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Inconvenient truths* and a proposal for a new approach

National Consumer Roundtable on Energy
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*with apologies to Al Gore

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Inconvenient truths

- It costs more to produce and deliver electricity at some times than others
  - At times of high demand (typically, hot summer weekday afternoons and early evenings, and to some extent on cold winter weekday mornings and evenings) more generation plant has to be available and running, and more transmission and distribution capacity has to be available to deliver the electricity
- Capital assets that are used for only short periods still have to recover their capital costs as well as their variable running costs (operation and maintenance)
  - In the NEM, generating plants can receive revenue from the pool when they are producing electricity – so generation plant that runs for only short periods has less output over which to recover its capital costs, and therefore charges a higher price
  - Some of that plant also uses high cost fuel
- But prices to customers have generally been flat or at least relatively so
  - Customers generally do not like time-varying prices, and retailers in a competitive market will try to give customers what they want
  - Regulators have traditionally favoured flat, energy based prices for the recovery of transmission and distribution costs – particularly in the case of smaller customers – due in part to the limitations of available metrology

Inconvenient truths (2)

- Price does matter – we use less of a commodity that costs more, and more of a commodity that costs less
  - Cost-reflective prices inform consumers of the true cost of their consumption patterns
  - The importance of economically efficient price signals is perhaps best illustrated by the problems that arise in their absence. Flat tariffs and inclining block tariffs are good examples:
    - Both fail at signalling the underlying cost of the use of electricity in both a temporal and physical sense (though inclining block tariffs do provide a strong general conservation signal)
    - Their highly averaged price signals under-signal the true cost of producing and delivering electricity at times and in locations where incremental demand will require capital investment in the near term
    - They also over-signal costs in areas and at times when no congestion exists, thereby potentially reducing revenue for the electricity supply system and more importantly the productivity or amenity that could be derived by consumers from additional electricity use that could be afforded at the lower true cost.
    - The over- and under- consumption that results from these inaccurate price signals represent deadweight losses to the economy.
    - They generally also impose cross-subsidies between and within customer classes. For example, the flat price paid by all customers includes the extra cost imposed my customers with significant on-peak loads
- In the NEM, generators and retailers are different from networks
  - Generators and retailers are, for the most part, (a) privately owned and subject to competition, (b) assumed to be profit-maximising entities, and (c) not required to ensure that the lights stay on
  - Networks are required to build capacity to meet reliability standards and are subject to price regulation

Inconvenient truths (3)

- Current price regulation places significant risk on the ability of distribution networks to recover their capital and operating costs
  - Costs are largely fixed, but prices are based on the consumption volume of end-use customers
  - The variables that affect consumption are almost wholly outside the control of distributors
- At the same time, it is harder for some consumers than others to reduce their electricity consumption – either in total or at particular times of day
  - Smaller volume customers are likely to have fewer discretionary loads
  - The lifestyle or business requirements of some customers may limit their ability to shift their consumption from one time to another
    - Restaurants that do most of their business during the business day cannot shift their use of electricity to the evening
    - Households in which people are home during the day are limited in the amount of electricity consumption they can reduce during or shift out of those hours
- Some customers in each of those categories have limited financial resources
- It is also the case that at least some customers with limited financial resources are likely to have a higher ratio of peak demand to average demand (lower load factor) than other customers – for example, if they generally conserve but use air conditioning on the hottest days

Inconvenient truths (4)

- But if we ignore the truths above by insisting on a policy that provides flat prices for all customers because some members of society have limited means, we will
  - Continue to over-consume electricity when we may not actually be prepared to pay its true cost, and under-consume electricity when its true cost is lower than its price
  - Perpetuate inter- and intra-class cross subsidies
  - Perpetuate the impact of rising peak demand on electricity prices

