LPG Association OF NEW ZEALAND (INC)

Gas Association of New Zealand (Inc)

March 30, 2007

New Zealand Energy Strategy,
Ministry of Economic Development,
PO Box 1473,
Wellington

Energy Efficiency and Conservation Authority
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To whom it may concern

Submission on the draft NZ Energy Strategy and the draft NZEECS:
Comments from the Gas and LPG Associations

Introduction
The Gas and LPG Associations have prepared this joint submission in response to the draft NZ Energy Strategy *Powering our Future - Towards a Sustainable Low Emissions Energy System* and the NZ Energy Efficiency and Conservation Strategy.

As well as this paper, our submission includes:

- A power point presentation made to Energy Minister, David Parker *(attachment 1)*.
- Summary of a BRANZ research analysis outlining the impacts on the electricity system of using DUOG to displace household electricity for water and space heating – *appendix 1*).
- A breakdown of the base electricity load that is displaced currently by using DUOG in the domestic and residential sectors, and projected displacements based on specific but achievable growth scenarios *(appendix 2)*.
- An analysis of the current and projected peak load displacements that are/could be achieved by fuel switching to DUOG *(appendix 3)*.

The contents of this submission are consistent with the theme of our discussions with you on February 20, 2007.

The submission covers points relating to:

1. The direct use of natural gas and LPG in residential, commercial and industrial sectors.
2. Automotive LPG *(page 5 of this submission)*.

Key issues – NZES and NZEECS marginalise DUOG
The LPG and Gas Associations are very concerned the draft NZ Energy Strategy appeared to downplay the strategic value of direct use of gas (DUOG). The draft NZEECS did not mention DUOG at all.

This situation indicates that Government considers:

- DUOG has no real role to play in New Zealand's future energy supply infrastructure.
- There is no value in using it to displace base and peak load electricity (fuel switching).
- There are no climate change or energy efficiency advantages to be gained from using DUOG to displace other fuels, including coal and LFO, in the residential, commercial and industrial sectors.

It appeared the draft energy strategy and the draft NZEECS concentrated more on 'electricity issues' and renewables, rather than on the most efficient and effective use of New Zealand's full portfolio of energy resources – including DUOG.

In our opinion:

- Too much focus was placed on achieving 'energy efficiency savings' (ie. a greater reliance on heat pumps was supported).
- Insufficient attention was paid to the broader impacts of that approach on the electricity system (ie. increased use of heat pumps can actually increase overall electricity load), and on the contribution other fuels can make to energy security and diversity.
- Insufficient attention was paid to the contribution other fuels, including DUOG, can make to the transition to a low carbon energy economy.

We also note that there is a history, when assessing the viability of energy efficiency programmes, to focus solely on energy savings as the only selection criteria. However, there are equally strong arguments for also considering reduced greenhouse gas emissions and reductions in other pollutants, including particulates and sulphur dioxide.

Resulting impact – negative market signals

The position on DUOG adopted by the draft Energy Strategy and the NZEECS sent powerful negative signals to both industry and consumers. Unless amended, the result of this positioning could well be that:

- Residential and commercial sectors will increasingly use electricity to fulfill energy requirements that could be met by DUOG. This has long-term implications for generation and transmission.
- The industrial sector will use more coal and LFO, both of which have major climate change and local air quality impacts.
- The exploration and gas industries will question the wisdom of investing in exploration and infrastructure development.
- Gas/LPG – which could be used more strategically to facilitate energy security - could become marginalised.

Recommended amendments to the NZES and NZEECS with respect to DUOG

The Gas and LPG Associations support the transition to renewables.

However, we want to stress that using gas and LPG directly will support this objective, and help to provide a secure, diverse and low carbon energy supply for all New Zealanders. Therefore the Energy Strategy should actively encourage fuel switching.

The NZES must:

- Note that using gas directly offers significant strategic advantages in terms of energy security and diversity, climate change impacts and energy efficiency gains.
- Endorse DUOG as a viable and preferred energy source for space and water heating and cooking in the residential and commercial sectors. The LPGA is participating in the Ministry for the Environment Warm Homes study that will assess the benefits of using DUOG in this regard.
- Advocate DUOG as a priority to displace coal and LFO in industrial applications.
- Endorse DUOG as a partner fuel for solar applications.

We also submit that in the NZEECS:

- DUOG should be recommended as a primary energy source for Government housing stock.

