Utility of the future
A customer-led shift in the electricity sector

A New Zealand context

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A customer-led shift in the electricity sector

As little as five years ago electricity was something that most people and to a lesser extent, businesses, took for granted and cared little about. In marketing terms, electricity was a 'low involvement' product. Now that power prices are rising and climate change is widely accepted, almost everyone has a view on the energy sector and what it does well and, more importantly, what it doesn't. These views are many and varied – some customers are very loyal and will never change supplier for any service, whether that is for energy or for banking, whereas others are always searching for the best and cheapest deal. Others are looking for the best service and are prepared to pay a little more for this. On top of this, consider the introduction of new technologies and new value chain participants that will assist customers to take control of their energy management and increasingly their power generation and energy storage. These customer and technology factors will shape the electricity market of the future. Utilities will need to respond to the changing needs of the market. Those that respond will preserve or increase enterprise value. This will require changes to business and operating models.

At PwC we contend that the utility of today faces new pressures and is struggling to meet the needs of its customers while maintaining acceptable returns to shareholders. The so-called 'death spiral'[1] is a prime example. Globally, traditional large scale power utilities are being challenged as customers take greater control of their own energy supply needs. To survive and prosper the 'utility of the future' will have to provide much more than reliable energy supply – it must respond to a diverse range of customer, business and community demands and do so in a rapidly changing regulatory and technological environment. The utility of the future is unlikely to control the value chain but will need to enable or facilitate customer energy solutions – they will become 'energy enablers'.

Five value drivers will be fundamental in the future utility market:

1. Customers are looking to take more control over their energy supply and demand – they will look to manage their energy far more effectively than they can today.

2. Power generation and networks will move away from traditional delivery models – the energy value chain is currently subject to disruption, and this will accelerate over the medium term – those that innovate will protect and increase their value.

3. The role of the utility will transform into that of a service company that enables 'energy solutions' and in many cases 'home solutions' – this will require transformation of business and operating models.

4. Data will play a dominant role in the future energy value chain – new value will be found within the data underlying customer energy usage patterns.

5. Governments and regulators will need to reshape energy and related services markets to keep pace with customer and 'energy enabler' needs.

1 A number of commentators in Australia, Europe and the US have used this phrase to describe the falling consumption and increasing tariff dynamic.

Recent and emerging trends

We summarise our view on the emerging global trends in the utility industry:

Figure 1: Global trends in the electricity industry. The foundation of the electricity marketplace is shifting with multiple global trends reshaping the power sector.

 Impact of the new energy customer	• Consumer preferences are changing to control energy supply, usage, service standards and costs • Customers are becoming more mobile and socially and digitally interconnected • Customers are increasingly interested in utility service levels and prices • Data analytics and agile strategy will become core competencies
 Changing tasks and roles of regulators	• Policy-makers have the difficult task of balancing supply availability, affordability, proximity and environmental impact • Wide-ranging reforms to market design/planning/ governance framework • Changing approach to economic regulation and revenue setting
 Transformation of the electricity sector	• Decentralised power, technological changes and a different customer outlook are leading to a changing electricity environment • Electricity utility companies need to adapt their business models to stay profitable and to succeed in the future • New services will emerge and new players will enter the existing value chain • Reduced demand in many developed economies
 Disruptions to electricity supply channels	• Distributed generation and disconnections from the grid via self-generation may encroach on the electricity utility business model • These technologies will present challenges to the centralised utility model but depend on technological developments and cost decreases • Changing fuel price relativities are altering utility company behaviour
 Influence of technologies on the energy supply chain	• Energy efficiency, demand-side management, smart grid technology, solar PV, electric vehicles and battery storage head the list of technological developments • New technologies have the potential to compare with utility-provided services and impact centralised power generation and networks

Source: PwC Analysis

Combine the global trends with the following New Zealand trends and it is little wonder customers are looking for more control over their energy supply. There is a heightened sense of change on the horizon, as indicated by:

