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Australian PV Market Update and Grid Parity Implications

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SPREE Seminar
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OUTLINE

- The global and Australian PV market
- The levelised cost of electricity from grid-connected PV
- Future rate of installations
- The role of the grid in a solar world



Global PV Market Development

- 8 GW installed in 2009
- 18 GW in 2010
- 26 GW in 2011
- 27-33 GW projected for 2012
- Installed capacity now > 70 GW
- Module production costs < \$1/Wp



International PV Targets

(PVPS, 2011)

- USA: Solar 10% of energy by 2020
- Japan: 28GW by 2020, 53 GW by 2030
- India: 20 GW solar by 2022 + 2 GW off-grid
- Italy: 23 GW by 2016
- China: 15 GW by 2015; 50 GW by 2020
- France: 5.4 GW by 2020; 25,000 new jobs
- Spain: 3.6% of electricity by 2020
- 12% of EU electricity by 2020? (EPIA, 2009)



AUSTRALIAN MARKETS, PRICES & TRENDS



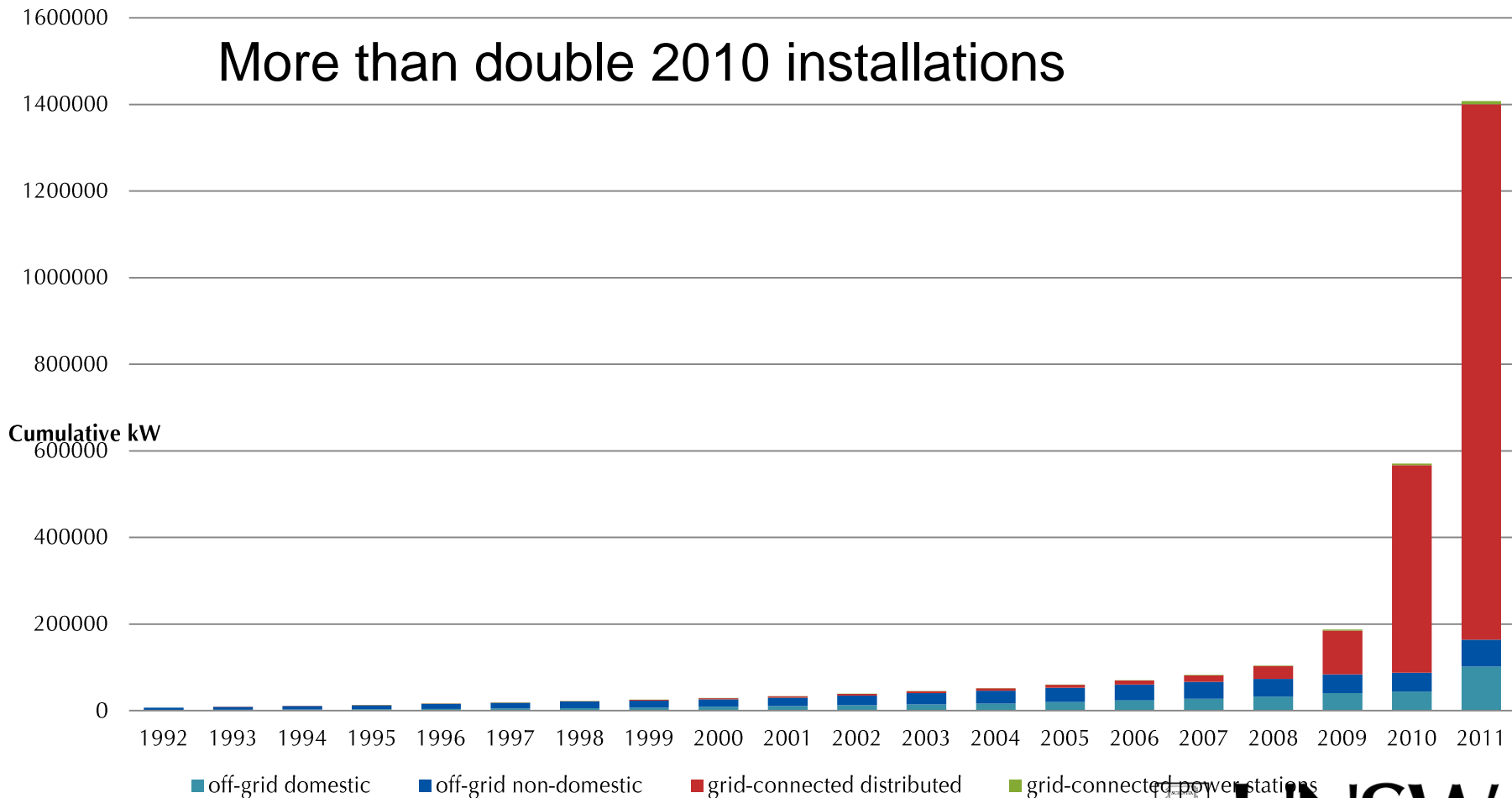
305 kWp PV system
on Alice Springs
Crown Casino

