



SUSTAINABLE ENERGY DEVELOPMENT FOR NEW ZEALAND

CONVERTING A POWER CRISIS INTO A SUSTAINABLE ENERGY DEVELOPMENT OPPORTUNITY

Synopsis

The present deeply flawed wholesale electricity market structure needs an extensive overhaul if New Zealand is to move towards a sustainable energy future. The expected government announcement of changes to help ensure a sufficient reserve supply of electricity for dry years will inevitably be a “quick fix” to an immediate problem, but in the longer term, much broader changes to the wholesale electricity market are required.

This paper has been prepared for the Sustainable Energy Forum by John Blakeley (SEF Convenor), Molly Mellhuish and Steve Goldthorpe after extensive discussion and contributions from other people participating through the SEF members email discussion group.

OVERVIEW

A fundamental problem is that the wholesale electricity market has been designed by the major electricity generators principally to serve their best interests. For markets to work successfully the benefits and costs must fall to the same entities. But in the New Zealand electricity industry, the benefits of running the system without sufficient dry year reserves go to the generators and the risks are covered by consumers, in the form of high spot prices (commercial and industrial users) or cold showers and baths (domestic users).

Although the government is now expected to move quickly to seek a solution to the dry year reserves problem, in the longer term much broader changes to the market are required. The three parts of this paper gives a sustainable energy perspective view on issues to be addressed and in particular the need to encourage distributed and small-scale supply, and demand-side management and greater encouragement for energy efficiency and conservation.

The restructured market also needs to ensure that the “essential service, public good” philosophy that drove the development of the New Zealand electricity system is returned as one of the drivers for the new market operations.

It is the SEF contention that:

- (a) The electricity industry is dominated by a production/consumption mindset. This blinds people to the fact that conservation is a valuable substitute for production. This is demonstrably bad on several levels.
- (b) The only way to change this culture is by providing significant resources for the "other side" (i.e. conservation/efficiency in electricity use), and to help improve the investment climate for new distributed generation facilities.

The market changes need to be made in consultation with representatives of small-scale and distributed energy suppliers, and small energy consumers. Both of these groups are severely disadvantaged by the present electricity market.

Expert advice is needed to support the development of a market which will support the “sustainable energy options”, which will improve the reliability of NZ’s electricity supply at all times, not only in dry years.

It must be recognised that the days of New Zealand having plentiful sources of cheap energy are now over. This is highlighted by the coincident run down of the Maui gas field and a dry-year electricity shortage.

We must no longer attempt to attract to New Zealand new industries requiring cheap energy, such as aluminium smelting or methanol production, and we must accept a requirement for a fundamental change in thinking on energy issues.



Frequent calls for “sustainably low electricity prices” for industry reflect thinking of the past. This is unable to be met without subsidy and must be rejected.

The energy challenge for New Zealand is multi-faceted. To overcome the risk of future dry-year electricity shortages we need better control of increasing electricity demand, and we need further energy supplies.

However, we must also progressively phase out wasteful uses of electricity, and ensure it is only used for high grade energy applications, for which it is best suited, rather than as a source of low grade heat, where alternative energy sources, such as solar and wood, should play an increasing role.

To achieve a sustainable energy future, New Zealand needs to progressively move away from fossil fuels as a source of electricity generation, and on towards a sensible diverse mix of renewable energy alternatives.

The focus of an extensively revised electricity market should be on helping to achieve this objective and also to achieve much greater efficiency in energy use.

Sustainable energy policies can positively contribute to improving New Zealand’s economy and the environment at the same time.



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PART 1 BACKGROUND

Historically, New Zealand has been fortunate in having had plentiful resources of primary energy from which an electricity supply infrastructure was built to deliver cheap power to industry and homes. Because of this abundance, the expectation of cheap and unlimited electric power became the norm in the twentieth century. For some industries, notably the aluminium smelter, the availability of cheap and plentiful energy was a primary reason for the location of their business in New Zealand.

