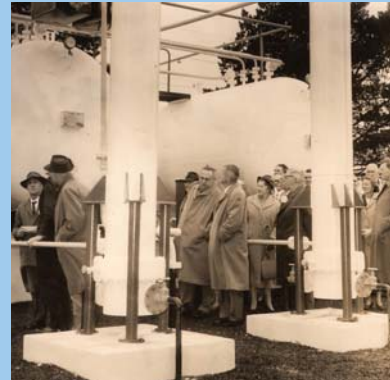
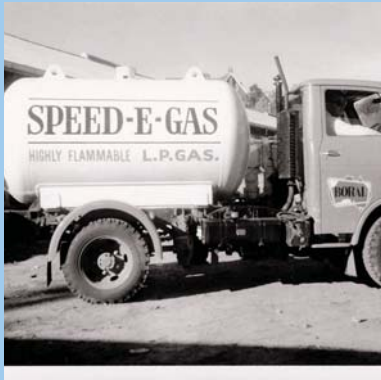


THEN TO NOW



50



50 Years
of LPG
Australia



HISTORY OF LPG AUSTRALIA

By John Synnott and Jason Frenkel

INTRODUCTION

The liquefied petroleum gas (LPG) industry took off in Australia's great post-war wave of infrastructure investment in the 1950s. The players knew where LPG was going and wanted to get there by their own rules before government became involved. Thus, they were quick to set up the Australian Liquefied Petroleum Gas Association (ALPGA) to sort out technical and safety standards for the new industry. It was all hands to the pumps as key players gave freely of their time to set the ground rules for an industry starting from scratch. That same cooperation was evident in the preparation of this history; recollections and illustrations were there for the asking. In particular, thanks are due to veteran members who gave time and frank opinions on the business. History is dynamic and views on the same events and issues can vary. This collection of impressions may be a starting point for further editions as other players add their observations on events and issues that have affected the Association over the last half a century. LPG is a great Australian success story, a billion dollar industry built up by pioneers, entrepreneurs and companies working together and in competition.

Acknowledgement is made of information from:

- Light Fractions, 50 Years of LPG in Australia by Rosemary Broomham (Gogas, 1987)
- A history of Elgas by RE Ringer (Elgas, 2004)
- A history of American LPG from the National LP Gas Council as part of its 50th anniversary in 1962
- The Tyranny of Distance, How Distance Shaped Australia's History by Geoffrey Blainey (Macmillan, 1975)
- From the ground up — Boral's First 50 Years by Stephanie King (State Library of NSW Press, 1996)
- History of GAMAA 1957–2007 by Jennifer Frost (Gas Appliance Manufacturers Association of Australia, 2007)
- ALPGA records and publications.



ORIGINS

The ALPGA hit the ground running in 1958. The oil refinery era had arrived and the Australian industry was turning out a good supply of the new-fangled gas that was easily liquefied and packed such an energy punch.

LPG was starting from scratch but the successful American industry had shown the way it could replace wood, coal and oil fuel. The market was wide open and it quickly became a growth industry.

Oil and gas companies, and the Westralian Farmers' Co-operative Ltd (the farmers' co-op), were suddenly scrambling to tie up distribution and sign on new customers before any competitors arrived on the scene. It was clear that they needed an association to lay the ground rules for handling this new, cleaner and portable but flammable gas.

The gas-rush was a symptom of an Australia on the move after the restrictions of World War II. Like the fledgling car industry, a lead came from the USA where LPG had developed as a 'wonder industry' and was nearly 50 years old.

The American LPG industry claims it all began in 1910 when a motorist reported that his car's gasoline was evaporating and wanted the disappearing fumes checked out. A government chemist separated butane and propane, later using the combination to power a farm in Pennsylvania on the 17th May, 1912. The LPG industry marks this as its birthday.

Australia's LPG start came a quarter of a century later. When Ampol's first boss-to-be, Bill Dunlop, showed a Sydney motor mechanic, Ernie Steventon, the flame from a LPG cylinder in 1936, saying: You ought to get out of the motor garage business and distribute this. It's the up and coming fuel of the future. Steventon took up the challenge and became our indus-

try's go-it-alone pioneer. He was starting from scratch, first selling gas he imported from America to caravan owners, then securing a local supply and even making his own equipment and appliances.



Western Australia made its own start through the farmers' co-op which began marketing oil products to break a kerosene monopoly. In 1925, an American oil company invited Walter Ashton, a young ex-farmer working for the farmers' co-op, to come

to the US to plan the introduction of petrol retailing in Australia. He received a crash course in the US oil industry, which was rapidly developing LPG as a sideline.

This opportunity stimulated an interest that would see Ashton qualify as the inaugural chairman of the ALPGA some 30 years later.



The Association was founded at a joint meeting of 36 distributors of LPG, and equipment and appliance manufacturers held in Sydney on Monday 10th February 1958.

PRE-REFINERY TIMES

Ashton and AGL general manager, Bill Pettingell, are largely regarded as the corporate visionaries who fathered the modern-day LPG industry. This up-and-coming fuel of the future, generically referred to as LPG, was a mixture of propane and butane gases, by-products from refining crude oil into hundreds of hydrocarbon components.



Ernie Steventon
The pioneer of the LPG industry in Australia

Ernie Steventon, who worked his passage to Australia as a teenager from Liverpool, was a jack-of-all-trades who built the first radio in Perth before moving East. “He was a forward thinking guy with plenty of energy to get things done,” his son Rodney remembers.

He set up the Blue Ray Light Gas Company in 1937 in George Street, Sydney and began his new venture modestly, importing 30 nine-kilogram (20-lb) cylinders of propane LPG from the US, according to the history of LPG in Australia by Rosemary Broomham (Gogas). The cylinders were carried on cruise liners such as the Mariposa.



One of Ernie Steventon's Blue Ray LPG Tankers.

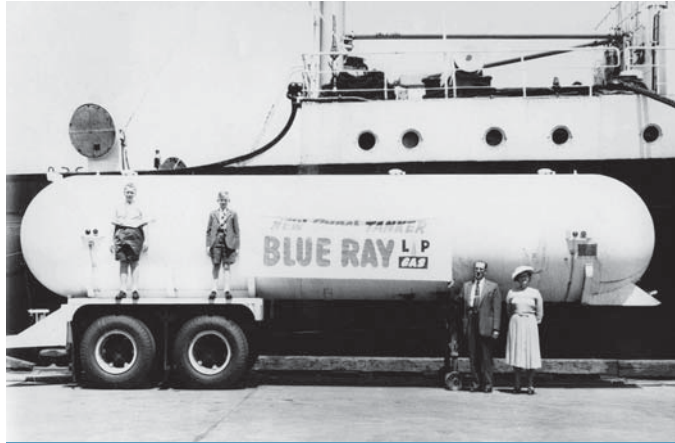
Steventon travelled to rural agricultural shows with a tent in which he demonstrated the product to potential customers. Armed with his bottled gas and a small stove, Steventon's cooking shows were the first Australian displays for the traditional use of LPG in Australia. He then graduated to a travelling caravan equipped with a full-size domestic stove, lights and a single-outlet hot water system. The ingenious and enterprising Steventon made a lot of the appliances and cylinders himself — yet he lacked scale because of the restricted supply of LPG.

