Solar Energy ; The prodigal sun?

Introduction

21 years in PV & Storage !

- Solar and EV advocate
- Award winning service provision
- Work with Utilities, Government, Investment advisors, EPC's, Wholesalers, Manufacturers, Retailers, Industry associations and installers

Part A: PV Industry Analysis and Research

- Industry research
- Intelligence reports & analysis
- Custom research projects
- Policy and program analysis
- Industry advocacy & lobbying

Part B: PV Business development support

- Strategic business planning
- Market entry support
- Product and offer development
- Marketing plans and implementation
- Training and education
- Introductions and acquisitions

Client's, partners, friends and collaborators

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Data sources

1. Australian PV – Market Forecast report (SbS/Sunwiz)
2. Australian PV – Technology and Brands report (SbS)
3. Australian PV – Industry Intelligence report (SbS)
4. Market surveys (SbS)
5. Market intelligence
6. Clean Energy Regulator
7. ABS
8. PV Manufacturers, wholesalers, retailers, installers and financers
9. Clean Energy Council
10. Australian Solar Council
11. Solar Citizens
12. Australian PV Institute

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Market

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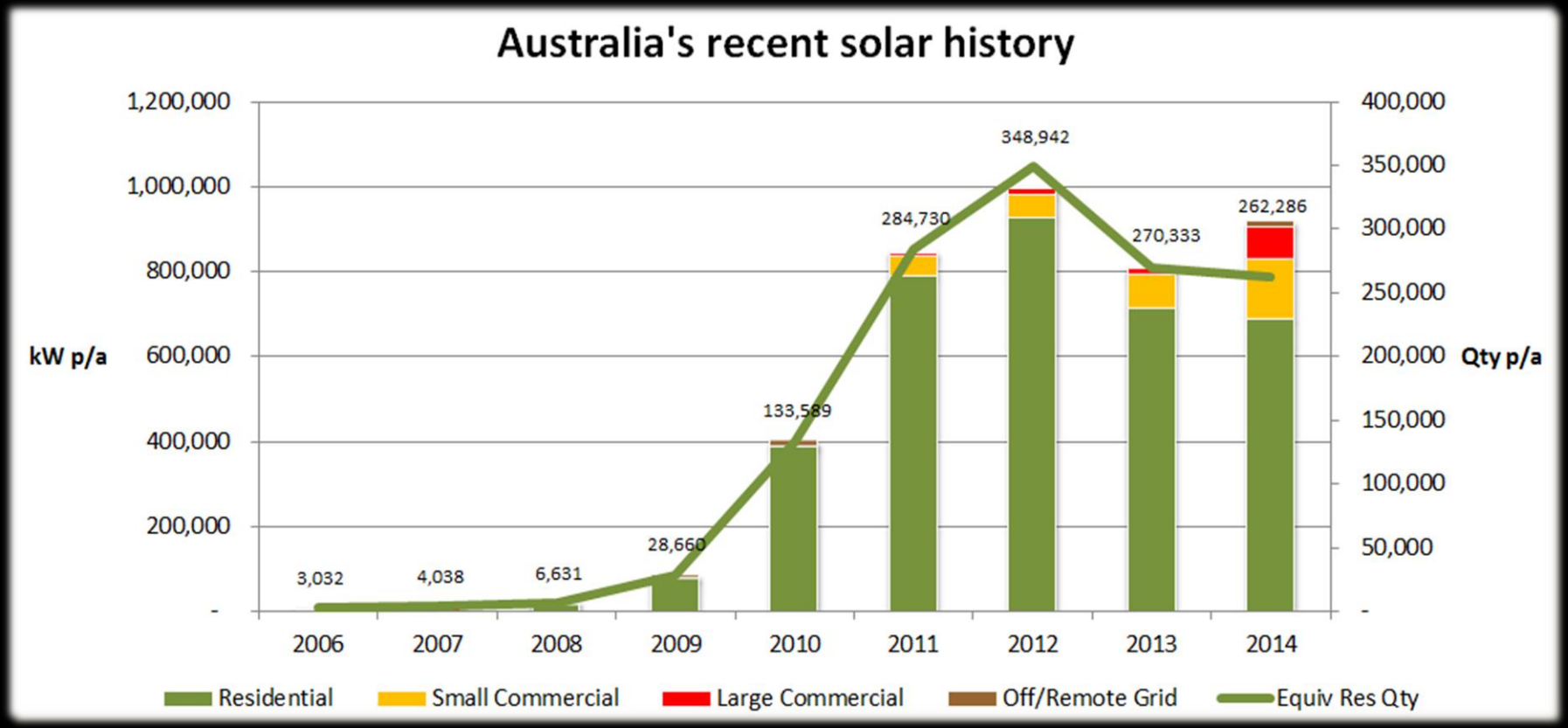
Astounding growth



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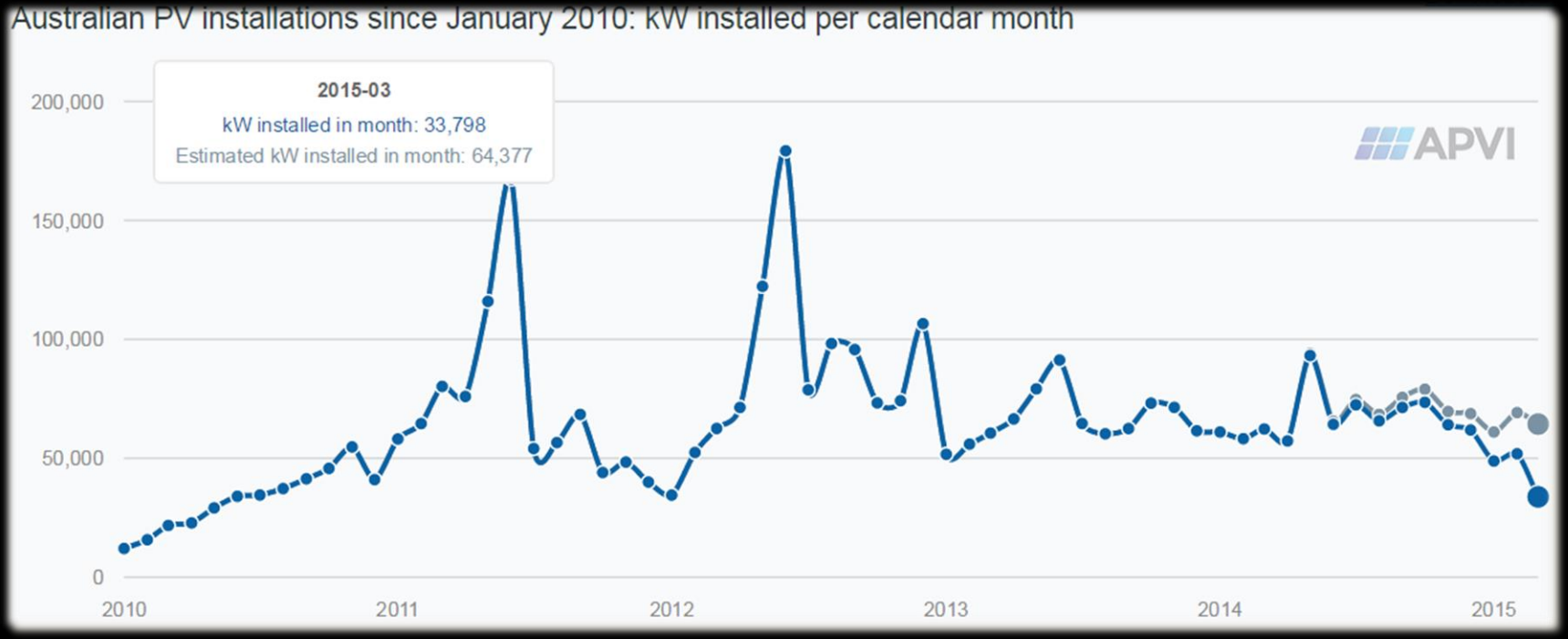
Recent activity



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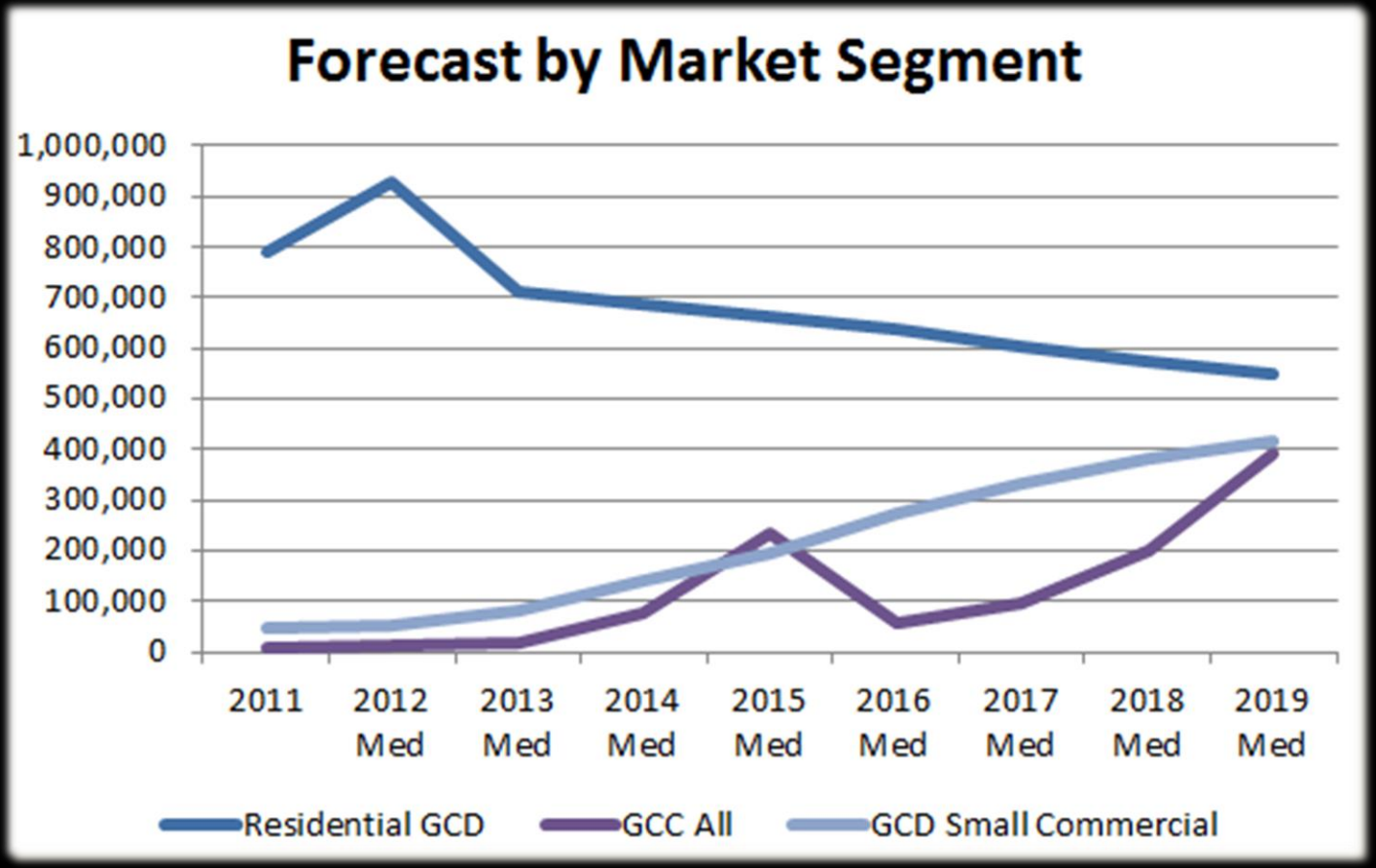
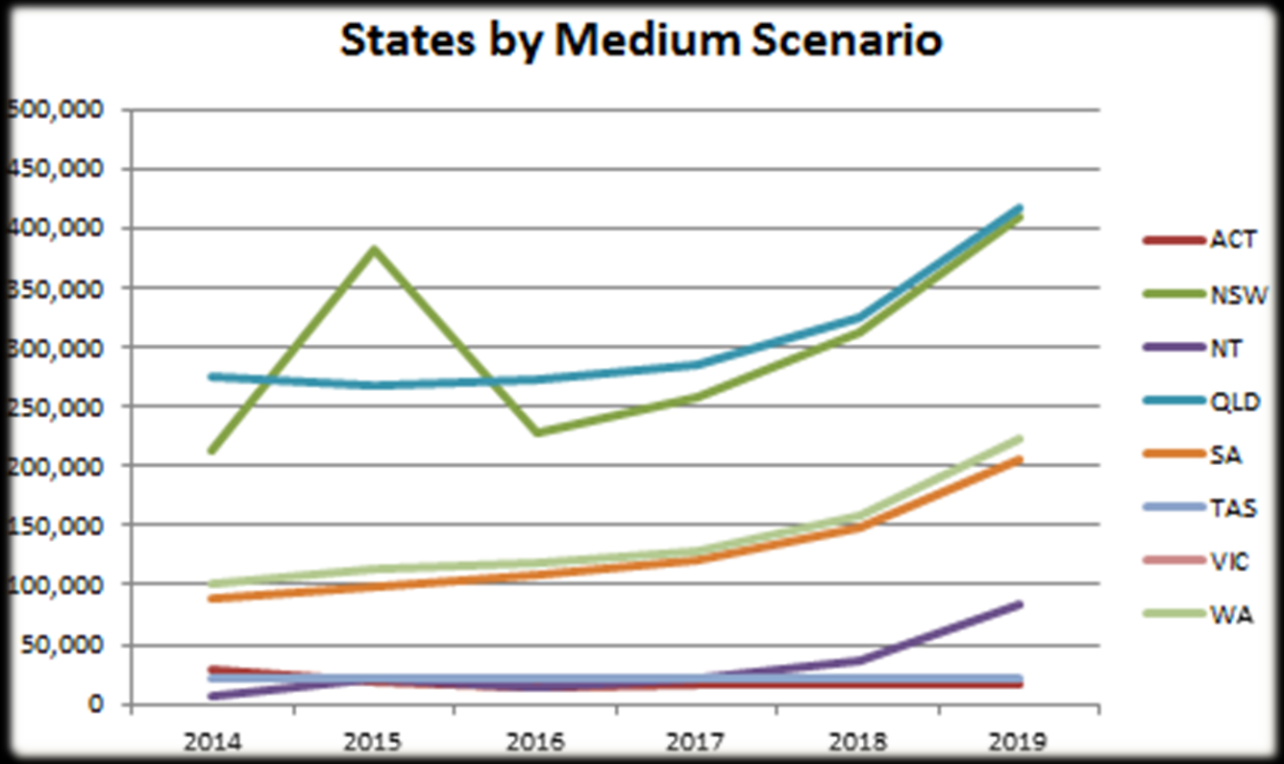
Market outlook