Now we are entering the 21st century it is becoming clear that the high level of demand for electricity that was engendered by the plentiful supplies of the past cannot be sustained into the future. Therefore the challenge for New Zealand is to realign supply and demand of electricity, and progressively phase out wasteful uses of electricity. This is needed to establish a balance in primary energy supply that will meet the needs of industry and the people for the long-term future.

The power crisis presents two distinctly separate problems, the instantaneous supply of demand - megawatts (MW) and the longer-term supply of energy - gigawatt hours (GWh). Actions to address one problem will not necessarily benefit the other and may even aggravate it.

Unlike other energy forms electricity cannot be stored, and supply is vulnerable to complete collapse if supply cannot meet demand at each instant. The supply of MW requires sufficient active generation capacity and reserve generation capacity to be available every second of every day. New Zealand is much better placed to solve this problem than many countries because of the high level of hydroelectric capacity, which has some flexibility to act as a “store” of energy that can be called on as required.

In addition New Zealand has (or had) an infrastructure, which permits non-critical applications, such as domestic water heating to be switched off for short periods in order to avoid peaks in demand exceeding the on-line capacity. Where problems remain with the supply of MW, the solution lies in technical innovation and organisation of both the supply and demand sides of the balance to meet all the technical and safety requirements for a reliable continuous electricity supply system.

In contrast, the problem of supplying GWh is a resource allocation matter, which requires policy that is effective over the longer time-scales of weeks, years and decades. The solution of this problem requires sufficient fuel resources and generation capacity to be in place to convert appropriate primary energy resources into electricity sufficient to meet the end-uses for which electricity is needed.

The solution to the GWh problem lies in defining a long-term vision for sustainable energy supply for New Zealand and then working back from that ideal to the present situation to identify where there is a need for temporary expedients to assist with balancing supply and demand over annual and weekly timeframes. Solutions to the annual GWh problem have the effect of feeding-up short term hydroelectric capacity, which can be used to address any MW supply problem.



Completely renewable electricity supply for New Zealand by 2020 - can we get there?

The Sustainable Energy Forum suggests that complete elimination of fossil fuel electricity generation in New Zealand by 2020 is a valid and affordable target for the following reasons:

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- New Zealand's renewable resources are abundant and diverse, in comparison to those available in many other countries.
- Fossil fuels are a finite capital asset, which on a national and global basis are being depleted at a faster rate than they are being discovered. Long-term reliance on fossil fuels is inherently not sustainable.
- Fossil fuels are storable and transportable and are therefore able to be used to provide direct energy services at the point of use. Direct use generally provides a more efficient delivery of energy to the end use than can be achieved via the conversion with large losses to electricity, which is an intermediate energy carrier.
- The hydroelectric infrastructure that is in place means that we are already well over half way towards the sustainability target. Maintenance and improvement of that resource plus development of infrastructure to harness the other available renewable primary energy resources can provide electricity indefinitely. Combined with demand reduction, a balance can be achieved.
- Renewable energy resources are often not suitable for direct supply of energy services at the point of use. Therefore conversion into electricity is often the most appropriate means of capturing that primary energy for delivery to the end user.
- Recognition of the size of the available resource for the use of New Zealand will provide a basis for allocation of that valuable resource. That recognition would replace the expectation of an unlimited supply, with consequent profligate use, with an ethos of efficient use of a valued resource and avoidance of waste.

Adoption of this 21st century paradigm for electricity in New Zealand to replace the “cheap and plentiful” paradigm of the 20th century will require recognition of the inherent strengths and weaknesses of each of the contributors to the electricity demand /supply balance.

Contributors to achieving electricity demand/supply balance

Conservation: - Avoidance of wastage of electricity provides a win-win outcome for both the consumer and the electricity supply system. We replace the washer on a dripping tap because it is easy to see the waste that is occurring. More astute observation will identify ways in which electricity is leaking away. Conservation includes switching off unused lights and standby appliances, but does not include depriving users of electricity they need for modern living.