During World War II, when US supplies dried up, the Australian government organised a revival of oil shale mining at Glen Davis near Lithgow in NSW to make up for petrol shortages. Another notable Australian entrepreneur, George Davis of Davis Gelatine, formed National Oil Pty Ltd in 1940 and soon produced the first fuel from shale. In 1941, some four million gallons were produced by 170 miners. Steventon sourced indigenous gas extracted from this shale oil-to-petrol process and supplied army camps with gas lights, stoves and hot water systems.

By the end of the war, Blue Ray began to manufacture its own cylinders and by the early 1950s was supplying kits including stoves, pipes, cylinders and fittings for installation by farmers themselves. These were sold in their thousands without any accidents. LPG started to be used in rural and remote parts of Australia, where electricity and town gas were still largely unavailable. When Glen Davis closed its shale oil mining in 1952, because of the high production costs, industrial trouble and competition from the cheaper Middle Eastern petrol, Steventon moved to using a mixed gas from Boral's new refinery at Matraville.



A young Ernie Steventon as a service station operator



In 1957, Steventon imported the first long-haul tanker from the United States



Mining at Glen Davis near Lithgow, NSW



REFINERY ERA

Robert Menzies won the post-war election in 1949 on a promise to end petrol rationing and his government encouraged the building of oil refineries in each state capital city on mainland Australia.

Oil was fuelling a technology revolution ushering in a cultural change towards greater use of mechanical labour-saving devices including transportation.

Australia had been quick to embrace the motor car. It was one solution to the distance problem faced by many Australians. In his book, *Tyranny of Distance*, historian Geoffrey Blainey draws attention to how distance has shaped Australia's history. He notes that a mere two years after the Model T Ford was produced in 1908 there were already 5,000 motor vehicles in Australia.

Cars were the all the rage in the 1920s. By 1930, Australia had nearly 600,000 motor cars and trucks — more than many European countries — and 3,400,000 motor vehicles by 1963. The Ford Falcon, the Mini and the Chrysler Valiant followed the Holden and put a car in the average home.

Australia had to import petrol to power this new fleet. This was in contrast to the nineteenth century when the nation had been virtually self-sufficient in energy:

Its own coal mines yielded fuel for steamships and railways, city factories and gasworks and electricity powerhouses, and also had a surplus for sale to visiting ships and foreign port. Australian firewood cut by thousands of men fed most household stoves and fireplaces, the steam plants of mines, sawmills, butter factories and the Murray River paddle steamers...

Horses...water wheels...wind...sheep produced tallow that was made into candles...Virtually the only fuel which Australia had to import was the illuminant, kerosene, a product of United States oil refineries.

A hefty 10 per cent of our total import bill went on oil in the 1940s and 1950s, with another seven per cent on motor vehicles. World War II highlighted the strategic weakness of bringing fuel from California and the Middle East. The Commonwealth government failed to fill this widening energy gap and stimulate a proper search for oil — in 1920 it offered prize of a mere £10,000:

It seemed to reflect the idea that someone with a few hundred pounds to spare could find oil if only monetary bait was dangled before him. In fact nearly \$80m was spent in seeking oil in Australia and New Guinea — and two thirds of it was spent by foreign oil companies — before the first payable oil field was found at Moonie near Brisbane in 1961.

The arrival of oil engines spurred a wave of foreign investment — mainly American — in cars, tractors, oil refineries and petrochemicals. Post-war, Britain slipped from its position as the monopoly provider of capital and technical innovation.

Australia had already been a petrol importer, so the advent of oil refining in the 1950s suddenly meant a local excess of gas as an oil by-product. This excess kick-started the new LPG industry:

In the 1950s Australia came of age industrially, a fact which was demonstrated by the proliferation of oil refineries and a general change over from coal to oil as the major source of energy.

Sydney had relatively small refineries, operated by Shell at Clyde and Boral in Matraville. Australian Oil Refining (a subsidiary of Caltex) first produced refined products at nearby Kurnell in 1956 for distributors Caltex, Ampol and H.C. Sleigh.

In Victoria, much larger plants were established — Shell's Geelong refinery came on stream in 1954, and the Mobil Esso plant at Altona began operation the following year. In the West, 1955 saw BP announce the commencement of LPG production at its new refinery at Kwinana near Fremantle.

With the advent of modern refineries, more sophisticated cracking processes and large scale production, Liquefied Petroleum Gas became readily available and both gas companies and oil companies considered its potential. However, Steventon remained the pioneer. Blue Ray Gas used the first tanker to pick up LPG from the Shell oil refinery at Geelong in 1956.

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This supply powered the spread of LPG across the nation for domestic and industrial use. In the West there were 4,000 LPG installations by 1959, and the following year 110 Kleenheat depots were supplying 5,800 customers. Use escalated for the new gas, from tobacco leaf dryers and gas-fuelled weed burners on farms, to LPG-fuelled brooders for the poultry industry. "It is hoped that chicken will one day become a year-round food commodity, rather than a Christmas-only treat", announced Kleenheat in 1960.

The new gas coming from refineries was used to supplement the supply of mains coal gas in Sydney and other centres.

In 1954 Bitumen and Oil Refineries floated the Petroleum and Chemical Corporation (Australia) Ltd (PACCAL), in which it had a controlling interest, to erect a high-temperature cracking plant at Silverwater on the Parramatta River in Sydney's West. This plant would ensure the disposal of residual oils from the Matraville

IMAGE OF REFINERY MISSING (25)

refinery, as well as enabling Bitumen and Oil Refineries to expand into the petrochemical field. The cracking plant took the heavy end of the crude oil and converted it into liquefied petroleum gas (LPG). At one stage Bitumen and Oil Refineries was supplying one-third of Sydney's gas supply because of a deal with Australian Gas Light Limited (AGL). To facilitate this supply, PACCAL built a gas pipeline from Silverwater to Mortlake where AGL was situated. The cracking plant's LPG was used to supplement AGL's own gas supply which it was making from coal and coke.

The cracking plant's LPG was used to supplement AGL's own gas supply which it was making from coal and coke.

ALPGA member David Batchen (founder of LPG equipment manufacturer DJ Batchen Pty Ltd) remembers working for Monsanto. They had formed a joint venture with PACCAL, called Australian Petrochemicals Ltd, to manufacture styrene monomer:

Styrene monomer was the precursor to polystyrene which Monsanto manufactured in its Melbourne factory using imported monomer. PACCAL produced a gas by cracking the heavy ends supplied by the Boral refinery and this was used to supplement Sydney's coal gas supplies. PACCAL gas contained about 15 per cent ethylene which Australian Petrochemicals, using technology developed in the US, reacted with benzene produced by the Boral refinery to give ethyl benzene which was subsequently dehydrogenated to produce styrene monomer. In this way, the development of an oil

refining industry in Australia also spawned the development of a petrochemical industry before the availability of natural gas.

LPG also helped Prime Minister Robert Menzies in his campaign to 'defeat the red menace!'

Coal mines had been one source of industrial trouble in Australia but coal strikes became less common as oil emerged as an alternative fuel. The issue of perceived communist influence within trade unions assisted Menzies in winning five elections in the 1950s. The Australian Labor Party (ALP) split, with the formation of the Democratic Labor Party and the Anti-Communist Labor Party taking up to 30 per cent of ALP votes.

David Batchen recalls:

The post war period was very dynamic. There was a lot of worker interest in socialism, but not so much by the public at large. So the unions, such as the coal miners, power workers, refineries and wharfies used industrial muscle to try to control strategic industries such as coal and petrol...

