

Local Power Home Solar Panels and Grid Parity

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**MA – viewers are advised this presentation is mostly suitable for an engineering audience.
May contain technical language, graphs and images of new technology.**

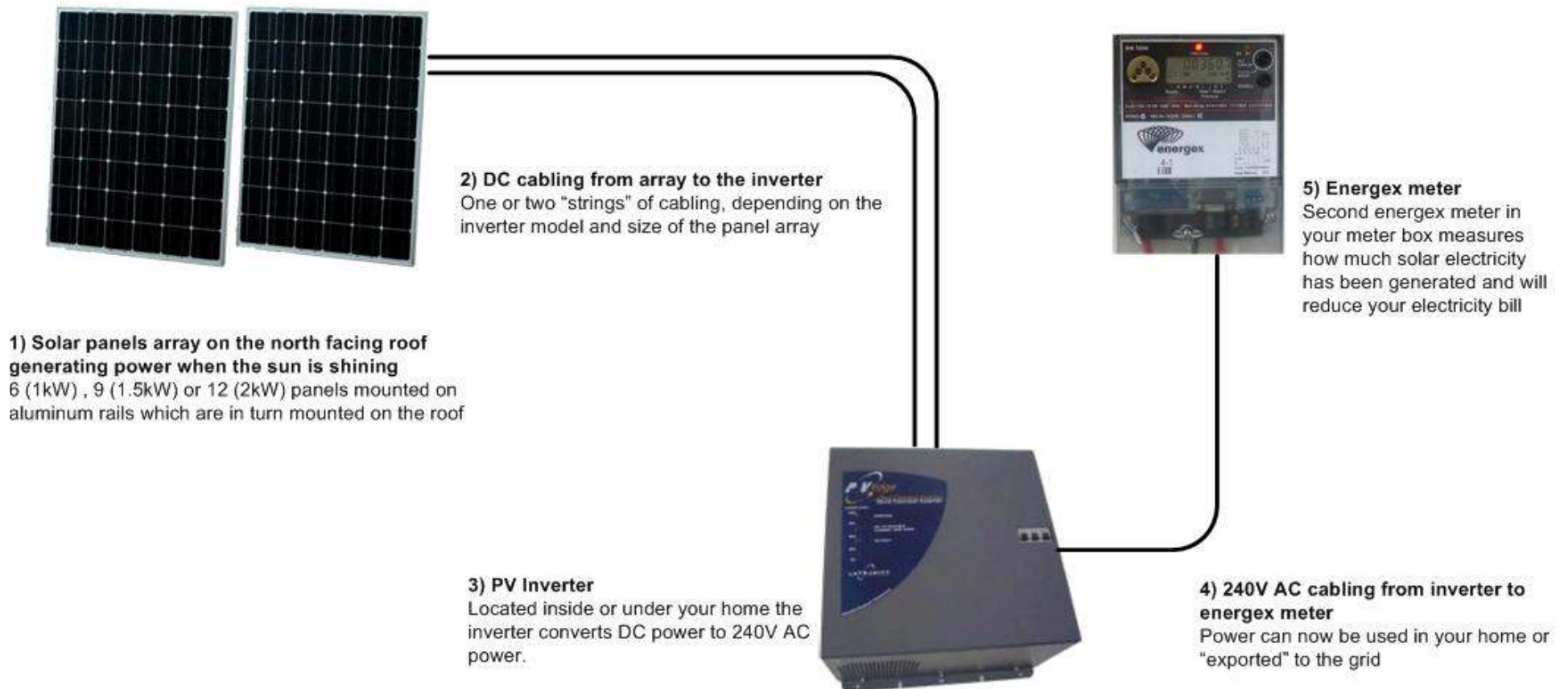


Outline

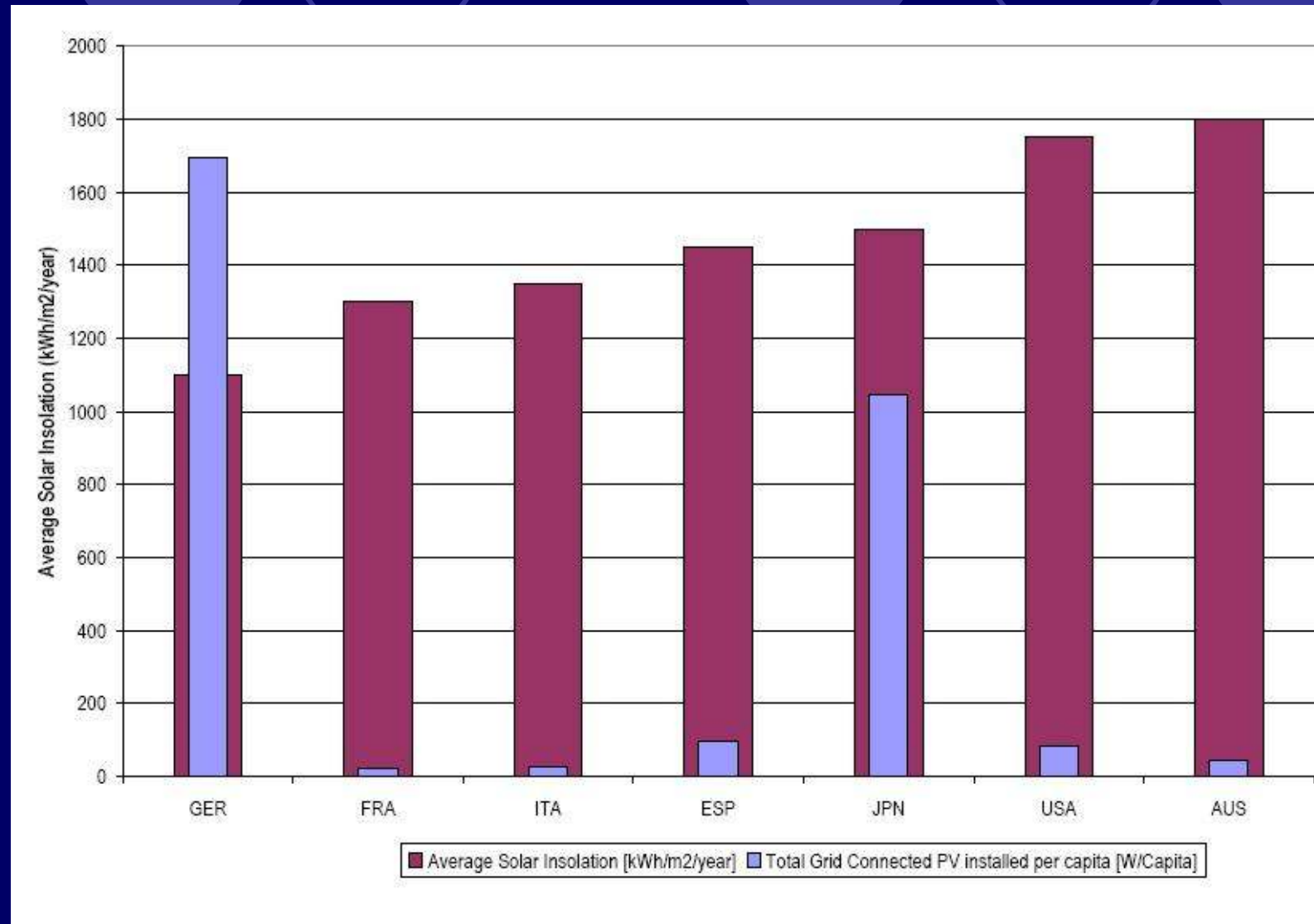
- How PV works
- Local Power - PV rollouts in Brisbane
- Grid Parity is coming
- Grid challenges
- The near future
- Questions?