Efficiency upgrades: - Adding insulation to ceilings and floors cuts energy bills and makes houses more comfortable and healthy. Changing to more efficient appliances, such as energy-efficient light bulbs and heat pumps, typically pays back in two to five years. The value to the national energy system is even greater than to the consumer who invests, because these upgrades reduce MW demand in critical winter peaks, as well as saving GWh.

Energy supply substitution: - The replacement of electricity by other sources of energy, such as solar water heating and firewood, pelletised wood, or other biomass fuels, has the potential to make a major reduction in the demand for both MW and GWh. Free-standing LPG heaters are also becoming commonplace to utilise a surplus by-product of oil and gas production. However, condensation and unhealthy emission problems and a limited availability of fuel, means that unflued LPG heaters are a temporary expedient and not a long-term solution.



“Smart houses (and businesses)”: - The increasing sophistication of technology in our homes and businesses provides the facility to monitor and control electricity use. Demand management can make a major contribution to the MW supply problem by smoothing out demand profiles.

Distributed generation by renewables: - The local capture of renewable energy resources where appropriate to reduce demand on the national system can contribute to the provision of GWh. Although most renewable resources are intermittent (especially wind and solar), they usually peak at differing times, creating diversity that helps solve the MW problem by smoothing of bulk electricity demand profiles.

Distributed generation by fossil fuels: - The use of small fossil fuel generation units, to provide local security of supply and to overcome transmission constraints, is a temporary expedient to address the MW supply problem. However, the lower thermal efficiency of stand-by generators aggravates the GWh supply problem by consuming finite fossil fuel resources inefficiently.

Hydroelectric generation: - The hydroelectric infrastructure supplies GWh via capture of the renewable hydro resource. In addition it addresses the MW problem by the ability of most hydro generators to rapidly respond to fluctuations in demand.

Wind generation: - Wind turbines contribute to the supply of GWh, but they have no storage capacity. Although they generate only intermittently, their supply is unlikely to be wasted, because there is a natural synergy between wind and hydroelectricity. As with all suppliers of GWh, solutions of the annual GWh problem have the effect of freeing-up short term hydroelectric capacity to be used to address the diurnal MW supply problem. Wind turbines can be installed rapidly to meet demand shortfalls, and can even be moved if necessary to overcome transmission constraints.

Geothermal generation: - Geothermal schemes are steady state base load suppliers of GWh. Geothermal resources differ from fossil fuel resources in that they cannot readily be used in more productive applications. However, the very long-term resource availability is questionable unless the size of the scheme is carefully matched to the size of the geothermal field.

Cogeneration - The integrated supply of industrial thermal energy services and electricity results in the efficient use of fuel resources. Cogeneration contributes to the supply of GWh, but since the timing of generation is driven by the industrial demand for heat energy, cogeneration generally provides no assistance with the MW supply problem. When utilising biomass as a fuel, cogeneration schemes have the added benefit of long-term sustainability.

Gas fired generation: - At present gas fired generation is used as a main supplier of peaking MW and also supplementary GWh. However, the high efficiency combined cycle gas turbine (CCGT) plants are not well suited to hourly load following. Natural gas is a highly versatile fuel with multiple uses both as an industrial feedstock and for direct provision of end use thermal energy services. During the Maui era, plentiful supplies of natural gas were available as a by-product of oil and condensate production from the Maui field. Now that the Maui era is coming all too rapidly to a close, the rationale for converting the remaining high value natural gas resource into low value bulk electricity has disappeared. Similarly the possible future importing of Liquefied Natural Gas (LNG), if the premium gas market cannot be met from indigenous resources, does not logically have a contribution to make to bulk electricity generation. Several of New Zealand’s other gas supplies, notably Kapuni, have a high content of CO₂, which makes them unsuitable for reticulation without expensive, non Kyoto compliant CO₂ stripping.



Natural gas with a high CO₂ content can be used untreated in a CCGT to generate electricity, however, such use would compromise New Zealand's Kyoto obligations and should therefore only be considered a temporary expedient.

