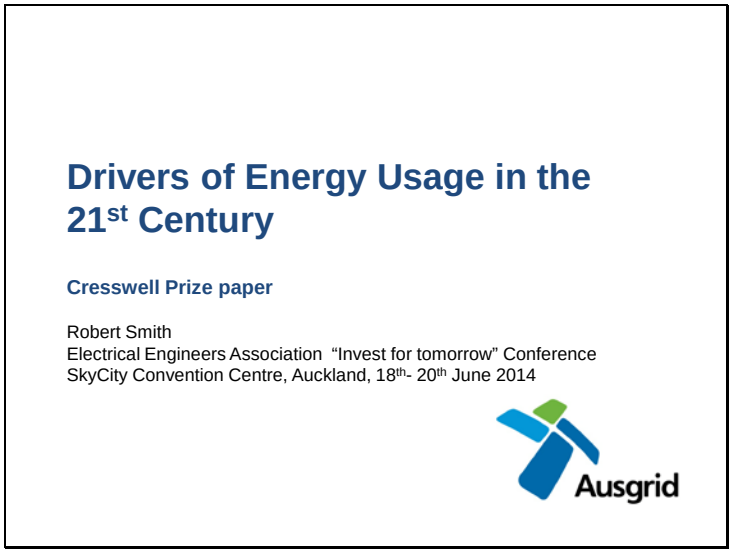
Slide 1



The energy future is always a great thing to have a discussion about.

- its about what we do every day, its about new consumer toys, saving the planet, about how we live, maybe even how we should live.

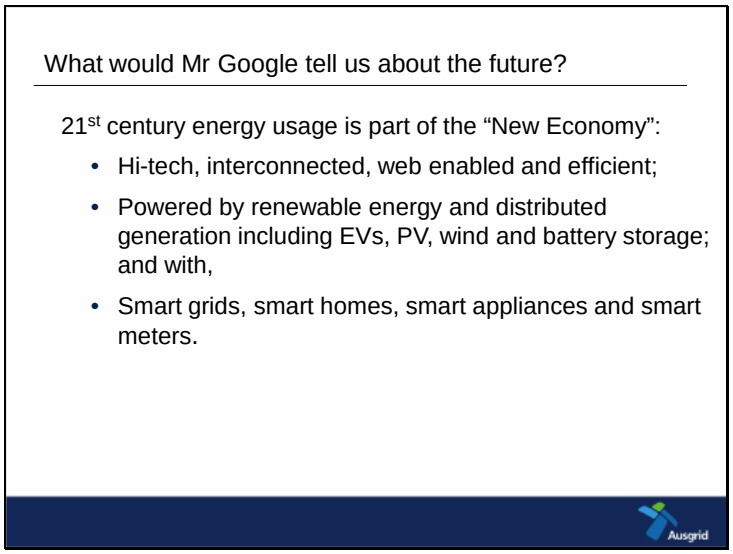
The Future, the forecast and particularly new technologies are always exciting.

So I have split this talk into Two parts: the technology part: then the other part – the more interesting part about economics.

The aim of this presentation is to get you thinking about the drivers of energy usage in the 21st century in terms of both parts.

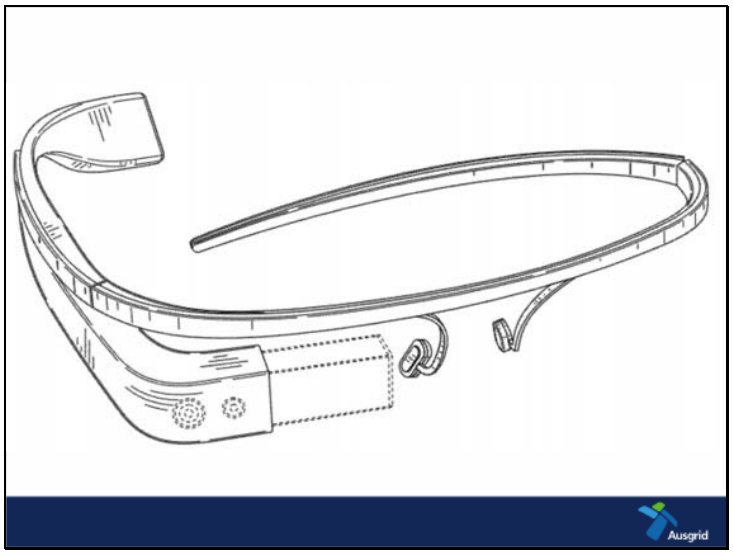
My secondary aim – comes from my kids (who are 10, 13 and 15) and that is to create a presentation that look as cool as the ones they do for school largely by cutting and pasting stuff off the net.

Slide 2



So if this was a school project what would we conclude from searching the net.
Ask Mr Google and he will tell you energy usage is part of the "New economy" and will be:
•Hi-tech, interconnected, web enabled and efficient;
•Powered by renewable energy and distributed generation including EVs , PV, wind and battery storage; and with
•Smart grids, smart homes, smart appliances and smart meters.

Slide 3



So what will the future look like?

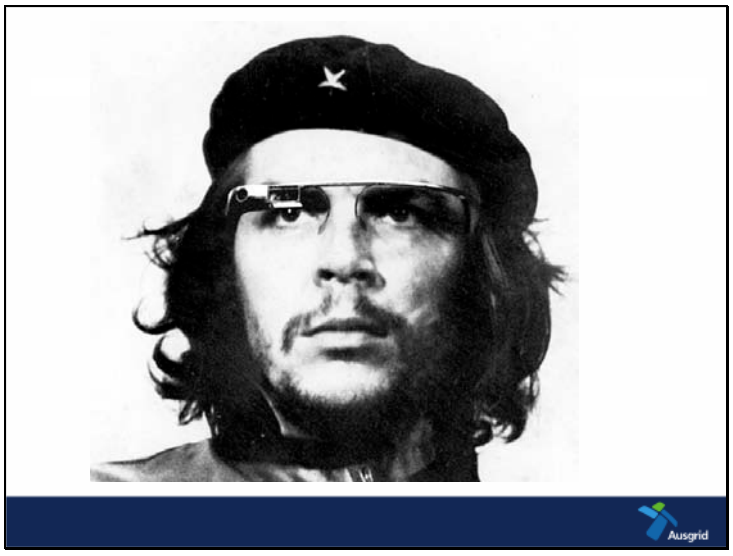
We will see the world through new Google glasses –

The whole world of information - better than at your fingertips – will be at your voice command and eye ball movement

Slide 4

All the cool kids will have them.

