



“If the rate of change on the outside exceeds the rate of change on the inside, the end is near.”
— Jack Welch

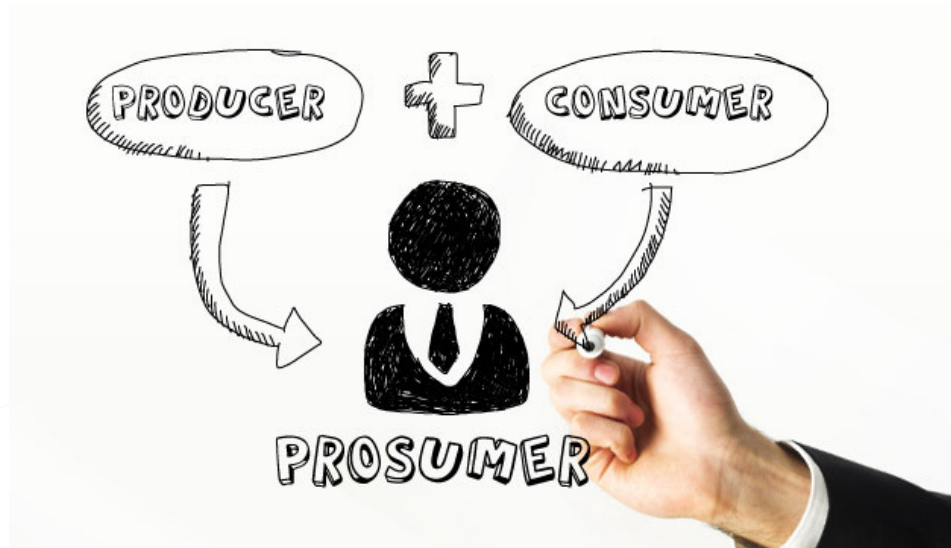
Andre Botha, Vector
July 2015



Customer sentiment is changing

- But, in the odd world of regulated utilities, a company like Con Ed traditionally makes money by building more stuff: put in a billion-dollar substation and you can “rate base” it, making customers pay the cost, plus a 10% mark-up, for decades.
- That arrangement worked well when society needed utilities to build the electrical system, to serve everyone, and when the cheapest technical solution involved big plants “pushing electrons in one direction”
- But today “the system is not just energy-inefficient; it’s capital-inefficient.” At any given moment, New York’s utilities are using only about fifty-five per cent of their system capacity. “No other industry uses capital like that...”
- A new wooden pole can generate that mark-up for the utility in the course of its fifty-year life span. A pole makes money—hence, poles.
- Power utilities now face uncertainty of a kind that traditional phone companies faced when cellular technology emerged. A few utilities welcome the challenge; others are resisting it; and the rest are waiting for someone to tell them what to do.

Customers want choice and are driving change



- "Internet of electricity"
- "Negawatt production"
- Total energy solutions
- Technology agnostic - hardware & software
- **Big data, sensing, communications and analytics**
- Huge expectations