Oil-fired generation: - Heavy fuel oil for power generation is a by-product from the production of transport fuels from crude oil. Unlike gas, it has no premium market. However, the use of fuel oil for power generation has significant environmental issues to be addressed, which limit its application and flexibility. Oil fired generation is a short term expedient to address the GWh problem, but the cost of adequately addressing its environmental consequences limits its applicability in the 21st century.

Coal fired generation: - Coal is an indigenous primary energy resource in plentiful supply. New Zealand has one large coal fired power station at Huntly. The use of coal in Huntly power station is currently a principal supplier of GWh in dry years when the hydroelectric resource is reduced. The capacity of Huntly power station is greater than range of annual hydro variability over the last decade. But routine use of coal is inconsistent with New Zealand's obligations under the Kyoto Protocol. CO₂ capture and sequestration from coal fired power stations has been extensively studied and has been shown to be a high-cost expedient of last resort. Expectations of a technological breakthrough to allow CO₂ sequestration to become a mainstream technology, largely emanating from the USA, stray into the realms of science fiction.

Consideration of quantified assessments of these contributors to the electricity demand/supply balance will lead to a road map for developing electricity and other stationary (non-transport) energy services in New Zealand. Only when that road map is defined and agreed can New Zealand make progress along that road to a sustainable energy future.

The purpose of the electricity market mechanism is to provide New Zealand with a means of navigating along that road by: -

- providing valid signals to encourage appropriate investment in infrastructure and demand management;
- providing incentives for actions that simultaneously solve the MW and the GWh problems;
- avoiding the entrenchment of options that are only temporary expedients; and
- providing barriers to activities that impede progress on our journey towards a sustainable energy future.

In this context the mechanisms of the electricity market are further discussed in [Part II](#) of this paper.



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PART II: NEW ZEALAND'S ELECTRICITY MARKET BLAMED FOR POWER CRISIS

For background information on the power crisis facing New Zealand in Winter 2003 refer to [Part I](#) of this article.

The 2003 winter power crisis follows hard on the heels of the winter 2001 shortage. Neither was an electricity crisis as generally portrayed. They were both caused by a serious shortage of primary energy. “Fixing” the electricity market, or building new power stations, will not fix the underlying cause. The fact is that New Zealand no longer has large reserves of rapidly deliverable fuel from the Maui field. Coal and imported oil are the only conventional fuels able now to make up for hydro shortages in dry years. New gas resources will be more costly and less able to increase their output in dry years.

New primary energy sources will be priced much higher than Maui – which was squandered because its low price was based on a rapid off-take, which led to petrochemical projects to use the surplus gas. Thus the call by the Major Electricity Users Group for “sustainable low electricity prices” reflects a dated “think big” mentality and cannot be met without subsidy.

New large-scale power stations, as called for increasingly stridently, could only overcome the present electricity shortages after “encouraging” (subsidising) further gas exploration, fast-tracking hydro schemes through resource management procedures, and ignoring our Kyoto obligations. Project Aqua has already been declared a “network” project, giving it preferential treatment. Thus this new “think big” lobby would have NZ panic and solve the problem in a costly way which is also at the cost of the environment.

A return to traditional power planning would lead to an increased requirement for transmission lines and distribution investment. Nominally, planning could incorporate demand-side options such as energy efficiency investments, but New Zealand has little experience and no “culture” at the political level of these. To political and industry decision-makers, improving reliability means investing more in generation capacity (up to 40% surplus in normal years during the 1970s and 1980s), and also network and power quality equipment. Power prices would rise sharply to cover these new investment costs along the whole power supply chain. Meanwhile the demand side, unused back up generators, smaller renewables, cogeneration and distributed / smaller fossil fuel options would continue to be ignored.