Slide 5



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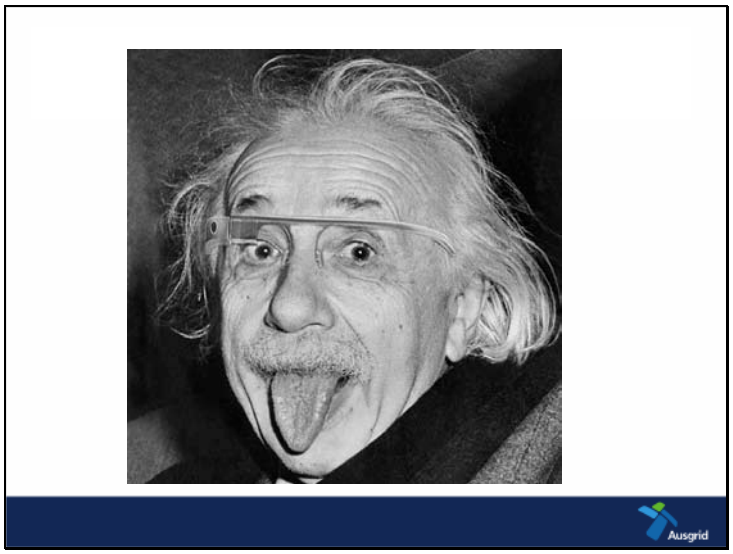


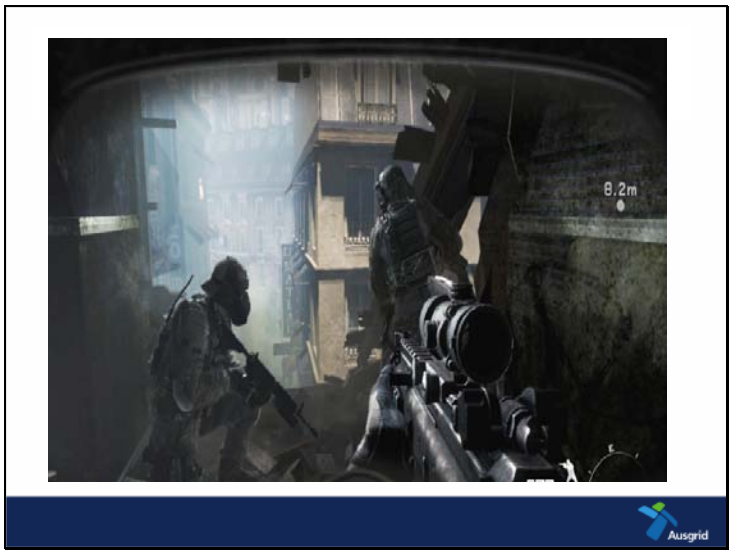
Slide 7

On the internet looks don’t count - the latest thing is 360 degree wearable virtual reality

Slide 8

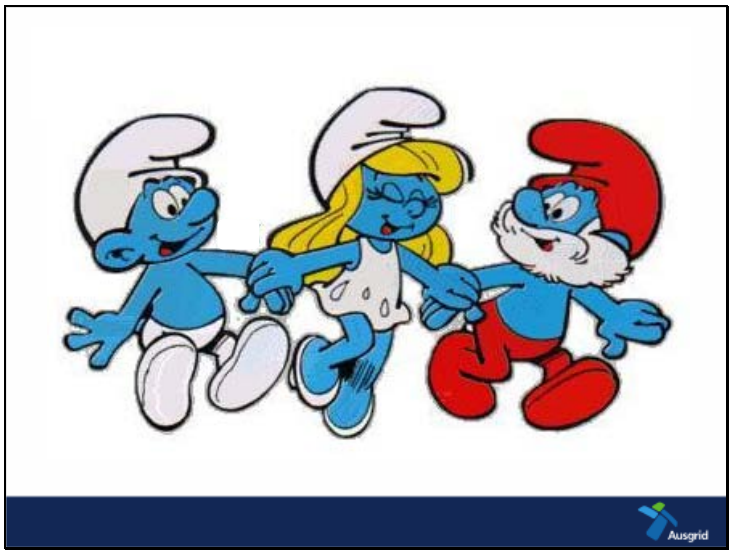
Being tested here by three models,

Slide 9



most likely imagining that they look like this,

Slide 10



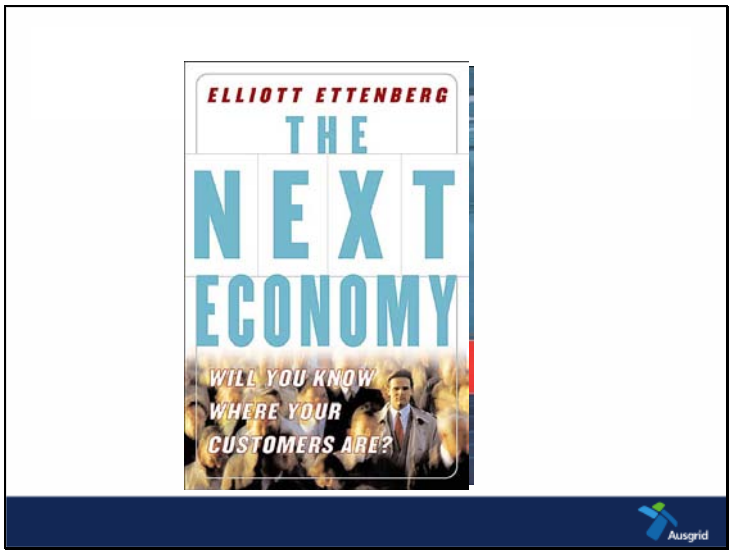
But for all we know they could look like this.

That’s the beauty (or not) of virtual reality.

if you listen to the internet the future IS the internet

Everything will be virtual.

Slide 11



So if we get off the net for a minute and look on the bookshelf.

Starting with Peter Drucker in 1969 the concept of the new Knowledge economy has grown, if you read around it seems increasingly clear we are facing a new world.

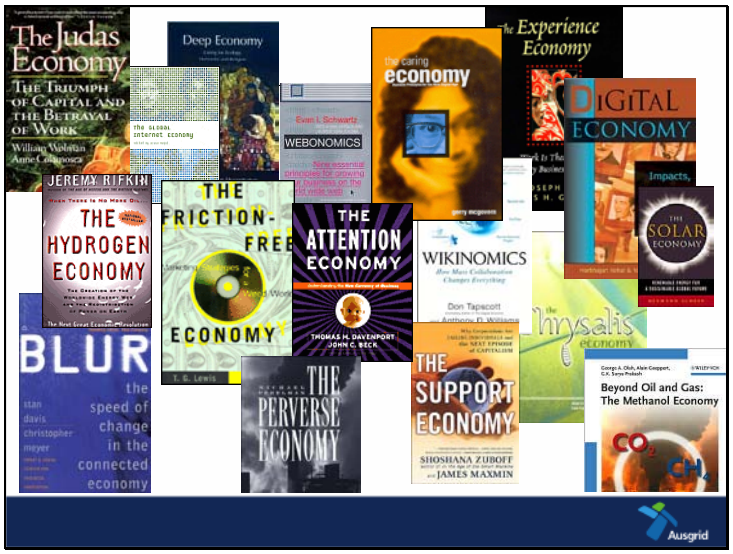
Technology, computers and the internet change everything.