And so, a proposal for a new approach that has two equally important parts

1. Embrace cost-reflective pricing
   - The distribution networks are an ideal place to start as pricing reform there will:
     - Enhance cost recovery for the regulated asset operators
     - Drive cost reflectivity to the energy market
     - Potentially create standing capability for demand response in the NEM
     - Establish a player within the industry that does not have a vested interest in throughput and can therefore assist in promoting energy efficiency
2. Establish effective and socially responsible support programs for customers in financial hardship

Such a change in network pricing is timely because of a number of factors:

- The availability of interval metering
- The now virtually complete separation of distribution from retail businesses
- A change in load growth patterns
- Concerns about recent price increases and continuing concern about the top-end problem

A review and forecast of price pressures

- Prices remained relatively low in real terms until about 2008
  - Total energy consumption had grown steadily, but peak demand had grown faster, largely due to strong economy and rapid increase in penetration of air-conditioning
  - Load factors declined, which drove up average unit price
- Then, significant prices increase began, particularly in NSW and QLD
  - Some DBs (Ausgrid, Energex) start to notice a decline in weather-normalised consumption in the residential sector, though peak demand continues to grow (though slower than previously)
  - But the combination is likely to be even worse for load factor: Ausgrid forecast to 2019 (total system load):
    - Peak demand: +1.6% pa
    - Energy consumption: - 1.4% pa

This is a rationale response to price by consumers to largely flat energy pricing.
Consumers respond to price and price structure.
Current pricing exacerbates the 'top end' problem.

Smart meters provide more information for the industry and customers

- The profile available from an interval meter will allow accurate assessment of the customer's use of wholesale energy and network assets, and therefore the real cost of being served
- IHD, web portals and other applications can provide customers with very granular information on their energy use
- In most cases, though, price (rather than information alone) will drive behaviour
- Customers, retailers and distributors will face new choices

Choices for retailers

- The serving retailer will know
  - Which customers they are serving at a loss
  - Which customers are producing above average profit
- The first thing to note is that this unwinds hidden cross subsidies between individual customers
- It also dis-creates the *prima facia* retail value of larger volume customers
  - When all customers have the same profile, the largest provide the largest retail margin
- More importantly
  - The customer's profile will be the key to their profitability to the retailer
  - The price offer to the former group will go up, as the retailer will not want to knowingly serve customers at a loss
  - The retailer will also need to be prepared to offer a better price to the latter group as they will be vulnerable to other retailers willing to serve them at an average profit and who can determine how to do so by assessing the load profile

Choices for distributors

- AMI (and the now virtually complete separation of distribution and retail businesses) opens a number of questions that have always been there:
  - *What commodity should network services be priced* – kWh, kW, kVa?
  - *On what basis should network pricing be differentiated* – end-use customer class or use of system assets?
  - *Who are the distribution system's customers* – end users or retailers?
- Our strawman for best outcomes:
  - Price cost-reflectively (price based on cost-drivers; price for indifference)
  - Price based on use of system assets
  - Price to retailers
- Benefits
  - Reduces revenue risk
  - Provides correct price signals to the parties that can best manage them
  - Provides a rational basis for further involvement of the distributor in demand management
  - Makes network indifferent to (or at least provides insulation against) policy decisions regarding carbon outcomes