Market outlook



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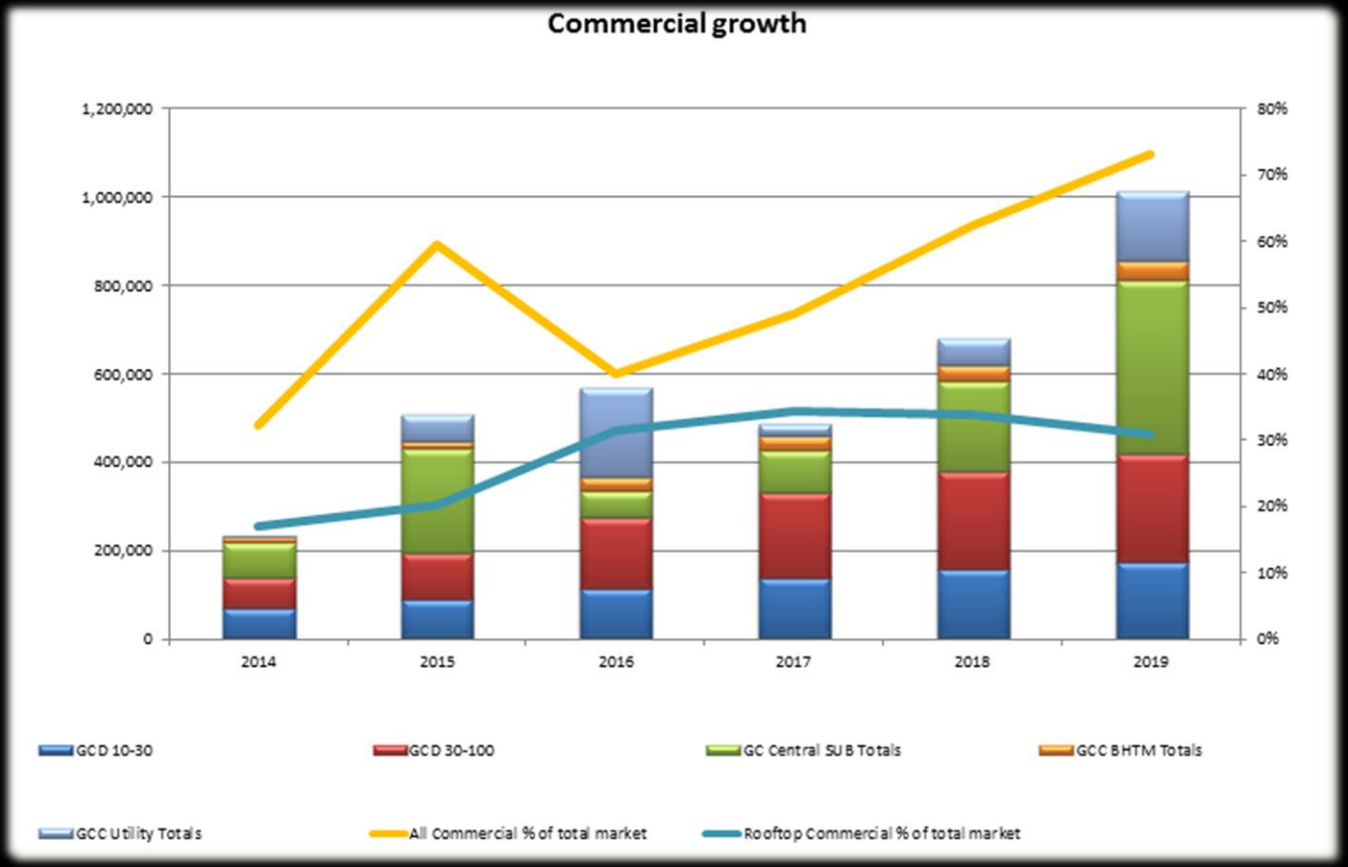
Market outlook



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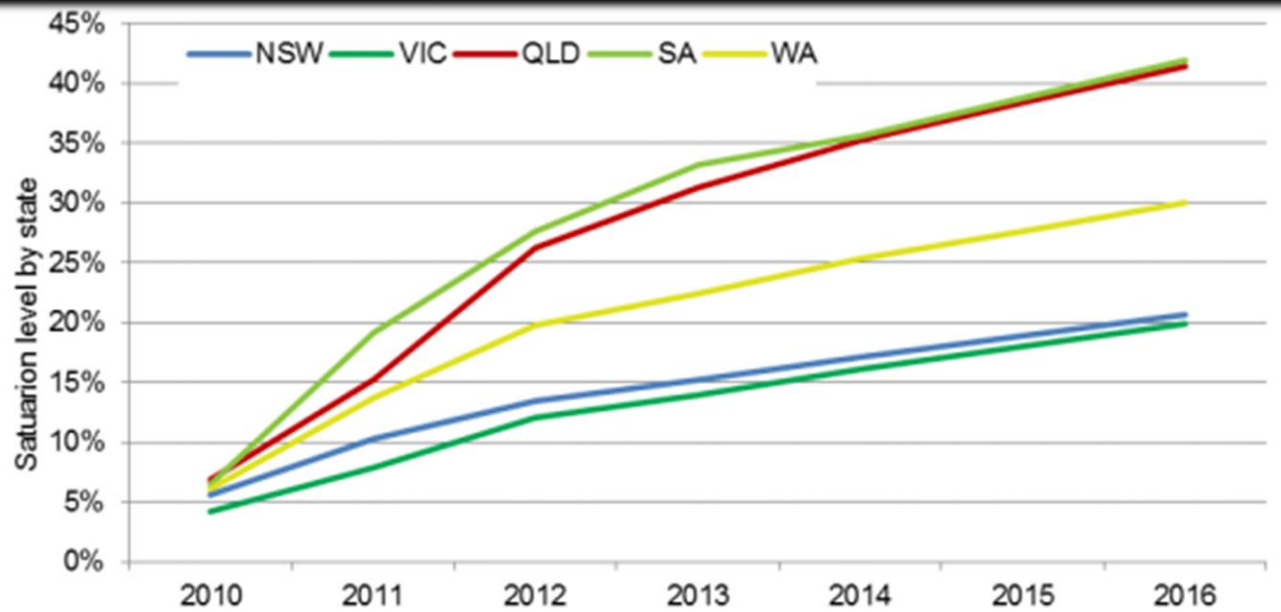
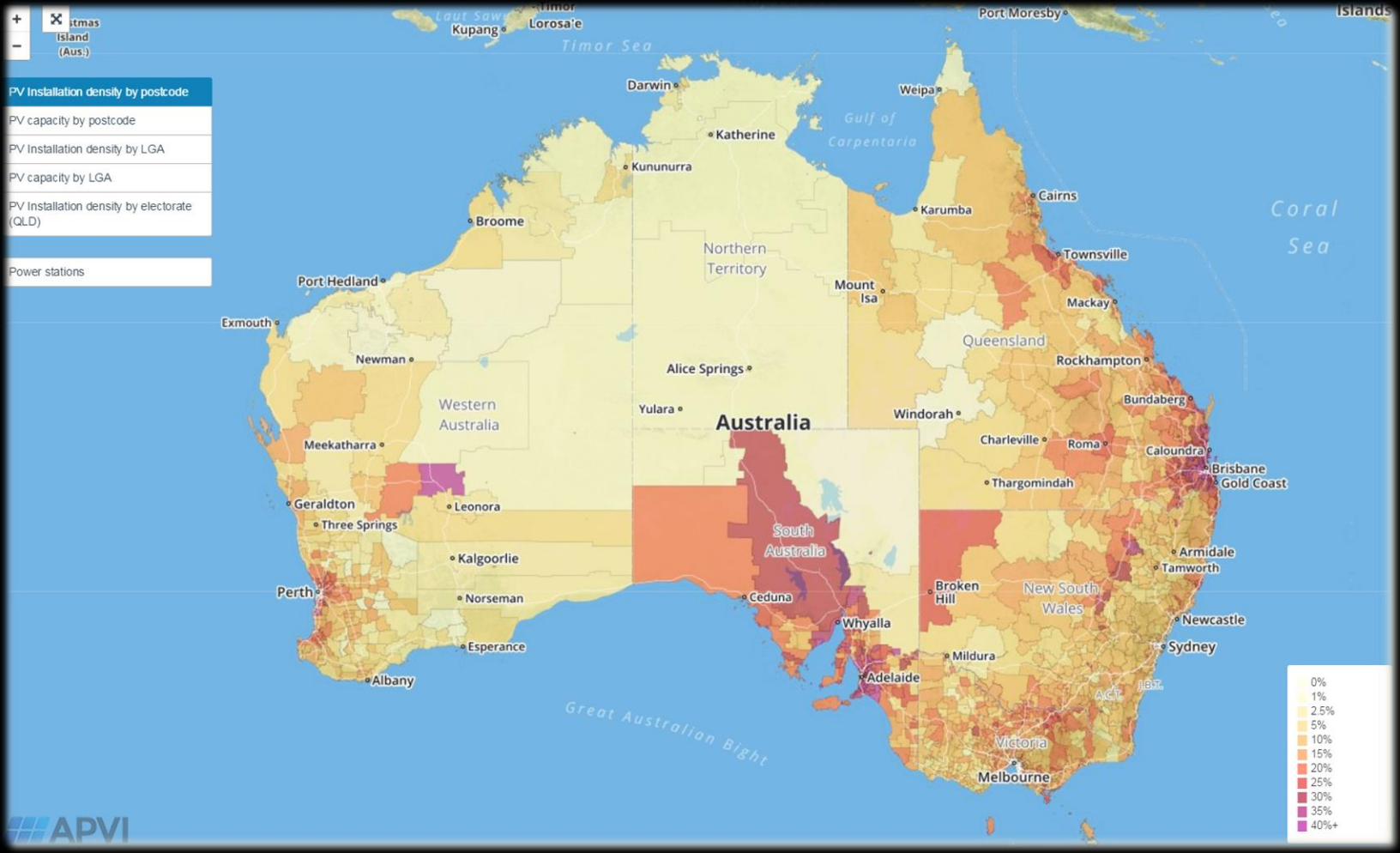
Residential saturation



Note: Saturation rate represents the cumulative proportion of residential systems installed as a proportion of owner occupied houses (separate and semi-detached dwellings).