Electricity markets were introduced in several countries including New Zealand during the 1990s in an attempt to create competition between generators to force power prices down. It was also claimed that a competitive market would create opportunities for small-scale generation, and energy efficiency projects. Instead, network companies have suppressed by the low wholesale prices in the electricity markets, and by hostile interconnection rules small-scale generation in all countries. Profit-seeking generators whose revenues depended on sales of kilowatt-hours have abandoned energy efficiency projects.

Theoretical work that underlay creation of electricity spot markets emphasised the need for forward markets to give longer-term price signals.¹ It said independent regulation and public consultation were needed to ensure public purposes would be met. These include controlling market power of large supply companies and very large consumers, and ensuring that environmental

¹ Outhred, H.R., and Kaye, R.J., "Incorporating Network Effects in a Competitive Electricity Industry:- An Australian Perspective", in M. Einhorn and R. Siddiqui (eds), *Electricity Transmission Pricing and Technology* (Kluwer Press Academic Publishers, Boston, Dordrecht and London, 1996), pp. 207-228.



impacts were accounted for. It also advised a transition path that would cause as little disruption as possible to existing power systems.

In contrast, New Zealand's original electricity market was a big-bang approach, and included neither the regulatory protection mechanisms nor any transition path. Energy efficiency programmes were abandoned probably more severely than in most other countries. Spot prices here are much more volatile, in part due to our unusually "lumpy" supply system. Uniquely, market power is unregulated here – New Zealand has no market surveillance independent of electricity market participants, who have designed the market to favour their own interests.

As a result, New Zealand has suffered all the pain of comprehensive electricity restructuring and market formation without capturing its potential benefits to date.

Two views of New Zealand's electricity problems

Extensive recent discussion between SEF members has identified a number of distinct problems with the current electricity management arrangements in New Zealand. These problems have combined to inhibit small-scale energy supply and demand-side management to a degree unprecedented in any other Western country. This is despite New Zealand's uniquely favourable physical resources of renewable energy, and grossly inefficient energy-using infrastructure in houses, commercial premises and industry alike. The specific problems are identified as: -

- no incentive to build or maintain reserves of capacity or fuel or demand reduction
- a near complete block-out of small participants, whether providing supply or demand management.
- lack of any convincing future planning or reliable information on which either planning or efficient markets can be based.
- generators, retailers and local lines companies suppress energy efficiency because they lose profits when people use less electricity
- no mechanism to require public purposes (reliable supply, reducing environmental and social impacts) to be achieved by energy businesses.
- The people now involved in electricity (and gas) reforms are steeped in the culture of "liberalization", and immersed in technical detail. Sustainable energy options, both rational and desirable, are sidelined in the policy-making process. The main objective of the measures proposed by these people is to keep wholesale power prices low.

The SEF characterisation of the problems differs strongly from that now swamping the media debate, which is:-

- Spot prices are far too high, and making energy-intensive industry uncompetitive.
- New Zealand needs more power stations (having forgotten that the Whirinaki and first Stratford gas turbines were shipped overseas, Meremere, Marsden A and most of Otahuhu A were dismantled and Marsden B was never used and only a few years ago had its chimney knocked over!)
- New Zealand needs new gas resources, and exploration should be further subsidised because international companies prefer other locations for their exploration.
- The Resource Management Act is inhibiting new power station investment, and the Kyoto agreement will inhibit coal-fired generation.

Even if these problems could be solved it would not ensure a sustainable supply of energy services to all consumers in both the short term and the long term.



A basis for choice - diversity is security

New Zealand needs to choose which problems it wants to solve. We could focus on the features of the present system that suppress cost-effective small-scale energy supply and service options. Or we could expand the traditional investments in large-scale power supply without providing for small-scale options to compete on equal terms. Neither choice will take New Zealand back to the luxury of cheap and abundant power that we enjoyed in the last century.

This choice must not be made without open and informed public debate; and it must draw on extensive international experience of both planned and market systems.

Overseas experience in the wake of the California power crises in 2000 and 2001 has confirmed, “diversity is security”. Small-scale investments in energy efficiency, demand-response to peak loads, and small-scale supply of energy services, are today more cost-effective ways to ensure a secure and reliable supply than expanding investment in conventional power systems. This is true even when electricity demand is growing rapidly, as is true for California, New York and other highly developed regions. (However because several NZ power stations were closed, some new generation capacity will probably be needed also.)