- **Rising distribution costs**, which represent approximately 22%-25% of the total household bill.
- **Demand for electricity** has decreased in the last two years, but the peak demand trend is more complex – Transpower expects peak demand to continue to grow.
- **Increasing distributed generation**, including solar PV (photovoltaic). Technological change and economies of scale will continue to drive down costs and the trend is more distributed generation on the network, albeit more slowly than in some other countries. In many countries, the peak demand on the grid is driven by air-conditioning load – which coincides with the availability of solar power. In New Zealand however, peak demand tends to be based on domestic peak load, which coincides with morning and evening requirements.
- **Energy storage is becoming an economic option** in more than just niche applications. This factor alone has the potential to change one of the fundamental assumptions underlying power market and power system design: that electricity cannot be stored. As battery storage technology becomes more commercially viable, customers will be able to combine solar PV generation and storage; thus enabling them to offset usage during peak tariff periods and rectify the current asymmetry between solar generation and energy consumption patterns.
- **Customer churn continues** to regularly top 20% per annum.
- **SMART meters** or Advanced Metering Infrastructure (AMI) rollout continues at pace. This technology threatens to be a game changer in the utility sector in New Zealand, as it has been in some parts of Canada and the US and a number of European countries. This technology facilitates greater control for consumers and utilities.
- **Time-of-use tariffs** being introduced to allow consumers to manage their demand and benefit from off-peak pricing.

Customer centricity will drive major changes

We expect customer centricity to be a major influence on the strategies of utilities and indirectly on market structures. We anticipate industry structure shifts will occur as companies adapt their business models to respond to an environment that could be transformed by significant changes. We expect to see business and operating model changes within utilities. We envisage a true battle for the energy 'wallet' across the value chain.

There are economic drivers for both network businesses and retailers to develop highly customer centric businesses and to compete for customer attention. Let's take network businesses – they need to keep customers connected to the network to maintain prices at reasonable levels – if there is significant take-up in solar PV, if battery storage becomes economic and if demand side management remains a key feature for business and domestic customers, there is a real risk that prices for remaining connected customers will increase. But we do not expect distributors to stand still – they must build or possibly regain customer confidence and offer a new range of services to counter these challenges. We expect this to be largely in the area of the provision of energy supply solutions, such as bundled solar PV and network storage solutions (using both batteries and grid), as well as the traditional regulated network services. We see distributors looking to prevail upon the hearts and minds of the traditional retail space, subject to regulatory constraints – a key question will be whether or not retailers and distributors will face-off and effectively compete for customer wallet share at some level or whether the current value chain separation will continue.

We expect to see more innovative solutions for transport fuelling, which will see new services and incentives created for electric vehicles.

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We expect to see metering and data services become a very open market offering and there will be major competition from energy retailers, telcos, ISPs and other technology players. We expect the bulk of the value in this space to be captured by current data and content players rather than traditional utility companies[2].

Let's turn to utility retail businesses – this will continue to be a real battleground for market share. Traditionally the view has been the big will survive and the game was all about economies of scale. We contend that in the future it will be the customer centric who will survive. We have seen large growth rates in innovative solution take-up – whether that is the high growth rates for niche retailers or the take up of solar PV or the creation of innovative business models, such as Virtual Power Plants and Demand Aggregators in overseas markets. This strongly suggests that innovative customer centric offerings will be appealing to the market and it has not been about economies of scale but about responding to customer needs in agile ways. They will be leaner with many different product lines and multiple channels to the customer. To maximise investor value, they will be constantly redesigning 'content' and 'bundles' to remain relevant to an increasingly demanding and diverse customer base. In addition, the battle for home services is yet to play out. Telcos want to own the home, ISPs are looking to add energy services to their offerings and insurance companies offer a variety of home services. One thing is for sure – customers rely on 'trust' and 'referral' when it comes to service providers. We contend that retail utility players who are better able to translate this trust to other adjacent services will create new customer and shareholder value.

2 More than a quarter (27%) of respondents to PwC's 13th global utilities CEO survey said the biggest competitive threat could come from companies with strong brands outside the sector.