Postcode saturation



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Price

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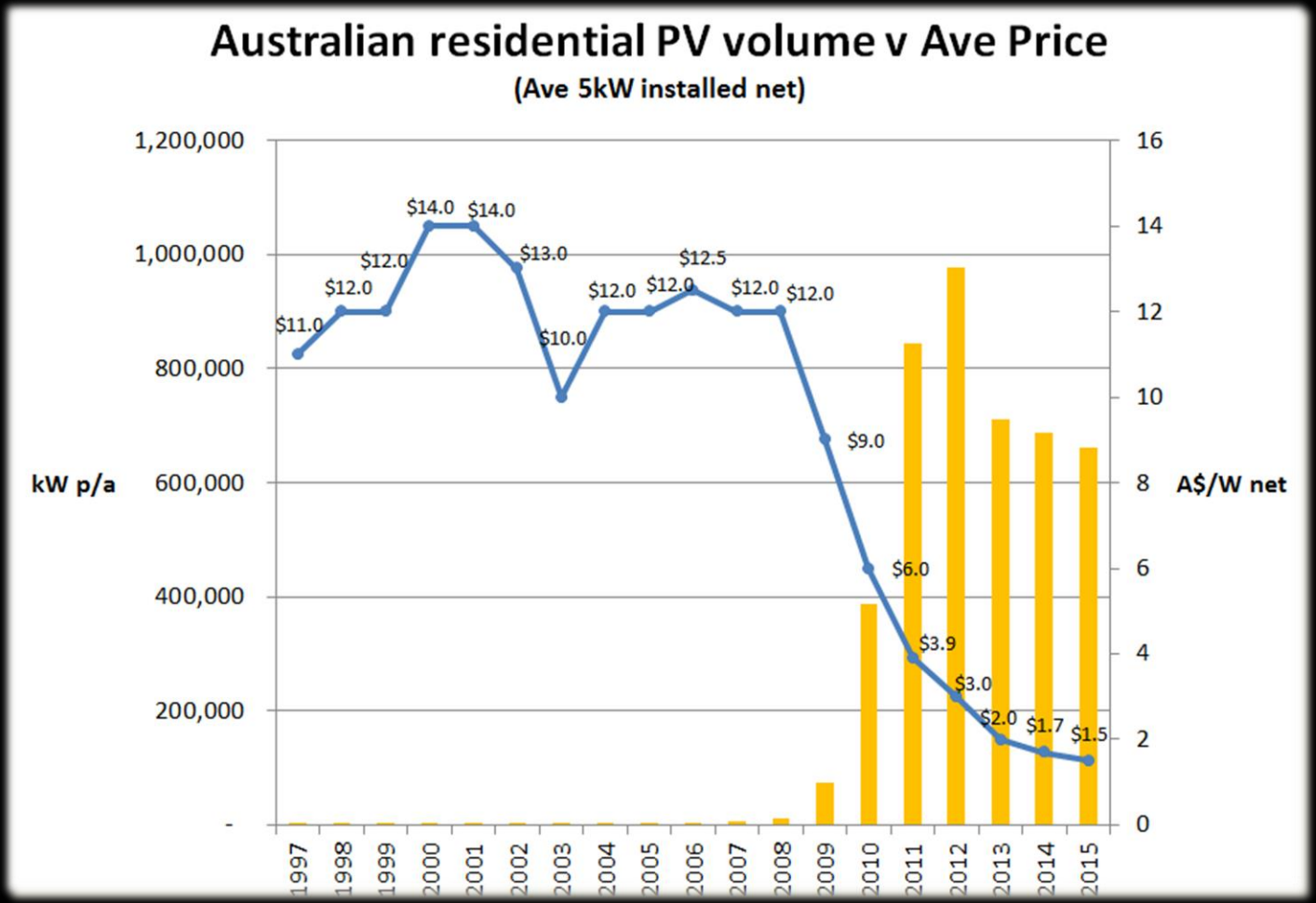
Price



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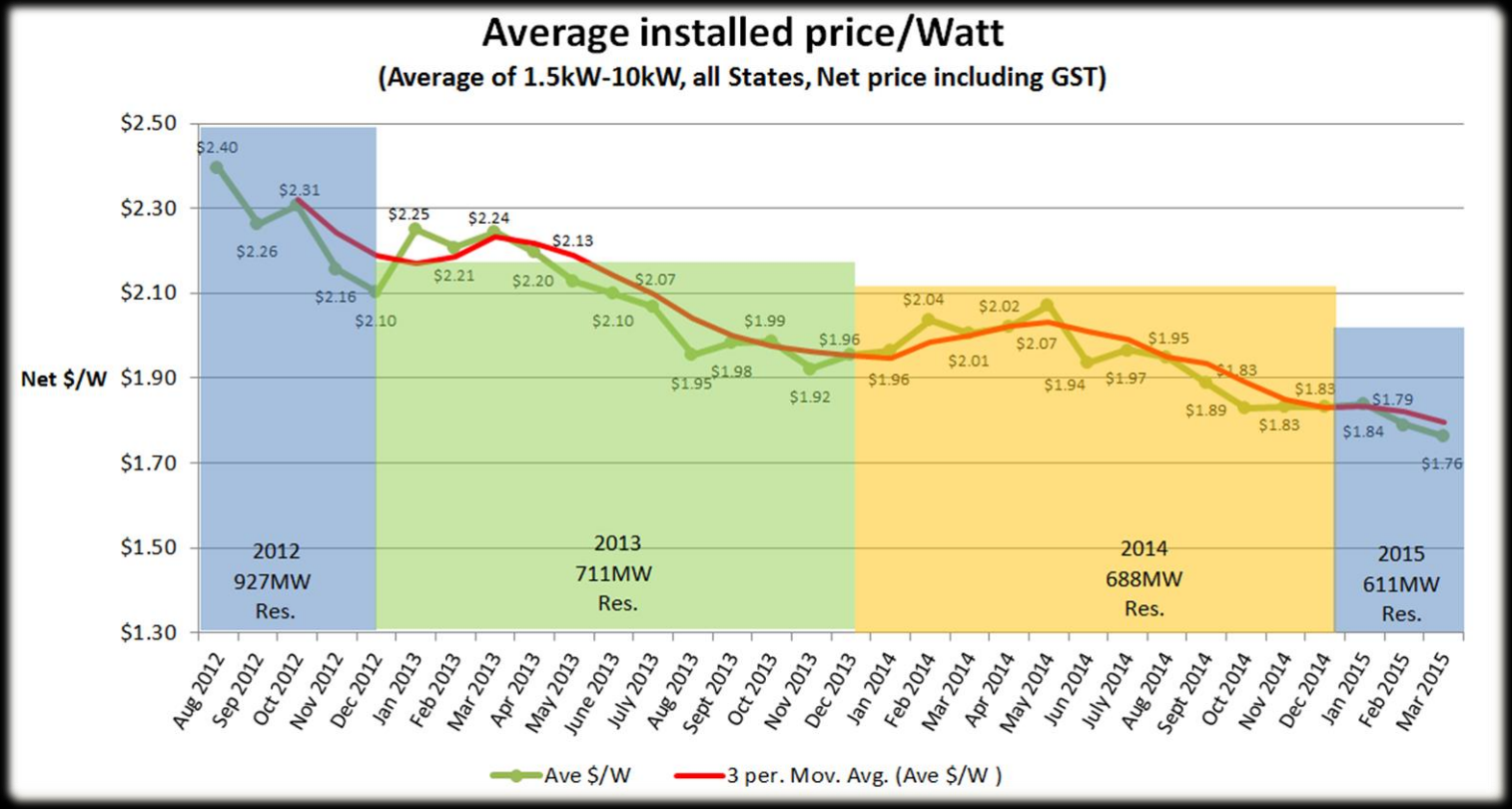
Price



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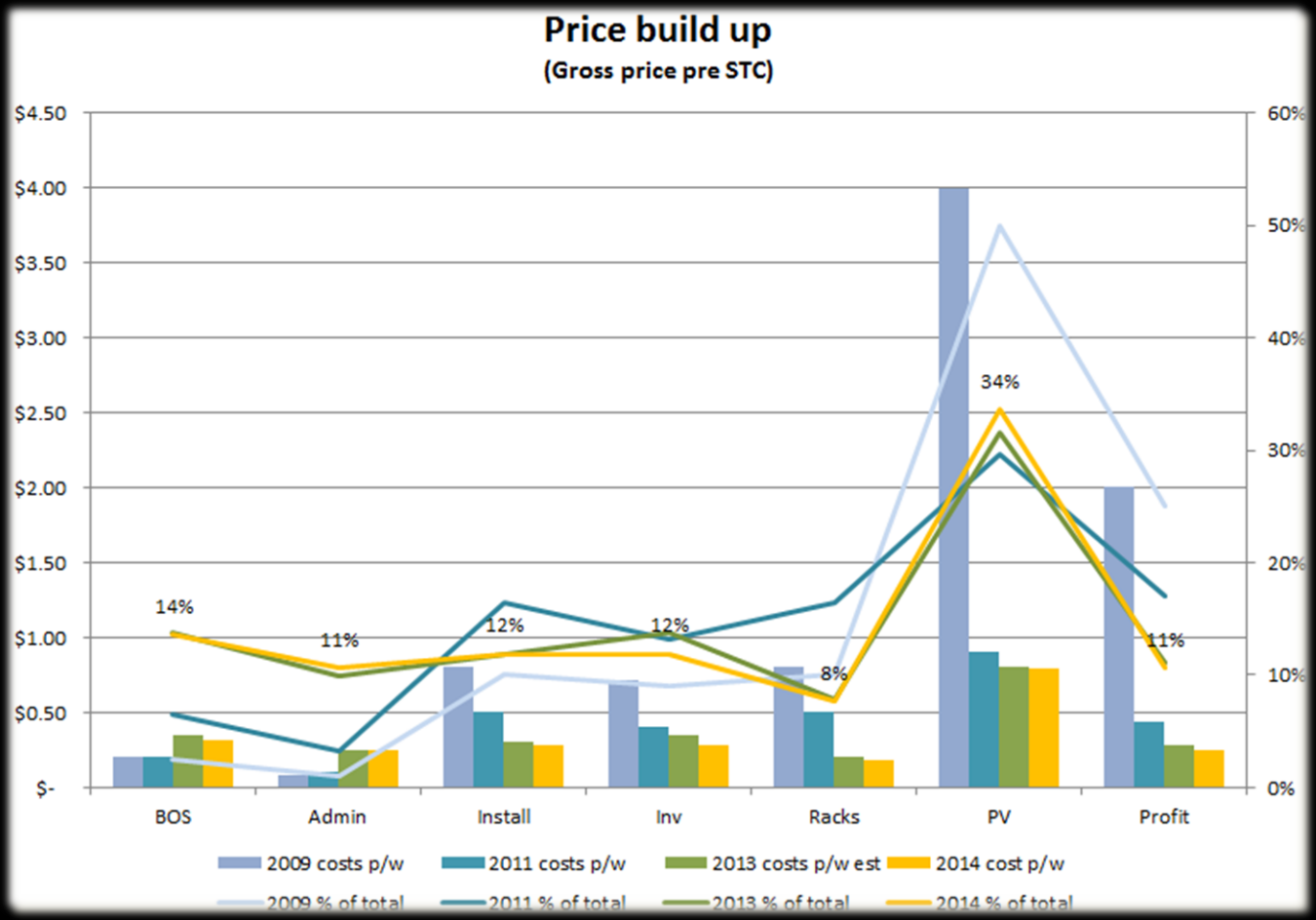
Price



