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Submission on Project Discovery: Energy Market Scenarios

Preface

This submission is based on an intimate knowledge of the Victorian Electricity Industry Restructuring, the close involvement with the establishment of the National Electricity Market (NEM), over 15 years experience in electricity cost modeling and pricing development, both under a regulated environment and in the new competitive market and a keen interest in the techno-economics of energy use.

Electricity Markets Research Institute (EMRI) undertakes research with primary focus on:

- Public benefit aspects of competitive energy markets:
- Technical and market efficiency,
- Equity issues,
- Transition issues going from integrated utility in a monopoly market to competitive marketing.

A brief write-up of the work of EMRI and a short biography of the author are given in Attachment A.

Introduction

While electricity industry restructuring in Australia was originally modeled on the then newly restructured electricity industry in Great Briton, Australia continued with a gross type electricity pool market while GB adopted a net pool market. Problems GB had with Uplift in a day ahead market were largely resolved by coming down to five minute dispatch and half hour average market price. In most other respects the electricity supply industry in the two countries are very similar, even to the extent of forging a closer alignment with the gas supply industry.

Threat of Global Warming and the recent Global Financial Crisis makes it more important that energy industry responses involving large sums of money employ the best available solutions and are the most likely to succeed in the shortest time possible. GB has shown leadership in committing to demanding targets for GHG emissions reduction. It is hoped that the insights and propositions contained in this submission would help fashion the processes being put in place to achieve the said targets. In the submission it is proposed that a new scenario be developed to reflect a plausible alternate technology path and comment is provided to flesh out some of the aspects that need to be incorporated. If need be, the author is happy to collaborate with an independent local authority to more fully develop such a plausible alternate technology scenario that best suit conditions in GB.

Chapter 2. Approach and assumptions

Question 1: Please provide comments on our approach of using scenarios and stress tests to explore future uncertainty, and as a basis for evaluating policy responses. Scenario Planning is a powerful tool and worthy for this application; "*The original method was that a group of analysts would generate **simulation games** for policy makers. The games **combine known facts about the future**, such as demographics, geography, military, political, industrial information, and mineral reserves, with **plausible alternative social, technical, economic, environmental, educational, political and aesthetic (STEEEPA) trends** which are **key driving forces***" (http://en.wikipedia.org/wiki/Scenario_planning).

Scenario planning is a structured way to 'think outside the box', as it is concerned with "combine **known facts** about the future, such as demographics, geography, military, political, industrial information, and mineral reserves, with **plausible alternative** STEEEPA trends. Nothing should be taken for granted, there are no sacred cows. Project Discovery has not broken the shackles that tie it down to existing practices: "*existing market and regulatory arrangements need to be re-examined to see if they are still appropriate*", "*energy policy has been based on the view that competition between companies to generate and supply energy would deliver the best outcome for consumers*", "*focus in protecting consumers has been to promote effective competition in the supply of gas and electricity*", and "*The interest in the ability of energy markets to deliver secure and affordable energy and at the same time meet environmental objectives is intense*". It seems 'current forms of energy markets' and 'renewable energy target' are still considered as sacred cows. Project Discovery has chosen to concentrate effort only on plausible alternative **economic, and environmental** trends leaving out the more important aspect of plausible alternative technical trends. Energy supply and use is highly technology dependent, and cost-effective containment of environmental impacts needs all the technological help available. While the chosen plausible alternative economic and environmental trends are exogenous, Ofgem has the capacity to influence future technology choices that

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stand out from the rigorous testing of plausible alternative technical trends according to the scenario planning process.

"Ofgem's statutory duties were extended in the 2008 Energy Act to put more emphasis on the achievement of sustainable development and to consider the interests of future as well as current customers. The Government's Low Carbon Transition Plan, published in July of this year also emphasised that Ofgem's duties to protect current and future customers include tackling climate change and ensuring security of supply, by competition or otherwise".