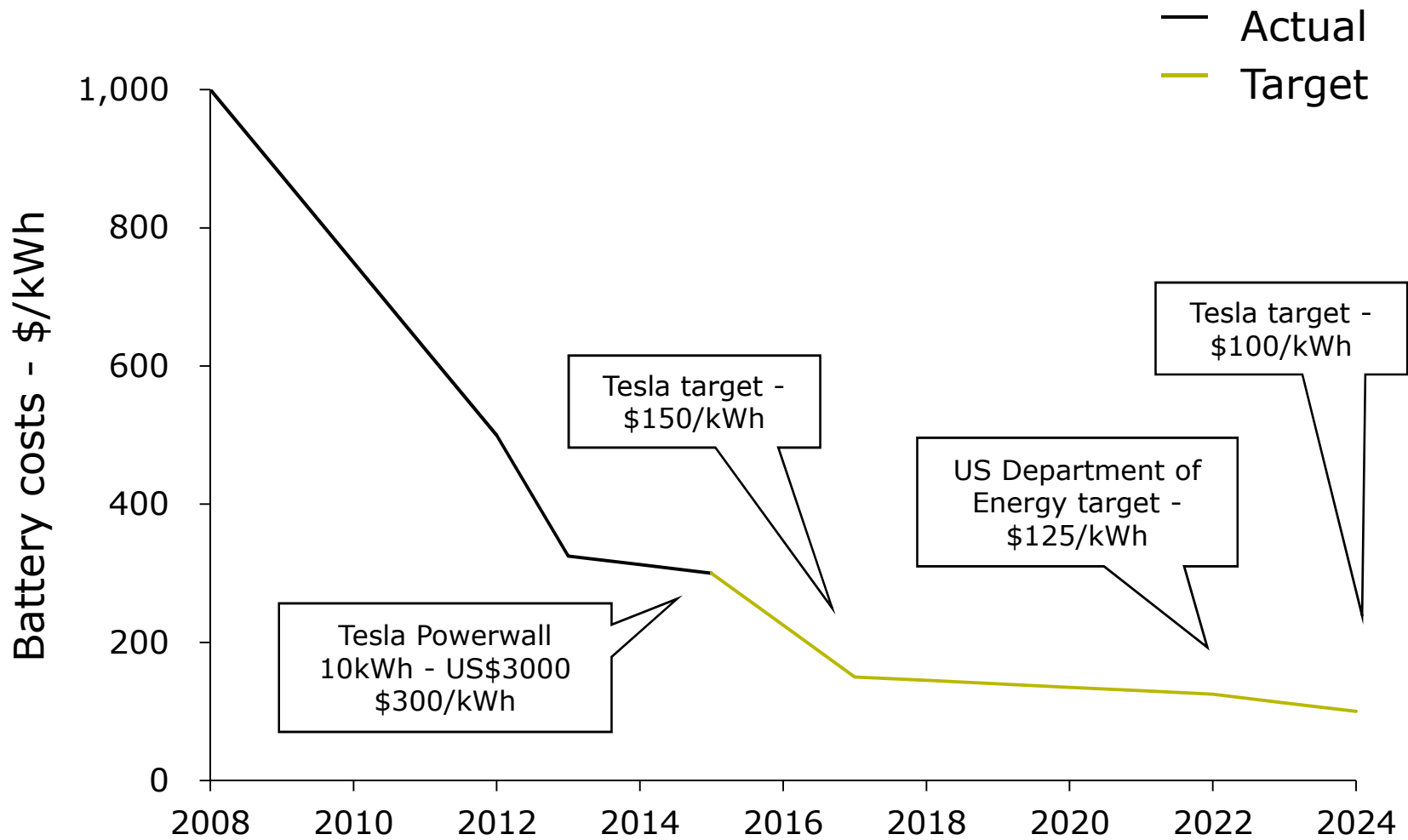
Various new players offering a wide range of options

- PJM Interconnect - 60 million customers from the Mid-Atlantic to Chicago.
 - Internet based automated controls to respond to market signals.
 - Change settings on thermostats, dim lights, turn off water heaters and refrigerators.
- Ford launched [MyEnergi Lifestyle](#) combining renewable energy generation with 'time-flexible' loads to optimise consumption across Evs and home appliances.
 - Integrate C-Max Energi electric car with smart appliances and solar – target a 60% less energy costs for a typical home. (Georgia Tech, Whirlpool, SunPower & Nest)
- Google purchased Nest Labs - intelligent thermostat with built-in Wi-Fi and access via app. [Sunrun](#) partnered with Nest to combine efficiency & renewables.
- All IKEA UK buildings to be fitted with solar panels in the long-term for environmental **and** financial benefits.
 - Stores incorporate geothermal heating and cooling, biomass boilers & better insulation.
- Amazon [home automation store](#) - energy management, home security, etc.
- AT&T rolled out [Digital Life](#) service in fifteen cities - incl smart home energy.