- DUOG should receive a positive weighting in programmes such as the Household Energy Rating Scheme.
- The programme of partial subsidies that encourage homeowners to swap to cleaner-burning DUOG heating appliances (provided by ECAN) should be expanded.
- Subsidies for solar installations could be broadened to cover gas applications as well.
- Local authorities should be encouraged to introduce initiatives to incentivise DUOG applications in new builds across the residential, commercial and industrial sectors.
- Government acknowledges its role in building market support for DUOG by sending regular positive signals about surety of gas supplies, and that it actively and regularly positions DUOG as a good option for New Zealanders.
- Government continues to work with industry to ensure appropriate frameworks that encourage use of the most energy efficient gas appliances.

What greater use of DUOG can achieve

1. Current base load impacts

Jointly, natural gas and LPG provide currently the equivalent of approximately 5,805 GWh of delivered electricity (6,449 GWh of generated energy) each year in the domestic and commercial sectors alone.

2. Projected base load impacts

However, with appropriate market conditions and policy frameworks, DUOG use in these sectors could increase to 9,428 GWh of delivered energy (10,459 GWh of generated energy).

This generated energy represents approximately 1,260 MW of installed capacity, or around:

- 28% of the delivered electrical energy for the year ending March 2005.
- Around 22% of combined electrical and gas energy generated.
- Approximately 14% of current NZ installed generation capacity (data from Energy Data File Sep 06[1]).

The 3,623 GWh increase over current base load represents over 17% of existing combined residential and commercial delivered electricity (20,708 GWh - data from Energy Data File Sep 06).

See appendix 2 for a breakdown of these current and projected figures.

3. Current and projected peak load impacts (residential sector only)

Based on the figures above, industry calculations show DUOG currently displaces a maximum hourly electricity load of about 450 peak megawatts (see appendix 3).

Based on the above projected growth in DUOG use, the maximum hourly load that could be displaced increases from 450 megawatts to 680 megawatts.

4. Impact on household electricity use

Accord to BRANZ, increasing use of DUOG for space and water heating in the residential sector alone has the potential to halve household electricity demand *(see appendix 1)*.

The benefits of increased DUOG include:

- Greatly increased diversity of energy supply.
- Significantly enhanced energy security.

[1] It also represents around 100% of the identified "Possible Future Plant Changes – 10 MW or Greater" indicated at Table G.7b of the Energy Data File Sep 06. These are identified new/additional generation projects from parties like Meridian etc. and thus includes significant wind, geothermal and gas supplied generation.

- Markedly improved consumer choice.
- Reduced base and peak electricity demand.
- Increased energy efficiency deliverables.
- Controls on/reductions of greenhouse gas emissions, and other emissions that have adverse health and local air quality impacts. This is particularly relevant where DUOG is used in the industrial sector to displace coal and LFO.

The Electricity Commission is investigating some of the issues associated with this strategic approach following its decision to include natural gas and LPG in its Electricity Efficiency Potential study.

Security of gas supplies and pricing
There is/will be plenty of natural gas from Kapuni, Kupe, Pohokura and the new Turangi wells to cater for the fuel switching scenarios we have outlined above (details can be provided).

LPG supplies are also secure, particularly with the commissioning of Kupe, which will produce approximately 90,000 tonnes of LPG per annum. This represents 50% of New Zealand's current annual LPG demand of 180,000 tonnes pa.

LPG can also be imported as necessary from Australia, which exports some two million tonnes pa. In addition, the exploration industry is actively drilling for more gas.

LPG pricing is increasing as new supply sources assume the majority of the load. However, these price movements are not expected to erode the existing differential in the key growth markets of domestic and small commercial.

Previous trends indicate the differential between natural gas and electricity and other fuels will also not be reduced – if anything the differential may increase as electricity becomes more expensive and natural gas prices remain at lower levels.

In addition, the more gas New Zealand finds, the more likely prices are to remain at lower levels.

Environmental benefits
The following shows the % reductions in CO_2 emissions that can be gained by using LPG and natural gas to displace other fuels.

Displaced fuel	**% reduction in CO_2 emissions when displaced with DUOG**
Coal	33%
LFO	15%
Heating oil	12%
Petrol	10%-12%

Because LPG is virtually particulate-free, it would help to control smog problems like those affecting Christchurch and other South Island areas.

Energy efficiency benefits
LPG and gas are approximately 85% energy efficient when used in most appliances/applications common to light commercial and industrial applications. The following demonstrates the efficiency ratings of other comparable boiler fuels.

Fuel	Energy efficiency % when used as a boiler fuel
Diesel	80%
LFO	78%
Coal	75%

Gas boilers are able to maintain their higher efficiency for longer because of gas' cleaner-burning qualities.

Recommended amendments to the NZES and NZEECS with respect to automotive LPG
The draft Energy Strategy acknowledged the benefits of automotive LPG and noted *'there may be the potential to increase the amount of LPG that is used by the transport fleet'*.