Changes in business and operating models for existing utility players

Over the last 25 years the New Zealand utility sector has essentially been broken into separate value chain segment specialities and business models have largely followed the value chain of generation, transmission, distribution and retail. One major exception has been the predominance of the 'gentailer' model which has been adopted by the major utilities in New Zealand. This aligns with models in place in Europe and the UK. This segregated value chain model has seen the formation of some alliances and joint ventures but this has typically been at operational levels (eg network contractors for distributors or back/middle office services for gentailers) or in the case of fully vertically integrated energy companies, it has been at the upstream end of the value chain. The key question will not be whether there will be change to these business models but what changes will occur[3].

We see all utility companies being concerned about productivity and about the challenges of growing shareholder value from a market where demand is falling and where there is plenty of supply. When we add the prospect of customers effectively competing with utilities to source supply there is a compelling case for change. This change will occur soon.

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We expect to see new entrants in the market. We envisage more joint ventures and alliances forming and further consolidation in the utility sector. We also anticipate larger players to have entered the data services market – this is most likely to be done in conjunction with other players such as data and content providers in an alliance structure. Some argue and we agree that the telco and ISP sector will become forces in the energy market in coming years – we are already seeing some entering the market and providing some forms of service bundling.

The existing shape of the energy retail business may not survive in its current state, given the atrophy of retail growth in traditional markets. Retail will turn into a channel fight focused on reducing the cost to serve and improving service and choice, which will pose major threats to utilities. If it is assumed that the customer is central to success, then precisely meeting customers' service needs will become the most important success factor. The question will then become, what is the most effective and efficient way to provide service to customers in the way that they want it? This could lead to utilities' retail component being subsumed into other large-scale retail engines, such as data service providers and other in-home services including telcos. There may be many more suppliers of energy, some with retail front-ends and some without, including third party brokers.

3 In PwC's 13th annual global utilities CEO survey, 41% of utility CEOs saw business models transforming while a further 53% saw business models changing significantly

We expect to see continued economic regulation of transmission and distribution services. This will act to push prices lower, but with some major asset replacement programs underway or commencing over the next 10 years, this will be a constant challenge for regulators. In response to this regulatory squeeze network businesses will look to adjacent markets to find new sources of value. This will be a quest for unregulated revenues and profits – which has been pursued in the past to varying levels of success – this time the strategies must be different and will most likely have a focus on their core customers (those connected to their network assets). This will see a new form of relationship emerge between network businesses and customers and will create real tension with retailers who will also be looking to offer new service bundles to the same customers. Ownership and operational control of distributed generation and metering assets will be a factor in this aspect.

New players and services in the market

We are already seeing new entrants emerging to capitalise upon the uncertainties within the value chain and the uncertainties in the minds of customers seeking the best possible energy solutions:

- **Non-traditional energy providers** will appear. Some of these will be large scale and may include telcos and high street retailers. Others will be smaller scale, providing specialist services (eg business only) and agile business models. We may see the emergence of 'white label' retailers, but we expect these to be spun out of larger existing utilities in much the same way that low-cost airlines have spawned from within traditional airline brands. Perhaps the ancillary revenue model of these low cost airlines will prevail where, in some cases, over 30% of all revenue is sourced from 'add on' products and services

- **Transactions** involving growing smaller players may occur within the next few years in order to better match customer and trading book profiles. We also expect successful innovation-based utility businesses being absorbed or forming alliances with other companies from outside the traditional utility sector.

- **International technology companies** as well as service-centric niche players are certain to play a more significant role in global energy markets. As battery storage, electric vehicles, fuel cells and other emerging technologies become more mainstream, so will the energy providers that champion their causes. In Europe, companies such as Next Kraftwerke are already taking share and creating innovative solutions for their customers and investors by developing 'Virtual Power Plants', which delivered over 2 TWh in 2013. There are some parallels with gas storage technologies.

- **Data services and content** will play a much larger role in the energy market in the next 10 years. Google has already formed an energy company, global technology companies have taken positions in metering services, and we expect it to be only a matter of time before telcos, ISPs and the like look to enter the sector, given the numerous similarities in the existing and likely future operating models.

- **Smart grids, smart meters and customer energy management 'gadgets'** are only the beginning of what is possible. Already we can control our home electronics and entertainment and heat pumps via our smart phones and tablets – why not our energy usage on a minute-by-minute basis?