What is true in the United States applies even more strongly in New Zealand, where the benefits of improving diversity of supply through investments in energy management and small-scale renewable energy, are particularly high, and energy use is particularly inefficient.

Yet New Zealand suppliers of sustainable energy are finding it progressively more difficult to achieve commercial success, or even space in the media. Clearly there are strong and increasing barriers to achieving what is environmentally, economically and socially rational. Changes are needed both to the market design and regulatory environment.

Opening New Zealand’s electricity market to sustainable options

Fortunately the required changes can be incremental and progressive, and do not require yet another overturning of the present system. The only disruptive change is to fully separate retailing from generating businesses, and this is already considered likely to be required by Government. Allowing those businesses to combine was probably the most misguided of all the recent reforms.

Above all we need to facilitate investment in a wide range of small-scale sustainable energy options, on both the supply side and the demand side. These investments appear uneconomic today only because incumbent energy suppliers are able to set pricing and terms and conditions which are hostile to their small-scale competitors. They are risky because any commercial advantage gained when spot prices are high will be reversed if future surplus generation drives spot prices back down.

The people who have been deeply involved in New Zealand’s electricity market design need to recognise how far the present market departs from the original principles of design of competitive electricity markets. The originators of the idea never expected that large market players would be unregulated – or allowed to design their own regulatory regime, as happened here. Ironically, despite that freedom of action, the market players are unable to agree on a regulatory regime.

In keeping with the “liberalisation” theory, New Zealand’s electricity market was privately owned. Market design was funded by participants not the public. The well-funded generators, and Transpower, dominated the process. The industry’s Market Surveillance Committee was unable to prove what to everyone else was self-evident – gross exercise of market power by generators.



Transpower's overseas advisor, Professor Bill Hogan, still considers that New Zealand's market design lacks only the provision for financial transmission rights, and considers that the market will then provide for long-term decisions on resource adequacy and sustainability as well as fair pricing. He also considers that power retailers will be effective advocates for their consumers – not noticing that New Zealand's retailers buy and sell consumer blocks like herds of cattle. Our much-touted "consumer choice" is just a bad joke.

To provide a counterbalance to such advice, poorly funded representatives of small-scale sustainable energy options need public funding so they can participate on an equal footing. This must include generous access to expert advice of quality appropriate to challenge the experts now advising the major electricity suppliers and consumers.

Thus an early requirement would be to educate both present market players and representatives of the now-excluded small-scale energy supply and service providers, to create a common understanding of the potential role of small-scale and sustainable options. This would be the basis for progressive changes in market design. A single 2- or 3-day seminar would be appropriate, followed by working sessions in which common ground could be negotiated.

Careful re-regulation of the electricity sector.

As well as electricity market design, a careful overhaul of the regulatory system is needed, to reduce the perverse incentives that are suppressing sustainable energy options. Generating companies should not be integrated with retailing, because this insulates them from the very pricing signals they impose on others. Instead, they should be required to contract out all their generation.

Regulation should be focussed on core public purposes – fair pricing (a concept which can be defined in economic terms), markets open equally to small and large market players, access to electricity or equivalent energy service by low-income people, and environmental protection.

High spot prices should not be capped, except possibly at levels much higher than this year's. The spot price creates the revenues needed to pay consumers to reduce their demand. In fact, sky-high spot prices create "excess profits" in every sense of the word, so the operating surpluses from these could be regarded as public property (Refer Outhred and Kaye, 1996) and re-directed to overcome the scarcity that caused them. Both competitive bidding and public consultation have a role in such an exercise.

Local lines company (distribution network) profits should not be based on the throughput of kilowatt-hours, because network costs depend only a little on the actual throughput. But New Zealand's policies were muddled when retailers demanded that the network companies reduce the retailers' risks by charging them by the kilowatt-hour not the kilowatt.