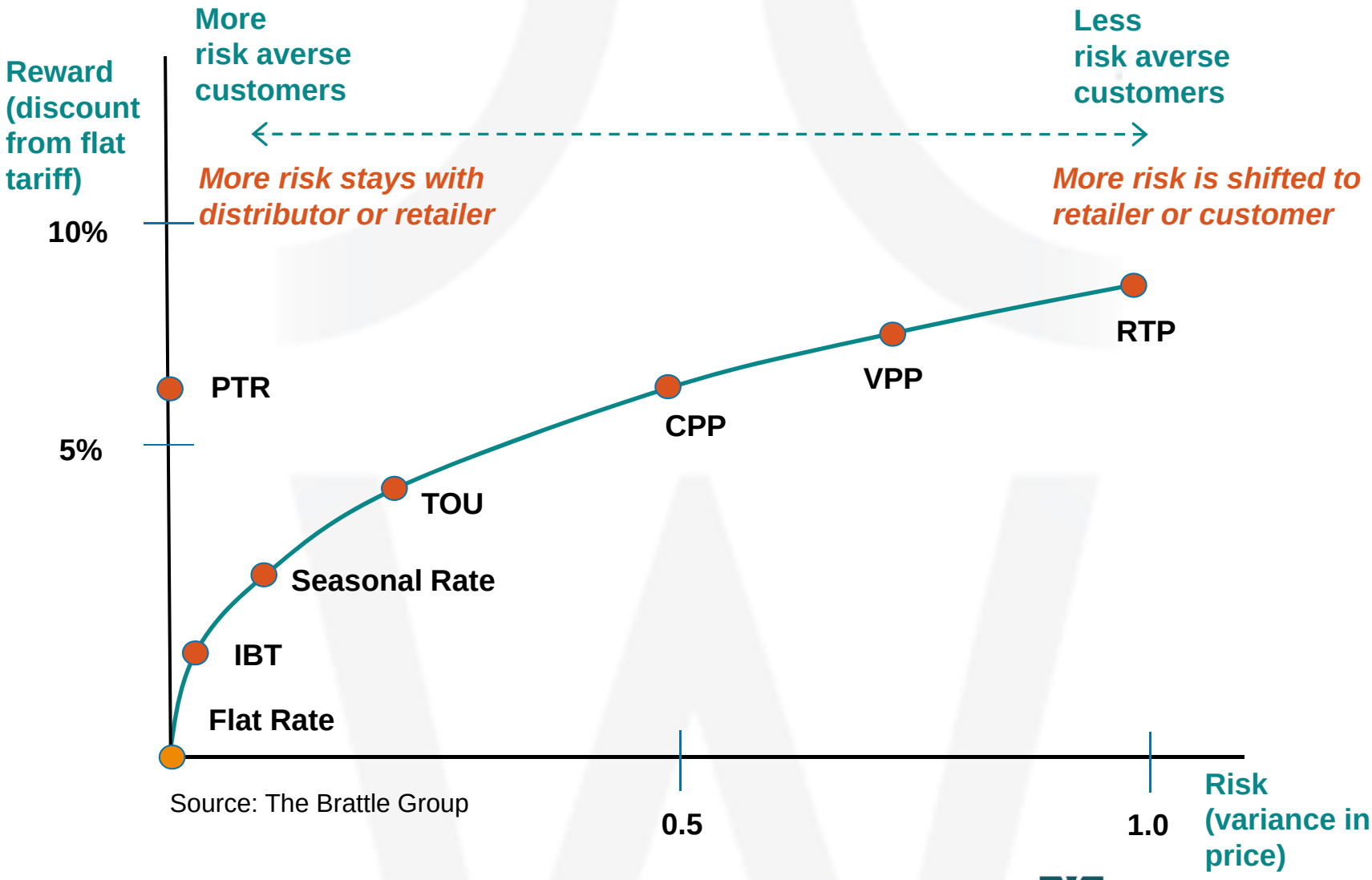
A wide range of new pricing structures is available

- Critical peak price (CPP)
  - A higher price is set for a predetermined number of hours or days on which demand and/or energy price is likely to be at its very highest levels
  - The price is fixed, but the duration of the event may be fixed and non-varying from event to event (CPP-F) or it can vary (CPP-V)
  - Consumers are notified in advance of each critical peak event; generally the day before the event, but can be less depending on the particular pricing arrangement
  - In CPP-V consumers are notified about the duration of the upcoming event at the same time
  - Is often superimposed over a ToU structure, but can also be combined with a flat tariff
- Variable peak price (VPP)
  - Essentially a CPP in which the price can also vary and is notified to consumers prior to the event
- *Note that CPP tariffs are essentially a means for pricing demand in energy terms*
  - AMI will allow distributors to price based on demand, including combinations of peak demand, anytime maximum demand and average demand
  - Many historical reasons why this hasn't been done and will require a significant transition