It is disappointing to note that "*Not all scenario assumptions can be related back to the two scenario drivers, for example the impact of geopolitics on the oil price, or the speed of technological development. For these variables **we have made assumptions** that support the **emerging picture** from each scenario*". Project Discovery apparently fail to appreciate that the ideal free market is a voluntary exchange at a price arranged solely by mutual consent of sellers and buyers. No amount of competition for supply can compensate for denying the customer a free choice at the purchase moment (as electricity cannot be stored economically, electricity generation and the retail consumption are linked in real-time and there is a price disconnect between real-time pool price and retail price, with next period retail prices having to absorb new hedge costs which are influenced by current period pool prices). Important technology changes are now available to provide the customers correct price signals at the purchase moment thereby enabling informed consent. What has been lacking are the bridging technologies that emancipate the consumer, reduce the transaction complexity and cost for the small customer to participate in co-generation and demand response, make high efficiency heat pumps a mainstream component like in the case of the Combi boiler, and give the consumer the opportunity to make own choices to improve energy efficiency and reduce GHG emissions at a lower cost than possible by mandating higher cost routes such as wind, solar and hydro

Question 2: Are there other techniques for analysing uncertainty that we should consider?

Scenario Planning of plausible alternative technical paths can very usefully draw upon techniques in Technological Forecasting, broadly classified as the "**ontological** view, that science and technology change in response to scientific and technical opportunities, and the **teleological** view, which holds that science and technology change in response to social, economic, political, and other factors in the total environment. One could also think of exploratory and normative forecasting as analysis according to the "pull" of objectives versus the "push" of opportunities. "*As contrasted to ancient and medieval times, the values of the modern era, starting with the Renaissance, are based on the premise that man has some control over his destiny and that he should use nature and the earth's resources to improve his lot, rather than being a servant of nature. In recent years, this value system has been extended somewhat and now includes the notion that man is a custodian of nature and has responsibilities for conserving the resources of earth. Still, **technology** can be viewed as the instrument for both improving human conditions and insuring the conservation of nature*". (Operations Research and Technological Forecasting by Dr. Roy K. Frick

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at http://www.airpower.maxwell.af.mil/airchronicles/aureview/1974/may-jun/frick.html)

The advantage of combining Scenario Planning of plausible alternative technical paths with Technological Forecasting is that it can recognize a **paradigm shift in technology**, which will be missed under the current version of Project Discovery. It is preferable to combine the use of different tools in the manner of Informed Forecasting, which begins with a set of key assumptions helped by techniques such as Decision theory and Utility theory, and then use historical data and expert opinions to develop plausible alternatives.

The term **paradigm shift** was first used by Thomas Kuhn in his influential 1962 book "The Structure of Scientific Revolutions" to describe a change in basic assumptions within the ruling theory of science. When a paradigm shift occurs, seemingly ordinary concepts take on extraordinary meaning. Often the leading industry players fail to recognise the onset of a paradigm shift since they are still attuned to the traditional industry landscape and may be in denial as their vested interests might be at stake. The following seemingly mundane technology developments conflate seamlessly to solve number of seemingly intractable problems. The paradigm shift provides new insights to improve on current practices and provides the framework for designing incentives necessary to implement the new paradigm.

Substantial synergy flows from combining following emerging technologies (the push):

- **Heat pumps** with high coefficient of performance (COP 3 to 6) can pluck heat from ambient air equivalent to 3 to 6 times the energy input to the heat pump;
- The **compressor** – the core of a heat pump, has significantly improved in performance with the introduction of **scroll type impellers** and use of **carbon dioxide** as the refrigerant;
- Heat pumps improve utilisation of low level heat and cold from ambient air, significantly increasing effectiveness of **solar / ground thermal** applications. European Parliament legislative resolution passed on 17 December 2008 recognises[1] for the first time **aerothermal** and **hydrothermal** energy as sources of renewable energy under EU law;
- There is **synergy effect of combining heat pumps with solar / ground thermal applications,** avoiding significant deterioration of heat pump efficiency at extreme temperatures (hot or cold) that would occur otherwise. This then reduces the big drain on mains energy supplies. For example, on very hot summer afternoons the heat pump air-conditioners have to work harder since their efficiency drops with increased ambient temperature. Unfortunately, this is the very time when the energy delivery capacity of the power system also gets de-rated because higher ambient temperatures reduce the cooling available to operating power lines and electrical plant. This triggers plant tripping when they reach thermal limits for safe operation;