Surely the rules designed in the 19th century won't work for the 21st century?

The old rules no longer apply.

The new economy is here!

Slide 12

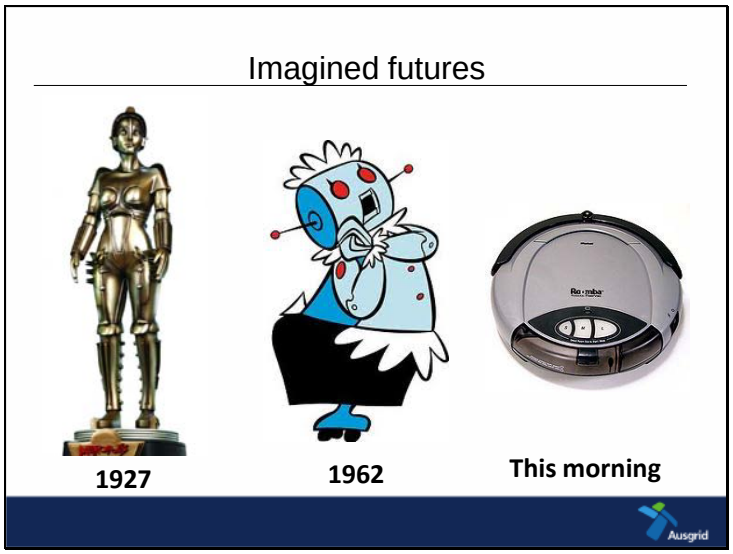


Well there are lots of imagined versions of the “new economy” and they have been coming for a long time now

For example the:
The Digital economy
The Global internet economy
The weightless economy
The network economy
The Friction free Economy
The support Economy
The caring Economy
The Deep economy
The experience economy
The attention economy
The methanol Economy
The solar Economy
The hydrogen economy

Most involve a mish-mash of computers, the internet, energy, services and the environment, - combined with a complete change in the laws of nature, in human nature, and the basic rules of economics.

Slide 13

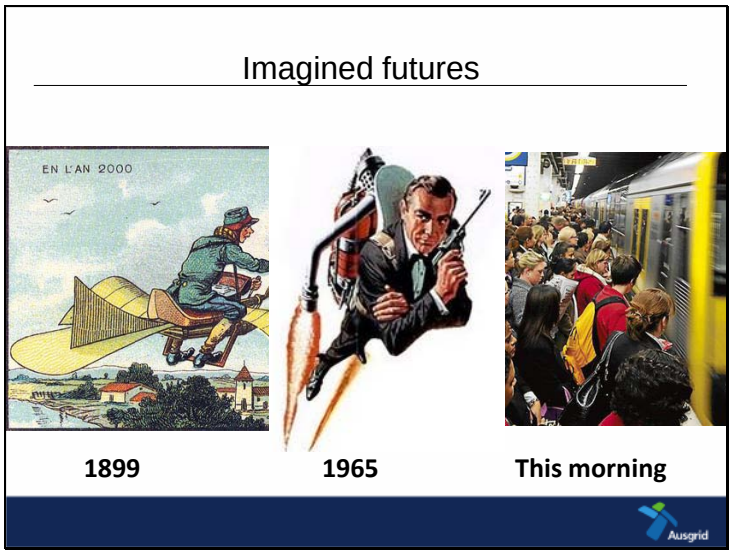


But when we do a reality check – imagined futures have a tendency to turn out more mundane.

The robot we expected in 1920's and even the 1960s is here but not as we imagined.

Maria star of Fritz Lang's Metropolis
Rosie star of the Jetsons
Roomba star of the shopping channel

Slide 14



And we are all still waiting for our jet packs as well as the 7.15 to town hall.

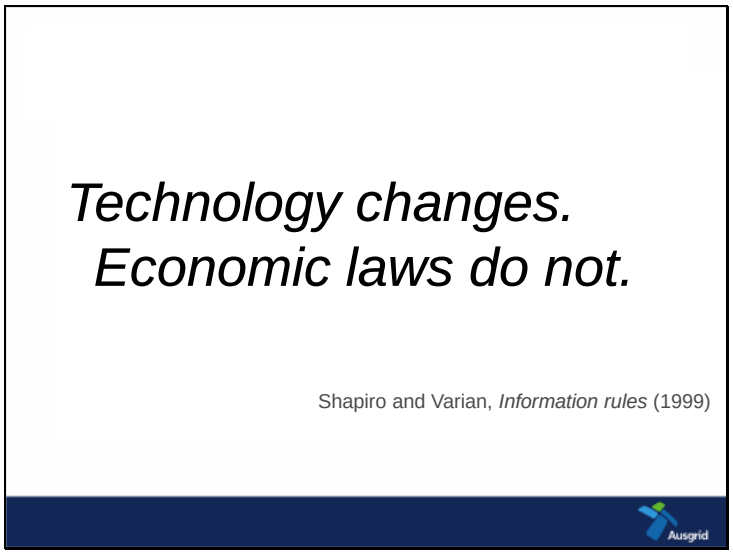
(And we can discuss where EVs fit if we have time during questions)

Slide 15

New technologies are here.

Today you can go out and buy an EV, PV, a fuel cell, household battery storage and a $30 IP addressable LED light bulb but what does this mean for energy use?

Slide 16



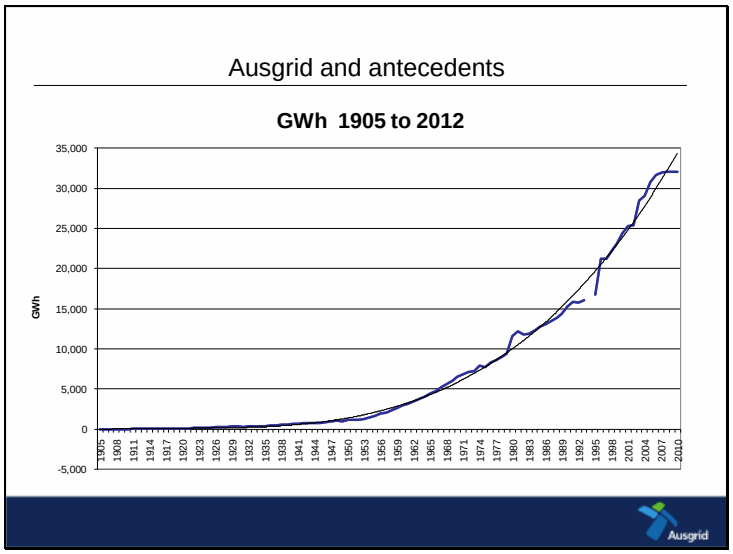
As Hal Varian - now the Chief economist at Google - said at the end of the 20th century - before the Dot-com bubble burst and just as Y2K was about to disable the planet.