Photo: SunPower
Corp

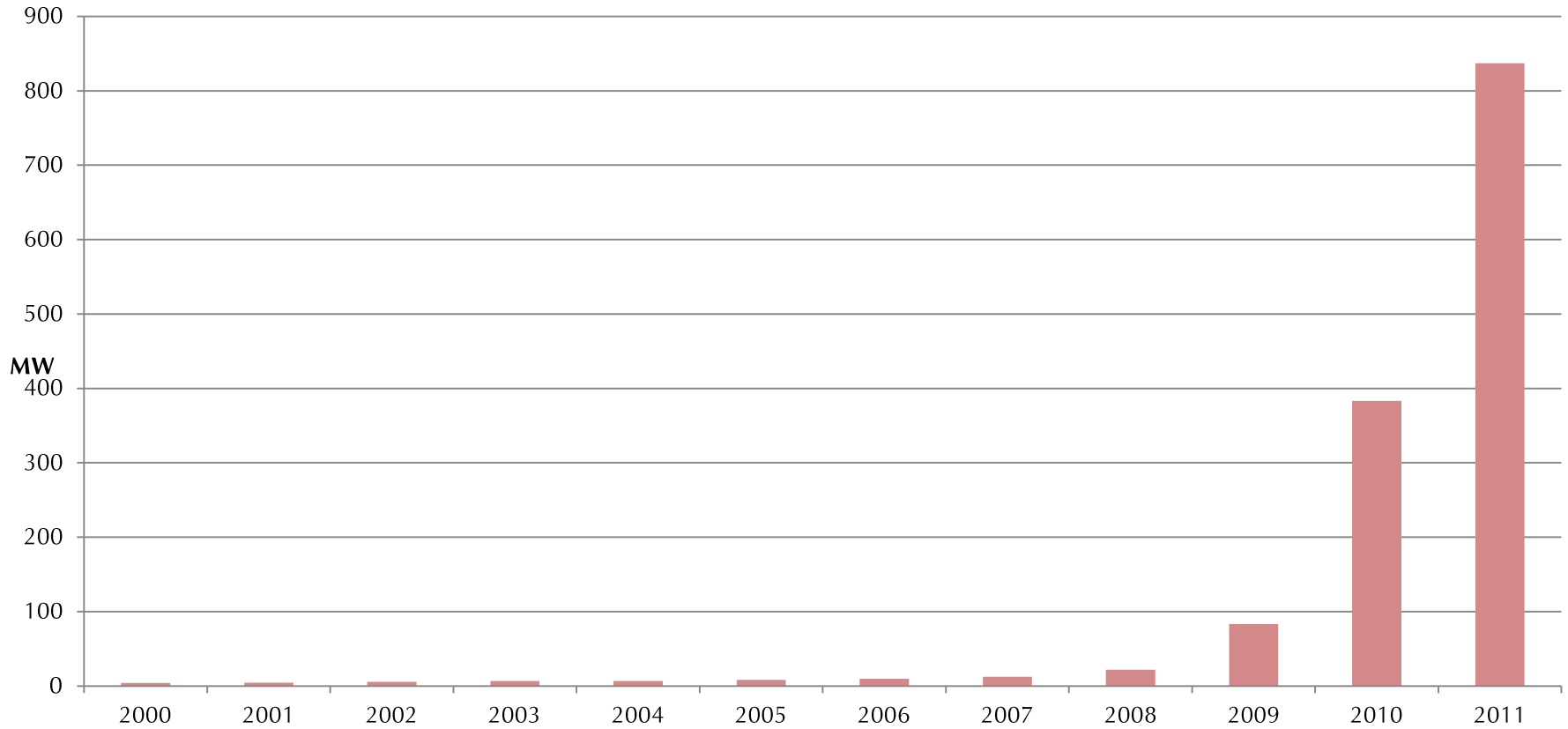


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Australian PV Market (APVA, 2012)



Annual installations



Australian Market Drivers

2011

- Solar Credits X3
- Feed-in Tariffs
- Solar Schools
- Solar Cities

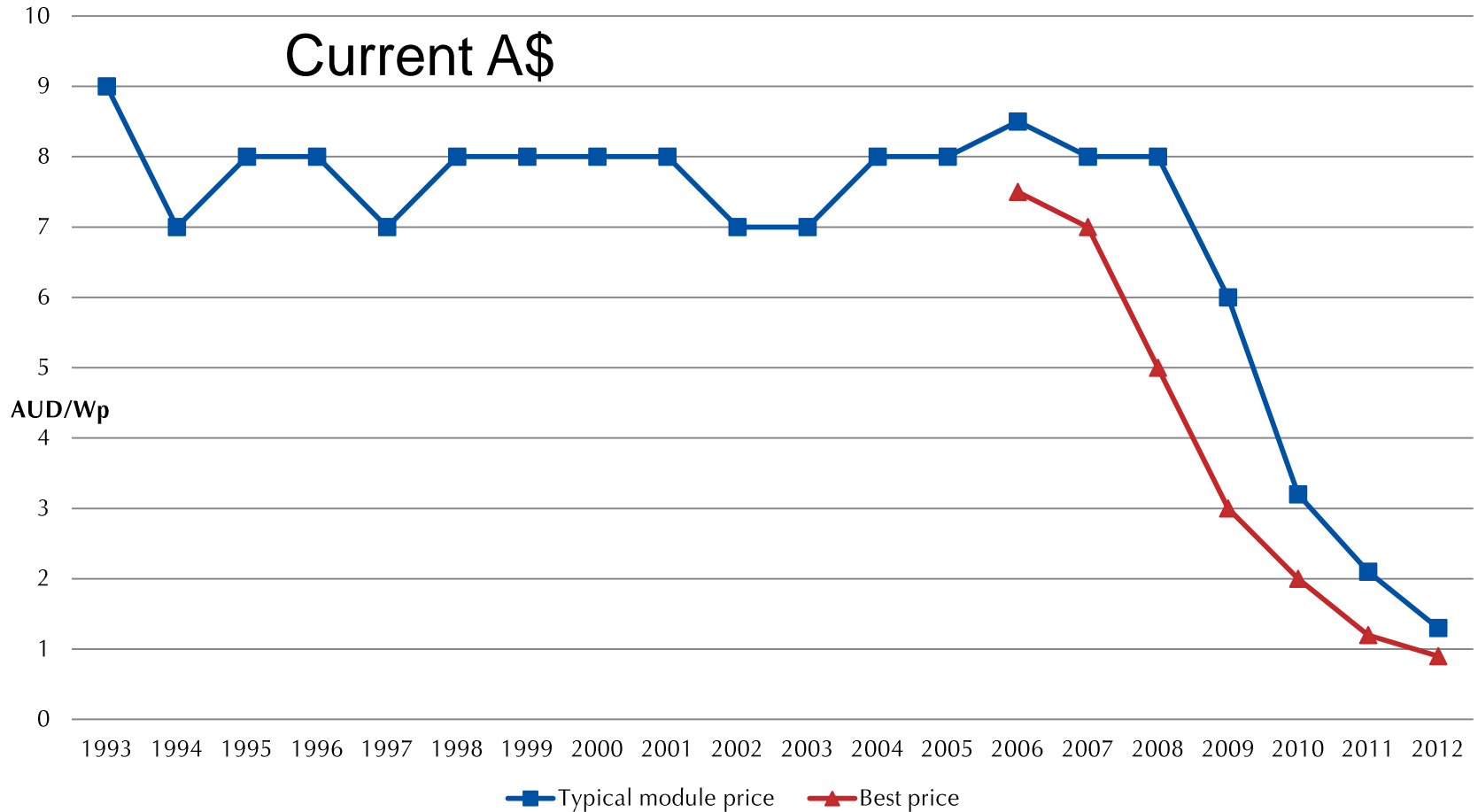
2012

- Grid parity for own use
- Carbon price
- Solar Credits X2
- Reduced or no FiTs
- Solar Flagship
- Development of commercial sector?