[1] See http://ec.europa.eu/energy/strategies/2008/doc/2008_01_climate_action/2008_0609_en.pdf
Article 2 Definitions: b) "aerothermal energy" means energy stored in form of heat in the ambient air; and d) "hydrothermal energy" means energy stored in form of heat in surface water;

- High efficiency environmentally friendly small diesel engine developments in the car industry are now being translated into high efficiency small gas engines with significantly lower GHG emissions than their diesel counterparts;
- Cogeneration with small sized gas driven internal combustion engines are starting to appear, able to provide substantial increase in the efficiency of converting gas to electricity use with the added bonus of reduced line losses, ability to contribute to peak electricity demand, contributing to reduced need for power system augmentation, contributing to improved electricity market outcomes;
- Development in power electronics has substantially reduced the cost and versatility of inverter / converter systems, to the extent that most medium size air conditioners and even micro wave ovens nowadays have a built-in inverter. Such units can now enable the in-house co-generation system to even supply reactive power to help with line voltage support;
- Having a gas engine at the premises also opens the door for running the heat pump as an additional option to using an electric motor drive, helping reduce summer maximum demand on the electricity power system and to reduce winter maximum demand on the gas transmission / distribution;
- Home automation and security systems are finding favour helped by the widespread availability of 'always on' communications systems (eg internet) at the home and office;
- Smart meters are entering the market and will combine with developments in communication systems and home automation to substantially increase synergy effects;
- Developments in real-time pricing and curtailment tariffs promise substantial benefits to customers and the operation of the power system / energy markets;

The synergy effect of the above mentioned technologies are able to be synthesised due to the contribution of two new bridging technologies:

- Opportunity Power ™ a new technology package[2] that combines
  - a new type of dynamic real-time retail energy contract that contain provisions to limit pool price exposure risk but able to access financial gains from price excursions in the pool market;
  - provision to add further incentive payments from retailer, network operator, electricity market operator, or demand response aggregator;
  - provision for incentive payments to be location / region specific;
  - a fully automated demand response system covering key loads installed at the premises, in communication with smart meter installed at the premises, able to access pool price and price forecast information, able to disconnect or reconnect loads on occurrence of specified conditions;
  - conditions for disconnecting or reconnecting loads dependent on type of load being served and customer attributed value of using that load;
  - the diligent operation of which enables substantial financial gain with minimal exposure to pool price risk;

[2] Covered by Australian Patent No 748800, patent granted NZ, pending in USA, Canada & Europe

- a new[3] type of automated co-generator plant called Energy Arbiter™ that enable key customer loads (eg HVAC, water pumping, compressor operations, etc) **to arbitrage between energy sources, between electricity import / export and between energy efficient technologies (co-generation and heat-pumps in the case of building systems).** The key component is a gas fuelled engine, already in commercial use for co-generation at customer premises. GB has traditionally had hydronic heating systems and the popular Combi boiler is a good example. An intermediate thermal storage facility enables optimum technical, operational and financial outcomes. Heat pump operation under extreme conditions is helped by having a solar / ground water thermal source.
- See comment in Chapter 2 Q1. As the scenarios are inappropriate there is no point in commenting on their results.
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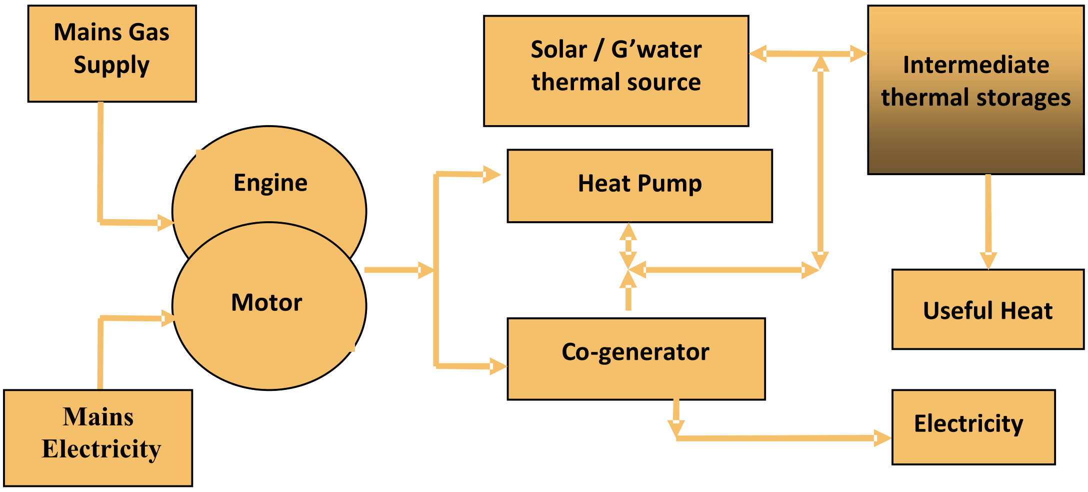