<http://www.newyorker.com/magazine/2015/06/29/power-to-the-people>

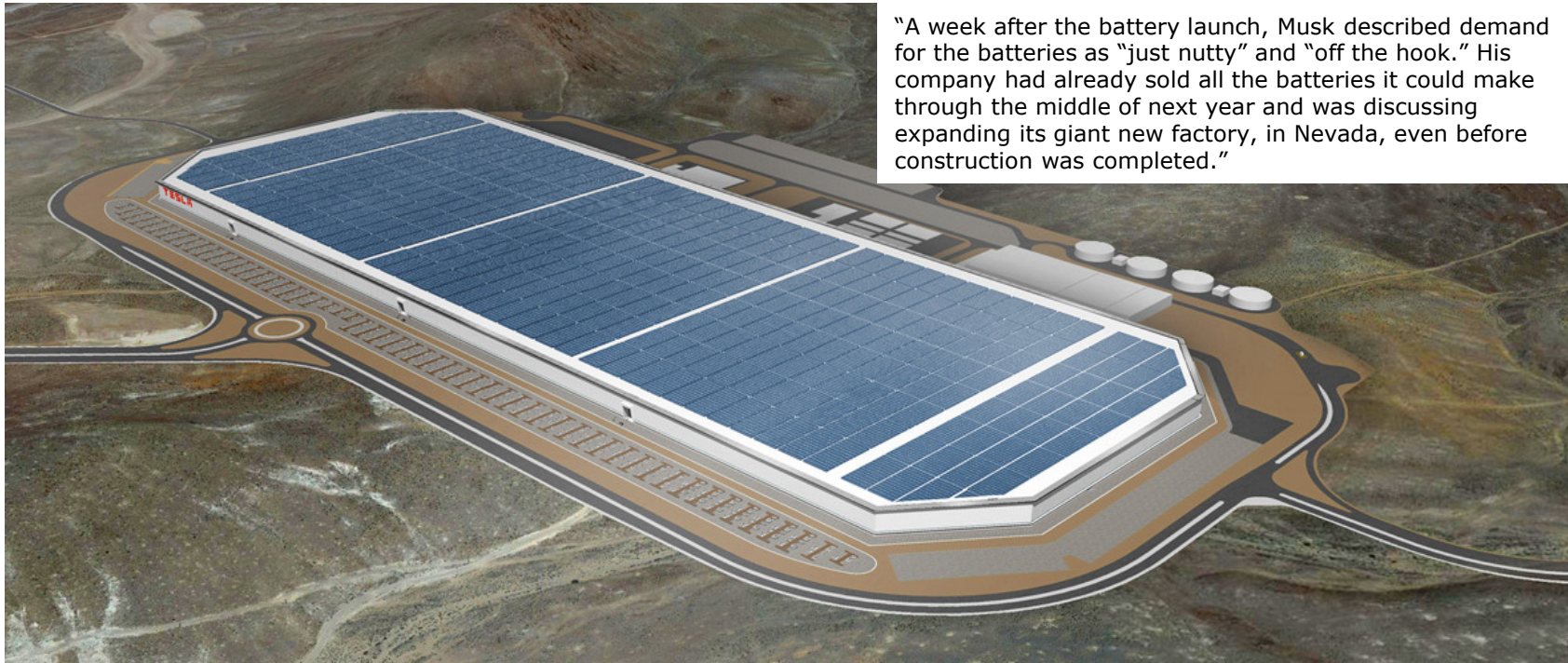
<http://www.greentechmedia.com/articles/read/distributed-energy-the-power-sectors-wild-card>

Battery costs are declining



Source: Deutsche Bank Markets Research Report – Solar and Storage, 27 February 2015