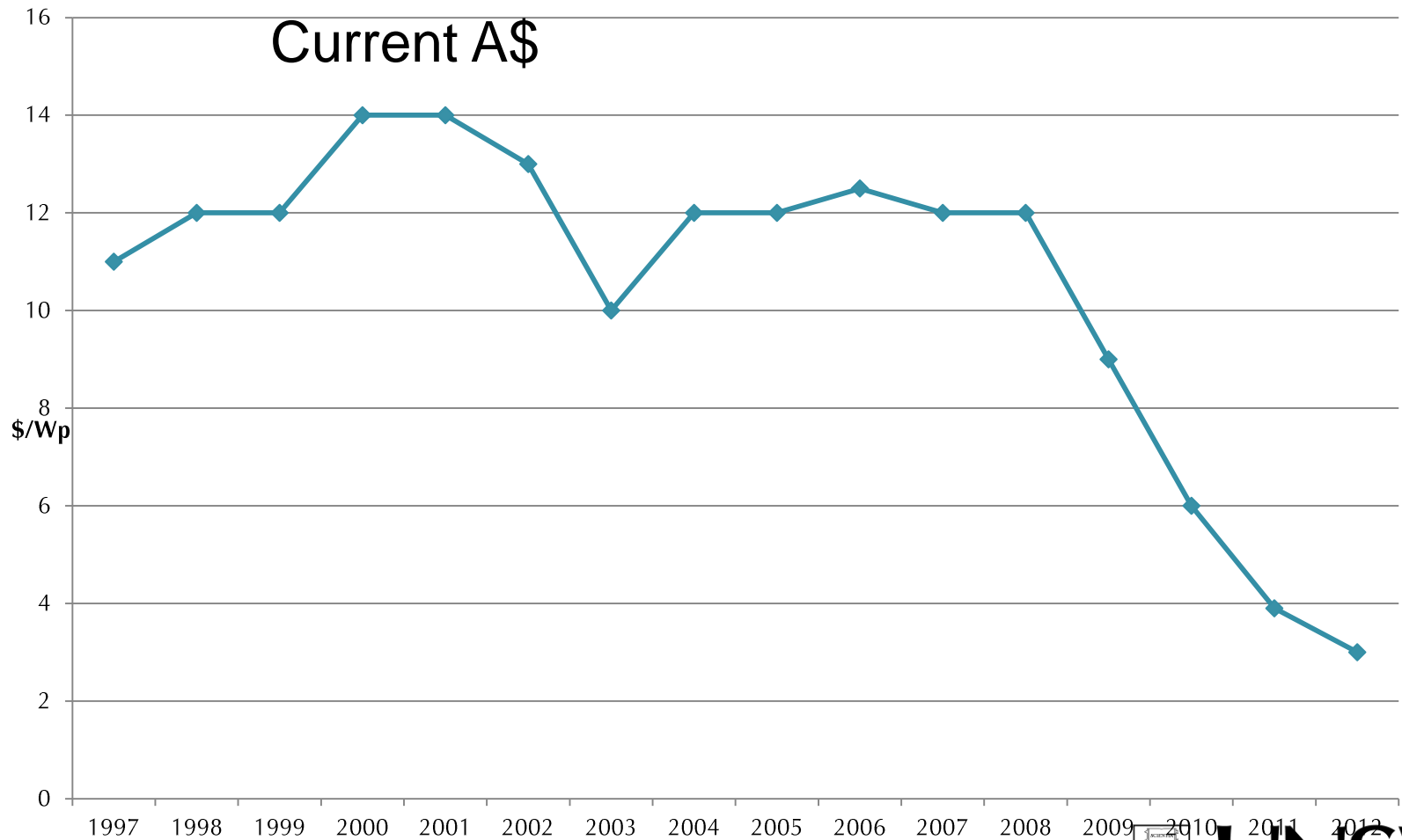


Module price trends

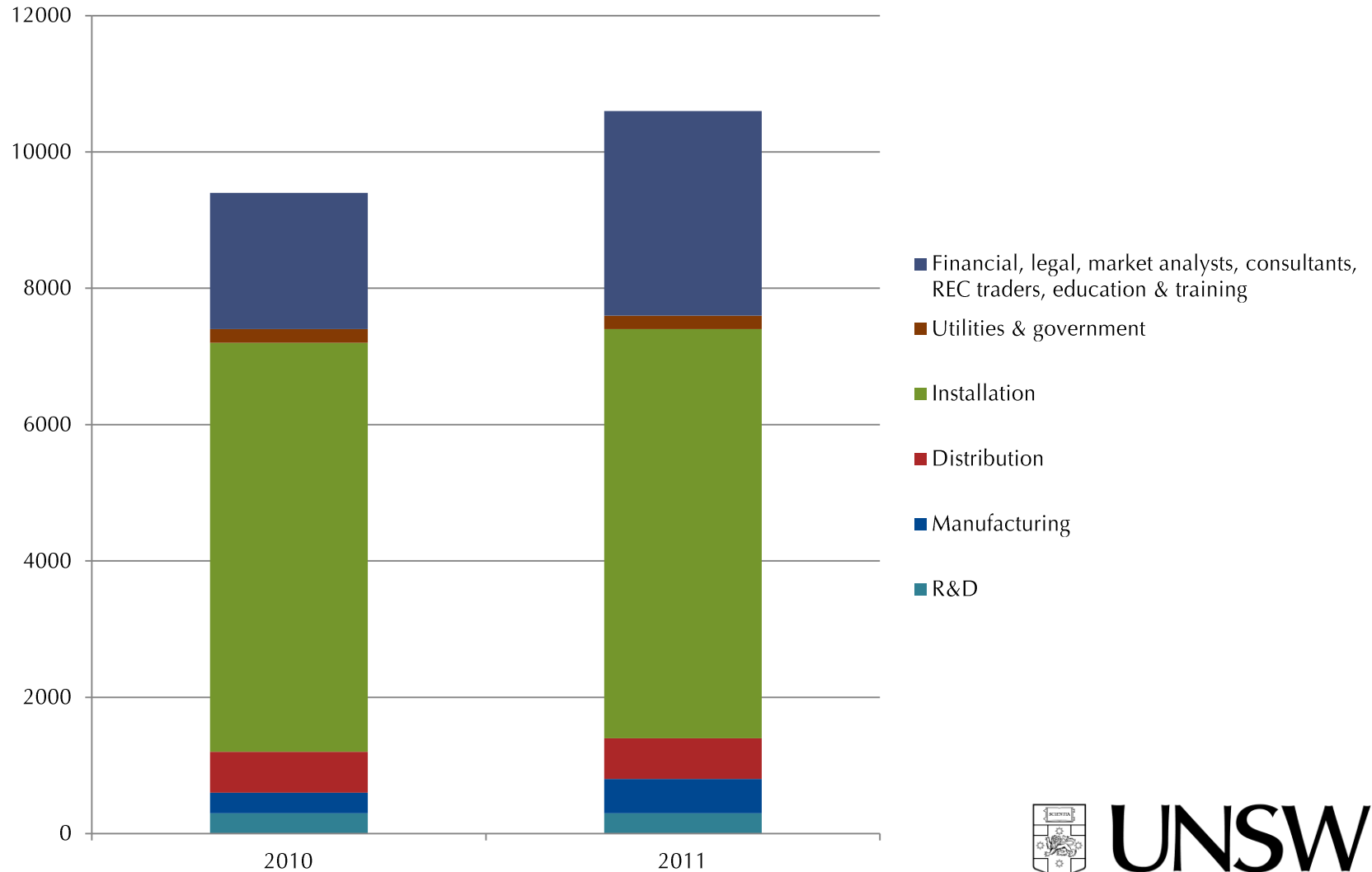
(APVA, PV in Australia report, various years)