It was upsetting as far as industry was concerned. The coal miners tried to get control of the Sydney gas supply, which was produced from coal by keeping back supplies in the winter.

PACCAL was an offshoot division of Boral which used refinery by-product to help AGL supplement town gas supplies and ensure Sydney's continued supply.

The coal miners tried to get control of the Sydney gas supply, which was produced from coal by keeping back supplies in the winter.

When Batchen was working as a Project Engineer with Monsanto in Melbourne, he was invited to be chief engineer of the new petrochemical project. Part of his training was to spend three months at the Boral oil refinery at Matraville and a further three months at the Monsanto styrene monomer plant at Texas City on the US Gulf Coast:

The Boral experience was stimulating and exciting. The refinery was small even by the standards of the time and its energy and vitality was epitomised by two outstanding men. One was the refinery manager Ted Webb, and the other was the managing director Elton Griffin who subsequently became Sir Elton Griffin.

Ted Webb had gained his refinery experience during the war at the Glen Davis shale oil plant and was a human dynamo. He knew every nut and bolt at the refinery and he loved innovation. He was like a child with a new toy when they introduced a new process or piece of equipment.

The management structure was flat, with almost no middle management, and little in the way of organisation charts. On one occasion an engineer from an oil tanker moored in Botany Bay came ashore to discuss some technical detail concerning unloading of the cargo. He was advised to ask for the leading hand fitter or Ted Webb. There was no one in between. One day I asked one of the young engineers how he knew what his duties were and he said "because Ted Webb kicks me in the bum if I haven't done them".

The staff all worked long hours but were well paid and many were given company cars at a time when this perk was a comparative rarity. Young engineers were given plenty of responsibility and at the drop of a hat could be told to pack their bags and fly to the US to report on some new refining process or piece of equipment. So, there was an air of excitement and enthusiasm that I found very infectious after the rather staid formalities of Monsanto.

Elton Griffin was a very successful businessman and the refinery was very profitable. He was a big man physically and had an imposing personality. Everyone, including Ted Webb who was about 20 years his senior, respectfully called him Mr Griffin. That is when he was in hearing range. He was known as Griff at other times. Griff used to arrive at the refinery each day in a chauffeur-driven car, either a Rolls Royce or a Cadillac as was his whim.

APPLIANCES AND EQUIPMENT.



American companies were prominent in the growth of the local LPG industry. Gas equipment manufacturers Robertshaw-Fulton Controls sent a young Graham Fairfax to America in 1955 for training after he had completed his engineering apprenticeship and national service. He returned in 1958 for the opening of Robertshaw's factory at Burwood NSW and soon became sales manager with it and Rego L.P. Gas

Equipment Co, and was an early ALPGA councillor.

Eventually there was enough gas being produced to mass-market LPG to the rural, camping and leisure market for lighting and cooking, gradually replacing kerosene and slow burning wood and coal stoves.

In 1957, Primus developed portable appliances to operate on LPG, although the liquid gas fuel market for this purpose was only 10 tonnes per annum. Former ALPGA president Bruce Reid pioneered the marketing

and distribution of Primus cylinders with Thermal Traders (AGL's Porta-Gas), Wesfarmers (Kleenheat) and CIG (Handigas).

Kleenheat sold gas in compact, portable bottles in 1958 for the leisure market and the WA Premier Mr AG Hawke (uncle of later Prime Minister Bob Hawke) opened an exhibition of appliances.

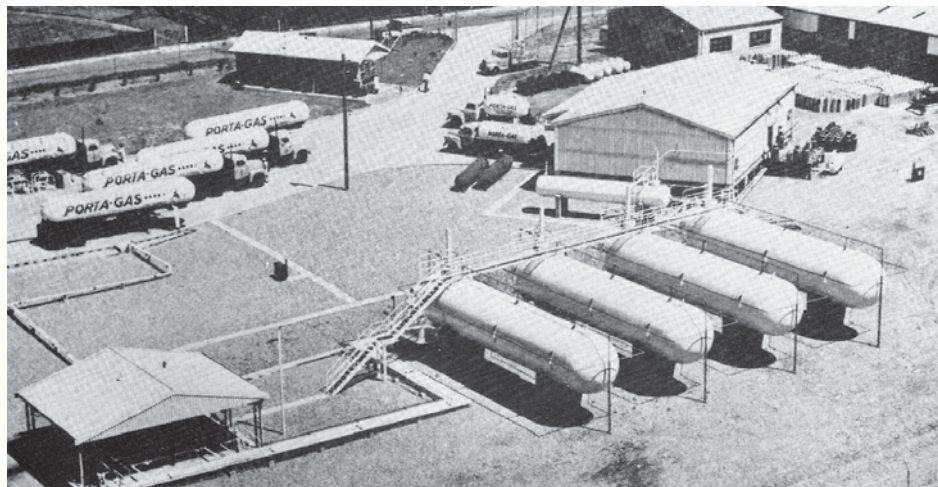
The oil companies were all wholesale suppliers to the gas companies after Shell pulled out of distributing bottled gas in 1957.

AGL bought Boral refinery LPG gas to supplement its town gas, and set up Thermal Traders to market Porta-Gas to areas outside the gas mains network. Like other players from other companies in the industry, Ted Magee (on ALPGA's inaugural standards committee) was sent overseas on behalf of AGL to study LPG development and standards of safety in America, Brazil, England and Europe. Brazil proved especially interesting and AGL had licensed Porta-Gas and Porto-Gas from there.

AGL spent \$125,000 (\$1.5m in today's money) on advertising in country towns and procured 100,000 kits to convert kerosene refrigerators to LPG, says Broomham: In 1957, Thermal Traders made an agreement with the Swedish company Primus to market small Primus lamps, two burner stoves, industrial torches and other equipment, spending \$57,000 on the first order for small cylinders.



Ted McGee



Porta-Gas Terminal

Primus 'gas' lamps lit proceedings at the ALPGA 50th anniversary celebrations in 2008 at Luna Park, a reminder of its pioneering role in LPG history.



Thermal Traders moved into Victoria to market Porta-Gas, sparking a reaction by the Victorian Gas and Fuel Corporation in 1957. South Australia's Gas Company (SAGASCO) was slow off the mark because its refinery was not built until 1963, and Elder Smith took the opportunity to become an agent for Porta-Gas.

Over on the other side of the continent, British Petroleum built a large refinery at Kwinana, the first in Australia to produce liquefied petroleum gas. It was this plant which paved the way for the West Australian farmers' co-op to establish its own brand of bottled gas under the brand name of Kleenheat in 1956.

HOW THE WEST WAS WON OVER TO LPG

Western Australia was quickest off the mark with LPG, because the farmers' co-op had been importing US oil products for distribution through its network.

Ashton was familiar with American oil after his visit there in 1920s and the farmers' co-op distributed Rich-

field oil which was bitumen-based and renowned for giving off an excellent gas.

Richfield learnt how to turn this colourless, odourless explosive that destroyed oil wells, into a tame servant for industry and the kitchen.

Walter Ashton was provided with data on all the early research work that achieved this transformation which led to the introduction of liquefied petroleum gas into Western Australia.

While travelling in England the previous year, Ashton had been in discussion with BP executives over the type of LPG to be introduced at Kwinana — BP wanted butane, whereas Ashton, who had seen the American market first-hand, thought propane the better option.