“Technology Changes, Economic Laws do not”.

Developing, understanding, responding to and educating people about Technology is going to be important – it is one of the reasons behind Ausgrid’s SGSC project, Smart home, and Learning Centre.
But for the immediate future energy usages is going to be driven by other factors.

As Dooley Wilson (Sam) sang in Casablanca “the fundamental things apply as time goes by”.

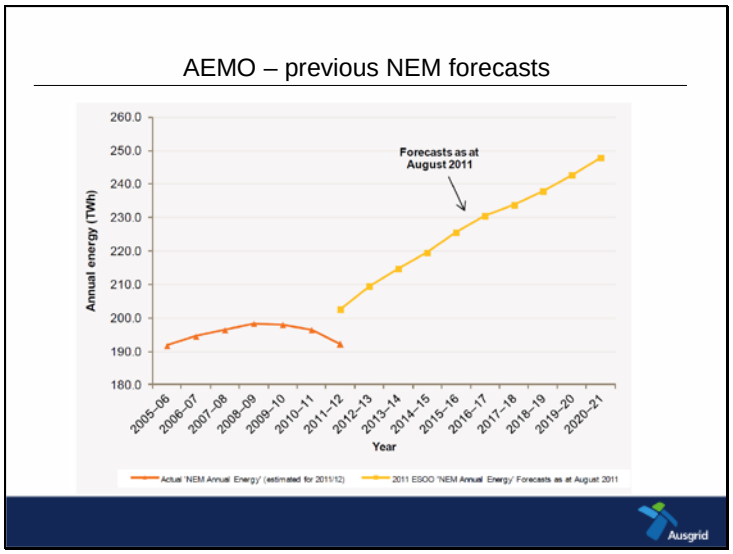
Slide 17



So what has been happening.

You will all be aware of the shift from a long history of continuous growth to falling usage in recent years – most notably by residential customers.

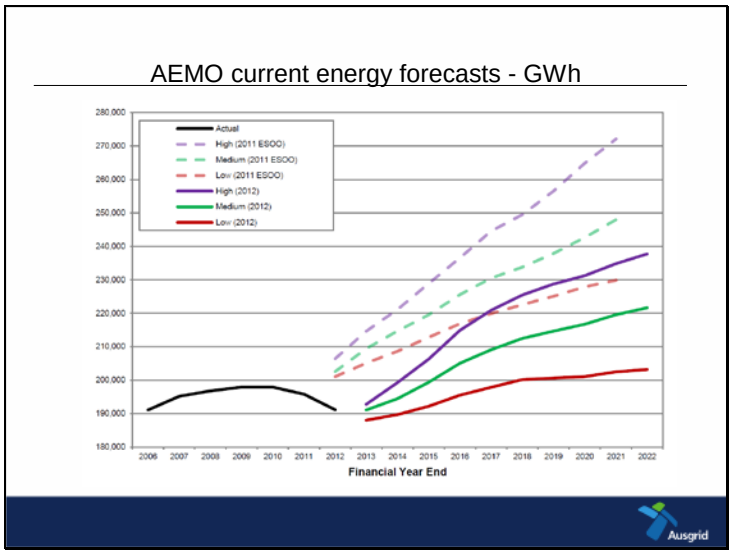
Slide 18



This is a big shift . This old AEMO August 2011 forecast of annual energy usage in the NEM shows how hard it has been to move past the traditional long term growth view.

When the future has always been drawn with a ruler, it is hard to realise and change when Actuals begin being traced out with a protractor.

Slide 19



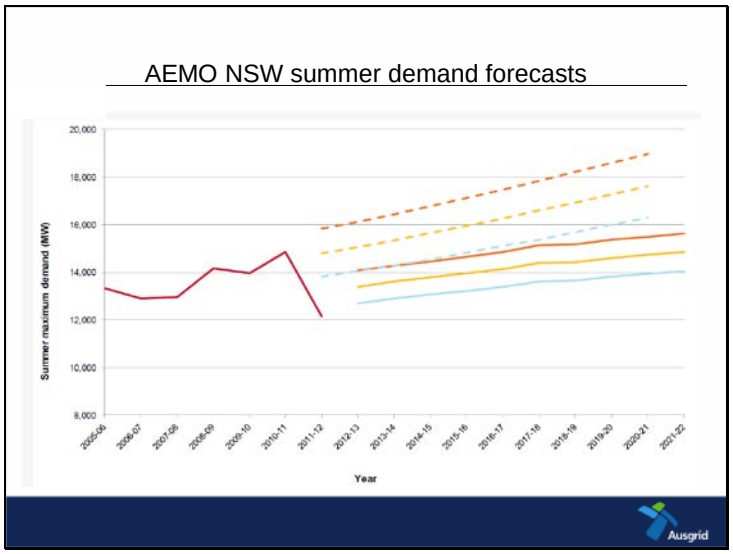
And AEMOs latest forecasts show how much views have changed.

The old view – which we saw in the last graph - is the dashed green line – the new view the solid green.

The difference is about a 10 % drop.

You will notice that the new HIGH forecast (the purple line) barely passes the level of the old LOW forecast (the pinkish dotted line) and then only after 2017.

Slide 20

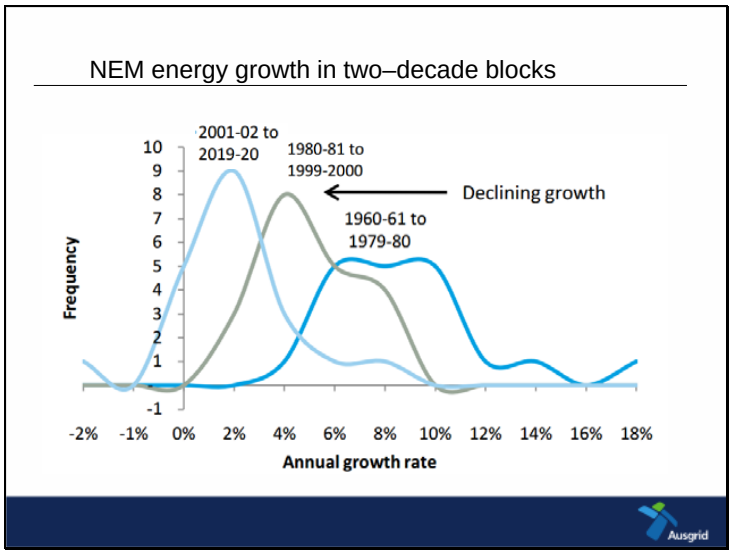


This change is even more evident in NEMCO forecasts of peaks for NSW.