Grid System Price Trends

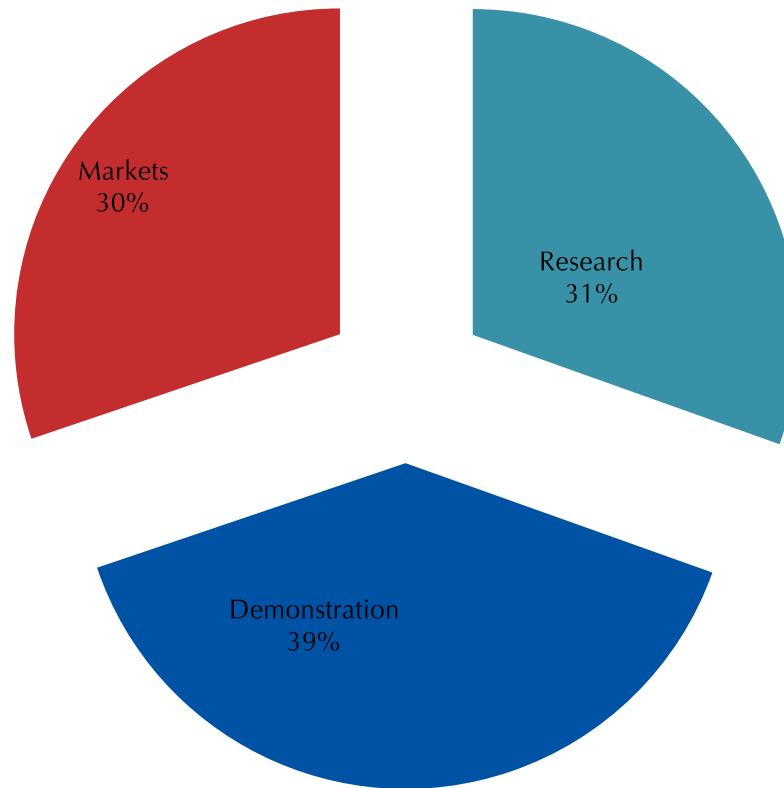


Employment



Government RD&D Funding - \$99.5 M

Significant
change in
2011 due to
SHCP
ending



THE LEVELISED COST OF ELECTRICITY FROM GRID- CONNECTED PV SYSTEMS

- And Implications for Grid Parity



Residential Grid Parity

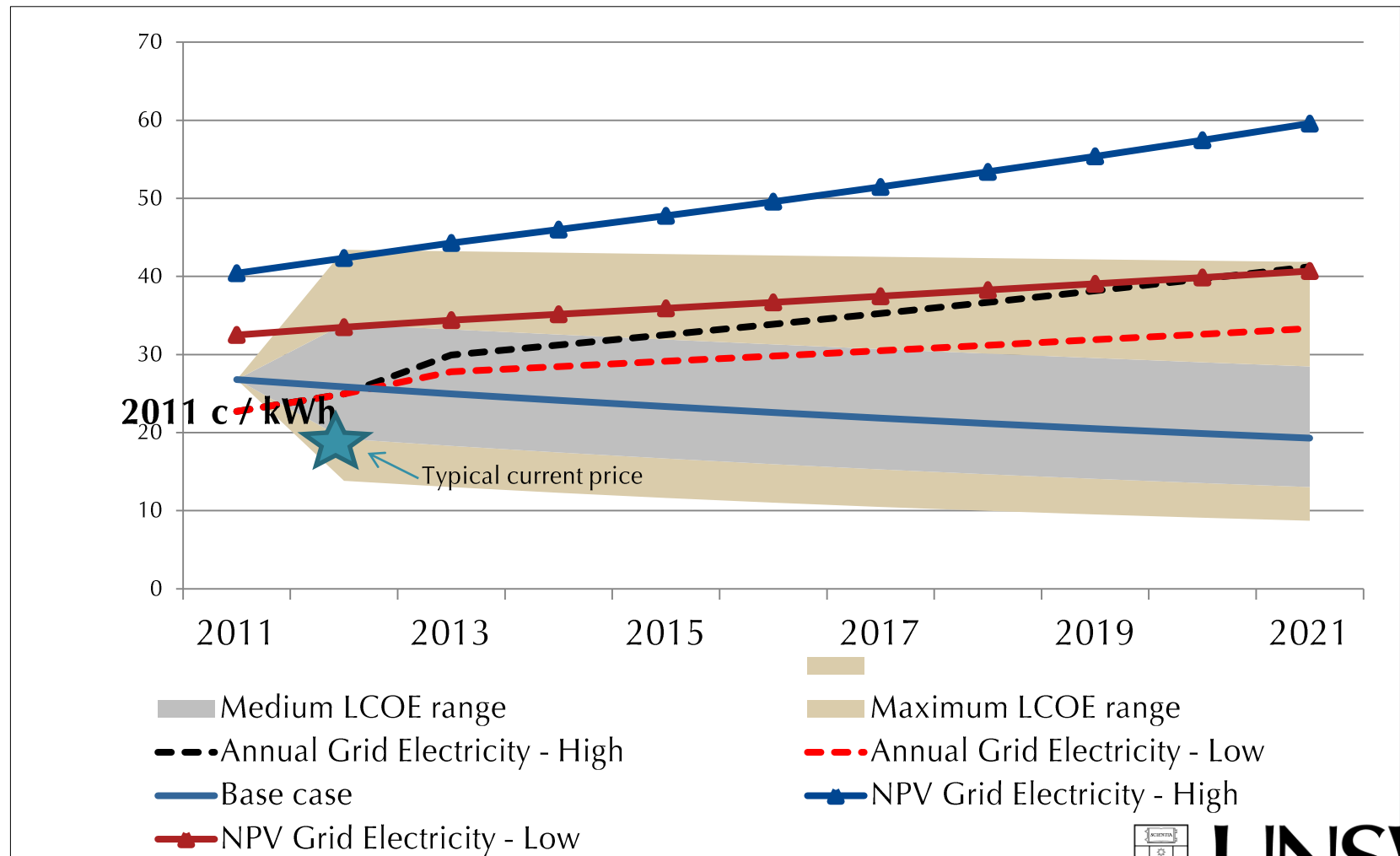
- When PV LCOE = electricity tariff (prevailing or NPV)
- Both reached in 2012 without subsidies, assuming all PV power receives retail tariff
- Solar Credits make upfront cost affordable
- FiTs provide immediate cashflow