Performance-based regulation developed in the U.S. recommends that all network companies be subject to revenue caps, instead of price caps which give them incentives to sell more.² It is unfortunate that SEF's submissions to that effect were ignored by the Commerce Commission in their recent decision on lines company regulation.

Lines companies are at the heart of reliability management – most lost kilowatt-hours come from network failures (this year in New Zealand would be an exception). They also account for roughly a third of overall cost of supply on average – but 90% or even more in some locations.

² SEF's research over the past year has identified a source of regulatory advice which would be worth tapping into – the Regulatory Assistance Project (www.raponline.org). These people work with electricity systems of all kinds in the U.S. – from pure traditional planning systems through to fully competitive markets. RAP's network includes the big "Energy Laboratories" (Berkeley, Oak Ridge, and several others), with technical and legal expertise as well as regulatory expertise.



As monopolies, lines companies' investment plans are of public interest. Integrated resource planning should be required – this means comparing supply-side investment with demand-side investment, and choosing whichever is the less costly. New Zealand has already taken a good first step, in requiring lines companies to disclose their investment plans, together with options and costs.

Incentives for energy efficiency are the most troublesome of regulatory issues. A myriad of market barriers, sometimes but not always deliberate, ensures there is much less investment in improving energy efficiency than is economically efficient.

Almost all countries run some energy efficiency programmes; many U.S. states apply a levy of 2-3% on electricity sales to fund them. To get maximum benefit in saving both MW and GWh, energy efficiency programmes can be targeted to locations and times where peak loads are costly. Reasonable mandatory standards for appliances and building envelopes are also important.

To encourage small-scale renewable energy projects, mandatory targets appear to be the best regulatory measure – Australia's target of 2% of new generation has been very effective.

As is the case in electricity market design, the regulatory devil is in the details. This means that effective consultation is needed with all affected parties – most particularly the parties that have been excluded to date – small consumers and small suppliers of energy services.

Moving forward

The imminent failure of industry self-regulation opens the way for constructive change to make New Zealand's primary energy supply, and its delivery via electricity, more robust and sustainable.

A return to traditional large-scale power planning would be excessively costly to the New Zealand economy and the environment.

However central government must take full responsibility for long-term “resource adequacy”, as markets do not effectively deal with long term issues. This begins with properly verified information on quantities and costs of primary energy resources and energy savings potential. We must never again be caught unexpectedly with the demise of our largest single primary energy source, Maui! The crude analytical model Government now uses in “Energy Outlook” needs to be replaced by modelling commensurate with the importance of this task.

The present power crisis opens the way for immediate investments in those measures that would give the quickest return – probably focussed on the largest electricity users in each category – domestic, commercial and industrial. Free energy audits, followed by incentives where appropriate to install electricity saving equipment, would be an important first step. Health and safety issues are paramount – wood fires are wonderful for dry years, but chimneys must be clean. Solar water heaters can supply large amounts of primary energy, quickly. But free-standing gas heaters put their exhaust fumes into the living area, and are undesirable even in ventilated houses, and dreadful in well-sealed houses.

Energy audits, especially of households, need to be “client-centred” in full recognition that peoples' private homes are their castles. Technical efficiency is only part of the input to personal decision-making.

A new Crown Electricity Governance Board is expected to plan the steps forward for electricity. Market rules will need to be changed by working parties in which small consumers and small suppliers of energy services have representation equal to that of large market participants. An essential first step would be to formalise the membership of sustainable energy advocates on all governance and regulatory committees.



The gas sector is even more subject to market power than electricity, and similar market and regulatory principles are needed.

New legislation is certain to follow this winter's power crisis. The challenge is to abandon the politics of blame, and create a governance and regulatory system designed on a coherent basis, with a workable transition to a more sustainable and fairer energy sector.

This Government can now convert a crisis into an opportunity by adopting sustainable energy policies, which can positively contribute to improving the New Zealand economy and the environment.