Role of government, regulators and market operators

- **Governments** have an enormously important role to play. Policy setting must provide long-term stability for the industry, while giving customers the ability to make the choices that suit them. These policy settings must obtain bipartisan support to underpin local and offshore investment in the sector.
- **Regulators** of network businesses will continue to focus on network performance and returns, with increasingly sophisticated regulatory mechanisms introduced to incentivise innovation and efficiency and ultimately improve outcomes for customers.
- **Market operators** have an ongoing responsibility to facilitate effective and efficient markets. The potential for markets to intersect and the ever-increasing presence of new technologies and business models will see the need for much quicker responses to market issues and streamlining market reform processes. This will require new disciplines from all market participants on market rule and framework reform.

Provision of information services will become the norm within energy companies

Traditionally, utility companies have traded in energy commodities of one form or another. While this will continue to be a major driver of value in the future, data services and a broader services portfolio will become part of the mainstream for utility companies and energy services companies.

It is no accident that Google and other technology and content companies have recently acquired energy companies – there is great option value in these transactions. Utilities have a very valuable asset at their fingertips: the meter data from millions of smart meters and multiple smart grids. This data shows the patterns of individual, household, suburb, town, city and country usage. Consider the vast bank of data available for analytics when all customers are connected to the electricity network via smart-grid. We are already hearing of the value of this data in crime investigation and fraud prevention. While these may be alarming statistics for those concerned about data privacy, we contend that the benefit of allowing access to this data and creating value for customers is potentially very large.

The development of analytics capabilities within utilities, which today is generally of a low to moderate standard, or via alliance partners will be a core capability in the future. The ability to predict customer behaviour based on meter data will be of enormous value to network businesses for better managing assets and predicting outage risks. Furthermore, this data will be very useful and valuable to others such as advertisers and media companies and to appliance manufacturers. All of these types of potential end users will pay to receive insights from meter data.

What are future investors looking for?

With the fall in value of global utilities, due to generation overcapacity and increased commodity trading affecting in-country profits, where will investors look for better returns in the next 10 years?

As we have alluded to earlier, we see movements in the risk/reward outcomes for the various assets in the energy value chain. Network businesses and generation assets will need to adapt to meet investors' expectations given the risk of competition from 'prosumers' and new entrants. This will drive up the cost of capital. This may lead to new investors entering the market or at the very least will see an increase in the risk appetite for existing shareholders.

In our recent annual global review of Power and Renewable Deals[4] we observed that traditional utility investors are predominantly looking to invest for the long term. However, new investors are entering the market. We are seeing venture capitalists and private equity investing, district heating and cooling projects being facilitated by governments and global investors, such as Berkshire Hathaway becoming active.

This more diverse investor universe will capitalise upon the shifting risk profiles in the sector. We see venture capital playing where it plays best – at the leading or bleeding edge of technology (eg battery storage, virtual power plants and niche solutions). We see private equity investing in poor performing businesses in the same way that they typically have in other industries. For the traditional long term utility investor there is a real conundrum right now – they must support the creation of new value via new services but this may increase the relative riskiness of the company. Consequently these investors will seek higher returns to balance this risk. In an environment where customers are increasingly taking control and looking to drive prices downwards this will be quite challenging. This will also create a conundrum for economic regulators.

A central issue will be the decisions governments make about maintaining their shareholdings in major utilities. We do not see that it is viable for governments to retain ownership of utilities over the next 10 years and beyond. These assets provide too many capital recycling opportunities for governments in an infrastructure-demanding era where balance sheet constrained governments have limited alternative funding capacity. The recent partial privatisations of Mighty River Power, Meridian Energy and Genesis Energy are evidence of this dynamic in the New Zealand market.

4 PwC's Power and Renewables Deals 2014 outlook and 2013 review

How will customers benefit from energy sector transformation?

The main benefit to customers will be the ability to exercise choice even more freely than they can today. This power of choice will extend to the source of electricity and at the extreme, will allow some customers to become self-sufficient, particularly in remote areas and those at the extremities of existing networks. This will also benefit some networks as costs of serving remote locations could come down as options such as diesel/solar generation negate the need to maintain expensive remote lines. This has implications for electricity contracts and will also lead to new innovations in customer engagement, pricing models and other ways in which utilities manage their businesses and, most importantly, their assets. It also opens up the need for asset owners to require exit fees and asset value guarantees from customers in order to invest – this has been the case at the industrial and commercial end of the market for some time, but this may also become a reality at the domestic level too.