Despite this →

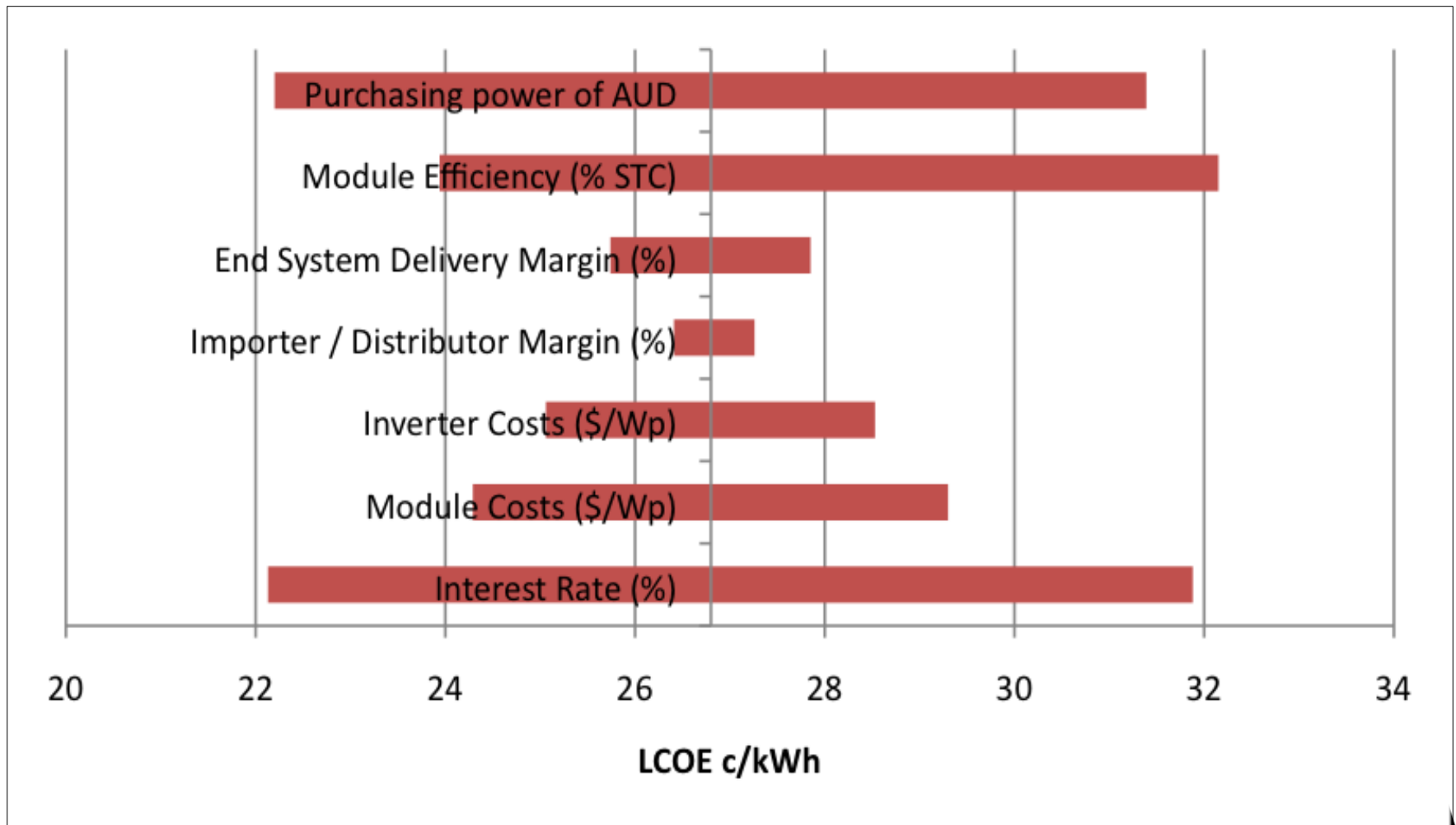
- Market spooked by SC & FiT changes
- Negative media – subsidies, poor quality imports, fire, cyclones, floods, grid problems
- Customers want < 10 yr payback
- Several large and many small company bankruptcies
- New marketing strategies needed and this is starting to happen



Residential System Price trends and Grid Parity Projections (APVA, 2011)