These benefits include:
- Fuel diversification and added energy security
- Cost savings to motorists
- Climate change benefits

This level of support is very welcome and the LPGA trusts the next version of the Energy Strategy will continue to endorse auto LPG.

However, this high level support must be reflected in concrete actions designed to actively encourage more use of this, and other, cleaner-burning transport fuels. It may be most appropriate to include these practical support initiatives in the NZEECS.

In the case of auto LPG, these actions should target high mileage (40,000kpa+) drivers, most of whom operate in main centres.
- Taxis (over 11,000 taxis licenses in NZ, LTNZ).
- Couriers (approx. 251 courier companies in NZ).
- Contractors' & light commercial vehicles.
- Company fleets.

Support actions to be included in NZEECS should involve the Government in:
- Publishing consumer information that encourages high mileage drivers to consider auto LPG as a cleaner-burning transport fuel.
- Working with industry to facilitate the importation of appropriate late model LPG vehicles.
- Encouraging the wider Government fleet to consider LPG vehicles as well as those using other 'alternative' fuels.
- Increasing (or at least committing to maintain) the tax differential between LPG and petrol/diesel.
- Partnering with industry to provide interest-free loans to support high mileage motorists into appropriate LPG vehicles.

Conclusion

The LPG and Gas Association thank the Minister and his officials for their consideration of this joint submission.

The NZES and NZEECS provide a unique opportunity to put in place a comprehensive energy framework that takes into account the needs of the New Zealand people and business, as well as important climate change and other environmental considerations.

We look forward to reviewing the next versions of the NZES and NZEECS, and to seeing DUOG included in them as an integral part of our future energy supply infrastructure.

Contact

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Appendix 1 – Summary of a BRANZ research analysis showing impact of fuel switching in household space and water heating applications

New research shows major electricity savings from more direct use of gas
New research analysis reveals that more direct use of gas and LPG could halve New Zealand's household electricity demand, whereas a reliance on heat pumps can actually increase strain on the electricity system.

The paper, released by BRANZ in February, suggests greater use of gas and LPG for low process heat applications – eg. household space and water heating – could shave 56% off current winter household electricity loads, and 51% from average household summer demand.

Not only would this greatly reduce current pressure on electricity generation systems, it would also limit the need for and size of new power stations and minimise investment in costly grid upgrades.

As well as advocating direct use of gas and LPG, the report also casts doubt on the strategic impact of heat pumps.

The research shows that using high efficiency electric heat pumps for water and space heating reduces average winter load by just 6% and summer load by only 22%.

It also shows that heat pumps could actually increase peak electricity load, although this needs further analysis.

The BRANZ paper shows hot water and space heating account for 63% of total household energy consumption. Lightening, refrigeration, cooking and other appliances comprise the rest.

The paper notes the importance of shifting the focus of energy policy away from electricity generation and on to 'the best way for the country to match fuel resources with energy needs.'

"There is no alternative to electricity for some applications, like lighting and running specific electric appliances," the report notes, "but, equally, there is no reason why direct use of gas can't be used for cooking, and space and water heating."

Doing so would reduce both base level and peak load electricity demand.

While the BRANZ analysis looks only at residential sector, it is thought the commercial and industrial markets will have similar energy consumption patterns. This leaves the door open to even greater electricity savings.

Appendix 1 continued - The full BRANZ paper

The Need For New Electricity Generation – The Role Of Demand

Nigel Isaacs, Principal Scientist, BRANZ Ltd.

Introduction

The debate over New Zealand's need for more energy has ranged widely over the past few years but there seem to be some common themes:

- there is an urgent need for more electricity generation and transmission
- all possible ways of producing large amounts of electricity must be explored, whether commercial (e.g. wind or geothermal), existing but under development (e.g. nuclear) or in early (e.g. 'clean coal') or developed research (e.g. biomass or marine).

This paper explores how households use energy and concludes that the real issue is not more electricity generation, but rather the best way to match our fuel resources to our energy needs.

Fuels and energy

The focus of New Zealand's recent energy debate has been on electricity. Electricity is **a** very important fuel, but it is **not** the only fuel. 'Energy' and 'fuel' are different – fuel transports energy, but needs to be transformed to be useful. For example, the burning of coal (fuel) releases heat (energy). Uniquely, electricity is both fuel and energy – it can be transformed into heat or used directly (e.g. for a computer).