Demand is forecasted to be huge

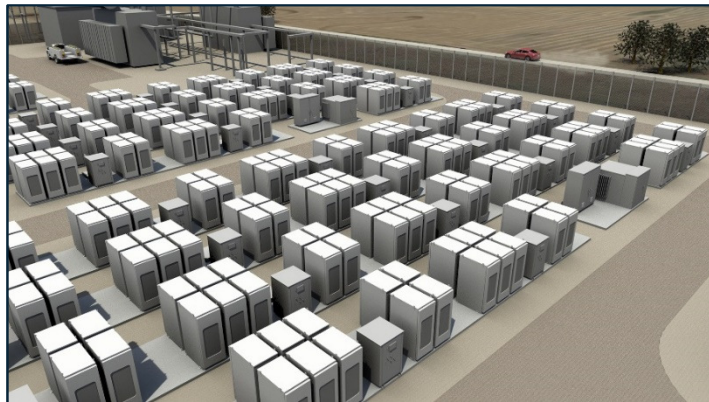


"A week after the battery launch, Musk described demand for the batteries as "just nutty" and "off the hook." His company had already sold all the batteries it could make through the middle of next year and was discussing expanding its giant new factory, in Nevada, even before construction was completed."

- Beginning production in 2017
- 2020 Gigafactory production (35 GWh) will equal today's global lithium ion battery production
- Expect to reduce kWh cost by >30% through economies of scale, process optimisation
- One line dedicated to recycling

Flexible range of options

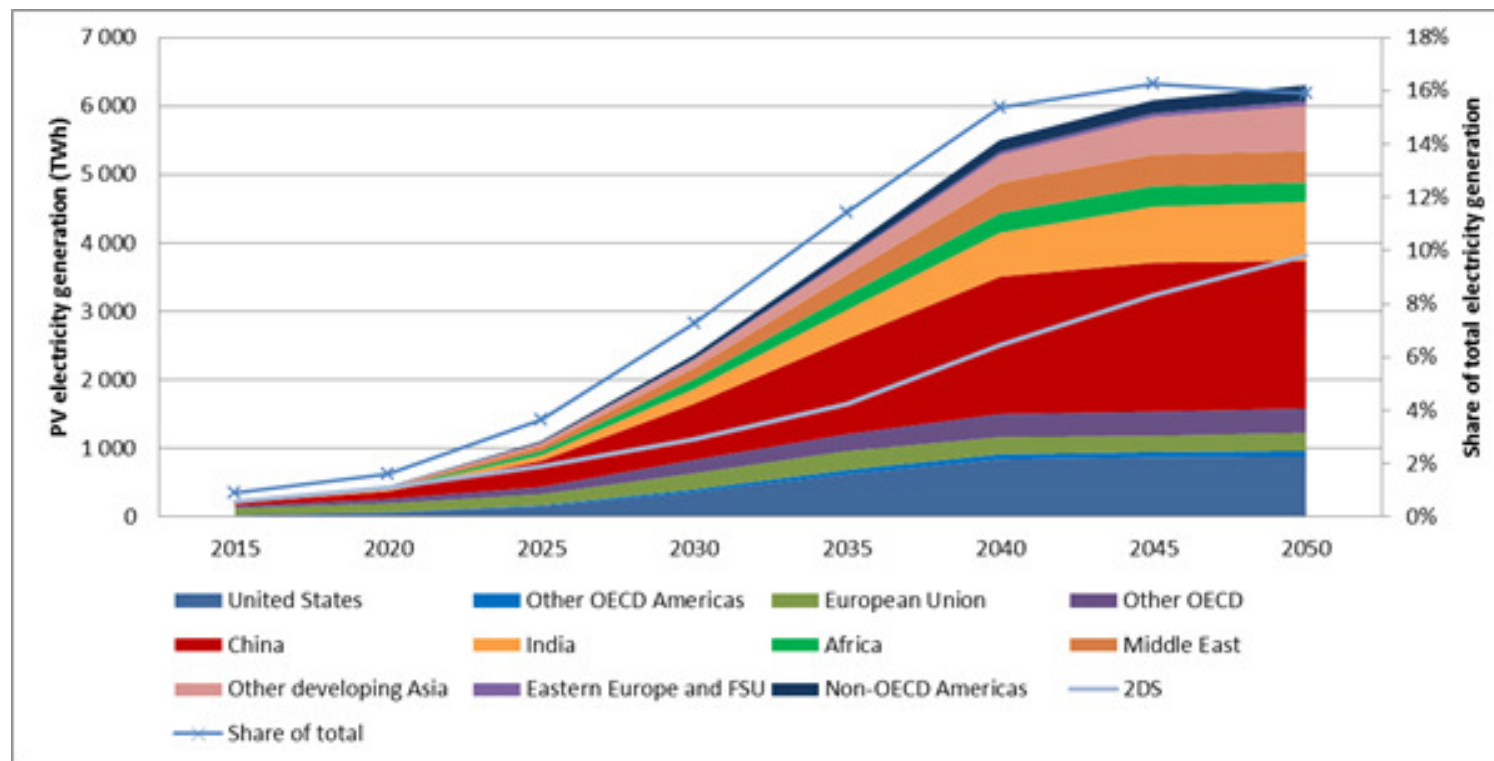
Commercial/grid solution Powerpack 100kWh-10MWh