The 'pull' factors include:

- Retirements of older nuclear plant and closures of coal and oil plant by the end of 2015
- Increasing gas import dependency could be exacerbated by growth in gas-fired power generation
- In 2007 use of gas was 51.4 MTOE or 36% of total Final Consumption (excluding international aviation), and was 43% if including gas used for electricity generation
- Gas use by Domestic, Commercial & Public Administration customers amounted to 38.6 MTOE (around 75%) mostly for space and water heating
- Significant changes in the way in which we generate and consume power may be needed to manage the variability associated with increasing reliance on wind power.

[3] Covered by Australian Patent No 2004907153, patent pending USA, Canada, Europe, Japan, China, India & NZ

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- High levels of investment are likely to be needed to secure energy supplies and meet carbon targets, including the need to augment the electricity transmission and distribution systems to cope with extreme weather events due to global climate change;
- Impact on consumer bills will be substantial and supply reliability levels will be under threat.

Question 3: Do you agree with how we measure the impacts of our scenarios and stress tests?

Scenarios need to include plausible alternative technology paths that may require other stress tests like availability of gas and speed of innovation diffusion. It is worth noting that where the new innovation has clear and worthwhile benefits, UK customers have demonstrated very rapid diffusion rates, eg Combi boilers have grown from only 1000 units in 1975 to 9 million by 2006. Because of the already established customer experience with Combi boilers, the introduction of new units proposed under the **technology paradigm shift scenario** would find market acceptance that much easier. Given the economic life of units like the Combi boiler would be around 15 years, replacement time for the existing units would be an opportunity to change over to a next generation innovation.

Sub routines build-in to the Project Discovery scenarios such as the **uplift** function (calibrated by analysing the historic relationship between spot prices, the short run cost of the assumed marginal plant and the system margin) and level of **Feed-in Tariffs,** are hostage to historical circumstances and are not sustainable in the long term. The **technology paradigm shift scenario** points the way to reducing reliance on such sub routines and their eventual withdrawal.

Question 4: Do you agree with our key scenario drivers and choice of scenarios?

As mentioned previously, Scenario Planning is a powerful tool to explore 'outside the box' options "*The original method was that a group of analysts would generate **simulation games** for policy makers. The games combine known facts about the future, such as demographics, geography, military, political, industrial information, and mineral reserves, with plausible alternative social, technical, economic, environmental, educational, political and aesthetic (STEEEPA) trends which are **key driving forces***". Using only exogenous drivers makes it a sterile exercise, whereas including key endogenous drivers like technology - over which the policy maker has some control, is a more appropriate use of Scenario Planning. A scenario driven by plausible alternative technology path(s) of course needs to be stress tested under most likely ***social, economic, environmental, educational, political and aesthetic*** settings.

It is suggested that Project Discovery should include a **technology paradigm shift scenario**, where customer generated electricity is cheaper than electricity from central power stations and both overall gas consumption and GHG emissions are reduced, with dramatic reductions in required investment in the total energy sector translating to reduced customer bills and improved power system reliability / energy market operations.

Question 5: Do you believe our scenarios sufficiently cover the range of uncertainty facing the market, and hence cover the areas where future policy responses may be required?

The term *'secure and sustainable' energy supplies* is used to describe the balance between security of supply, environment and costs to consumers. A **technology paradigm shift** requires new relationships rather than incremental change to existing relationships.