The new High is below the old low forecast.

This is still growth but not as we have known it.

Slide 21



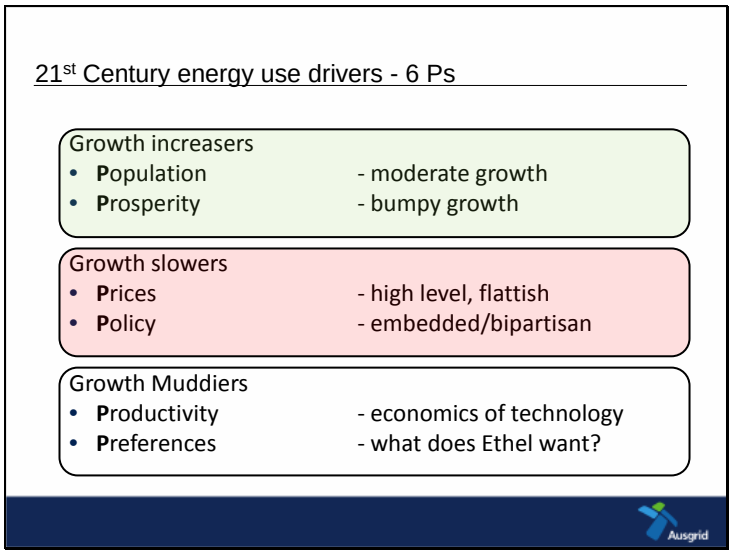
And this long view graph shows this slowing in a dramatic fashion.

You need to realise the graph - moves from right to left over time and from high growth in the 60s to low forecast growth now.

Average energy growth of around 8% in the 60s-80s shrank to 4% before and after 2000, and forecasts only about 2% average growth this decade

What growth will be is still unclear – it is currently negative – But the odd favour it being historically low.

Slide 22



So if technology is not the only driver what is?

We can summarise the drivers as 6 Ps – combined into three groups

The growth increasers.
Population and prosperity –Australia is a mature economy – there will be more of us, who are richer and will use more.
Energy usage remains closely tied to economic growth but, partly because no one can forecast economic growth accurately - I won't focus on this today

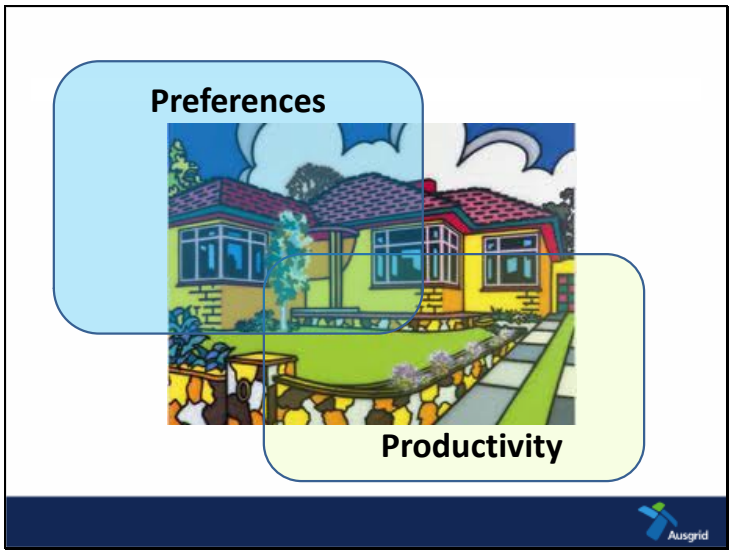
The growth slowers.
Prices – recent increases are clearly driving a slowdown in usage – the important question is, is it the big price increases that reduced usage or is the high price level that reduced usage. If it is the first the impact on growth may be short term - if it's the second it may be more permanent. I have discussed this elsewhere as "crouching demand, hidden peaks".

Policy – this has driven a lot of reduction in usage through Energy efficiency schemes, Feed-in-Tariffs for PV, a carbon price, MEPS for appliances and buildings – and will continue through both embedded and bipartisan programs – but as this involves another P- Politics – I'm not going to speculate about how far or strong this slowing effect will continue.

The growth muddiers – mixed and less certain impacts
What I will talk about is Productivity and Preferences which can have mixed impacts for energy use. But which are Key as they are about customers choices.

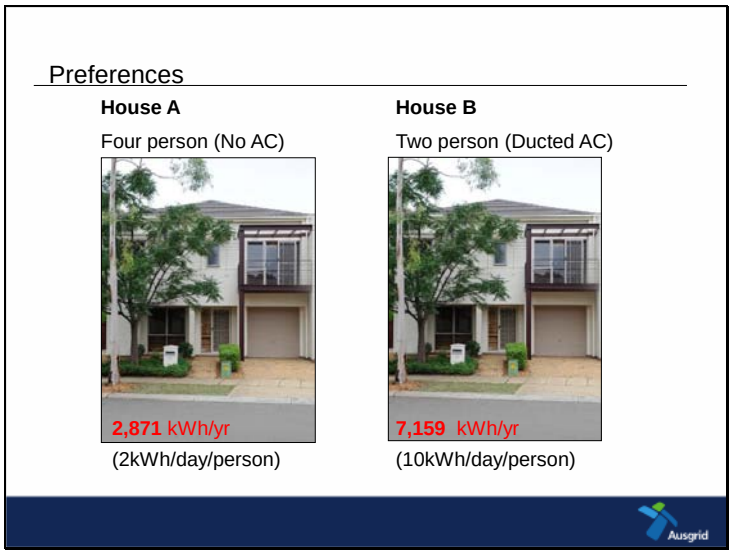
And customers not as an economic abstract but your aunty Ethel, the bloke next door, the girl on the bus, the daily paper reader.

Slide 23



They overlap but will be the key drivers of usage in the immediate future.

Slide 24



Peoples preferences – what they want - is still the dominant effect on usage.

This is a real example of two near identical houses in the Olympic village at Newington.

The per capita consumption in one house is five time the other.

Its not because one family is bad, or more technological savvy or five times richer - it is about what they want and how they use energy to get what they want.

Changing this requires either a change in peoples preferences – what they want - or productivity – how they get what they want.

Slide 25

What is it people want from energy in the 21st century?

This is the big 3-D pie graph of household energy usage at our Silverwater energy efficient centre.
And I was explaining it to school kids one day when it struck me.

If, for an all electric household, you add up Hot water, heating and cooling, the fridges, laundry & kitchen it is close to 90% “Old school” usage.