Residential/SME solution Powerwall 6.5kWh/10kWh



Forecasted solar uptake



- Since 2010, the world has added more solar photovoltaic (PV) capacity than in the previous four decades *IEA 2014
- Solar generation, will make up 4% of supply by 2040 (2.2 TWh) *NEW ZEALAND'S ENERGY OUTLOOK, Electricity Insight MBIE*
- By 2018, 43% of New Zealand households could have PV *Photovoltaic Solar Power Uptake in New Zealand, EPECentre*

Electric vehicles are coming to the mass market



- Tesla New Model will be \$US35k.
- Right now there are approximately 740,000 EV globally and rising.
- EV charging stations now having overtaken petrol stations in Japan.
- In NZ the total number of battery-powered and plug-in hybrid EVs stood at just under 600.
- EVs could represent between 10-40 per cent of new vehicle sales by 2020, and as high as 80 per cent by 2040.* Canterbury University's Centre for Advanced Engineering (CAENZ)

We have seen significant public interest in batteries

A screenshot of the Vector website's Tesla Powerwall registration page. The page features the Vector logo in the top left corner and a navigation menu with links for Electricity, Gas, Solar, Smart technology, Outages, News, and Inv. The main heading is "Tesla Powerwall" in a large, white font on a dark blue background. Below it, a dark blue button contains the text "Coming to New Zealand. Register your interest". A breadcrumb trail reads "HOME / SMART TECHNOLOGY / TESLA ENERGY STORAGE". The section is titled "Register your interest" and includes a paragraph: "We will release timings on the Tesla home battery and commercial storage solution in the next couple of months. In the meantime, you can register your interest here." Below this text are three input fields labeled "First name", "Last name", and "Email address".