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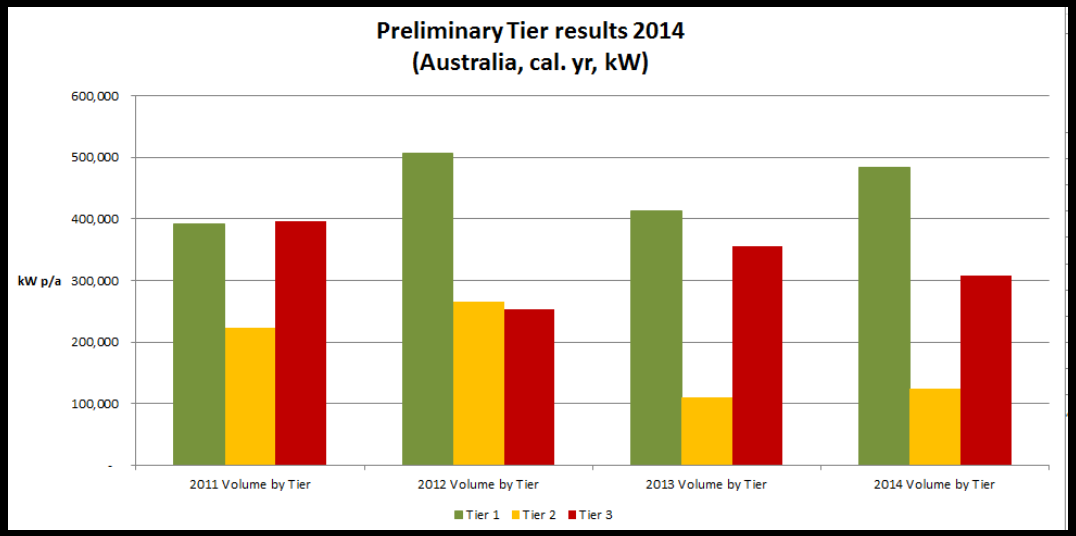
Volume v Price

- Influenced firstly by global factors
- Secondly by local market competition, FX rates and quality
- Shifting slowly to higher quality
- Price gap very small
- Consumers learning
- Channel learning
- Regulations tightening
- Market price very distorted



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Regulatory & STC's

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Update

SRES (0-100kW)

- Very likely it will survive unscathed due to voter pressure
- However, may be reduced or tweaked
- Will inevitably scale back as planned

Creation

- STC's are created through a simple calculation and paperwork process
- Aggregators take a fee (usually a few cents/$40 nom) for managing the process. Most have high efficiency, on line systems and app's for installers.
- Most large solar businesses self manage. Around 60% pf the total market uses aggregators
- Customised end to end software is getting cheaper, but requires audit capability and a full suite (admin, sales, installer and admin)
- The clearing house is almost redundant; the CER would be first point of contact

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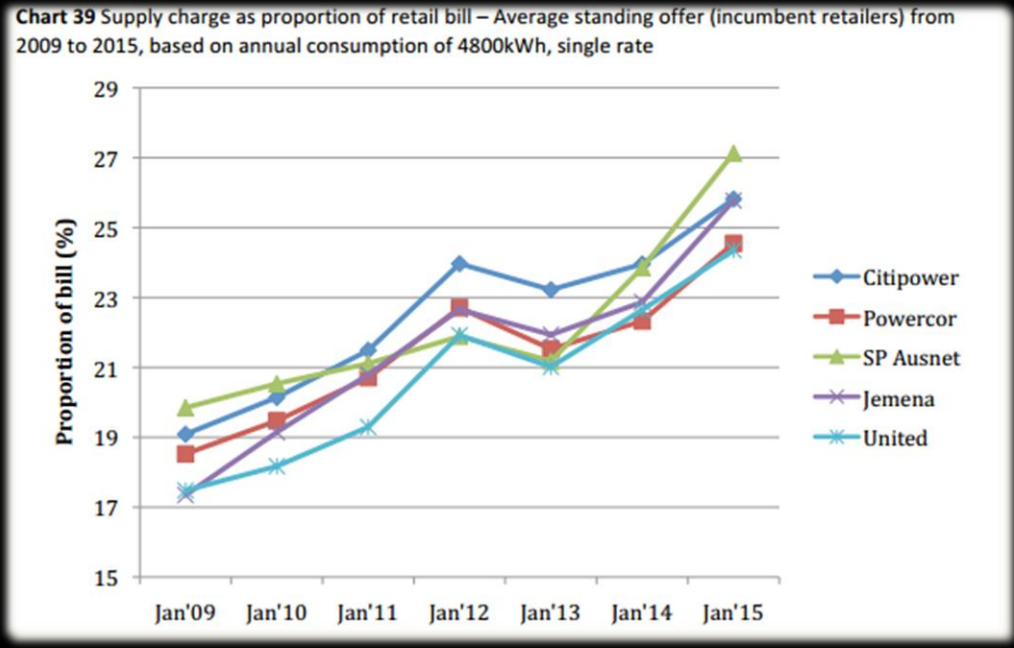
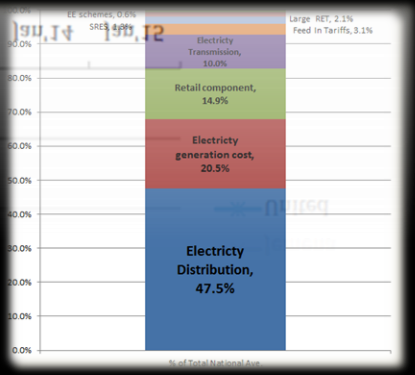
Retail and tariffs

- Fixed and standing charges
- Changes over time
- AER cost reflective ruling
- Lack of information or data
- Power factor and demand charges
- Lower energy tariffs equals lower return's





Sources: Australian Energy Regulator and St Vincent de Paul Society

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Products & Services

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(slow) rise of quality

- The market is slowly recognising quality
- PV Failures are not endemic, but noticeable
- Finance driving quality
- Standards and auditing
- Voluntary codes
- Independent advice for buyers

Solar experts claim multi-billion dollar subsidies wasted on cheap and dodgy panels

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Solar panel installer John Alberti says shoddy operators are destroying the industry. *Photo:*

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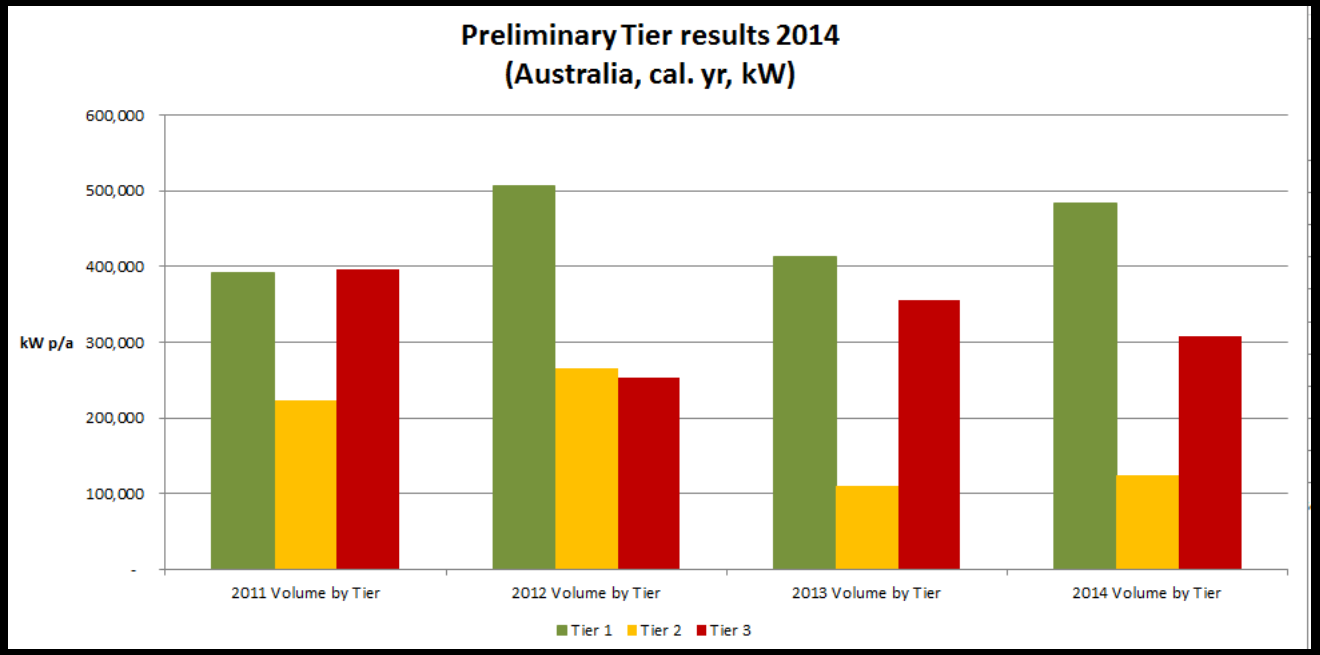
Tier volumes

T1 - 53% of sales, up 13% YOY
T2 – 14% of sales, up 8% YOY
T3- 34% of sales, down 17% YOY