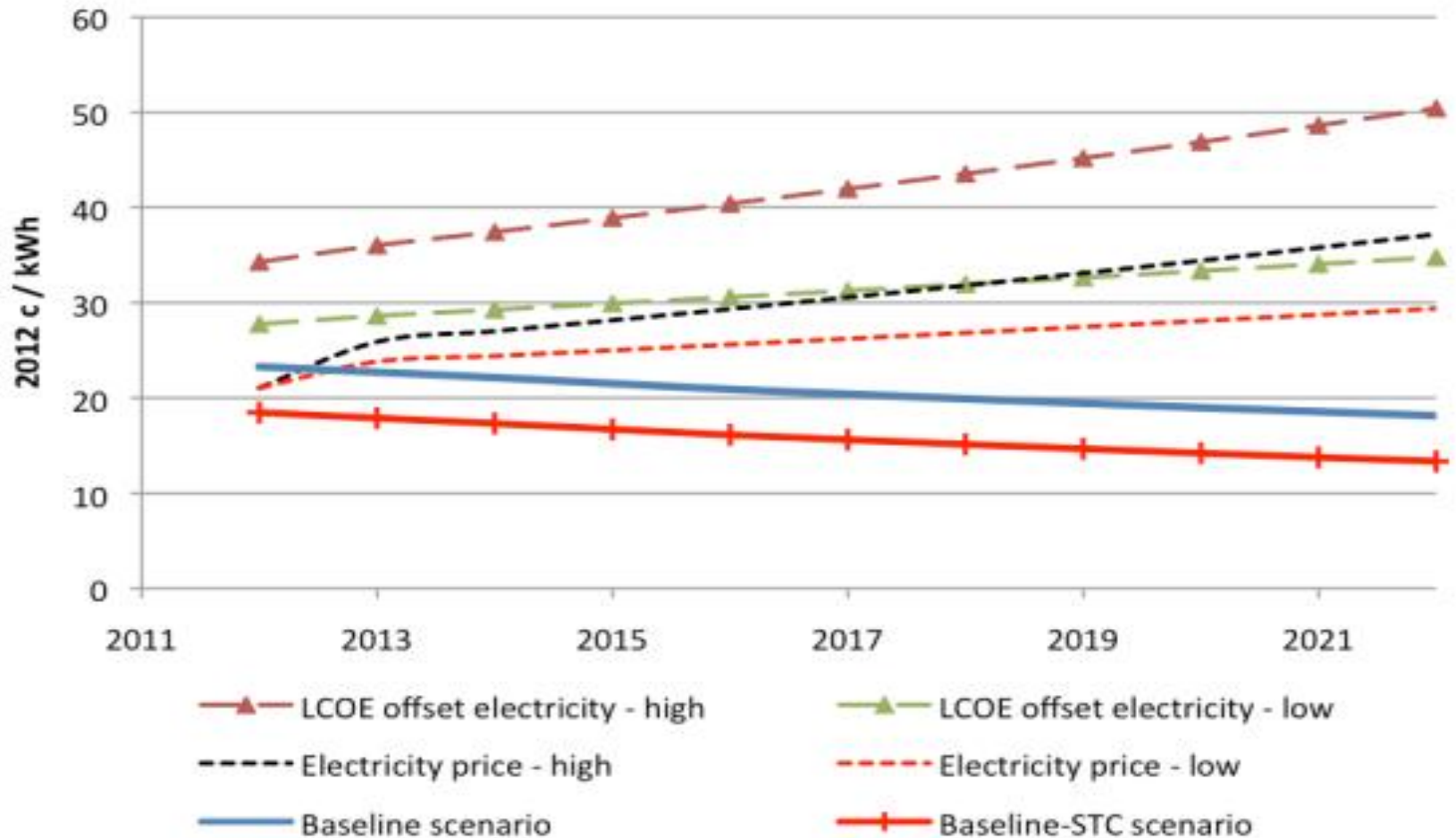


Sensitivity to 25% change

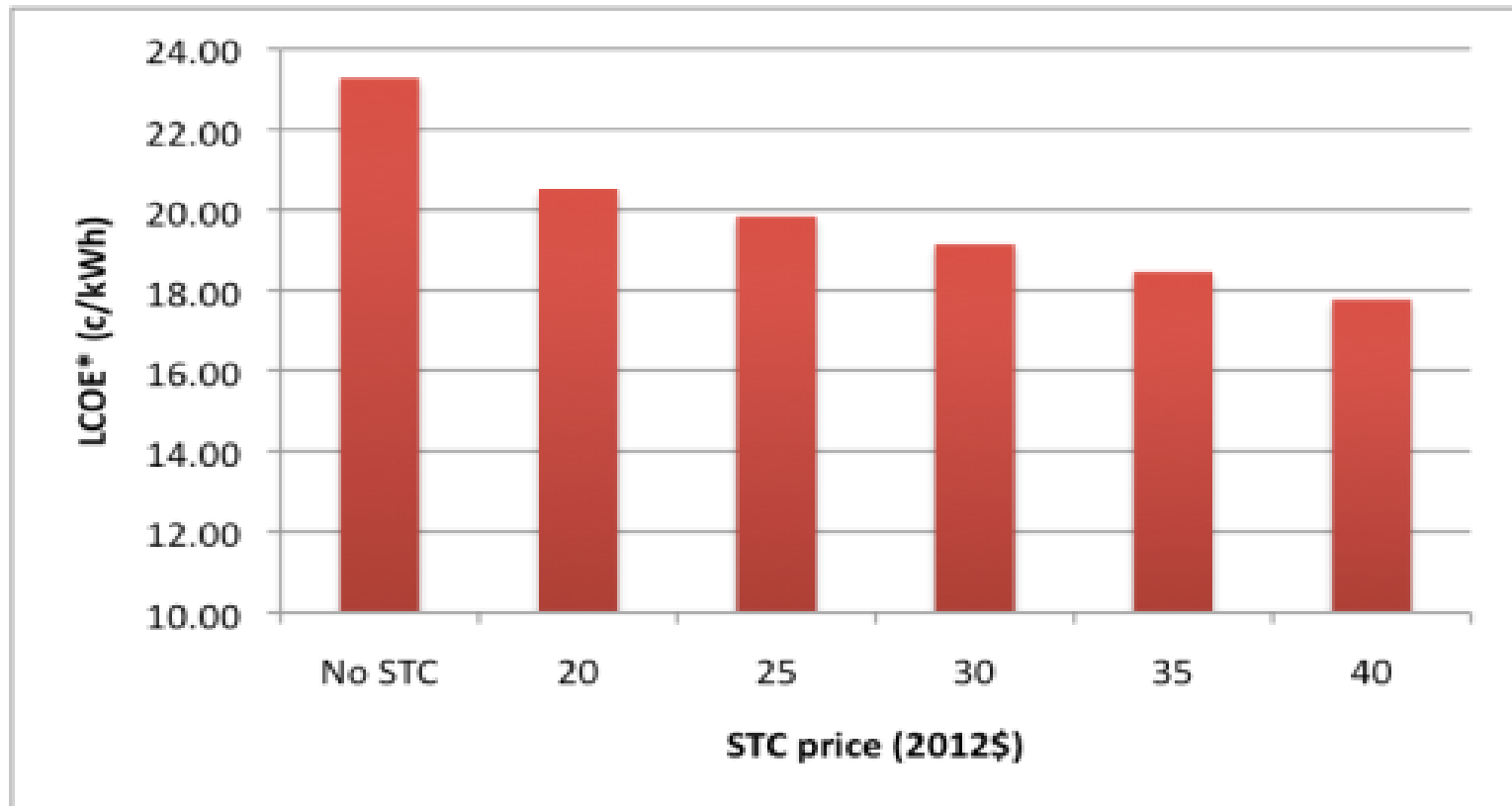


Commercial Sector

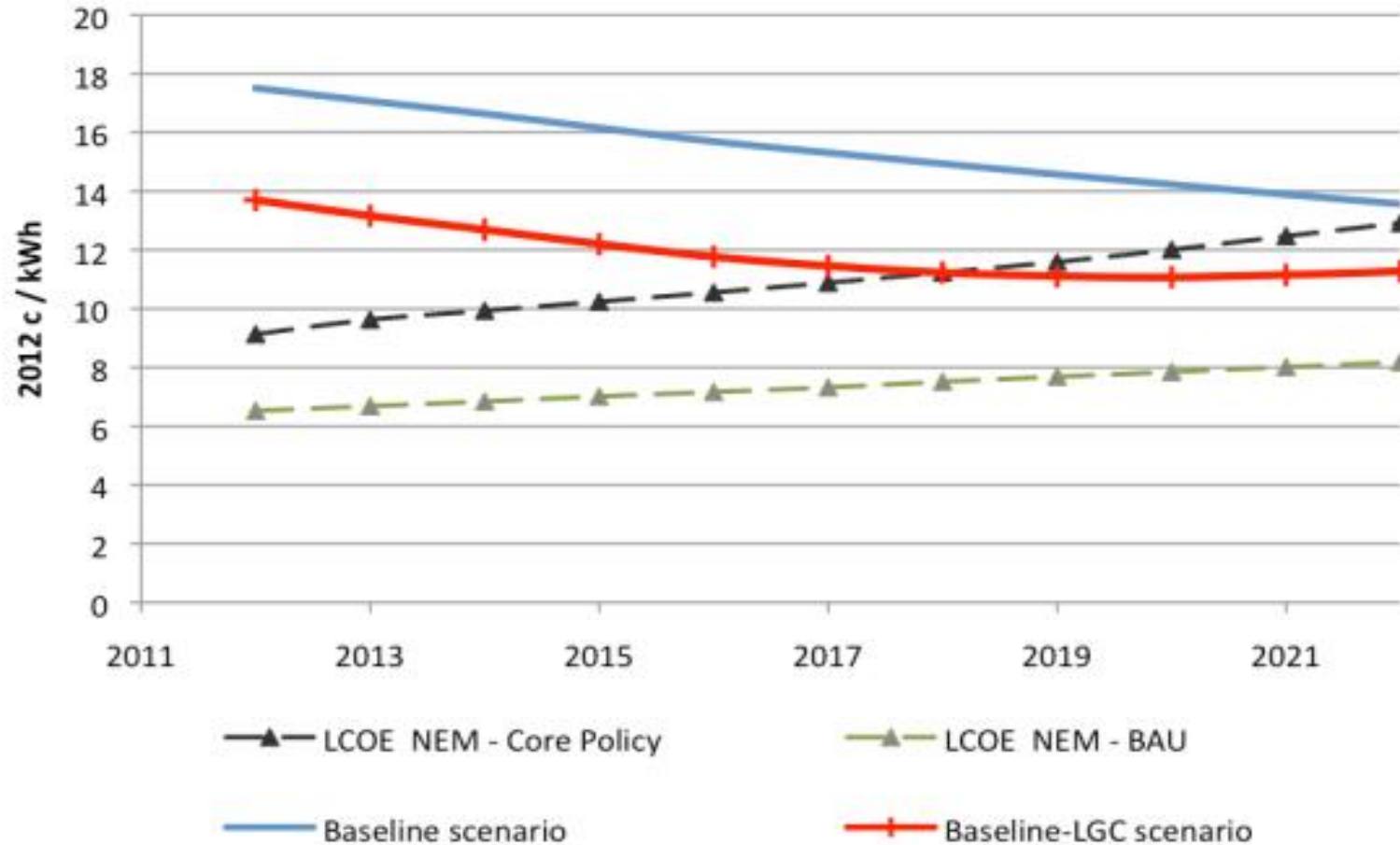
(APVA 2012)



Impact of STC price



Utility-Scale PV: module efficiency impacts (APVA, 2012)



Wholesale price parity

- From 2017, with LGCs, depending on trends
- Needs R&D
 - Efficiency improvements
 - Manufacturing cost reductions
 - New technologies
- Needs deployment to bring BOS costs down
- Intermediate size (up to 30 MW) promising but approval and interconnection costs not transparent and disproportionately high