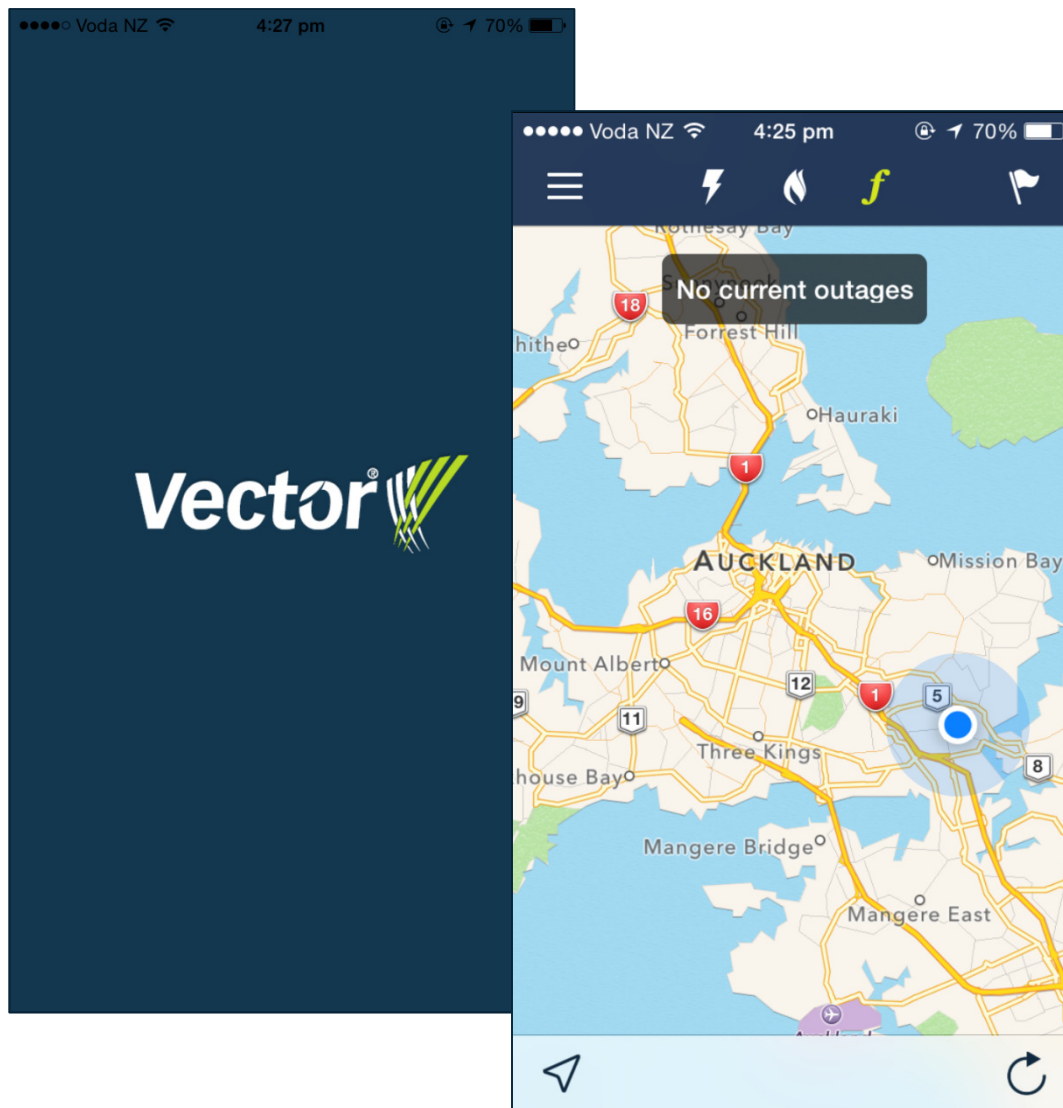
- Since announcing the relationship between Vector and Tesla
- More than 530 expressions of interest on our website
- Despite no prompting