Mainly heating things up and cooling things down.

There is very little dot com, new economy, hi-tech in household energy usage.

Our shift in preferences from goods to services is reducing the energy intensity of the economy (energy to GDP ratio) and Web enabled appliances will help us manage usage but underlying customer preferences, basic wants and the economics of delivering these are more important.

Slide 26

So to look forward lets look back.

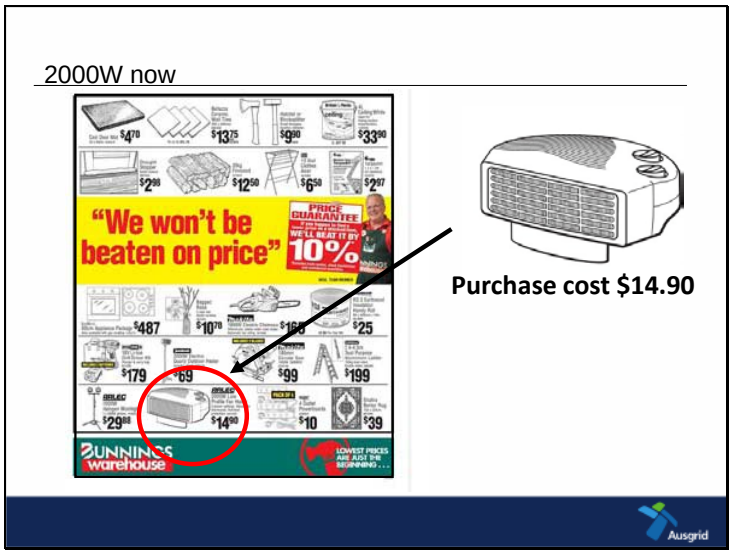
Some major uses have not changed much – like this beautiful Vulcan Conroy- “Flame shell” 2000w electric heater. From the late 50s.

Costing 5 pounds 17 and sixpence or about $11.75 at 1966 decimal conversion.

With around 50 years of inflation this comes out at around $140 in today's money.

Put another way - you had to work for a third of a week to pay for the old heater on minimum wage in 1966.

Slide 27

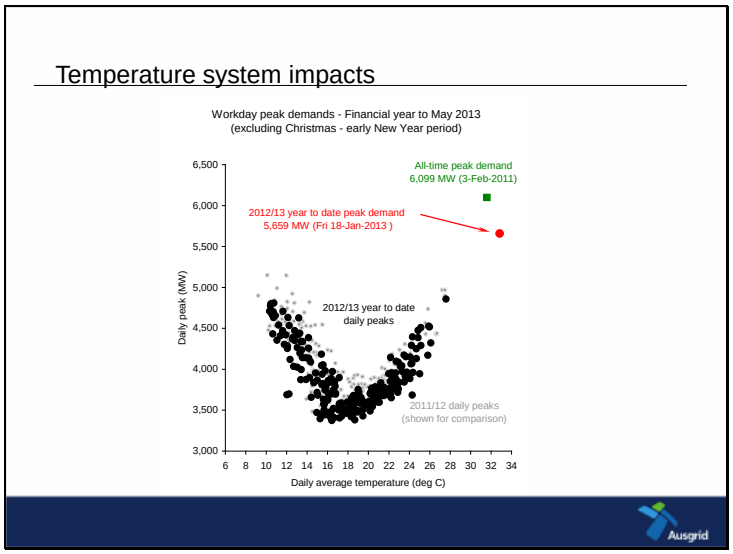


Put another way you had to work for a third of a week to pay for the old heater on minimum wage in 1966.

Check the burnings catalogue and the same 2000w of heat can be bought for less than an hours work today at the minimum wage.

Leave a 2000W fan heater on for a day or more and depending on the tariff you could match the purchase cost in energy use.
And it adds significantly to winter peak load.

Slide 28



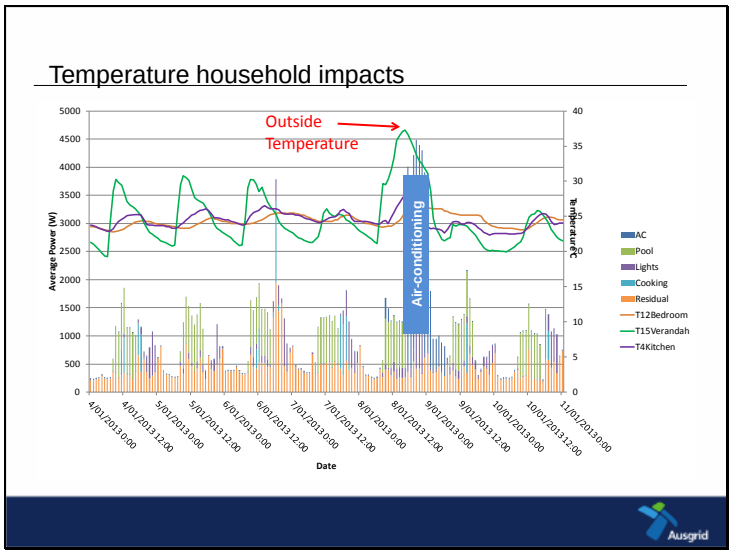
This graph shows daily temperature and daily peak demand for Ausgrid's network – removing weekends and the Xmas holidays.

Putting that 2000W heater in context – winter is still the high bill season for residential customers but peaks have shifted to summer.

Looking at demand it is heavily dependant on temperature – old fashioned bar radiators and new Air conditioners create a bathtub effect with temperature extremes driving usage.

High temperature rather than hi tech is a bigger driver.

Slide 29



On a micro level this can be seen in the data from a week in January at one of the 15 houses in our just completed SHAPE trial of appliance load research.

You can see a normal rise and fall Patten in the temperature lines and energy usage bars early in the week.

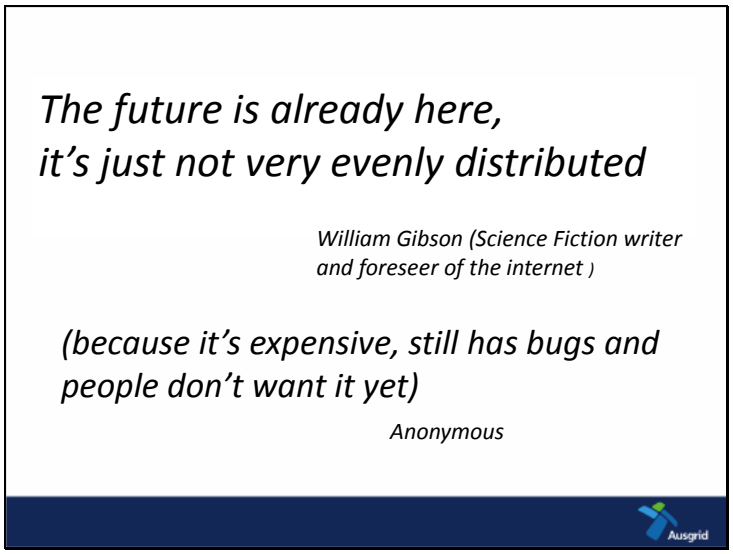
The bars are KW per hour - the green bar is a pool pump, the light blue cooking and the dark blue bars the huge impact of air-conditioning.
Then came 8th of Jan -a stinking hot humid day –not a system peak as it was still in the Xmas period – but dramatic.