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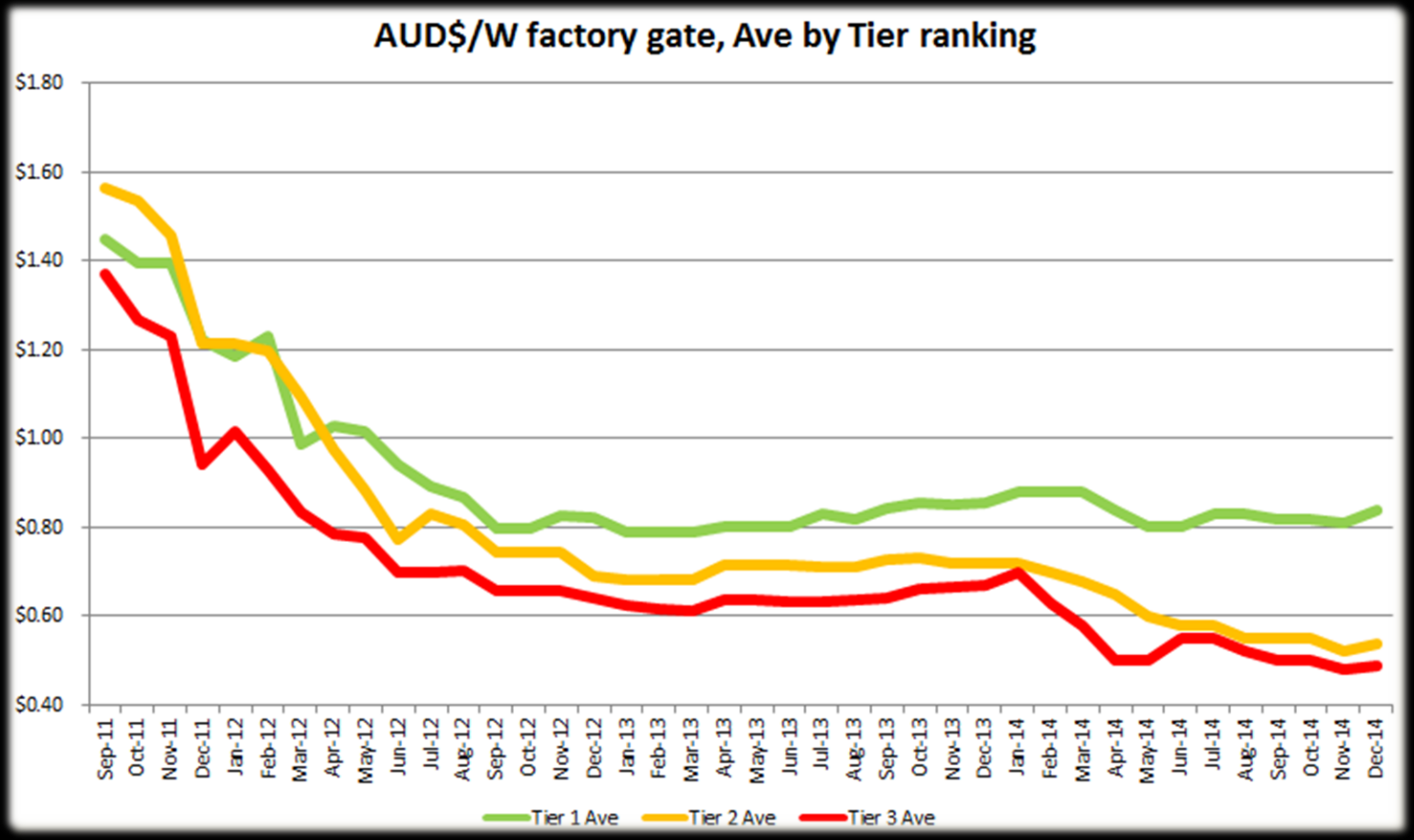
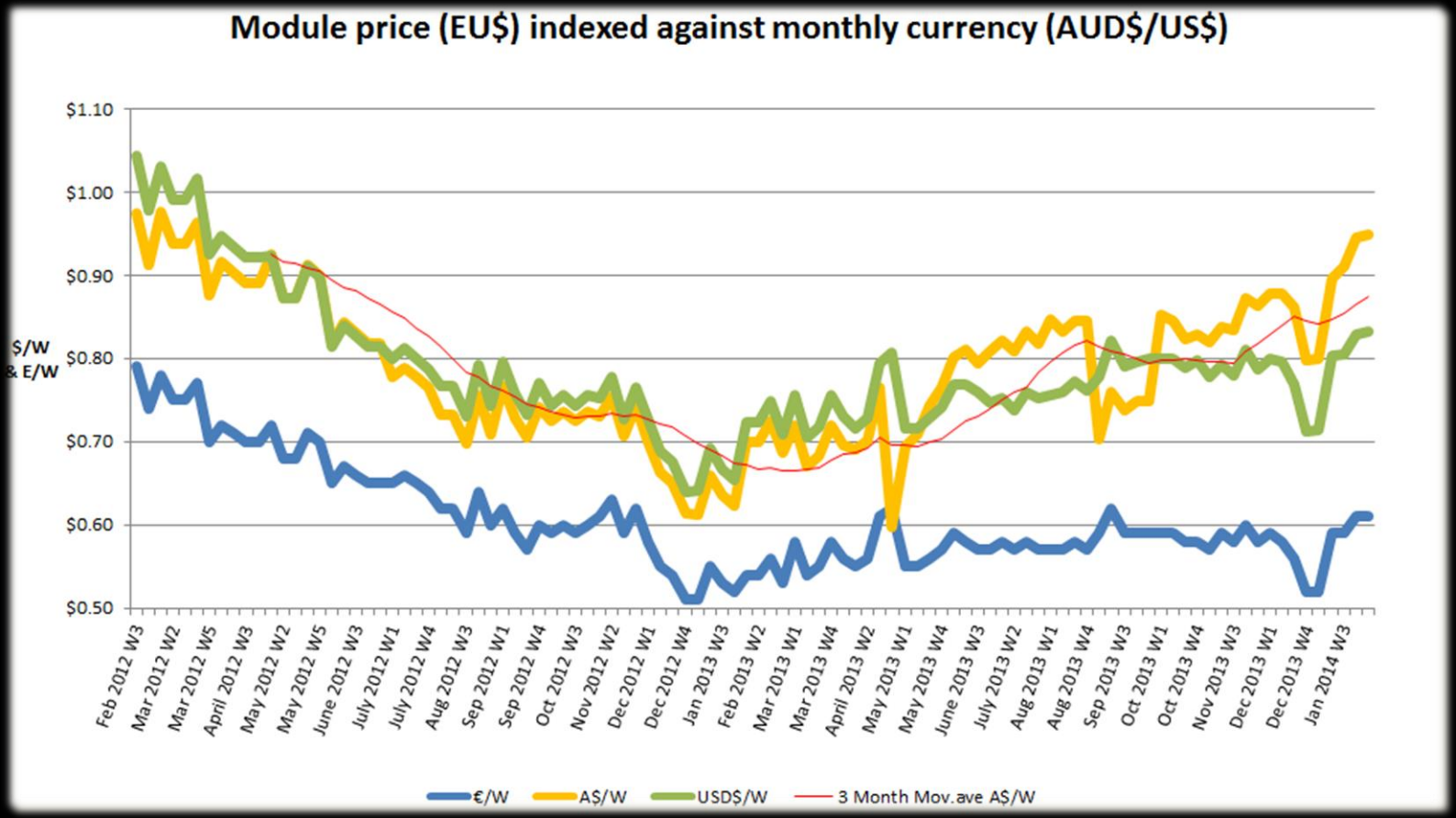
Price samples



FX impacts


Module price (EU$) indexed against monthly currency (AUD$/US$)
$1.10
$1.00
$0.90
$0.80
$0.70
$0.60
$0.50
$/W
& E/W
Feb 2012 W3
Mar 2012 W2
Mar 2012 W5
April 2012 W3
May 2012 W2
May 2012 W5
June 2012 W3
July 2012 W1
July 2012 W4
Aug 2012 W3
Sep 2012 W1
Sep 2012 W4
Oct 2012 W3
Nov 2012 W2
Dec 2012 W1
Dec 2012 W4
Jan 2013 W3
Feb 2013 W2
Mar 2013 W1
Mar 2013 W4
April 2013 W2
May 2013 W1
May 2013 W4
June 2013 W3
July 2013 W2
Aug 2013 W1
Aug 2013 W4
Sep 2013 W3
Oct 2013 W1
Oct 2013 W4
Nov 2013 W3
Dec 2013 W1
Dec 2013 W4
Jan 2014 W3
€/W
A$/W
USD$/W
3 Month Mov.ave A$/W

Servicing

- Existing and growing service business BUT
- Low returns - $150-$200 per visit
- Emerging opportunity for upgrades, upselling and repairs
- Almost every installer offers service – grown for collapsed competitors and low quality products
- Several window cleaning and other service entities dabbling
- Consumers poorly incentivised or rewarded for undertaking ongoing maintenance – PPA and finance changes this

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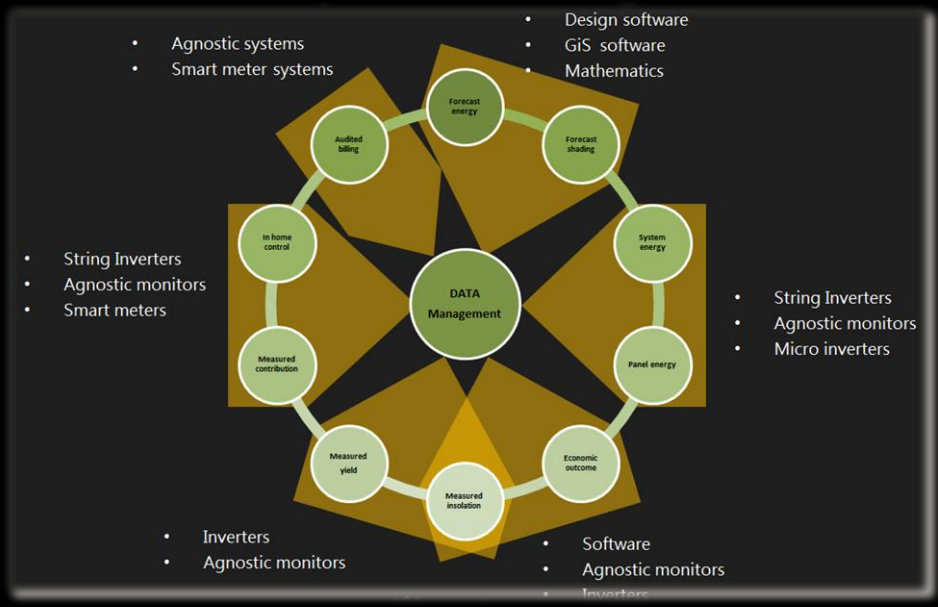
Data and control

- Multitude of applications
- Exponentially reducing in cost
- Exponentially more intelligent
- Tricky to install and operate at a consumer level
- Massive potential



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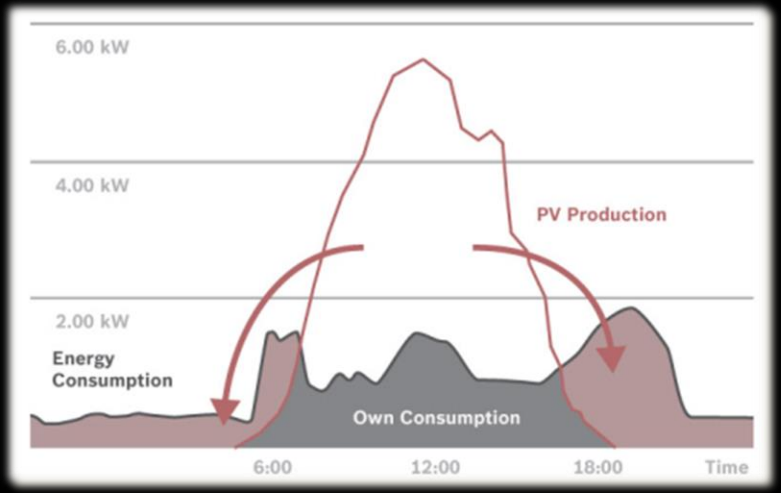
Storage

Crucially

- Australia will be one of the worlds earliest and theoretically best storage markets.
- *Won't all* be batteries!
- Core features:
  - High PV penetration
  - High solar radiation
  - Small, distributed system sizes
  - Low energy export value
  - High electricity prices
  - Cost reflective tariffs
  - Electricity market right for disruption
  - Technical barriers to connection
  - Innovative battery savvy supply channel
  - Hungry consumers