With US operations far more advanced than the relatively new British market, the West Australian pioneer would prove to be on the money. When the LPG industry association was established a few years later, it too would take many other of its cues from the vibrant US industry rather than Europe.

Former Wesfarmers general manager John Bennison says the driving force behind the farmers' co-op adoption of LPG was Scottish-born John Thomson, its first general manager.

Thompson had taken the farmers' co-op into the oil distribution business and had invited BP to provide oil fuel to WA. Before World War II, he had them provide some cylinders of petroleum gas from Iran for experimental work for Metters stoves.

When BP started building the Kwinana refinery in 1953, Thomson went to London to meet with the board of BP to tie up the LPG supply so Wesfarmers could enter into the gas business. It had experience distributing oil products in the West and was a company intent on 'first-mover advantage' with the new gas.

John Thomson and Walter Ashton visited Europe and America in 1955, and found parallels to West Australian conditions in the Mid-West USA. They set about copying that model they observed working in Texas, Oklahoma and Kansas. The feeling was that the UK was only playing at the LPG business by comparison with the US and their larger population and smaller distances made

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Australians who sweated to produce a hot meal on a wood stove were to bless the arrival of Kleenheat gas on the market.

Piggford was sent to America to get a working knowledge of the equipment used (100lb cylinders were adopted) and applied American technical standards to Australian conditions, including the US code of safety.

Western Australia Kleenheat's practices were ultimately adopted through the committees of the Association as standard for the industry. They were regarded as setting the standard required by the Mines Department and NSW enacted them in its safety code.

Bennison said Thomson was a business genius who drove the spread of LPG, famously demanding the invention of the ingenious method of using bulk tankers to refill gas cylinders, to save on transport in the back-blocks of the vast western state.

Nationally, there was a gas-rush to find new markets for the new LPG. Bennison, who became general manager of Wesfarmers recalls:

the economics of cylinder exchange, for example, quite different: Americans had conversion kits from kerosene refrigerators to LPG power — not a priority in the UK.

Wesfarmers' staffers John Bennison, David Piggford and Jim Hawkins joined with Ashton to form a committee which planned the development of a possible liquefied petroleum gas industry in WA. "They regarded every country housewife as the potential owner of a gas stove," says farmers' co-op historian, Kevin Smith.

As a result of these far-sighted negotiations, many West

We were flat out — all the states were — and we made a lot of money early in the piece and had no one to compete with.

The main reason WA wanted a LPG association was because we sought some semblance of control and say over the type equipment and safety standards we were going to be involved in.

He remembers the Association emerging as part of the natural progression towards uniformity as all the states got in on the LPG act. The Wesfarmers' history has no doubt who can claim credit:



At the recent A.L.P.G.A. conference held in Adelaide. From left: C. M. Allender (Elder Smith & Co. Ltd.); J. Bennison (Wesfarmers Kleenheat Gas Pty. Ltd.); R. W. Roberts (South Aust. Gas Co.); S. Ferrier (E. S. & F. Ferrier); J. M. Dunn (Gas Supply Co. Ltd.); E. G. Steventon (Blue Ray Gas Co. Ltd.); A. R. Down (Shell Co. of Aust. Ltd.); S. M. Adams (Secretary A.L.P.G.A.); P. G. Ryan (Parnall Aust. Pty. Ltd.) E. F. Magee (Thermal Traders Pty. Ltd.); A. R. Clarke (Vacuum Oil Co. Pty. Ltd.).

ALPGA conference held in Adelaide

Ashton was the person mainly responsible for setting up the Australian Liquefied Petroleum Gas Association which now has more than 400 members and is the self regulating body for the industry.

THE ASSOCIATION FORMED

There was a sense of nation-building in Australia in the 1950s. Restrictions of the war had lifted and manufacturing industry was hitting its straps, symbolised by the production of our first car, the General Motors' Holden.

LPG was on the move and it was time to have an industry get-together, said the General Manager of the Australian Gas Light Company (AGL), Bill Pettingell, in a letter to Walter Ashton, his counterpart at the farmers' co-op, on 11th October 1956:

With the advent of oil refineries in Australia, the natural corollary, the expansion of the Liquefied Petroleum Industry has followed. As evidenced by the size of the industry overseas, this expansion can reasonably be anticipated as being equally extensive in Australia, not only in respect to the distribution and sale of the product, but also in respect to manufacture of equipment and accessories.

Many organisations are directly interested in these projects and it is felt that cooperation in regard to meth-

ods, usages, standards of safety etc, without restriction of normal commercial competition, would be to the advantage of the prospective users, the LP Industry and the Australian people in general.

Walter Ashton later wrote a short history of the origins of the Association, published in the first issue of Petroleum Gas, the official journal of the ALPGA in September 1959:

The pattern of production and distribution of LPG became clear by 1955, after refineries started developing from 1952 and the infant industry started to survey the prospects and problems that lay ahead when LPG supplies would become available.

It soon became apparent that the existing State Laws, standards and regulations governing the distribution of inflammables under pressure were ill-suited to the needs of a modern and expanding industry. Similarly, manufacturers of appliances had little, if any experience of producing in Australia units in volume that would meet the exacting requirements of Liquefied Petroleum Gas utilisation.

Discussion of modernising regulations on a uniform basis throughout the Commonwealth in 1955–56 became more immediate in September 1956 when BP Kwinana Refinery commenced supplying LPG, and the Eastern State refineries were on the eve of production.

So the previous somewhat nebulous discussions about the development of uniform policy on technical matters became positive through the issuance of an invitation by WW Pettingell of Thermal Traders Pty Ltd of Sydney to all those known at that time to be interested in Liquefied Petroleum Gas distribution to attend a meeting in Sydney on October 22nd 1956 to form an Australian LPG Association.

Shell declined an invitation to that proposed industry conference but came to the second meeting when the objectives of the coordinating committee had been clearly spelt out.

The steering committee met in AGL's boardroom in Haymarket, Sydney. Present were:

- Walter Ashton, of the Westralian Farmers' Co-Operative Ltd
- John Ford and Al Smith of Commonwealth Industrial Gases Ltd
- Ernie and Sam Steventon of Blue Ray Gas Company
- William Pettingell, Ian Jamieson and Ted Magee and of the Australian Gas Light Company (AGL)
- Armstrong of the Fire and Accident Underwriters
- A Stewart and O Knight of the Standards Association.

The convening chairman, William Pettingell, made his case for the formation of a LPG association to work for the "common good of the industry and the Australian public at large, without in any way interfering with normal commercial competition".

Ashton tabled reports of the LPG Association of America, but did not favour an Australian LPG association joining the US body so as to maintain local control. "Mr Ashton said he felt very strongly about safety aspects and held the opinion that the industry could not afford, at any stage, to have serious trouble", records the minutes.

LPG pioneer Ernie Steventon indicated that, in his opinion, the formation of an association was premature because there were only two companies distributing gas (his Blue Ray Gas and Westralian Farmers' Kleenheat Gas).

Pettingell, as convening chairman, then vacated the chair for Ashton, because of a previous engagement (and does not appear to have played any further re-

corded role in the Association).

The meeting resolved that a committee of four (Ashton, Al Smith, Steventon and Ted Magee) develop the Association, with reference to:

1. The study of the safe handling, storage, transportation and distribution of LPG;
2. The study of the installation and operation of LPG systems;
3. Approaching with one voice such bodies as statutory authorities; and
4. Promulgating good feeling in the industry...