The green line is the outdoor temperate which sky rocked on January 8th , the purple the kitchen temperature, which fell when the AC came on and the brown line the un-airconditioned bedroom.

And the TVs and computer, the ipods and mobile phones are lost in the residual.

All the houses we surveyed are different but the big uses are similar and remain the old school stuf f- hot water, fridge, pool pump, heaters and AC.

Slide 30

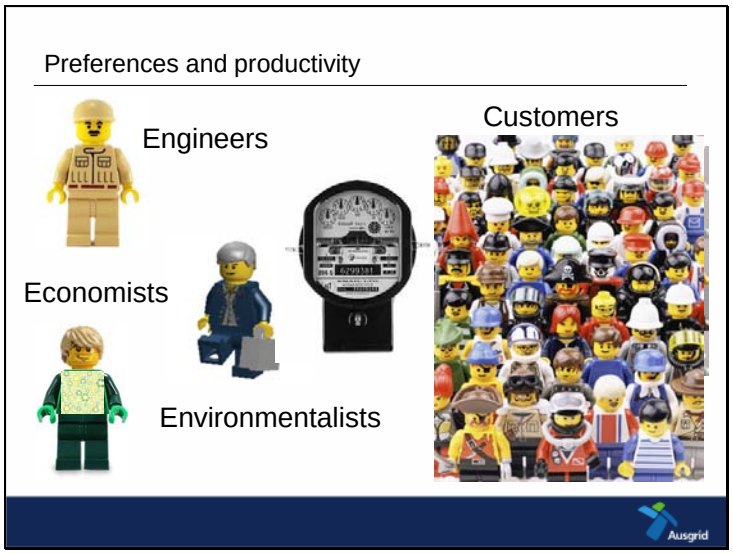


The 21st C still has another 87 years left, we are likely to see Renewable energy, distributed generation, battery storage and EVs become more important.
The future is out there waiting to happen.

But understanding usage and the basics are still the key to this part of the 21st century

Technologies come, When people want them and when they can afford them.

Slide 31

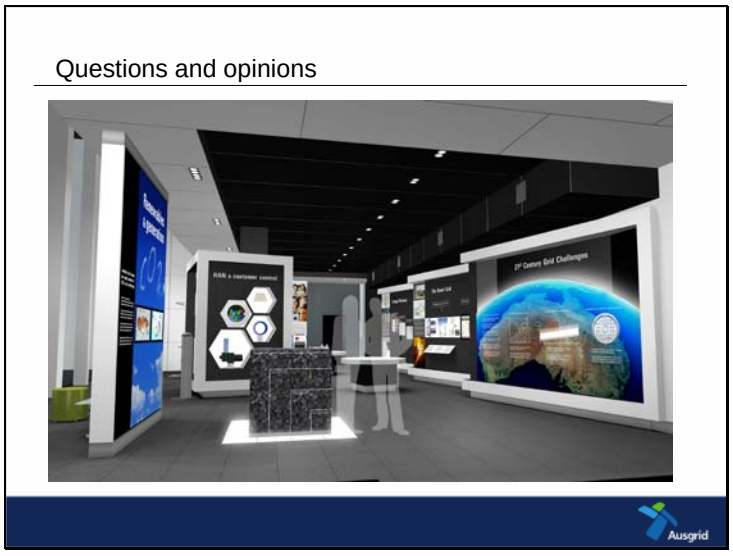


So where Engineers, economists and environmentalists are sold on the New energy future they need to take customers along with them.

This means not just creating new technologies but the hard work of understanding customers wants and creating the business cases to deliver products that people will buy and use.

We need to develop “customer glasses” to see as customer see and customer ears to listen to what customers want.

Slide 32



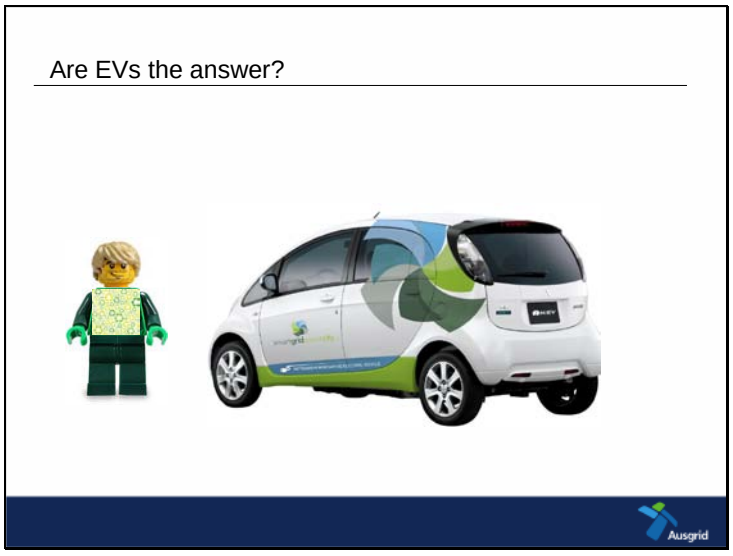
To finish - this the Ausgrid energy efficiency centre at Silverwater – one of the ways we are engaging with customers in a dialogue about the future of energy use.

I look forward to you views as well.

Slide 33

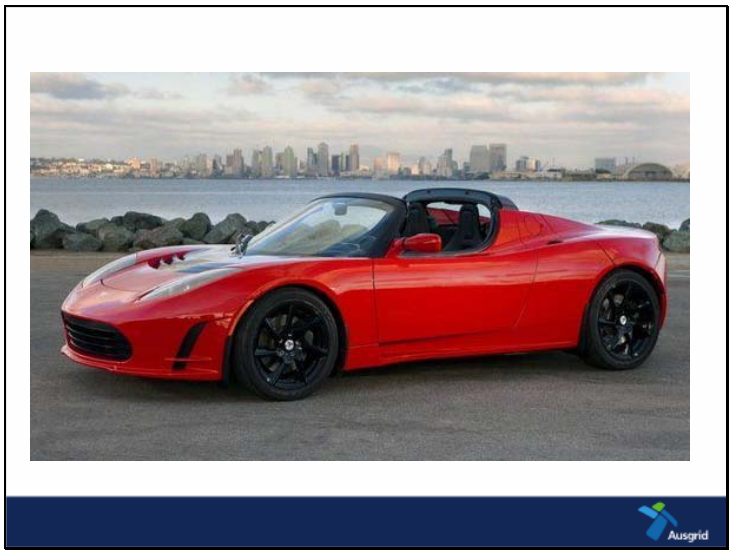
Additional slides

Slide 34



EVs, are popular with economists, engineer and environmentalists but not yet with customers
(Personally I am fan).