Possible pricing structures (cont'd)

- Peak time rebate (PTR)
  - Set up like CPP in that a set price is established that will pertain during specific hours on a maximum number of days upon notification by the utility
  - However, rather than this price being a price the customer pays during those periods it is a rebate that is paid by the utility for each kWh that the customer reduces consumption on event days below his/her baseline consumption on similar days
  - One issue is where this money comes from
- RTP
  - Consumer is charged a price that reflects actual movements in wholesale electricity price
- These types can be used in combination, for example:
  - CPP or PTR can be superimposed over a flat tariff or a time of use
  - RTP can be used for the variable part of a load, with the baseload on a static ToU or flat tariff

Dynamic pricing arrangements shift risk



Source: The Brattle Group

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Implications of changes in network price structure

- Evidence everywhere suggests that while customers may find they can cope with time-varying prices, and even benefit from them, most do not accept them voluntarily
- As a result, retailers have tended to offer flatter pricing structures – and they will continue to try to respond to what customers want
- *Traditional network pricing has been relatively easy for retailers to cope with* – most network tariffs for smaller volume customers tends to be energy based, and the retailer can simply add the charge to all portions of the NSLP for pricing (no price risk, no incremental volume risk)
- *There is no counterparty for a financial hedge on network charges*
  - Where the network tariff introduces either (or both) more volume or price risk, the retailer will be less likely to repackage the network price
  - A three part static TOU network tariff is more likely to be able to be 'absorbed' by the retailer within its price offer as compared to, say, a critical peak day demand network tariff

Result

- The distribution charge is more likely to get through to the end-use customer
- If it doesn't, the retailer has to deal with the risk
  - If the retailer smooths the price be adding a risk premium, the premium provides headroom for a competing sculpted offer
  - Or the retailer can provide demand management services to reduce the risk
- In either case, the pricing can make the distributor economically indifferent:
  - If peak demand is reduced, the reduction in revenue equals the long run average incremental cost of demand that will not be needed
  - If peak demand grows, the long run average incremental cost needed to fund augmentation is collected
- But it also provides a basis from which the distributor could offer demand response programs
- It also reduces the distributor's reliance on throughput for revenue, making it a potential provider of energy efficiency services

Customers are likely to have more choices

- As in any business, more information about how customers use a product leads to more segmentation of products and offers
- Flat price offers will still be available
  - Will be based on the customer's profile (or a time-band simplification of it) with a risk premium
  - Will be more cost reflective than the current flat tariff
- Sculpted offers will also be available for those customers that want them
  - 'Passive winners' – those with lower cost to serve profiles (i.e., those who have been subsidising others under the NSLP)
  - Those who can change their consumption to produce a lower cost to serve profile
- There will be a need for the retailers to develop tools that can quickly process profile information – or surrogate information – into offers
- There is likely to be a continuing role for Government or third parties to provide bill comparison services (though the input data will become more complex and costly to process)
- There will be a role for the provision of tailored advice to customers on ways they can change they behaviour or end-use technologies to produce a lower cost to serve profile while maintaining acceptable lifestyle amenity

What about those who can't change their profile?

- They will face the actual cost of their electricity service
- Will customers with poor load profiles have difficulty getting offers?
  - May be difficult for them to get offers they will *like*, but there is no reason to believe that offers won't be available
  - Poor credit history will undoubtedly be a factor (but is likely to be a factor even for customers with relatively 'good' profiles)
- There will be a need for social welfare programs for some customers, but presenting the right price is vital

Thoughts on what an effective social welfare policy would include:

- Cost-reflective prices to encourage economically efficient behaviour
- Cash payment that allows the household to afford the amount of electricity required for what the Australian community agrees is a realistic quality of life
- Technology investment and information that can cost effectively reduce the required payment stream while helping attain the agreed quality of life; examples could include insulation, renewable energy technologies, load control, etc.