The focus on setting industry standards was there from the start; at that preliminary meeting it was proposed to make both American as well as British specification valve outlets standard. The minutes of the third meeting of the ALPG coordinating committee tells of how the Standards Association of Australia was opposed to allowing American LPG standards as well as British for thickness of cylinder steel and the thread on the outlet of the cylinder valve.

Ashton made it clear this was a new industry in a hurry:

...as hundreds-of-thousands of pounds would be spent in the next few years by people around the table, the Standards Association of Australia could not hold things up. In WA they are annoyed at lack of movement in the Standards Association. Australia cannot stand for delay and we must continue to press for those things which we consider to be right, irrespective of past history.

Ashton said his company had been contemplating the LP business since 1937:

Westralian Farmers surveyed, in their humble opinion, the best way of handing the job. They went to the U.S.A. and examined the situation and then went to England, but found opinions given were influenced by the employer of the person making the statement. The directors finally agreed to follow America. We want the best and if the English or the American system was the best, we are going to have it.

There followed a string of eight meetings of the coordinating committee "to sort through wide variations in codes and regulations applying to the industry". Discussions culminated in a joint meeting of the distributors, equipment and appliance manufacturers.

Recognition of the new body came at its second meeting when the NSW Department of Mines sent an invitation for the fledgling committee to send a delegate to its deliberations. Ashton said the committee “became a factor in the LPG industry”.

Until agreement was reached between the various parties, Australian manufacturers could not tool up for the production of valves, cylinders, regulators etc, all of which were under strict licensing if imported from overseas.

Ashton said the technical committees should be comprised of the best available men in the industry irrespective of their affiliations.

Then, at a meeting in Melbourne in November 1957, it was decided to expand the coordinating committee into an association governed by a council that represented each major section of the industry. It would comprise ten distributors, two appliance manufacturers and two equipment manufacturers.

It was decided that the seven foundation members be the first members of the council:

- Blue Ray Gas Company
- Commonwealth Industrial Gases Ltd
- The Gas and Fuel Corporation of Victoria
- Industrial Oxygen Company Pty Ltd
- The Shell Company of Australia Ltd
- Thermal Traders Pty Ltd (AGL)
- The Westralian Farmers Co-Operative Ltd.

When an appliance approval sub-committee was added to the sub-committees on storage, transportation and distribution, installation on customers’ premises and equipment, the administration burden was so much that secretarial assistance was sought from the Chamber of Manufacturers.



This assistance came in the form of Stuart Adams, a convivial accountant who was divisional secretary of the Australian Chamber of Manufacturers. He became secretary of ALPGA at its first meeting and remained in the position until 1980. He also established and managed its publication Liquefied Petroleum Gas.

It was a happy day for the organisation when it linked up with the Chamber of Manufacturers, for whilst this Commonwealth-wide organisation is situated in Sydney, the set up of the State Chambers has and will facilitate the formation of State Branches throughout Australia.



Adams was one of the industry’s competent and colourful characters, having a great way with words, says John Urquhart of LPG equipment providers Gameco:

He seemed to like holding politicians accountable and part of his duties was writing to them — his letters were clear and direct. Stuart liked company and a drink and always took advantage of a night out when at council meetings, and he was great company. ALPGA went its own way, breaking from the Chamber of Manufacturers, around 1980.

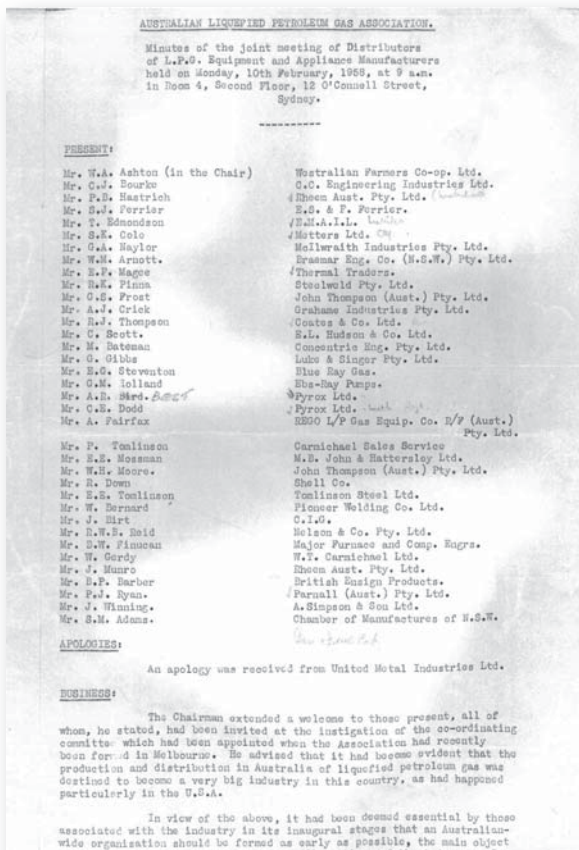
A draft constitution was prepared and invitations for companies likely to be interested in an organisation representing the LPG industry in all matters relating to state laws, regulations, specifications of gas, equipment and appliances, safety codes and standards, and technical matters generally.

While the committee was framing a constitution, Stevenston picked up on one of the objects of the Association — promulgating good feeling in the industry. He felt that, whilst certain activities continued in Victoria, in contravention of the fledgling Association’s objectives, it would be undesirable to form an association — an apparent reference to the barriers established gas companies put up to protect their business from any new competitor. However, he received no support. Stevenston held a laissez faire attitude, that everyone should have the right to peddle their wares.

The planning committee did however support Stevenston’s motion that its name should be the “Australian Liquefied Petroleum Gas Association”.

The Association would have no authority over the business of members, and be unable to discuss prices of gas, appliances or marketing.

Representatives from WA, SA and Victoria meeting in Sydney on Monday 10th February 1958 made the first meeting a Commonwealth function.



Ashton was chairman and welcomed all present with high hopes for the future of a LPG industry: ...an Australian-wide organisation should be formed as early as possible. The main object of which was to achieve uniformity in all sections of the industry.

Ashton proposed that the council consist of 14 members, ten of whom would represent the distributors, two the equipment manufacturers, and two the appliance manufacturers. In reply to a question, the Chairman advised that the large proportion of distributors compared with equipment and appliance manufacturers was due to the fact that the former had to safeguard their inter-

ests in view of the very heavy capital expenditure they had incurred to handle the product.

Vacuum Oil and BP Australia sent letters of interest in membership which were approved when the ALPGA meeting continued the following day. It was also resolved to write to the Australian Oil Refining Pty Ltd and Boral Bitumen regarding the formation of the Association.

The meeting considered the constitution and the establishment of committees. Officers elected for the year to 31st March 1959 were:

- President – W Ashton (Kleenheat)
- Vice-Presidents – E Magee (AGL) and R Down (Shell)
- Hon Treasurer – E Steventon (Blue Ray)
- Secretary – S Adams

ALPGA was housed at 12 O'Connell Street, also known as Manufacturer's House, a heritage-listed building in the heart of the financial district within the Sydney CBD. The nine-storey building was designed by architects SH Buchanan and Cowper and is a classic example of an inter-war art deco style building.