PV (PhotoVoltaics) - How it works

Local Power – PV solar system diagram (simplified conceptual only)



Global solar resource & PV per capita take-up (2005)



Local Power projects

- Not for profit community group
- Quality components (e.g. Sharp panels)
- No margin on components (transparent fee)
- Good prices due to
 - Buying lots of components
 - Install them close to each other
 - Not for profit admin & project management
- Encourage urban localities to embrace the concept of local energy production
- To give a boost to the local solar power industry and build the skills of local installers

450 systems installed in Local Power BG#1 2 3 4

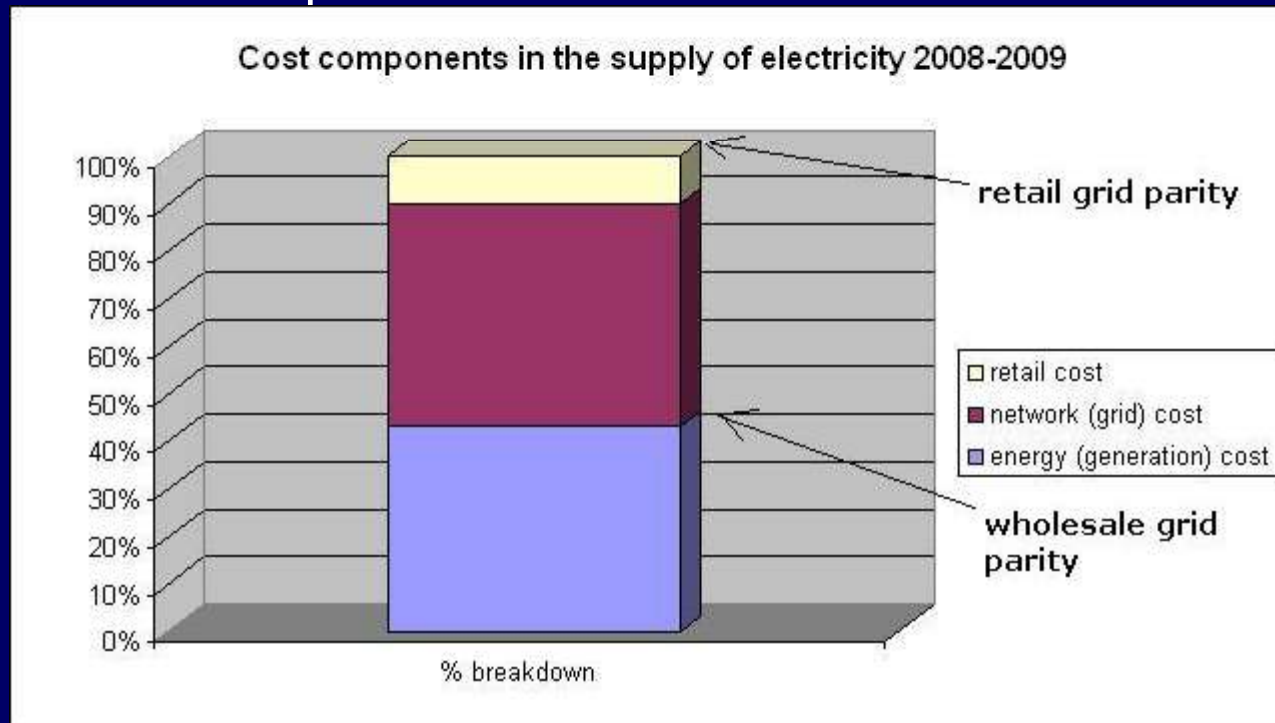


Australian PV Solar Incentives

- Upfront Solar rebates (PVRP/SHCP 1kW) - Federal
- RET - Renewable Energy Certificates (RECs) – Federal
- Solar Credits – (REC 5x multiplier 1.5kW Solar) – Federal
- ERET - RECS split into SRES/LRET (SRES fixed at \$40 but multiplier and system size may change) - Federal
- Feed in Tariffs (FiT) – gross or net export – State
- Carbon Price – (carbon tax or ETS or ???) eventually a negative incentive for fossil fuels – Federal?
- In summary
 - Multiple incentives are complicated for customers
 - Uncertain level of incentives (RECs)
 - Parochial (FiT)
 - A political football (rebates & RET changes)
- **We need to move beyond incentives!**

What is Grid Parity?