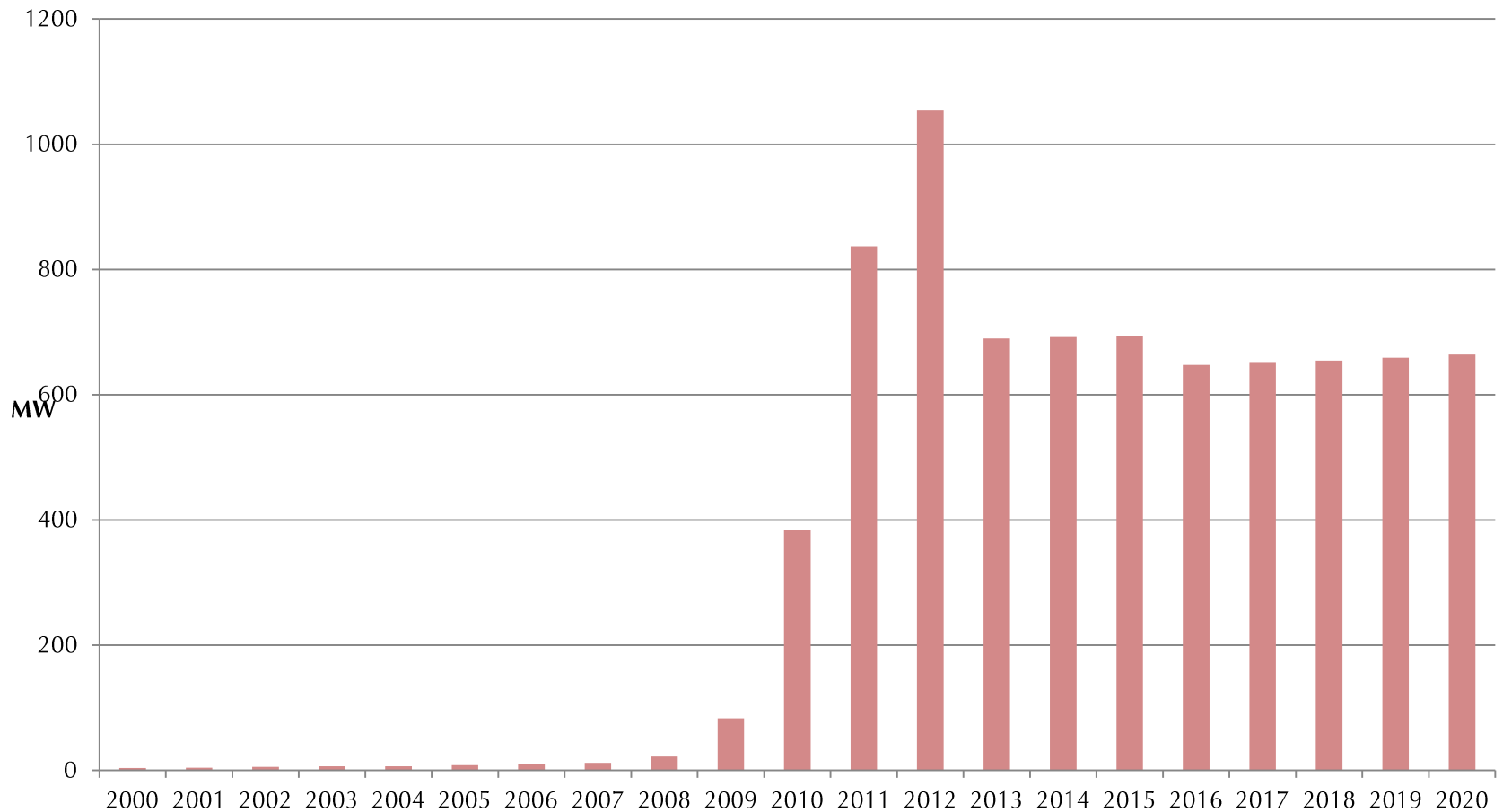
MARKET PROJECTIONS



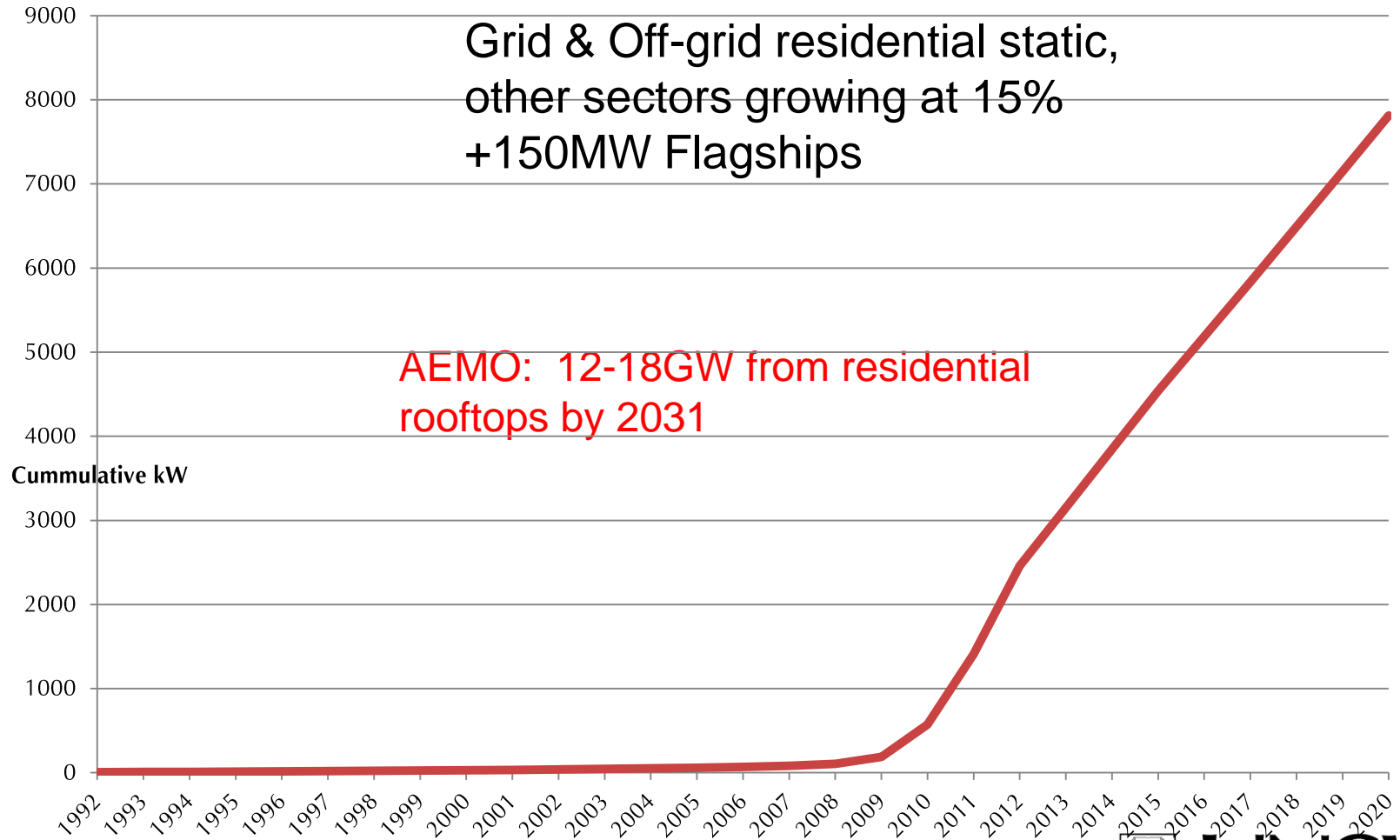
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Possible annual installations

— if residential market stabilises from 2013



Possible cumulative installations of ~8GW by 2020



THE ROLE OF THE GRID IN A SOLAR WORLD



So what now?

- One of the 1st countries to reach parity but:
- NEM designed for central generation
 - No incentive to value distributed energy
 - No inherent right or incentive to export to grid
- Hence export offers between 0 and wholesale rate (8c) once FiTs cease, if allowed at all
 - Favours own use & smaller systems
 - Storage now of great interest
 - Link to electric vehicle rollout?
 - Move to self-sufficiency & off-grid solutions?



Elect price increases (AEMC)

	c/kWh	% increase
Wholesale price	7.64	19
Transmission	1.56	8
Distribution	7.8	41
Retail	3.42	14
RET	0.4	11
FiTs	0.38	3
EE & DSM	0.57	3
Other	0.12	

Technical Issues

- Inflexible coal generation base makes Australia least able to accommodate PV cf countries with more hydro and gas
- Installations already being limited because old networks (physical infrastructure, regulations & operating strategies) not designed for distributed generation
- > \$50B in network upgrades
 - could increased DE (PV, EE & DSM) provide a lower cost solution?
 - Could we end up with stranded assets if net zero energy / self-sufficiency increases?
- Smart grids needed
 - not just TOU meters, but also communication with DE & appropriate two-way tariff structures
 - May end up with a very different grid

Regulatory Issues

- Monopoly distribution businesses earn money by kWh transmission and can pass through all increased costs
- Retailer earnings based on kWh sold
 - Neither has incentive to facilitate DE
- What will be the impact of a move to higher fixed charges as a % of total tariff?
- TOU metering rollout but network upgrades going ahead before impacts can be assessed
 - Electricity use already dropping
- How does competition survive if electricity retailers can intervene in the market and can also be DE product owners/suppliers?

Implications

- What happens to current retail market structures if:
 - All buildings are net zero energy
 - Usage keeps dropping
 - Customers opt for on-site storage and purchase only in off-peak periods?
- How long will customers put up with electricity price increases when:
 - Least cost planning options have not been used?
 - Bills go up even if usage is negligible?
- Customers now have an option, since DE is readily available & cheaper than grid power!



A Distributed Energy Market

- Rights and technical standards for connection of DE technologies to the grid
- Formalisation of the portability of DE services
- Trading rules and requirements
- Ancillary service requirements and rewards
- Appropriate DUOS charges
- The role and regulation of new energy service providers
- Pass through of energy and network cost reductions due to DE to the owners or customers generally



References

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