12 O'Connell Street, also known as Manufacturer's House

The construction of the building was completed in 1935 for the NSW Chamber of Manufacturers. It became the headquarters for Manufacturers' Mutual Insurance Ltd and thus received its name, Manufacturer's House.

The building was officially opened on 26th February, 1935 by the NSW Premier Sir Bertram Stevens. The Premier praised the building as being “Australian built, of Australian materials”. The building also represented the return of stability to the economy after the Great Depression of the 1920s.

The building’s façade represents a rare example of a highly intact original-face brick exterior which is achieved due to the spacing of the brick piers and the use of rustic brick and polished granite cladding. There is also some copper detailing which includes peacock-style motifs.

John Urquhart (Gameco) remembers being impressed by the building and its fit out on attending his first technical committee meeting. The heavy wooden furniture and solemn décor had a formality and the meeting room was divided into sections reminiscent of a court. “The olde worlde atmosphere affected the tone, things were done in the right order and pace,” he said.

The building received extensive refurbishment in 1984 which has been highly commended, upgrading the interior fittings and building systems while preserving the external features which make this building unique and have earned it a heritage listing.

That ticket won first prize several weeks later. We were all richer to the tune of £3,000 each (worth nearly \$40,00 in 2008).



Ian Reynolds, (ALPGA President 1979–80, founder of tank and equipment maker CEM International Pty Ltd) fondly remembers one particular meeting which seemed to suggest the newly-formed Association was off to an auspicious start:

The second meeting of the technical committee was held in July 1958 in Melbourne at the Victorian Chamber of Manufacturers in Flinders St. At lunchtime five members of the committee strolled up Flinders St to Young and Jacksons for lunch. On passing the Tattersalls Lottery office one of the NSW committee members suggested we should buy a ticket. That ticket won first prize several weeks later. We were all richer to the tune of £3,000 each (worth nearly \$40,000 in 2008). What a great start and a lucky one for the fledgling members of ALPGA! The sixth member of the committee, who had other business to attend to at lunchtime, was less than impressed when the news got out about our win.

One of the first acts of the new Association was assisting the Victorian government in framing LPG regulations. In particular, the carriage of LPG in Australian waters was taken up with the Ministry of Shipping and Transport.

An executive committee was set up to deal with matters of urgency in 1959. The first AGM was held on the 25th of May at the Hotel Australia in Sydney. Reynolds remembers the occasion:

I was actually present at the first AGM of our Association when the first general election of council members took place. It was exciting to be part of this new industry. I remember travelling up in the lift with Bill Pettingell at the Hotel and thinking to myself how good it was to be involved. Little did I know what the future held.

Public relations were discussed and the Petroleum Gas journal was launched. Chairman Walter Ashton said the cooker and domestic water heater code sub-committees had completed their approval codes — some 90 pages of text. He told the meeting that the voluntary work of the council and committees reflected credit on all concerned:

Indeed, in all Australian industries much is owed to the many technical and professional associations whose members devote so much time and energy to their various tasks without expectation of any reward other than the satisfaction other than having taken a part in the building of our Commonwealth.

The Association quickly attracted producers, merchants, appliance manufacturers and equipment suppliers as its meetings were a good place to make business contacts. Ashton subscribed to the philosophy that an industry should look after itself and while the LPG industry did the right thing, the longer it would avoid having regulations forced on it: “It’s the industry’s job to ensure that there are no accidents to affect either customers or staff”, he said.

Ian Reynolds, who then worked for Steelweld as manager of its LPG division, recalls those days:

The likes of Walter Ashton and Bill Pettingell were respected people — proper people — and they could all see that if we didn’t have a safe industry we weren’t going to have one much at all.

While the committees immediately busied themselves with the technical minutiae of establishing uniform standards and regulations, it was safety which played the central role in all of their deliberations. We led the way in the preparation of standards. At the formation they set up various operating committees and one of them was the engineering committee. I reckon I attended just about every meeting there was, up until the 1980s or even 1990s.

The standardisation of cylinder threads was among the first committee’s chief concerns, along with discussions about safety standards for appliances, cylinder construction, and various regulations for transport tanks.

The gas companies dominated the Association from the start — the only oil company present at the inaugural meeting was Shell, which had long had an interest in LPG. R Down of Shell was appointed Co-Deputy President of the Association. Vacuum Oil and BP were later present for the 1960 AGM.

Bill Feutrill (Wesfarmers) said Ashton was a good candidate as chairman:

Ashton said he wanted a separate organisation in the middle and I think they chose him as the first president because he was not from either camp: the Australian Gas Association or the Australian Institute of Petroleum.

The oil companies and the gas companies could be

laws unto themselves in some respects. They had different cultures — gas companies laden with a century of regulation and the oil company type approach where the cheapest route was the way to go.

Shell made a conscious effort to position its LPG business as a gas company says Ian Brumby (ALPGA President 1984):

For example, our membership of the association was via Gogas. We marketed under that brand, and, for most of the 1990s, our headquarters were separate from Shell at Camberwell in Victoria. We believed this made good business sense because it enabled us to focus on our prime objective of growing a profitable LPG business.

Some oil companies treated LPG like petrol, at their cost until the new industry got together in the Association and embraced a rigorous technical path that raised the bar.

Gary Ireson (ALPGA President 2004–05), said the LPG market was wide open at first:

A lot of the gas companies were run along state lines, none of them competed at all. They all came together to share information and jointly develop standards and a regulatory framework for the industry. So at the start there were few sources of conflict between the marketers, nothing like what was to come, such as competition sparked by fuel discounting.

COAL AND COKE ERA ENDS

Kleenheat was the first to power a whole town with LPG when it convinced Geraldton Council to replace its aging reticulated gas with cylinders in 1956. In September 1956, the first Kleenheat road tanker rolled out of Kwinana carrying LPG which was pumped into 45 kg cylinders located at Geraldton. It increased awareness of the gas and opened up sales between there and Perth. LPG appliances were sold by agents in agricultural areas and installers, often plumbers, were trained by Kleenheat at four-day schools in Perth.

Geraldton was the only council in the West to switch but it was to be the pattern for other states, and their gas monopolies sent over representatives to see how it was done.

In 1963 one of the first NSW municipal gas works, at Bega, was converted to LPG.

After two world wars and a depression, run-down town coal gas works were undercapitalised and had leaking problems in their distribution systems. They were an early market for the new, portable gas source in LPG and were soon being replaced all over the country.

Gordon Leslie (ALPGA President 1986–87) remembers:

In country-town gas systems in Queensland it was cheaper to install LPG, re-pipe the house and give the householder a new cooker, than renew pipes laid across a road and then replace the bitumen.

We introduced in situ filling of cylinders. Instead of exchanging them, a tanker would go from house to house refilling them.



Sir Eric Neal

Sir Eric Neal recalled at the 50th Anniversary of ALPGA the effects of many country gas works converting from coal to LPG as a feedstock in NSW and Queensland:

This significant marketing of LPG by all major distributors was to dramatically impact upon the coke market. Many country hotels and farms had been equipped with slow combustion coke stoves and hot water boilers. Their replacement with LPG appliances reduced the market for coke, a by-product of coal gas production

and the economics of coal gas production depended upon its sale. It was not surprising that the era of coal gas production in country towns was ending.

The switch to individual home cylinders from gas piped from the local gasworks was the end of an era:

...the big days in the life of a gasworks were Mondays, which in earlier times was “washing day”, when householders used gas to boil the water in the wash coppers that preceded washing machines. The peak day was (would you believe) Christmas Day, which was all about cooking that Christmas dinner.