'Energy' can be thought of in terms of what it does – the 'end-uses'. To boil water, heat to reach 100℃ is needed; to cook a cake needs heat over 100℃; while electronics need electricity. Heat can be provided by a wide range of fuels – natural gas, electricity, LPG, wood, coal, oil, geothermal or even the sun. Electricity can be generated from an even wider range of sources e.g. from fuels used in a thermal power station, falling water etc.

But is the real question: "What fuel is necessary to provide the desired energy services"? The results of the Household Energy End-use Project (HEEP) can be used to help answer this question (for more information on HEEP see www.branz.co.nz).

Household fuels

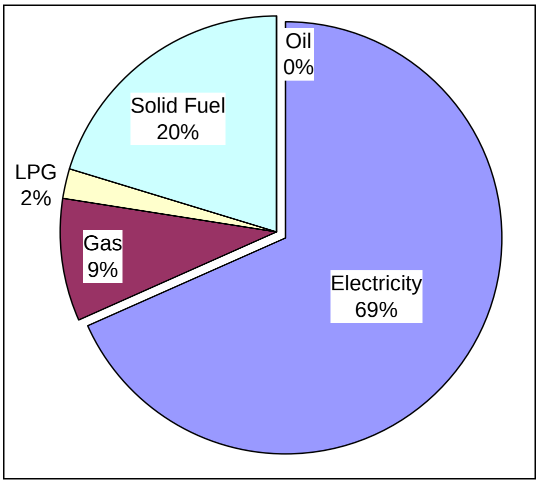

Figure 1: Household fuel use

The HEEP research monitored fuel and energy services in a statistically representative sample of 400 randomly selected houses from Invercargill to Kaikohe. In each house all fuels (natural gas, electricity, wood, coal, solar water heaters, oil and LPG) were monitored for a year. Energy services, such as living room and master bedroom temperatures, appliance and hot water use were also monitored.

The HEEP household fuel breakdown is given in Figure 1, showing that electricity is the major fuel in our houses. Before HEEP, the residential use of solid fuel (wood and coal) was not well known. HEEP knowledge has resulted in the addition of a 530 MW power station worth of wood to the official energy statistics – about half the size of the Huntly Power Station. But what are these fuels used for?

Household energy services

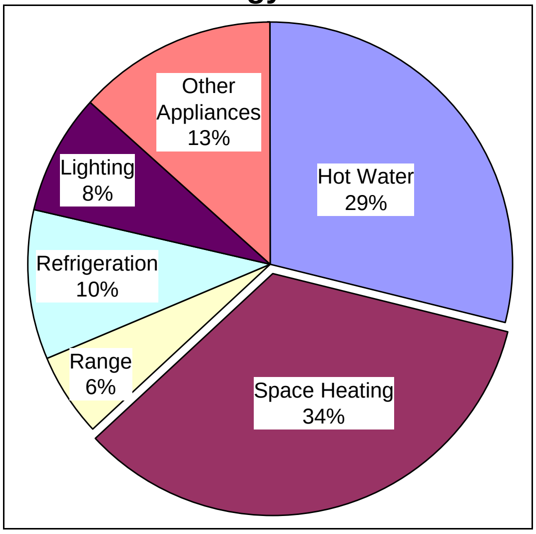

Figure 2: Household energy uses

Figure 2 shows the distribution of energy uses or services. Space heating and hot water are the largest uses, while appliances, refrigeration, lighting and cooking (range) account for the rest.

Another way to look at Figure 2 is that space and water heating (63%) need heat under 100℃, while the range (6%) needs heat over 100℃. Electricity-only services are 31%.

HEEP data reveals that the hot water fuels are electricity (75%), gas (20%) and solid fuel wetbacks (5%). The main space heating fuels are solid fuel (56%) and electricity (24%). Hence electricity generates a large amount of the under 100℃ heat.

But what if household fuel use shifted from its current pattern into patterns that better matched the energy services? At least two extreme scenarios are possible:

- electricity was used only for electricity-only services (31% from Figure 2)
- electricity was used for all services (100% from Figure 2).

Shifting fuel use

Figures 1 and 2 are based on average energy use over the whole year, but energy use varies by season – space heating is mainly a winter energy use. The HEEP data shows the highest energy (and electricity) consumption is in July (winter) while the lowest is in January (summer). Table 1 gives the results for the present situation and the two scenarios:

- **present** – the energy used by New Zealand houses based on the current mix of fuels
- **electricity+gas** – electricity-only services are provided by electricity, while natural gas provides space and water heating, range
- **all electricity** – electricity is used to provide all services, with heat pumps with a Coefficient of Performance (COP) of 2.5 providing hot water and space heating.