AEMC's strategic focus on DM

- It is noteworthy that of the 5 questions about DM raised by the AEMC in its recent *Strategic Priorities for Energy Market Development Discussion Paper*, 4 were directed to networks
- Note that the AEMC is primarily concerned with *demand response* to address low duty-cycle infrastructure
- AEMO (2010-11) estimates that there may be as much as 600 MW of demand response in the NEM (about 3.5% of installed capacity)
  - 177 MW very likely to educe consumption in response to high prices
  - 423 MW with an even chance of doing so
- By contrast, WA has about 450 MW – about 12% of its installed capacity (and increasing)

But why the sudden interest in networks for demand response?

- There isn't much demand response in the market
  - Vertical integration
  - Caps and other financial hedge instruments are generally readily available and relatively inexpensive
  - Demand response, by contrast, has high transaction costs for prospecting, administering and settling
- And there is a good commercial reason for there not to be too much DR
  - Where a retailer is exposed to pool price (unhedged volume) and has a fixed price to the end-use customer, it will want to reduce that volume
  - If the retailer is vertically integrated it may not want – even in this situation – to change pool price
  - In all other situations (ie, when the retailer is hedged) the benefit of DR is essentially an arbitrage of the pool price and the strike price – there is no incentive to change pool price as it reduces income to both the retailer and the customer(s) providing demand response
  - This application of DR amounts to a wealth transfer from generators to retailers and DR providers (where the retailer is also a generator the incentive is limited to customer acquisition and retention/satisfaction)
- It is reasonable to expect that beneficial changes to the network load duration curve will also be beneficial to the wholesale market

What stops networks from doing DR?

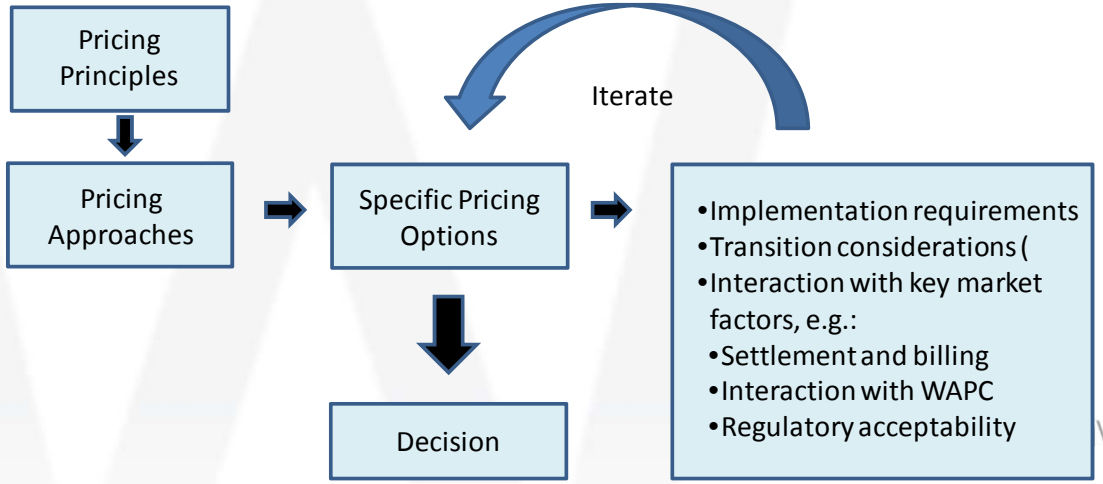
- Current incentives overwhelmingly favour investment in network augmentation
  - Supply side advantages:
    - Culture/practice/track record: networks are expert in and comfortable with supply-side solutions
    - There is a mature market of suppliers, products and constructors of supply-side solutions
    - Established track record of being able to deliver supply-side solutions on time and on budget
    - Very comfortable with the delivered reliability of the technology, which is primarily passive – once installed it provides the rated capacity in the overwhelming majority of cases and situation
    - (and not the least) it is how networks earn money
  - Corresponding demand-side disadvantages:
    - Generally low capex so earning potential is low (and may be existing prohibitions from network owning assets on customer side of the meter, which further reduces RAB potential)
    - Is not an off-the-shelf purchase as supply-side is – at present DR must be prospected and transacted; networks have little expertise in these areas, and it adds to the time required and the costs
    - No (or little) track level of deliverability of these projects for networks
    - (and therefore) Easy to suspect that demand-side may not respond when needed so reliability appears less good than supply-side, or unacceptable