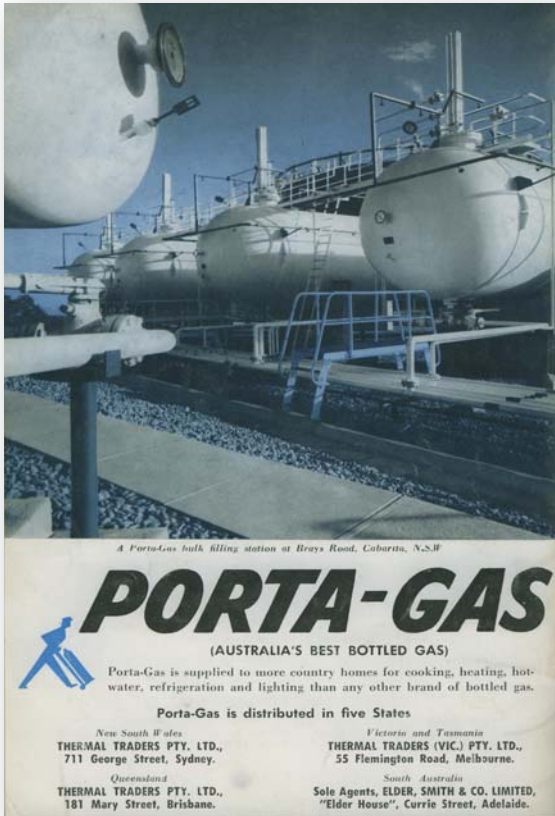
LPG COMPANIES

William Pettingell’s AGL was among the first town gas companies to enter the LPG market in 1956, through subsidiary Thermal Traders in NSW, and then partnered with Colonial Gas Holdings in Victoria. Both Thermal Traders companies sold bottled gas under Porta-Gas, a brand which became a generic title for bottled gas.

The other utilities were not far behind. The Gas and Fuel Corporation of Victoria entered the market in late 1957 and quickly took off. By 1959, it could already guarantee two days’ LP gas supply to the company’s total metropolitan area.

In SA, SAGASCO’s wide network of country agents enabled it to successfully trade in bottled gas regardless of its late start. Gas companies like Colonial Gas and the Gas Supply Co (GSC) had a network of country gas works in Victoria, NSW, Queensland and at Mt Gambier, so were well placed to market Porta-Gas through these operations.

In Melbourne and regional Victoria they seized the opportunity to convert networks to LPG by reforming it to simulate town gas. In the early 1960s, LPG replaced coal gas in reticulated supplies in Seymour, Shepparton, Wangaratta, Horsham, Benalla and Portland in the form of tempered LPGas (TLP). In 1962, GSC Ballarat introduced butane air as an interim supply pending the arrival of natural gas for large industries in that city and large tonnages of butane were sourced from the Shell Refinery at Geelong.



Porta-Gas and Sagasco press advertisements

In 1963, Boral acquired the Gas Supply Company (GSC). This group consisted of 28 coal gas companies ranging from Cairns in the north, down the east coast as far south as Portland in Victoria, and as far west as Broken Hill. GSC had just moved in 1962–63 to replace its coal gas operations with LPG, which it saw as “the fuel of the future”. Neal doubted if Boral was aware of the LPG tie-up when it bought GSC, but capitalised on it as a distribution platform for LPG.

AMERICAN RULES — AUSTRALIAN STANDARDS

Many of the standards were adopted from American regulations at the time.

According to former president Ian Reynolds:

There was a lot of discussion about that — whether that was the most advisable way to go and what about British practice and all that.

But at the end of the day the numbers were so huge in terms of experience and utilisation of LPG in terms of the US — it led the world — and we decided we might as well go with the biggest and the best.

In 1960, a LPG domestic cooker code was published. Work continued on codes for water heaters, space heaters, refrigerators, caravans and marine installations.

A lot of equipment was imported but most, like storage tanks, was manufactured in this country. We were leaders in the production of very large storage vessels, pressure vessels, and down to the smaller vessels in those formative years, and held a pretty good position for many years to come.

The Australian standards were a little more conservative than the Americans, and as a result, that created a situation where we'd often get questioned about our prices, but in the years ahead a lot of those differences disappeared, and the Australian industry has the same standards of design. (Ian Reynolds)



From LPG Gas News, August, 1978 – Bill Feutrell (Westfarmers), Pat Donnelly (Boral), Bill Marshall (Launceston Gas) and Nev. Bertalli (H. F. Stevenson).

David Batchen (of LPG equipment manufacturers DJ Batchen Pty Ltd) says because the American LPG industry was established many years before the Australian industry, we initially adopted many of their standards. This also applied to equipment to handle LPG, virtually all of which was imported from the USA:

American pumps, meters, valves and fittings were all used initially and performed satisfactorily in industrial applications but it was a different story when it came to autogas — in some ways we were the pioneers there.

Bill Feutrill (Kleenheat) who was on the ALPGA committee that produced the first Australian Standards, says the need for uniform rules was shown when Wesfarmer's boss John Thomson got Kleenheat to invent a system of filling exchange cylinders from bulk road transport tankers on site:

It was more flexible, safer and avoided double handling of cylinders when they had to be returned. The company had to work around a railways' ban on competition from road transport of gas.

It was a great innovation for the gas industry in Australia, because the railways couldn't take it in bulk to customer's doors, considering it too dangerous. Several companies used the system, especially in remote locations in WA, SA and the NT for about 30 years.

Yet, when it was introduced in Queensland, because it was not covered by any standards, the regulators said "you can't do that" and other eastern states also tried to stop Kleenheat using the system. They didn't win because ALPGA technical committees had the industry expertise to be able to convince Standards Australia that the system was tried and safe, and so it was written into the regulations.

John Bennison (Wesfarmers Kleenheat) says the best set of installation rules that ever went to the Association for adoption were Dave Piggford's of Wesfarmers:

They took him about three years to prepare. We insisted upon the best standards and I think led the Association in arriving at a system for protecting the public against shoddy equipment and shoddy engineering. Everyone wanted to bring a variety of stuff from overseas and

we were trying very hard to maintain a level of safety by buying good product. I remember that was a major issue. I can remember Walter Ashton saying that as long as you had technical safety standards you didn't have accidents.

Marketing fellows would come in that knew less about the engineering side of it like myself ... but it was really Piggford and one or two others, such as Ian Reynolds, that set the standards.

I was on the standards committee that produced the first Australian Standard. Before that we used the American [standards] — gas companies had a long standing culture of safety and their representatives bought this to the ALPGA.

I think the Association was a good thing because even though we had brawls over price we never gave way on standards. It doesn't mean that we were just a wonderful bunch of good blokes, it was just that we were protecting the industry and the cost of insurance, and we protected the market.

John Urquhart (Gameco) remembers that sometimes the technical committee meetings got heated but they usually settled on the safest option:

One old safety chestnut was arguments with appliance importers seeking approval for European-style, butane-fuelled mobile cabinet heaters. The problem was we had a propane-based supply and the gas cylinders on board were naturally at a higher pressure. Any leak could be significant and there was a source of ignition within centimetres. Also the heaters could easily be moved into bedrooms and bathrooms — not good places for gas heaters. The safe alternative was for gas cylinders to be outside the house and have a low pressure pipe running to a fixed bayonet point for the heater. There were other problems with adapting some imported appliances to propane.