HEEP results are presented as ‘average Watts’ – that is the power load if that fuel or service was being used for 8760 hours over a year. This avoids problems with different numbers of days in a month, or conversion between different energy units.

Table 1 shows that shifting to the **electricity+gas** scenario results in higher household energy use, while the **all electricity** scenario leads to lower household energy use. But just focusing on energy efficiency disguises the broader impact on the electric system.

Scenario season	Present	Electricity + gas	All electricity
Summer electricity	667 W	326 W	520 W
Summer gas or other heat fuel	81 W	503 W	-
TOTAL household energy	**748 W**	**829 W**	**520 W**
Winter electricity	1159 W	506 W	1086 W
Winter gas or other heat fuel	1050 W	1671 W	-
TOTAL household energy	**2209 W**	**2177 W**	**1086 W**
Winter:summer electricity ratio	174%	155%	209%

Table 1: 'What if?' residential energy scenarios

Table 1 also shows the present summer household electric load averages 667 W. Shifting water and space heating (**electricity+gas**) to natural gas reduces the average household electric load by 51% to 326 W. Shifting to high efficiency electric heat pumps (**all electricity**) reduces the average summer electric load by 22% from 667 W to 520 W.

In winter the impacts are more pronounced, as space heating plays a larger role. The **electricity+gas** scenario reduces the average winter electric load by 56% from 1159 W to 506 W, while the **all electricity** scenario results in a very small reduction of 6% to 1086 W.

The relationship between the winter and summer electricity load is also important. The closer the electric loads during the two seasons (i.e. closer to 100%) then the lower the need for costly peak electricity generation plant. The current average winter (July) load is 174% of the summer (January) load. Shifting space and water heating to natural gas reduces the ratio to 155%, as well as reducing the winter electricity demand. Using high efficiency electricity heating increases the peak to 209%, but maintains the present winter electricity demand.

Today about 80% of households have electric resistance hot water, reducing the impact of the **all electricity** scenario. Leaving hot water fuels unchanged (but using heat pumps for space heating) reduces the average summer load by 4%, increases winter load by 7% and increases the winter to summer electric ratio to 194% – resulting in a greater need for peak generation.

This moving of space and water heating to high efficiency electricity results in an almost unchanged electricity load with an increase in the 'peakiness' of the winter monthly (and most likely daily) load. This also holds true if only space heating is converted to heat pumps.

Resource implications

Any suggestion for more gas use raises concerns about gas reserves. In 2005 the residential sector consumed 6.5 PJ, or about 5% of total gas use. 68% of gas was used for electricity production and non-energy purposes. The increased direct use of gas under the **electricity+gas** scenario would not appear to be a major resource issue. Electricity generation in the **all electricity** scenario could use natural gas, but would require more than the **electricity+gas** scenario. Coal-fired generation would further increase carbon emissions. Alternatively, the household use of wood would reduce carbon emissions, but would need high efficiency burners to minimise local air pollution.

Each of these scenarios has generation, transmission, distribution, environmental and greenhouse gas implications. Of particular note are New Zealand's obligations under the Kyoto Protocol (which would be best served by lower greenhouse gas emissions), and local air pollution problems (which require the use of low emission residential scale burners).

Conclusions

New HEEP knowledge of energy use in New Zealand homes has allowed the use of two scenarios to explore the impact of encouraging the use of higher efficiency electric space and water heating. Shifting from current space heating fuels (about half of which are wood or coal) to electric heat pump based space and water heating adds a significant load to the electricity generation, transmission and distribution system. Heating fuels (e.g. natural gas, wood or coal) used directly in an efficient burner reduce the load on the electricity system, notably by reducing the baseload and the winter peak, and ultimately need less generation.

No attempt has been made in this analysis to account for changes in occupant behaviour (such as the use of the heat pumps for summer cooling), improved efficiency in the use of natural gas or solid fuels, availability of natural gas in the South Island, or any energy efficiency improvement of buildings or plant, beyond the use of heat pumps. Capital implications have also not been considered – whether for new generation, transmission, distribution or on-site equipment. These, and many other questions, should form the basis for a more detailed study.

Most importantly, this analysis shows that the real debate is not about the most desirable way to generate electricity or build transmission lines, but rather what is the best way to use our many different, abundant fuels.

Appendix 2 – Reticulated natural gas market current and projected energy provision

Reticulated natural gas end use by the commercial sector was 7.4 PJ for the year ending December 2005. For the residential sector it was 6.5 PJ or an aggregate 13.9 PJ[2],[3]. This quantum of delivered energy is equivalent to approximately 3,860 GWh of delivered electricity.

Allowing for electrical generation losses at an average of 11.1%[4], this represents 4,288 GWh of electrical energy generation (over 10% of the total electrical energy generated in the year ending March 2005).