What can networks do?

- As discussed, new approaches to network pricing can:
  - give an explicit price signal regarding low duty-cycle infrastructure, and
  - make networks much less financially dependent on throughput
- Overcoming these disadvantages will require a transition phase and a permanent change in incentives for networks
  - Incentives will need to reward network for doing a demand-side alternative – they will need to be financially at least as well off as if they did the supply-side option.
    - Performance incentive modelled on the mechanics of the STPIS
    - DMIS / DMIA
  - A transition period will be needed that will need to cover higher transaction costs of demand-side solutions (at least through a significant activation phase) and provide the capability for the network to revert to the supply-side alternative if demand side does not prove up in a particular instance
  - In the longer term, transaction costs should reduce as standardised processes are developed and some level of known (standing) capacity in DR is developed
- Pricing can be done now – but it is a journey

Managing the transition in network pricing

- Stakeholder, shareholder and community concerns will all need to be managed:
  - The magnitude and speed of price increases
  - The ability for an effective welfare support mechanism to be put in place
  - The need to continue to recover required revenue over the transition period
  - Community expectations regarding network/industry involvement in DM and energy efficiency
  - The historical resistance of customers and reticence of regulators regarding increasing fixed charges or demand based charges with regard to small volume users, and the need to be able to explain the rationale for them, while also providing mitigation strategies
  - The level of cross subsidy that exists in the current tariffs when transposed to a use of system asset framework and what that implies, in light of the other factors above for unwinding them
  - The reactions of retailers to the network prices as they unfold
- An iterative process