THE SIXTIES

The 1950s and 1960s were decades of expansion in Australia. Growth rose four-fold on pre-war rates with manufacturing seen as vital for national development. This was fuelled by large-scale immigration and technical and scientific innovation, as well as the increasing

availability of raw materials after the protracted war-time shortages. The white goods' industry mushroomed and metal engineering employment soared with the mass production of Australian motor vehicles.

The LPG industry surfed this wave of development and met strong demand for both gas and appliances.

In the early days, LPG was used for domestic cooking, heating, hot water systems and refrigeration. Appliances spearheaded the marketing by all the gas companies. The Metters LP1 was the first LPG cooker sold in Australia. In 1958, Metters acknowledged the assistance of Kleenheat's David Piggford in refining the design of more than 3,000 LPG appliances they had produced. "If you did not sell the appliance, you did not sell the gas load," said former Kleenheat head John Ring (ALPGA President 1995).

Appliances were a means to an end and you did not make any profit out of them. The oil companies hated it. The dominant supplier became Craig and Seeley which made Chef appliances. AGL's Porta-Gas, the Gas and Fuel Corporation of Victoria's Heatane, Kleenheat and SAGASCO all had large appliance retail showrooms.

Country people coming to Sydney's Royal Easter Agricultural Show would crowd in at Porta-Gas's George St shop to buy stoves and wall lighting powered by LPG.

Farmers had to do the gas installations themselves at home — the kit consisted of 20ft (6 metres) of copper pipe, fittings, regulator, gas bottle and cooker. In setting standards, ALPGA safety committees were aware that they were often dealing with do-it-yourself equipment and it was important to "get it right the first time".

In 1957, the gas stove manufacturers Chef, Simpson, New World, Metters, UMI, Cannon and Carmichael (Email) had formed the Gas Appliance Manufacturers' Association of Australia (GAMAA). Harold Seeley (Craig and Seeley) was a prominent advocate for appliance companies in GAMAA and ALPGA.

Attractive models such as Miss Chef, Miss New World were used to promote the appliances.

LPG and natural gas powered stoves are different, as they operate at different pressures and need different sized injectors.

At the start electricity was quite expensive and LPG was cheaper than its competitors.

Demand for LPG in Australia in 1960–61 was 35,000 tonnes. Between 1965–69 refinery production of LPG grew at 17 per cent per year, according to LP Gas News. In his annual report of 1962, Walter Ashton celebrated this progress:

It is very doubtful if there are many other associations which have been instrumental in placing a new industry on so sound a footing in so short a time as our own. In this regard it has had the benefit of the experience of ancillary industries in this country, in addition to the procedures adopted in America, the Continent and the United Kingdom in the LP Gas field.

TRANSPORTING LPG

Few grasped the potential of this new industry better than entrepreneur Ian Cootes (ALPGA President 2001). He came to Melbourne as a policeman but quickly switched to his real love, transport. In 1966 with Lindsay Fox, he started by carting oil out of Westernport BP refinery but soon realised the possibilities of the LPG that was often burnt off as waste gas. Before natural gas arrived, he successfully carried and then sold wholesale LPG as a clean, lightweight substitute for oil and coal in industry, especially in regional areas among milk processors and food canneries who needed steam and hot water.



Ian Cootes - Entrepreneur & ALPGA president 2001

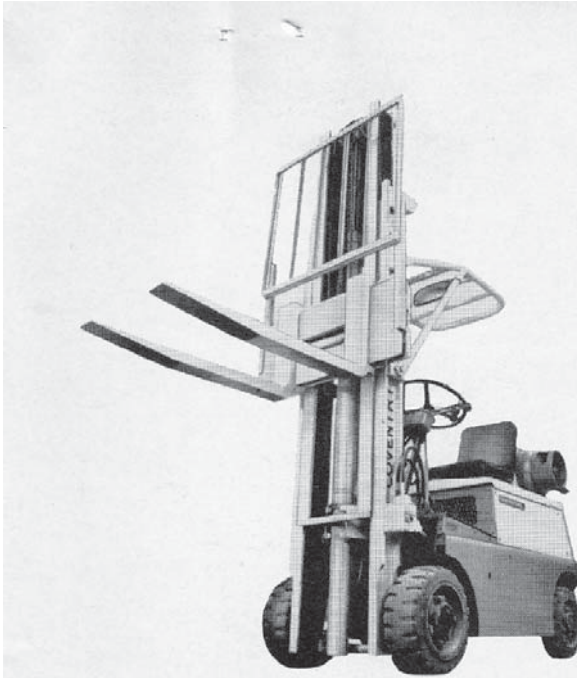
Bulk transport drove the LPG industry and helped create scale and momentum in early distribution systems. These factors would underpin the success of autogas. Ian Cootes championed technological innovation and was always on the ALPGA bulk transporters' committee, which set standards for pumps, meters and equipment, as well as driver training.

Bulk transport drove the LPG industry and helped create scale and momentum in early distribution systems...



David Batchen recalls the 1960s:

I started my own engineering design and fabrication business in 1965 and, because of my experience in the petrochemical industry, was awarded a contract to empty and open up for internal inspection a LPG tank owned by Borg Warner who manufactured automotive gearboxes. They used LPG to case-harden gears. This was my first introduction to the LPG industry and it was followed by doing repairs and modifications on small road tankers owned by Porta-Gas.



Forklift Trucks were converted early

Subsequently we received contracts to supply and install LPG tanks and piping systems in numerous brickworks around Sydney when they converted their kilns from coal-firing to gas-firing to reduce pollution and improve control over the brick-making process. This led to similar work for a variety of other industries including glass-making in Sydney and also the installation of LPG tanks in country towns as they closed their coal-fired gas works and switched to LPG. Many of the country towns chose to supply gas directly to cylinders installed on the consumer's premises and this resulted in our building LPG road tankers to transport the liquid LPG from the tank 'farm' to the customer. These industries prospered because natural gas was not available at that time.

The aerosols industry also switched to LPG to phase out the use of fluorocarbons as a propellant in spray cans because of concerns about damage to the ozone layer caused by the long-lasting fluorocarbons. We built most of the tank 'farms' around Sydney and equipped them with molecular sieves to remove all trace of odour from the LPG so that it wouldn't contaminate the contents of the can.

A continuing source of business for us was the building of equipment to fuel forklift truck cylinders. Forklifts operating in confined spaces used LPG as a fuel because its exhaust gases did not contain the poisonous carbon monoxide emitted by petrol. We had an arrangement with Rheem who fabricated LPG tanks under licence from an American company. Rheem supplied the tanks and we mounted them on a steel frame with a pump, piping and filling hose and nozzle. Sometimes the unit also included a meter installed inside a galvanised steel cabinet. We built hundreds of these over the years and they were responsible for our entry into the autogas industry

Forklift trucks were being converted to LPG quite early because of cleaner emissions, but with mixed results, and helped with the evolution of autogas. In the late 1960s, Mobil and Shell (Gogas) pushed LPG for forklift trucks — both had a strong interest up to the 1980s. Bill Jenkins recalls:

The gas was of variable quality and there was not a full understanding of the link between fuel composition and emission levels. Gradually the refineries learnt how to produce gas to a certain standard. Specifically produc-



Bill Jenkins