No customer loses supply of gas or electricity if they would have been willing to pay more for a more reliable supply (or is adequately compensated if they do lose supply) is only an implied assertion while the **technology paradigm shift scenario** makes it explicit or hard wired**;**

Environmental targets to tackle climate change and air pollution are expected to be achieved **but they need to be at least possible overall cost (including subsidies)**; and,

Consumers pay no more than they need to, in order to achieve these objectives, whilst at the same time prices are sufficient for investors to make adequate returns. According to the **technology paradigm shift scenario** co-generation at customer premises largely replace investments by industry players / outside investors. Proven models exist for achieving such objectives, eg Energy Service Companies (or ESCo).

Project Discovery expects to make an *assessment of how current market arrangements could be improved, and in particular whether they enable appropriate response on both the demand and supply side*. Suggested **technology paradigm shift scenario** incorporates demand response and customer in-house electricity generation that is driven by market price, thereby improving power system reliability, counteracting market power of the supply side, reducing need for expensive power system augmentation and reducing the burden on the power system from the intermittent output of renewable generation sources like wind and solar.
Project Discovery model *allocates energy to customers that most value it, and in the form (i.e. electricity or gas) they most value when energy supply is scarce and a response on the demand-side is required*. There is acknowledgement of model failure in this regard "*However, imperfections in the market rules, combined with technical difficulties in isolating individual customer segments, may prevent this*". The **technology paradigm shift scenario** provides a neat hard-wired solution to this dilemma. In this scenario self disconnection attracts a reward and export of in-house electricity generation can earn full benefits of congestion prices while at the same time helping to alleviate power system congestion.

Excessive reliance on incentives for renewables, nuclear and CCS, means taking the easy option of the "known devil" versus the "unknown devil" of energy efficiency, distributed generation, demand side response, etc. etc. A plausible alternate technology scenario incorporating best of breed "unknown devils" needs to be developed so that the two alternatives (versus current policy stand) can be compared.

Question 6: Do you have any specific comments on scenario assumptions, and their internal consistency?
See comments under questions 1 and 2. The consultation paper does not provide alternate policy scenarios but only give alternate economic and environmental positions to test policy options. As there is not disclosure of policy scenarios it is not possible to comment on internal consistency (of policy).

Question 7: Do you agree with our **methodology for modelling gas and electricity supply/demand balances**?

Previously it was mentioned that Gas use by Domestic, Commercial & Public Administration customers amounted to 38.6 MTOE (around 75% of gas use excluding electricity generation) most of it being used for space and water heating. Gas use is 43% of total energy consumption if gas used for electricity generation is also included. The **technology paradigm shift scenario** gives the final customer the capacity to arbitrage between gas price and electricity price (for around 75% of total energy consumption which is for space and water heating) without the need of a middleman. Provided energy markets are completely unfettered, this mechanism incorporating high energy conversion efficiency will always ensure the best outcome for gas and electricity supply/demand balance. According to the **technology paradigm shift scenario** the large amount of gas currently used only for space and water heating can cover **both heat and electricity** consumption of Domestic, Commercial & Public Administration customers. With use of newer ultra high efficiency heat pumps with scroll type impellers that give COP of around 6 in water heating applications and new high conversion efficiency permanent magnet generator units, the new co-generation units can provide much more electricity than their own premises' requirements. This will substantially reduce the extra gas resources that the Discovery Project now earmark for electricity generation from new CCGT units.

Question 8: Do you agree that LNG is the likely medium-long term source of "swing gas" for the European market?

Technology developments in coal seam gas and underground coal to gas conversion opens up access to deeper coal deposits that were previously uneconomic to exploit. Bio methane has been demonstrated to be economic in temperate climates within Europe and there is no reason to believe it would not be a success in GB as well. Bio methane has the added advantage that carbon sequestration during the plant growth phase will offset GHG emissions when that derived gas is used.
In the ten to twenty years it takes to rebuild a sizable nuclear presence and a sizable renewable energy portfolio, native gas production can be significantly increased given sufficient attention and incentives. Most of the needed infrastructure already exit for deploying such local gas production.

Chapter 3. Scenario analysis

Question 1: Do you have any observations or comments on the scenario results?

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See comment in Chapter 2 Q1. As the scenarios are inappropriate there is no point in commenting on their results.