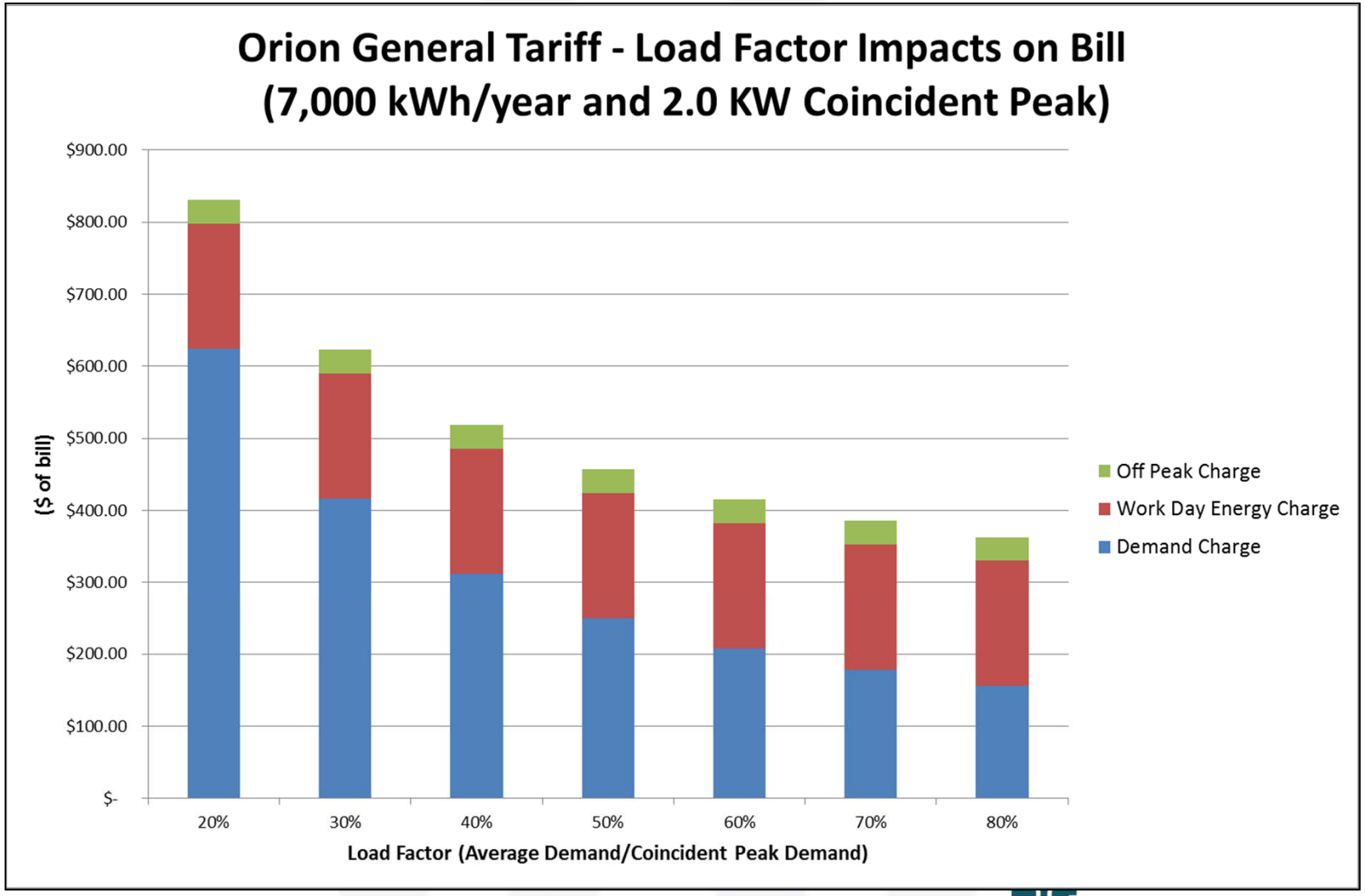
But it can work

- A very similar approach has been used successfully for about 18 years in NZ by Orion Energy – based on Long Run Average Incremental Cost (LRAIC) process we developed in 1993 – now applies even to low voltage customers

Tariff Component		
Peak Charge	42.80 cents/kW/day	Charged based on usage recorded on dynamic peak days
Energy Charge Working Week Days	6.215 cents/kWh	7 am to 9 pm
Energy Charge - Other	0.785 cents/kWh	Rest is all Off peak

- Retailers charged in aggregate for their customer load on the Orion Network
- They also deploy peak reduction rebates and embedded generation credits using the LRAIC – settled at Grid Exit Points (using NEM type data)
- All major Retailers voluntarily installed Interval meters in response, gave time differentiated prices and offered demand-side services

Impact of load factor on low voltage tariff charged to Retailers



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Summary

- Cost-reflective prices provide the best price signals possible for encouraging economically efficiency consumption
- Effective social welfare mechanisms need to be developed, but not at the expense of cost reflective pricing
- The electricity industry has a very real interest in making sure this happens
- An alliance for this between the industry and customer advocates could be a very powerful force for getting it right
- Network pricing that reflects network cost drivers is likely to provide significant impetus for demand response and remove a barrier to network involvement in energy efficiency activities

Living in the modern world is a lot like having bees in your bonnet – but there they are.

Duck's Breath Mystery Theatre

Thank you

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