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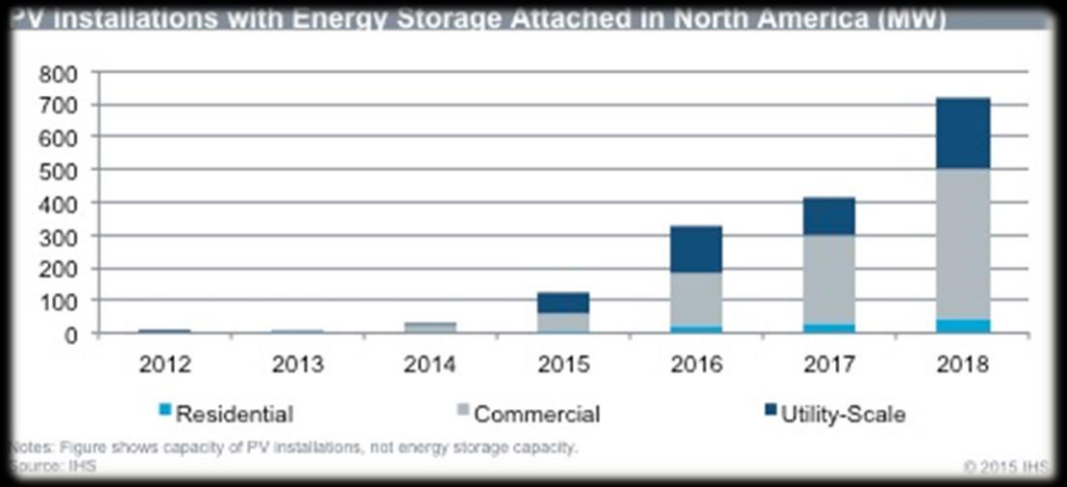
Benchmarking

- IHS predict US will have 9% of systems with storage by 2018
- Notably, they expect uptake in commercial where TOU pricing is most prevalent
- Australia has a different dynamic so we still expect residential to feature more strongly



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Storage

- Storage is a marginal case today.
- Market is fractured and in the earliest stages of growth.
- Best scenario is where solar is paid off, TOU rates and low capacity highly versatile products are used.
- Minimum lifetime energy cost is around 35ckWh+ for decent quality
- Complex to sell, own and maintain – but do-able
- A solar/TOU home can just make it stack up today
- Market likely to emerge rapidly but erratically
- Choice of being an innovator/leader or taking a wait and see approach. Without specific in house expertise, buying packages is a must
- Currently estimated to be 1000 sales $35M p/a sales (up from 100 sales in 2013)
- 20% of all solar homes by year 5 is a reasonable, but hi end assumption
- $/W and current GP is very attractive, readily back sold
- Margins will start low, increase then retract
- Quality issues and complexities are occurring, Support is crucial (supplier and consumer)
- Early adopters paying cash. Next wave likely to finance, but currently capital cost is key.

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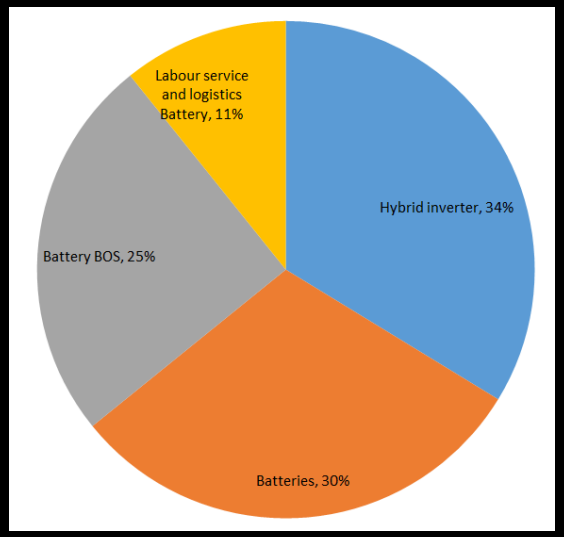
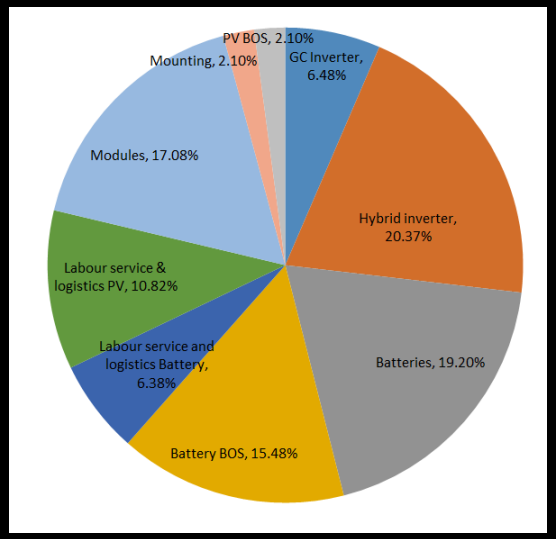
Study results

- Vast majority are using or moving rapidly to Lithium.
- Many are bundling PV GC inverters in for full integrated control
- Majority use AC coupling
- 5kWh-10kWh is the typical average storage capacity
- Cost per kWh decreases “reasonably” with battery capacity due to fixed costs
- Costs (excluding PV) are shared almost equally across batteries, BOS and Inverter, in the averaged results from the UBS study

Excluding PV costs



Including PV costs



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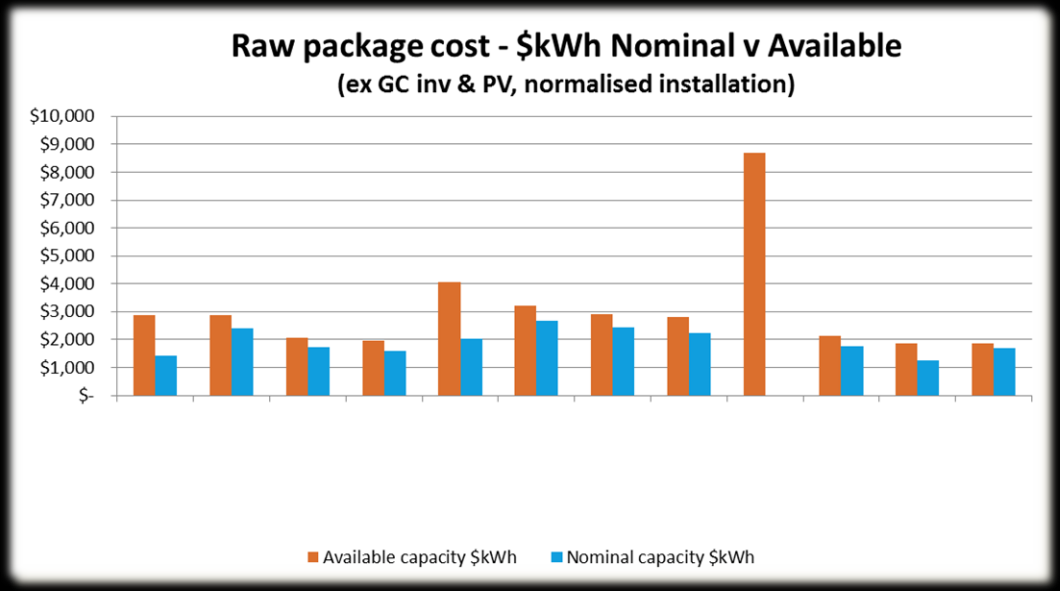
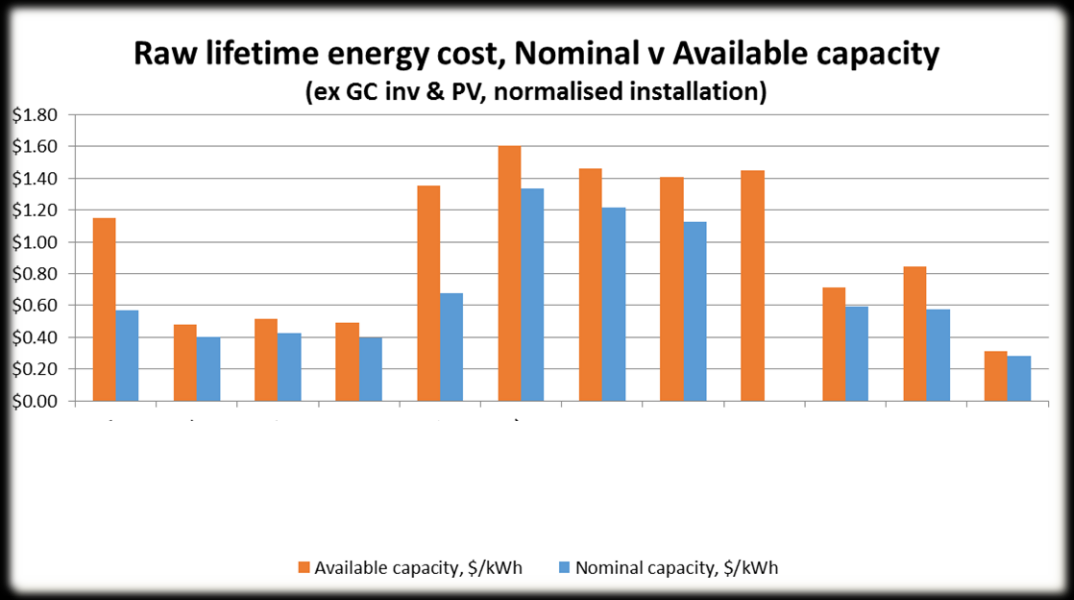
“1.Package cost”

- Range of gross capital cost from $1,264 to $4,339 per Nom. kWh ($1,875 to $8,679 in available kWh)
- Average price $2,129, median $2,0258 ($3,108, median $2,470 in available kWh)
- Real delivered cost is hugely impacted by battery cost and optimism or conservativeness of cycle life assumptions
- Included battery capacity (market strategy) versus the fixed cost of much of the other equipment



“2.Raw energy cost”

- Range of “raw”* lifetime energy cost from $0.28 kWh to $1.33 kWh ($0.31c kWh to $1.6 in available kWh)
- Average price $0.69 kWh, median $0.58 kWh ($0.98kWh, $0.78kWh median in available kWh)
- Hugely impacted by battery cost and optimism or conservativeness of cycle life assumptions AND
- Included battery capacity (market strategy) versus the fixed cost of much of the other equipment



*“Raw” lifetime energy cost excludes demand profile and PV impacts. See modelling results for “relative” lifetime energy costs.

“3. Relative cost of energy”

P1	Capital cost	Annual electricity cost	Annual Savings	Payback Years	IRR	Rel. Cost of energy
No PV or Storage	$0	$2,080	$0	0.0	0%	$0.24
PV Only	$6,500	$1,129	$950	6.3	16.8%	$0.23
Battery system only	$15,800		$533	29.6		
PV with Battery	$22,300	$596	$1,483	11.9	6.5%	$0.15