GANZ estimates that, with only incremental capital investment, a mature natural gas market may expect to service around 65% of available mains fronters (= 390,000, up from the existing 260,000 connections).

This would represent an additional 2,144 GWh of electrical energy generation capacity - over 5% of the electrical energy generated to the year ending March 2005[5].

The projection does not consider increased diversity of use of natural gas in the home or business, which could easily raise consumption further. Nor does it consider further expansion of the existing gas distribution network that currently makes natural gas available to around only 40% of North Island properties (residential, commercial and industrial sites).

LPG growth current and projected energy provision

The LPG market has grown by over 50% in the last five years and now accounts for some seven petajoules of energy, or some 1,945 GWh of electricity displacement pa.

Recent data shows LPG has a 63.1% penetration rate in the South Island residential sector, where almost 75% of new homes now use gas. Demand for reticulated gas connections in Central Otago alone is growing at about 15% a year.

Under a business as usual scenario, LPG load could expect to grow by 6% pa and be displacing 2,759 GWh of electricity by 2012 (3,054 GWh if calculations allow for electrical generation losses).

Active Government support for fuel switching using LPG could see an 11% increase over a business as usual baseline, giving a possible conservative total displacement of approximately 3,638 GWh by 2012 (4,027 GWh including generation losses).

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[2] The Ministry of Economic Development's September 2006 Energy Data File.

[3] It is reasonable to assume that almost all the 260,000 natural gas connections in the North Island account for the natural gas consumption of 13.9 PJ identified above.

[4] Difference between GWh figures in Tables G.1 and G.2 at pages 126-7 of the Energy Data File September 2006, presented as a percentage of the Table G.1 figure.

[5] Assuming a generation availability of 0.95 this is equivalent to about another 260 MW of installed electrical generation (or around 5% of current installed North Island capacity).

Appendix 3 – Explanation of residential peak shaving modelling

A spreadsheet model has been developed to represent an 'average' 24 hour period of electrical energy consumption for a residential household, broken down in to six activities as reported by BRANZ under the 'Energy Use in New Zealand Households – HEEP Year 10 Report[6]' (BRANZ Report). It is acknowledged that the modelling is necessarily limited due to access to data, a range of assumptions required, non-consideration of summer/winter energy consumptions variations etc. It is thus a high level view only.

The BRANZ Report summarises total energy[7] by end-use under the following categories: cooking (range), refrigeration, lighting, other appliances, hot water and space heating. The BRANZ Report indicates the percentage of total energy used by each of these categories which is represented in Table 1 below grouped under what are considered here as non-switchable (must use electricity) and switchable (can use alternates to electricity such as natural gas or LPG):

Category	**% of Total Energy Used**
Non-switchable	
refrigeration	10
lighting	8
appliances	13
Switchable	
cooking	6
water heating (hot water)	29
Space heating	34
	100

Table 1:

The BRANZ Report also indicates that the national average annual electricity consumption is measured at 7800+/-420 kWh per year[8]. Based on this starting information, an average daily consumption is calculated and then apportioned to each of the 24 one hour periods. This is then allocated to each of the six categories listing in Table 1 above by the corresponding percentage and the result represented in figure 1 as the 'average daily use – all electric' dark blue coloured line. Next this basic energy use profile is adjusted by category for likely time-of-use considerations and the resulting profile is represented in figure 1 as the 'Electricity only – adjustment of time of use within the day' pink coloured line. Finally all use which is considered here as switchable is assumed to be switched away from electricity to produce the profile is represented in figure 1 as the 'Electricity and Gas (Natural Gas and LPG) for switchable – adjustment of time of use within the day' yellow coloured line.

6 Study Report SR No. 155 [2006]. HEEP is the Household Energy End-use Project
7 Fuel types are electricity, solid fuels (wood and coal), gas and LPG
8 Study Report SR No. 155 [2006], page 17. National average annual energy consumption is measured at 11410 kWh per year