Question 2: Do you agree with our assessment of what the key messages of the scenario analysis are?
See comment in Chapter 2 Q1. As the scenarios are inappropriate there is no point in commenting on their results.

Question 3: Are there other issues relating to secure and sustainable energy supplies that our scenarios are not showing?

See comment in Chapter 2 Q1. The consultation paper does not mention key endogenous variables that can be influenced by policy action. For example, given that gas is the most important energy source, how can policy action increase gas supply in GB or reduce the demand for gas in GB while maintaining or increasing the social dividend from using gas?

Question 4: To what extent do you believe that innovations on the demand side could increase the scope for voluntary demand side response in the future?

Project Discovery seem to be laboring under the delusion that smart meters and smart grid **by themselves** will contribute significant voluntary demand side response. As mentioned in the consultation paper:

- *A smart grid allows system and distribution network operators to balance supply and demand on their networks using new technology;*
- *A smart meter is an advanced meter which identifies consumption in more detail than a conventional meter and communicates that information back to the supplier for monitoring and billing purposes;*

The reality is that electricity customers are very reluctant to allow network operators (remembering the retailer owns the customer) to have control over their loads as envisaged in claims by smart grid proponents and it is a far cry from assuring voluntary demand side response. Customers have other things to do than to keep watching the meter readings all the time, even if the price signal is relayed to the kitchen bench. Except for a few larger customers, most customers do not mind the extra expense of a hedge against pool price volatility, which is then incorporated into retail tariffs. To enable substantial voluntary demand side response it is absolutely necessary to have automatic load control systems complementing a new type of retail electricity supply contract that provide incentives based on pool price excursions and / or network congestion level with an underlying firm prices for base line consumption as proposed in the **technology paradigm shift scenario.** As spelt out in this scenario, demand side response is substantially boosted if in-house generation can use intermediate thermal storage facilities to provide market responsive export power at a higher overall conversion efficiency than is possible at a central power station.

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It would be a hard task to get a return on the **£10bn** expected to be spend by 2020 on account of smart meters, unless by 2020 there are large number of demand response systems like the ones proposed under the **technology paradigm shift scenario.**

Results from most studies on Value of Lost Load show wide disparities between values attributed to supply reliability by different customer classes including significant variation within each class as well. Regulation of electricity network systems incorporate reliability targets differentiated by location, eg rural versus urban, or long distribution feeder versus short distribution feeder. But reliability is the same for all customers connected to the power system at a particular location irrespective of customer class. The reliability dilemma is further aggravated by the fact that most pool type electricity markets target very high reliability levels completely out of proportion to the actual reliability delivered to a (say) rural customer whose overall reliability is very low because of the impact from poor local network reliability (say a customer on a long single spur distribution line in a rural area). Pool market reliability is based on dynamic management of reserve capacity whereas networks rely on in-built redundancy (like the n-1 network design criteria for urban areas). To rationalize operations and provide improved matching of reliability to customer requirements, it would help if the network operators were to adopt a reserve threshold with a declared minimum rates for demand response that restores network reserves. In extreme cases a reverse auction can elicit more demand side response for increasingly higher support payments until the required level of network support has been attained. Timely self-disconnection of one customer improves reliability for all other customers who remain connected, in effect customers with reliability requirements below the common level of reliability now get lower reliability and pay less as well. Customers wanting a reliability level higher than the common level of reliability can also achieve a better outcome by investing in own stand-by generation. The extra cost of the stand-by generator can be partly recovered from the proceeds of electricity export (or reduced network draw through own use of generation) when network support is needed. This then is a 'win-win' solution to the reliability dilemma.

The **technology paradigm shift scenario** mentioned provides a single platform for accommodating demand side response to pool market price excursions as well as responding to price incentives provided by network operators or even from the contracted retailer (wanting to reduce overall pool price exposure). The new retail supply contract form makes it easy to verify and settle accounts through the normal retail billing system. The beauty of the proposal is that once it reaches an adequate penetration level, it has the capacity to generate local response to meet most local network capacity constraints anywhere in the power system.

Chapter 4. Stress tests

Question 1: Do you agree that our stress tests are representative of the types of risks facing the GB energy sector over the next decade?