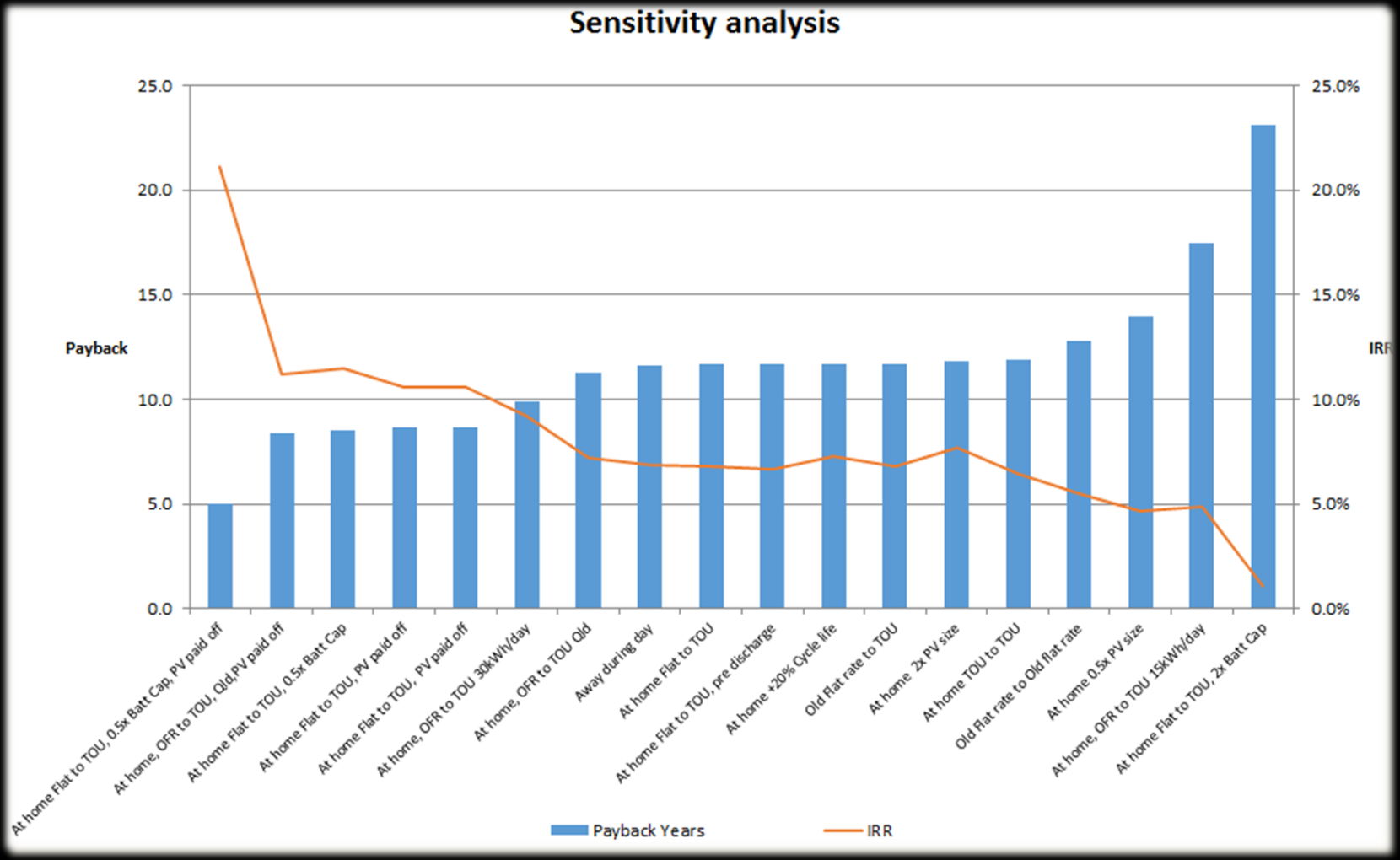
P2	Capital cost	Annual electricity cost	Annual Savings	Payback Years	IRR	Rel. Cost of energy
No PV or Storage	$0	$2,080	$0	0.0	0%	$0.24
PV Only	$6,500	$1,129	$950	6.3	16.8%	$0.23
Battery system only	$20,544		$565	36.4		
PV with Battery	$27,044	$564	$1,515	18.1	4.4%	$0.15

P3	Capital cost	Annual electricity cost	Annual Savings	Payback Years	IRR	Rel. Cost of energy
No PV or Storage	$0	$2,080	$0	0.0	0%	$0.24
PV Only	$6,500	$1,129	$950	6.3	16.8%	$0.23
Battery system only	$14,586		$430	33.9		
PV with Battery	$21,086	$699	$1,380	18.8	3.2%	$0.17

P4	Capital cost	Annual electricity cost	Annual Savings	Payback Years	IRR	Rel. Cost of energy
No PV or Storage	$0	$2,080	$0	0.0	0%	$0.24
PV Only	$6,500	$1,129	$950	6.3	16.8%	$0.23
Battery system only	$8,100		$218	37.2		
PV with Battery	$14,600	$912	$1,168	12.3	8.4%	$0.21

P5	Capital cost	Annual electricity cost	Annual Savings	Payback Years	IRR	Rel. Cost of energy
No PV or Storage	$0	$2,080	$0	0.0	0%	$0.24
PV Only	$6,500	$1,129	$950	6.3	16.8%	$0.23
Battery system only	$21,619		$526	41.1		
PV with Battery	$28,119	$603	$1,476	#REF!	-1.0%	$0.16

“4. Sensitivity”



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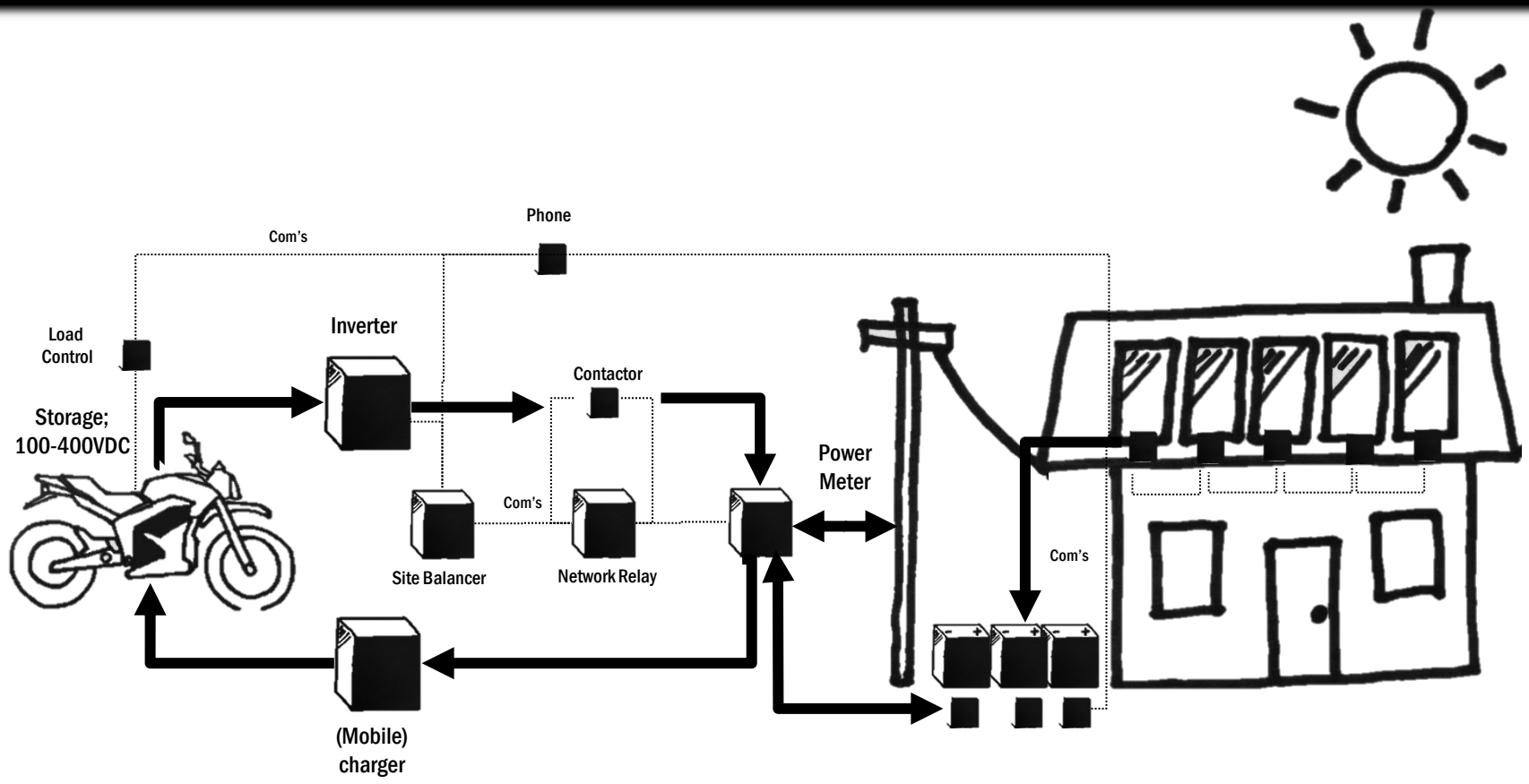
V2G is also coming



"EV Site Balancer"

enphase ENERGY

"AC Battery"

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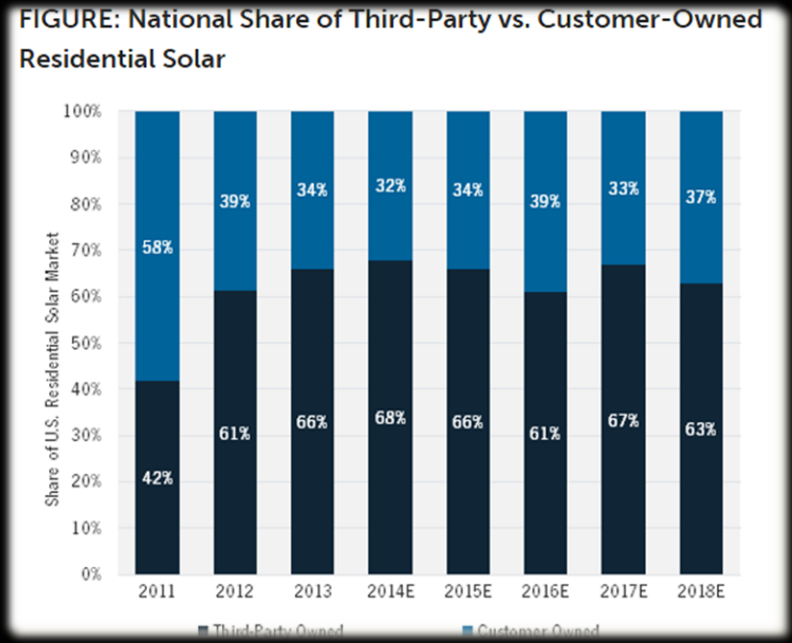
Finance

- The US is the worlds biggest solar financing market
- The majority of solar consumers (residential and business) use solar finance of one kind or another
- Applicability and "value" depend on a variety of factors
- Conversely, less than 10% of Australian solar is financed
- Interesting trends overseas



Source: GTM Research

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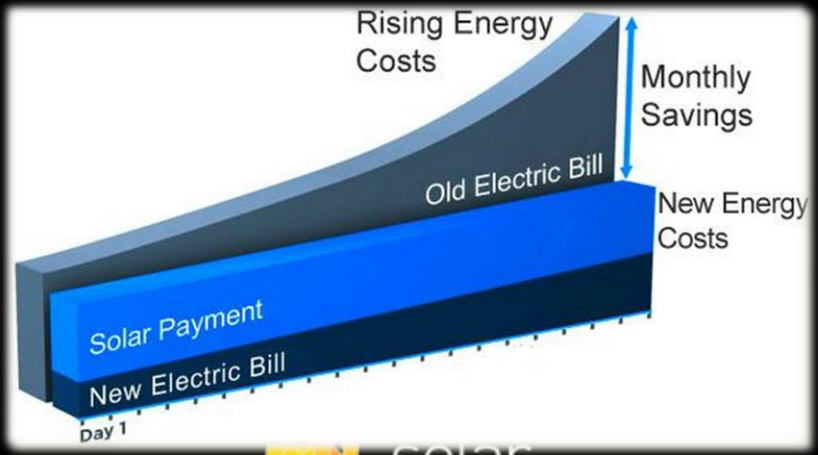
Finance products

Residential:

- Cash
- "Two years interest free"
- Personal loans
- Mortgage roll up
- Power Purchase Agreements

Business:

- Cash
- Personal loans
- Line of credit (existing lender)
- Rent to own
- Chattel mortgage
- Power Purchase Agreements



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Finance and PPA's

- "Interest free", escalators & index's
- EUA's
- Shift utility costs to finance costs, "with a cherry at the end"
- Financiers hate risk and choose safer products, suppliers
- Move quickly to avoid risk in changing conditions
- Have strict compliance, due diligence and qualification checks
- Are required to adhere to strict consumer finance laws
- Are good at leveraging tax advantages

Finance type	Best suited to	Typical interest rates	Typical term	Ownership
Cash Purchase	People with wads of spare cash earning no interest	0%	0	Self
Consumer POS finance	People who don't need finance law protection, need instant money & can pay it off in two years, with hidden interest	25%?	2	Self
Credit card	People with expense accounts or homeowners	20%+	3	Self
Personal loan	People who don't have existing personal loans	15-20%	5-10	Self
Home mortgage	People who need a very long time to pay it off and have paid off part of their mortgage	6-10%	15-25	Self (less title)
Rental to Own	People who can pay it off in a medium time frame, want flexibility	10-15%	7	Financier (end flip)
Chattel Mortgage	People who feel ownership is critical, want maximised tax benefits and final ownership	10-15%	7	Self
PPA	People who feel external ownership and maintenance is critical, need a longer term	15-20%	7-15	Financier

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Solar has increased electricity prices: government

May 30, 2013

Comments 50 Read later

Amy Remeikis

Queensland state political reporter

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Announcement comes ahead of an anticipated 21 to 22 per cent increase in the retail price for electricity.