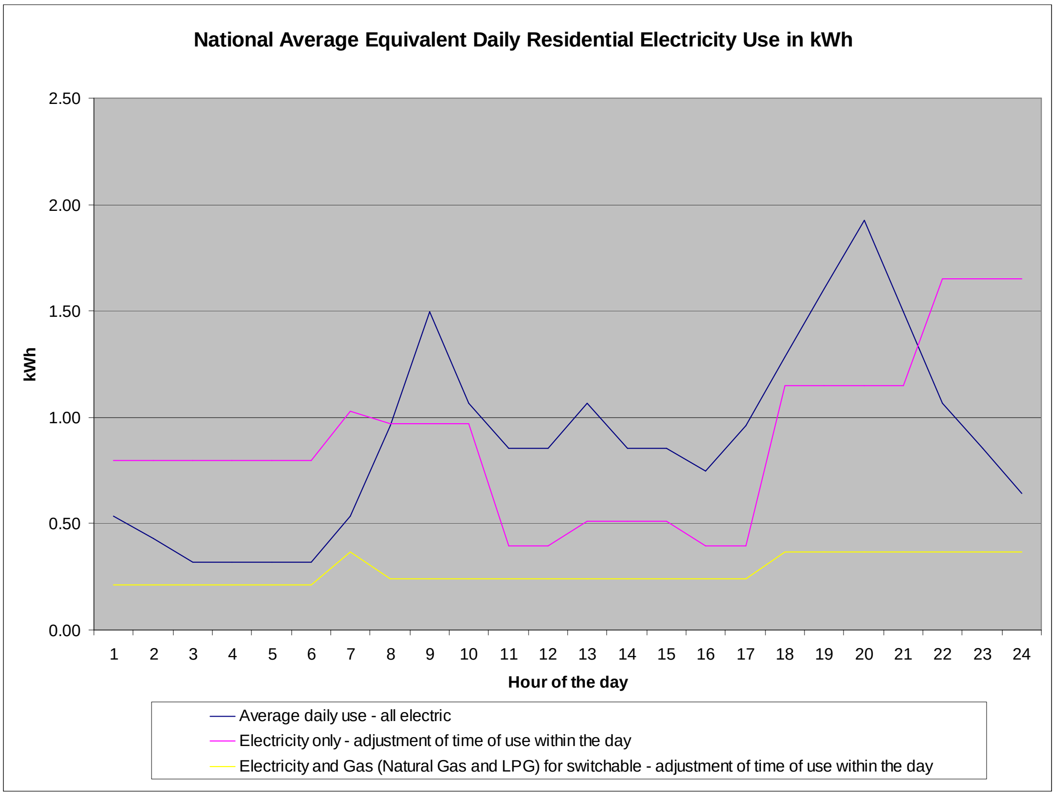

Figure 1.

The approach taken here is considered conservative even with our assumption that the electrical energy consumed can be split between end-uses in the same proportions as is applicable under all energy types[9], as the national average annual energy consumption as found by BRANZ indicates that multiple fuel types are used rather than just electricity,. This 'electricity only' apportionment does appear to be line with Consumers' Institute[10] findings and assumptions for 'all electric' households as indicated in Table 2 below.

Use Grouping	**BRANZ SR No. 155 [2006]**	**Consumer Inst. – current assumption**	**Consumer Inst. – May 04**
	All fuels	Electricity Only	Elect Only
General – lighting, cooking etc.	37.0	35.0	45.0
Hot water	29.0	35.0	33.0
Space Heating	34.0	30.0	22.0
	100.0%	100.0%	100.0%

Table 2:

In addition, the Consumers' Institute indicate one of their assumptions is that 'for houses which are usually occupied and only use electricity, we allowed the following annual

[9] This assumption is necessary due to lack of more detailed information regarding the specific proportions of end-uses of electricity.

[10] The Consumers' Institute's website http://www.consumer.org.nz has a range of materials relating to estimating electricity use within the home. They provide an "average New Zealand home" electricity usage by six categories as at May 2004; as well as a range of current estimating assumptions to assist website users to determine electricity costs (and hence enable retailer comparisons).

electricity usage levels: small (7,700 units); medium (11,000 units); large (16,000 units).'[11]. Here a unit is 1 kWh and we have modelled on 7800 kWh annual electricity consumption, hence acknowledging the national average BRANZ finding (relating to use of multiple fuel types).

The key message is that switching fuel types away from electricity can significantly reduce the quantum of electrical energy consumed in any hour period and further can massively flatten peak demand across the 24 hour period. Reduction in peak demand is very valuable as it means:

- there is less electrical generation required,
- reduces inefficient use of fossil fuels as at least part of the generation will be base load thermal generation;
- will reduce likelihood of transmission and distribution capacity constraints;
- will reduce the quantum of transmission and distribution line losses;
- a reduction in spinning reserve requirements;
- delay requirement for further capital investment in the electrical infrastructure related to system capacity enhancement; and
- in-directly increase transmission system security as the system may operate satisfactorily at an n-2 redundancy.