Business customers will have the opportunity to take an active or passive role in the market – flat tariffs and asset-based term sheets will come under pressure, since these options only favour the energy company from a risk mitigation perspective. Businesses will have better visibility over the trading opportunities available to them. Very large companies will develop their own energy management capability, for example IKEA has developed the capability to manage its own energy needs.

Other developments to the advantage of the customer:

- **Contracts with customers** for their own-source energy will take a different shape. At both the domestic and business level, own-source generation and storage will be used more frequently to manage peak demand. Energy companies and customers will recognise the value this provides in terms of avoided infrastructure costs. They will be happy to pay to connect their 'generators' and manage their own needs using the best technology available to them, so they can maximise their supply and commercial results. At the same time customers will need to make conscious choices about the services they require from the grid, with a range of services likely to be available from relatively inexpensive 'always on' connections to an expensive 'emergency back-up' for those that choose to virtually disconnect from the grid.
- **New optimisation tools** will be available to customers to trade into the market rather than having flat-rate contracts, expediting the innovation required to pull down costs for new technologies, such as storage and fuel cells. We may see community energy ventures emerge that will be self-sufficient and could morph into small-scale energy companies.
- **Demand aggregators** may play a significant role in the market as they have started to do in the UK and Europe. We expect future New Zealand aggregators will force retailers to offer innovative lower cost service and supply bundles.
- **Tariffs and contracts that incentivise customers to manage their demand** more effectively will develop. There will be greater collaboration across the utility value chain to develop tariff models and contracts that drive efficient long-term asset management decisions.
- **New solutions** will emerge that enable customers to optimise their energy positions.

How do today's utilities transform into tomorrow's 'energy enablers'?

For the innovative and brave we see more opportunities than risks in the current and future energy market. The measure of success will be the development of good business strategies and their successful execution. The normal drivers of business apply.

In our view, the keys to transforming today's electric utilities into tomorrow's 'energy enablers' are:

- The development of stable long term government policy and continued deregulated and open national electricity supply and services market.
- Customers becoming the centre of the utility organisation – develop excellent customer understanding, with a particular emphasis on the emerging power of social media to underpin new customer-centric corporate strategies.
- Creating value from the vast amount of data collected and created – utilise the best possible data management and analytics tools to support all major business decisions.
- Improving productivity and asset management – have a clinical focus on asset value, and manage assets via customer-centric frameworks.
- Be part of the new utility technology revolution and create options for the future – build out agile and innovative business models optimising the use of new and emerging technologies.
- Developing and continually refining agile and lean operating and business models focused entirely on executing customer and other strategies.

Perhaps the most impactful of these will be the emergence of new corporate strategies centred on satisfying the needs of customers and the establishment of new supporting business and operating models.

Industry participants who succeed over the next decade will not be the ones who blame the market or external events. It will be those who best respond to the ever changing needs of customers and who best work with policy-makers, market operators and regulators. These will prosper and build the 'utility of the future'.

Tomorrow's energy enabler

The following table summarises the key differences between today's utilities and our view of tomorrow's energy enablers:

	Today's utility	Tomorrow's energy enabler
Service orientation	Mixed	Customer-centric
Service offerings	Narrow	Broad with multiple services bundled
Retail pricing	Movement to time-of-use tariffs – very few bundles or incentives	Bundled pricing/incentives in place – some will have moved on from time-of-use tariffs
Network pricing	Small fixed charges and majority volume based with no energy management incentives	Pricing of services/solutions in line with what customers value
Network regulation	Regulatory incentives	Highly incentive based
Innovation	Engineering/technically oriented	Core value
Agility and responsiveness	Reactive	Proactive
Value added services	Low orientation	High orientation
Ownership	Mix public and private sector	Private sector
Economic development	Capital centric	Community centric
Predominant business model	Ownership	Ownership with increased use of joint ventures/strategic alliances
Community engagement	Public safety and environment protection oriented	Holistic

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