Prodigal sun?

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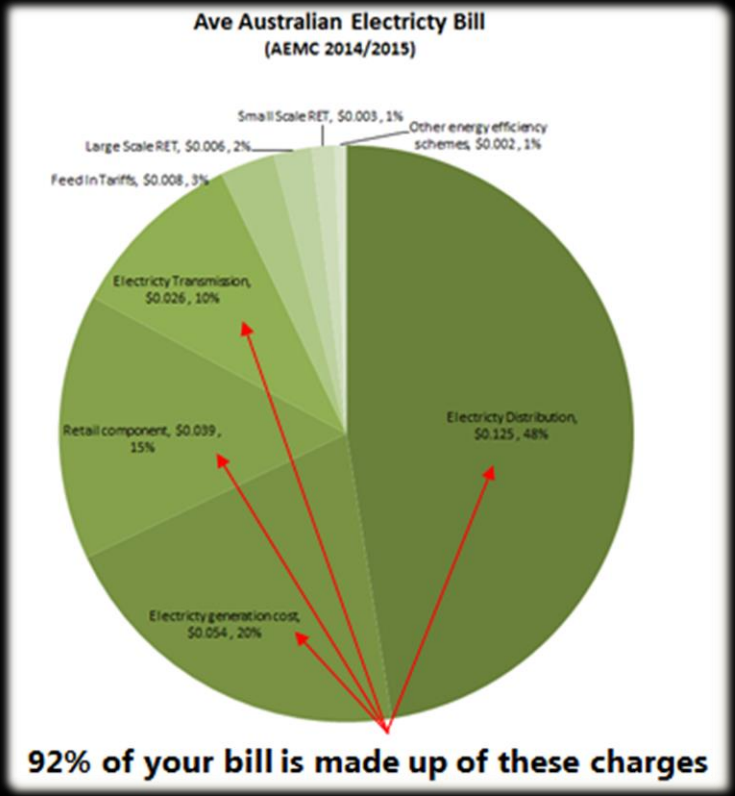
A big problem?

Yes, solar support adds some cost

- However, around 2-3% of average bill[1]
- One of a myriad of social cross subsidies
- Fossil fuel subsidies $7.7Billion p/a[2]
- Decreasing as a proportion
- A highly charged, complex and politically driven issue



[1]*Australian Energy Market Commission*
[2]*OECD (2010) Measuring support to energy*

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A cost to society?

Grattan report calculated "$10B cost to society" for solar support (RET). When teased apart it was found that:

- Discounts benefits and rates were ultra conservative
- Assumed a very short life for inverters and PV
- Did not account for any network value or benefit
- Net cost of -$9.7bn becomes a net benefit of $1.2bn.

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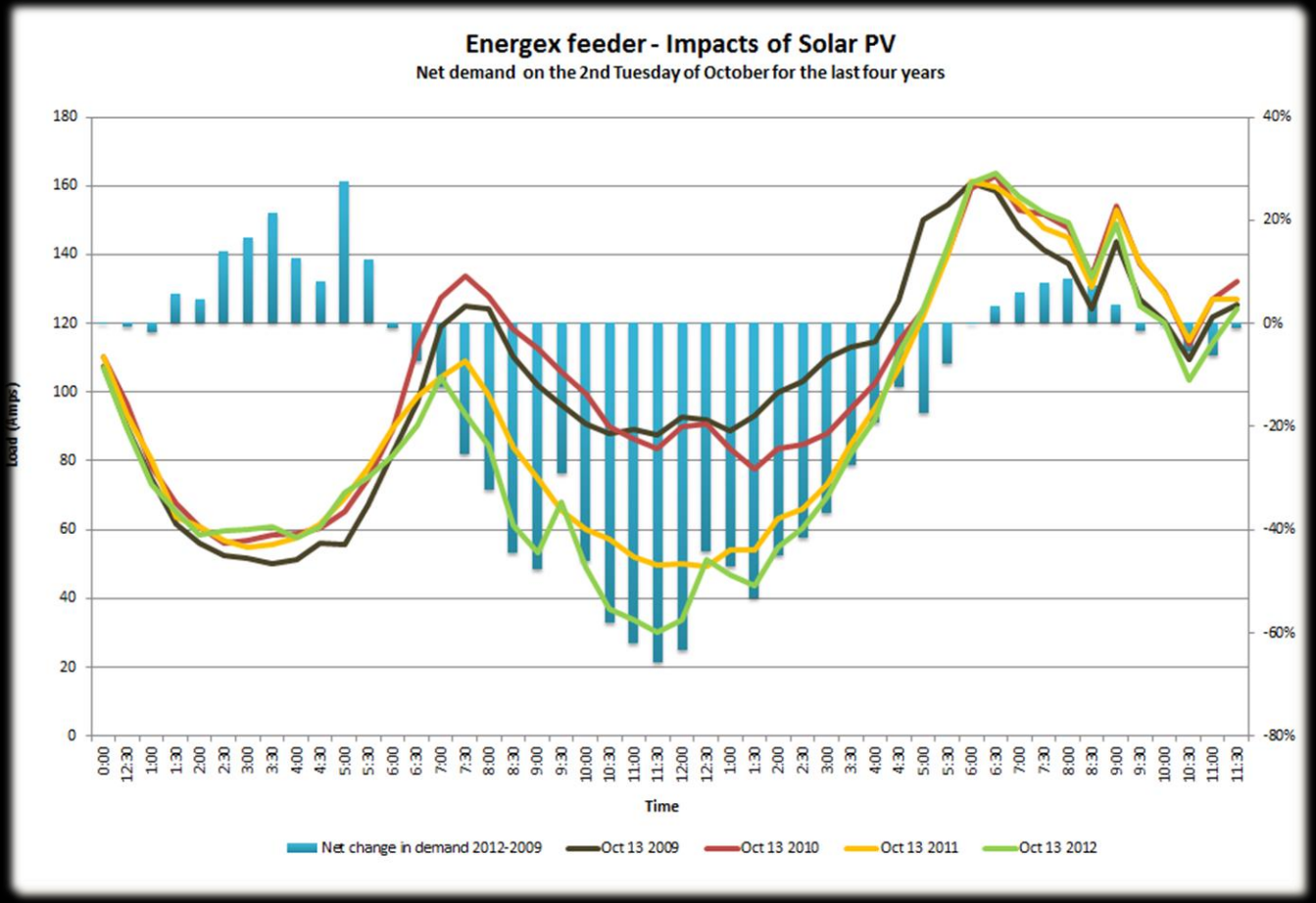
The new normal



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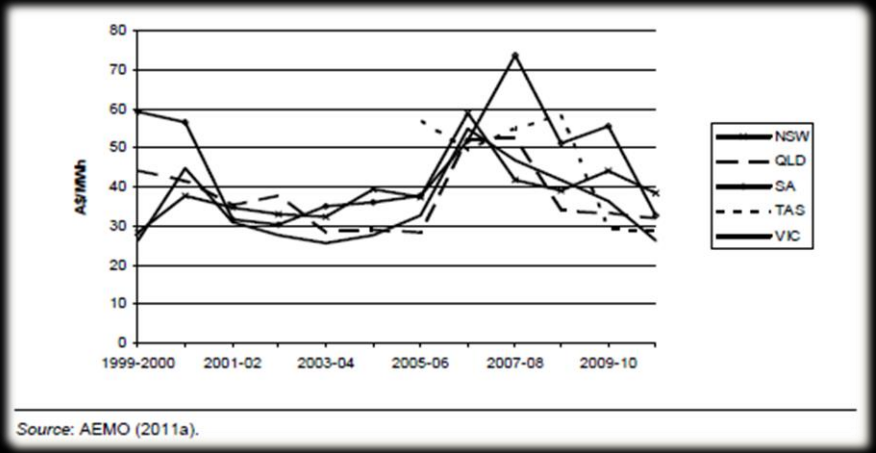
Solar reduces costs??

The ESAA said:

- *"..increased supply of renewable energy in a shrinking national market suppresses the wholesale price of electricity…"*
- *"..The value of the National Electricity Market has shrunk by more than $4 billion, or 40 per cent, in the last four years.."*
- *"..Renewable and gas power stations now account for more than 90 per cent of planned energy investment…."*

Average NEM wholesale electricity prices



Source: AEMO

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The problem is ?

Disruptive, rapid change

- Networks – transferring less energy
- Retailers – selling less energy
- Generators – making less peak energy
- Governments – receiving lower returns
- Shareholders – watching asset value diminish

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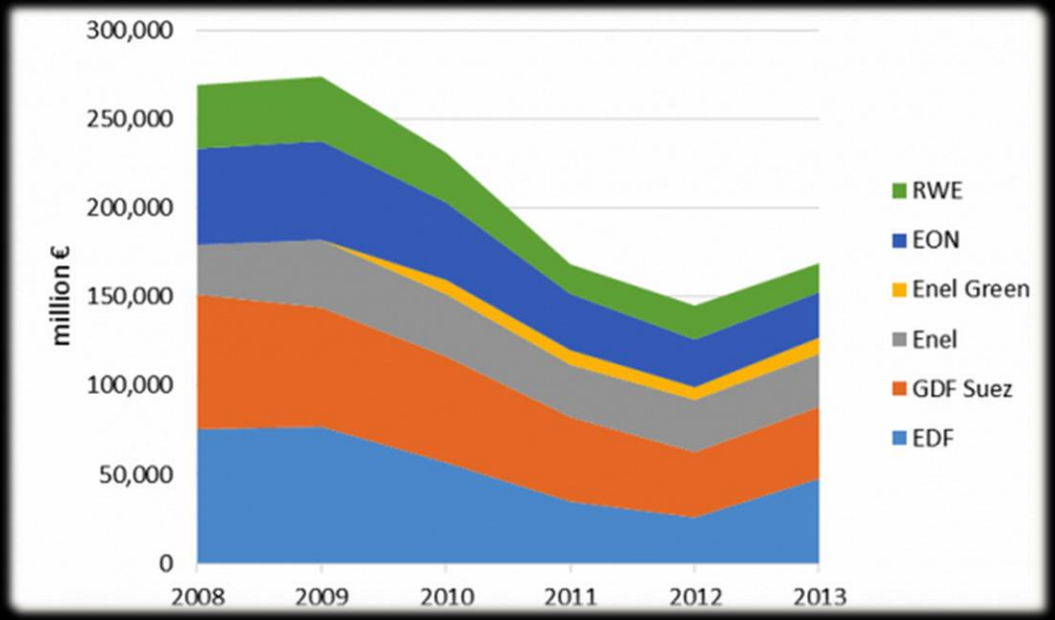
The death spiral

- These companies represent 60% of EU's generation
- 100Billion Euro's of lost value (market cap) over the period
- In Australia losses to utilities are "hundreds of millions" each year and growing



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Conclusions

- PV economics are fantastic *but*
- Saturation is a growing challenge. Hard to sell to a climate sceptic.
- Storage economics re rapidly becoming acceptable *but*
- Its an early adopter market right now, and will be technically very challenging
- Utilities are caught. Some fighting, some playing.
- Its all new. The dynamics of this energy market are all very new; dynamic, engaged prosumers with smart control and high expectations.
- Costs and benefits continue to be debated
- Data and smart control is key. No matter where you sit in the value chain smart control leverages value and buidls efficiency.

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Thank you

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