Electric vehicle charging stations



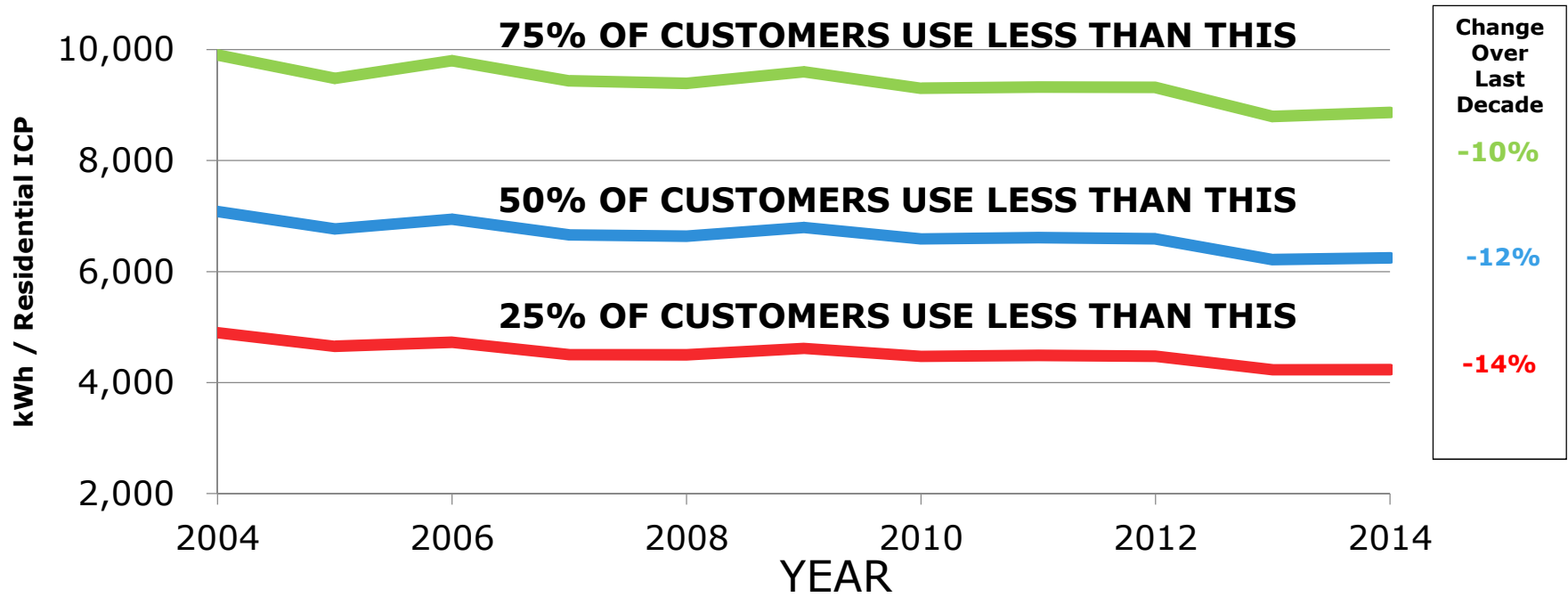
- 4 chargers installed in Newmarket; 2 public, including NZ's first on-road charger
- 118 charges on one charger in 3 months since installation
- 2-3 times as quick as usage patterns in Sydney
- 35 more chargers planned

Vector's Outage Manager App



- Over 66,000 app downloads, across iPhone and Android
- ~8.3 million API hits on our outage map across the app and website over 2 years
- Can follow electricity, gas and fibre outages

Residential volume





“For average Americans, however, the biggest source of carbon emissions is their home, so the utilities’ help is crucial in making the transition. And, even without climate change, utilities face a combination of threat and opportunity from disruptive new technologies.”

<http://www.greentechmedia.com/articles/read/distributed-energy-the-power-sectors-wild-card>



Customer able to stop, start, continue their journey seamlessly, across many channel types...



“The future always comes too fast and in the wrong order.”

— Alvin Toffler



Implications

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- A nighttime photograph of a cityscape, likely Victoria, British Columbia, Canada. The image shows a wide view of the city with lights reflecting on the water, and the prominent tower of the Empress Hotel in the distance. The sky is dark with some clouds, and the city lights create a warm, glowing effect.
- Customer engagement
 - Keep up with the rate of change
 - Service levels to be reflect what matters to customers
 - Customer expectations
 - Capital efficiency
 - Stranded asset risk
 - Total energy solutions
 - Growth and renewal capex
 - Network and asset management
 - Complexity
 - Transition
 - Uncertainty
 - Accelerating change
 - Heightened risk if simply addressed through regulatory discretion
 - Right incentives to invest in right technology
 - Diverging strategies in a default regime