Slide 35

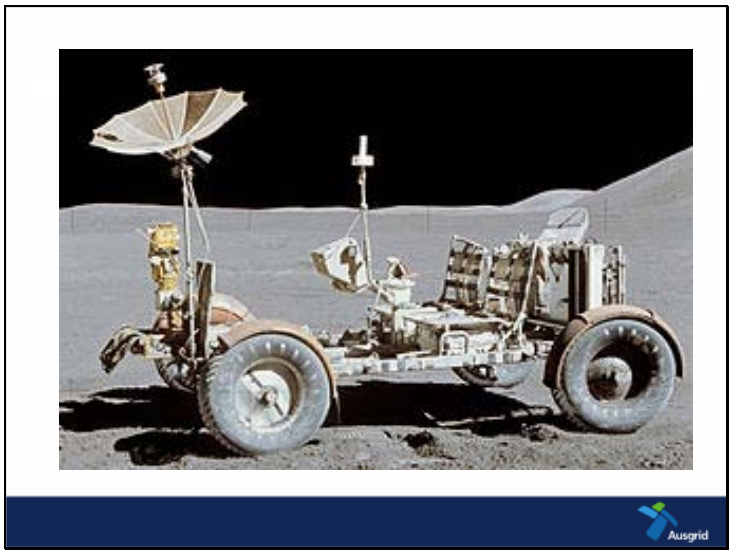


This is the Tesla – the pinup boy of evs

Slide 36

However the TESLA is still only selling in small numbers to luxury car buyers - the most successful EV ever is arguably the 1913 Detroit electric – which had the EV sales record till 2010.

Slide 37



Unique EVs have also been successful.

Slide 38

But lots of EVs failed to make it through the technology valley of death.
Hands up if you have ever been in a EV?
If you broaden you definition what about a golf buggy, a train, a tram, and elevator or a escalator, moving walkway?

Slide 39

Better place battery swap model –
A classic of “new economy – its all like the internet thinking “- without considering peoples preferences and the productivity of the technology.
Why do I want one? Is it better, cooler or cheaper than wants around now?

When confronted with these kind of questions IT people eventually realised cars are not weightless and harder to manage than websites.

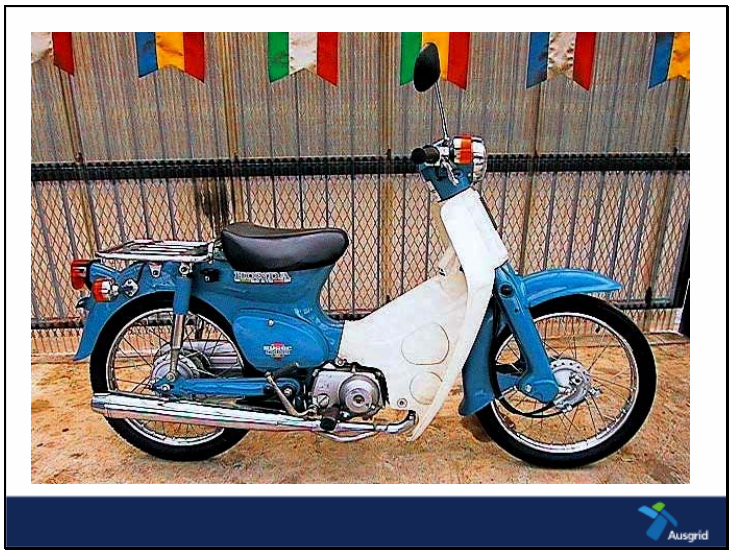
Why did they not succeeded:
-Poor customer offer
-Weak business model – making a higher priced monopoly from home charging.
- New technologies take a long-time and several goes to get right. Eventually some one might.

So what works – what is the most successful passenger vehicle of all time?

Any guesses

Not the model T, Not the mini, not the VW beetle.

Slide 40



The Honda super club is the most successful motor vehicle of all time over 60 million sold – mostly in Asia.

Its cheap, more fuel efficient than a prius and meets a need.

But .. There is still the flying pigeon

Slide 41

The most popular model of the most popular vehicle of any kind in the world the bicycle —is the Chinese Flying Pigeon, with some 500 million in service.

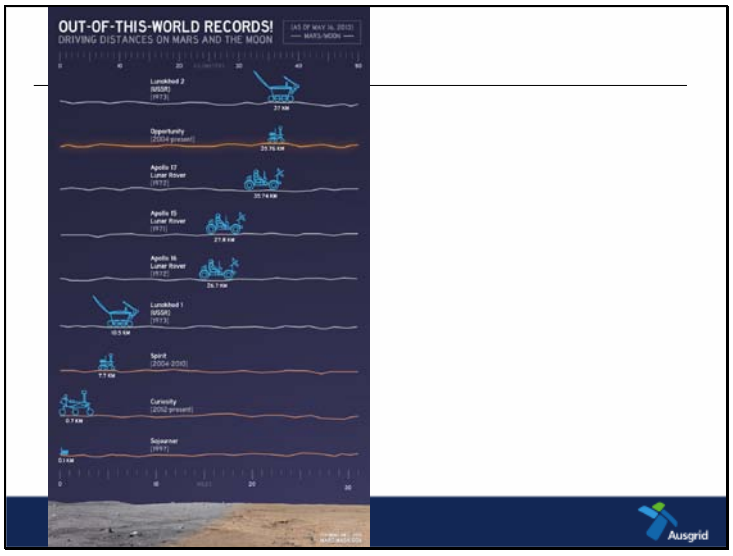
It has the basic 1885 Upright or safety design still used in producing about 130m bicycles a year.

Why – their cheap, their efficient, their effective.

PS: Electric Bikes 40m now and a bigger drain on grid than all other plug in EVs
EV have a long-term role but not a short term impact and faces many challenges.

But beware - when evs are successful it is because battery's are cheap and cheap batteries are a bigger game changer.

Slide 42


OUT-OF-THIS-WORLD RECORDS!
DRIVING DISTANCES ON MARS AND THE MOON
Lunokhod 2
Opportunity
Apollo 17
Lunar Rover
Apollo 15
Lunar Rover
Apollo 16
Lunar Rover
Lunokhod 1
Spirit
Curiosity
Sojourner
Ausgrid