To illustrate this graphically, the savings per hour are converted to the equivalent megawatts (MW) of generation which can be avoided if only a number of households equally to the actual natural gas and LPG connections in New Zealand were not using electricity to provide the 'switchable' energy uses (cooking, hot water and space heating) – this is the series of mauve coloured bars in figure 2 below. Using the forecast growth projections in the previous submission of August 2006 and again assuming the savings per hour are converted to the equivalent megawatts (MW) of generation which can be avoided, yields the series of plum coloured bars in figure 2 below.

The avoided electricity amounts to between 1700 and 2500 GWh per year and given approximately 75% of the around 1.4 million household are located in the North Island, the possibility of connecting an additional 310,000 to 460,000 household to natural gas or LPG is realistic given the current natural gas and LPG infrastructures that are in place. These additional connections could actually be a lot lower, given that a number of existing natural gas and LPG connections are not utilising these fuels for all 'switchable' load currently. On this basis the projections appear pragmatically deliverable should there be the will to do so.

[11] The Consumers Institute's website http://www.consumer.org.nz

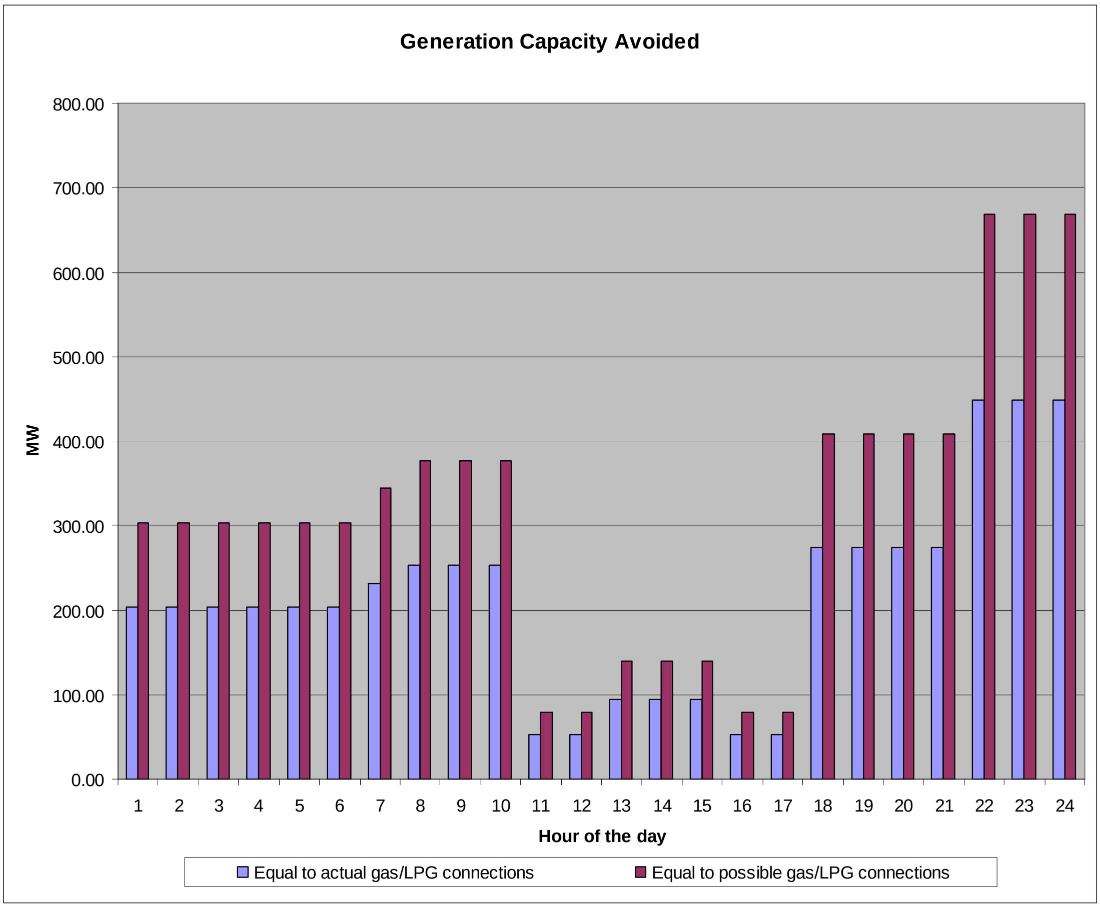

Figure 2.

Figure 2 indicates that around 5 to 50%[12] of the identified new generation projects could be shelved or delayed for a meaningful period of time' or alternatively at least one or two of Huntly's four generators would not need to run (at least for significant portions of the day).

Jim Coe
Director
JT Consulting Limited

[12] "Possible Future Plant Changes – 10 MW or Greater" indicated at Table G.7b of the Energy Data File Sep 06.