Consultative Paper mentions electric cars but not gas vehicles, which technology is already commercial (more than 10 million vehicles already running) and would work

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out to be cheaper than electricity charging from the mains supply (in all scenarios substantial part of electricity generation is from gas). Replacing all petroleum fuels used for transport would almost double the gas demand.

Question 2: Are there further stress tests that you think should be considered?
No comment

Question 3: Do you agree with the assumptions behind our stress tests?
No comment

Question 4: Do you have any views on the probabilities of these stress tests occurring?
No comment

Question 5: Do you agree with how we have modelled demand curtailment in response to constrained supply?

Discovery Project assumption that "where supply is constrained, energy will reach those customers who value it most highly, and in the form that it is most valued, i.e. gas or electricity" is riddled with inconsistencies. Indicated value of lost electricity load is significantly different to other international studies. Most other international studies of value of lost load attribute substantially higher values to commercial customers followed by industrial customers and the lowest value of lost load of residential customers, quite different to the figures quoted in the consultation paper. Domestic / Priority customers are the last to be involuntarily disconnected even though disclosed SMEs value of lost load is five times that of domestic customers.

In GB maximum demand of both electricity and gas systems occur in winter. Gas demand curtailment process seek voluntary load interruption (including self-interruption) of large industrial and commercial gas customers followed by voluntary load interruption of large industrial and commercial electricity customers - thereby inducing reduced gas demand from gas-fired power capacity. There is no avenue for domestic customers to participate in this voluntary load curtailment process although they account for 50% of electricity peak demand and more than 50% of gas peak demand. The **technology paradigm shift scenario** provides domestic customers the capacity to arbitrage between electricity and gas prices plus the high financial incentive driven automatic load management system for demand response to pool price excursion, will ensure large number of customers will participate in this voluntary curtailment process.

We know that Global Warming has started to produce extreme weather events such as extreme heat waves and more frequent storms. Heat waves in mainland Europe have the potential to disrupt gas and electricity supplies to GB and would create an energy supply stress point if there is a concurrent heat wave in GB at the same time. Impacts of such stress points need to be checked in the modeling process.

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Thank you for this opportunity to provide comment.

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Attachment A

Electricity Markets Research Institute (EMRI) undertakes research with primary focus on:

- Public benefit aspects of competitive electricity markets:
- Technical and market efficiency,
- Equity issues,
- Transition issues going from integrated utility in a monopoly market to competitive marketing.

Other research & consultancy work cover:

- demand side response in the context of the electricity pool markets;
- retail pricing and value studies;
- distributed generation;
- network and ancillary services pricing.

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Biography of Lasantha Perera, Director - National Electricity Markets Research Institute

September 2001 to January 2004, was Assistant Director at the Office of the Tasmanian Energy Regulator responsible for setting up the Performance Monitoring and Reporting section and providing technical advise to the Regulator. Also provided technical and secretarial support to the Reliability and Network Planning Panel responsible for setting standards for the Tasmanian power system and making recommendations to the Regulator on network investment proposals

Until July 1999, was Manager Pooling with Eastern Energy Ltd. Played a significant part in the deliberations of various bodies connected with the setting up of the National Electricity Market, including membership in the Dispatch and Pricing Reference Group. Was a founding member of the National Retailers Forum and have made many submissions to NEMMCO, NECA and the ACCC on different facets of the National Electricity Market.

Was inducted into Eastern Energy at its inception in 1994 and as Manager Pricing and Forecasting set up their Pricing and Forecasting section, participated actively in the trade sale process and managed the contestable customer pricing process.

As Pricing Analysis Manager with SECV spent seven years working on pricing development, cost of supply studies and the development of industry cost models, and defining price paths to reduce cross-subsidies. Was an active participant in the Victorian Electricity Supply Industry Restructuring process involving industry codes, Tariff Order and network pricing.

Has a MSc in Technological Economics from the University of Stirling in Scotland, is a Chartered Engineer from both the Electrical and Mechanical Institutes in the UK. Has over 35 years experience as an engineer / techno-economist, with work experience covering electricity generation, distribution, contracting, engineering jobbing, co-generation plant maintenance and R&D into renewable energy sources.