- Retail Grid Parity is where the cost of electricity generated over the life of a PV system is less than the retail cost of electricity purchased from the grid.
- From 1 July 2010, retail electricity from the grid is 21.35c/kWh in Queensland.
- A retail bill is composed of *



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How close are we to Grid Parity now?

- April 2010 - **unsubsidised** Local Power 3kW PV system generates at 19.9c/kWh in Brisbane

- Assumptions in model

- 3kW PV system fully installed
- 4.2kWh / kW generation per day in Brisbane
- then 1% panel performance degradation each year
- No opportunity cost (or finance costs)
- PV component lifetime of 30 years (panels, rails, cables)
- Inverter has 10 year life *(extended warranty)*
 - Replace inverter after year 10 & year 20
- July 2010 – tariff 11 - 21.35c/kWh

Recent pricing trending down again

Q: So the smart thing is to wait?

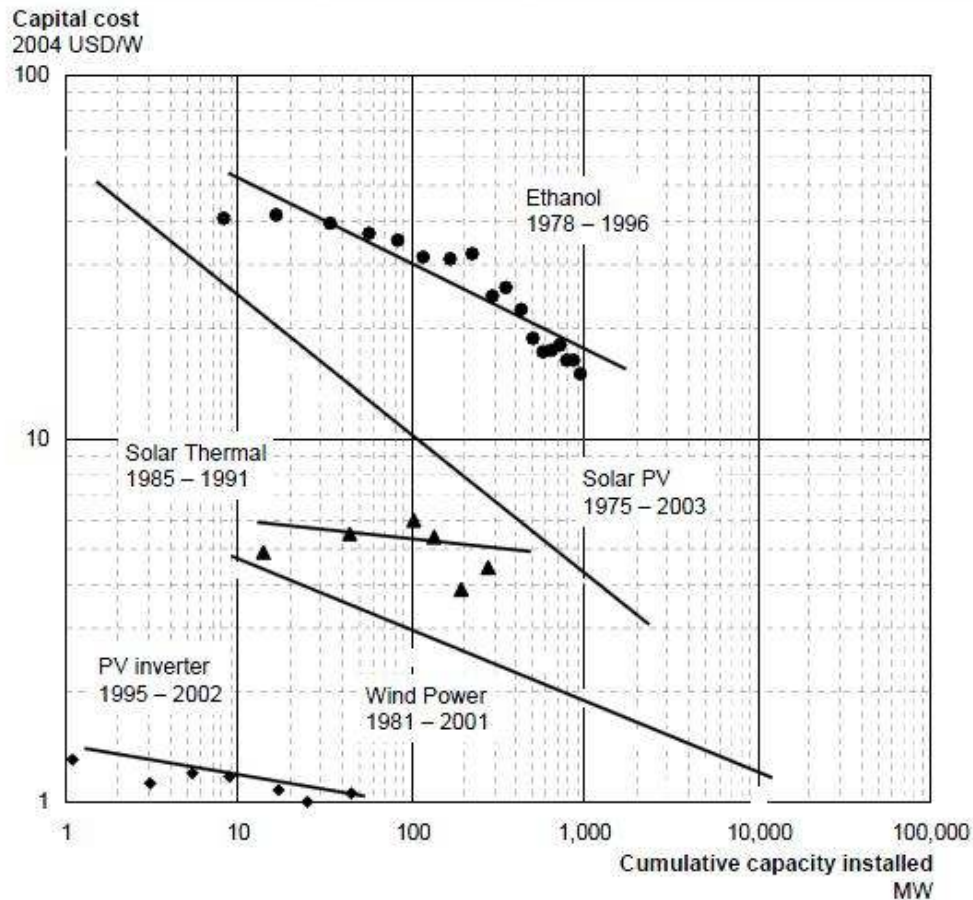
A: No. government incentives change regularly!

Unsubsidised installed PV AUD\$/Watt



System & panel prices - Vattenfall

Historical cost development for renewables, and assumptions going forward



* Other sources indicate learning rates as low as 18% for solar PV
Source: UC Berkeley Energy Resource Group; Navigant consulting

- Historical learning rates (i.e., cost decreases) per doubled cumulative capacity of
 - 23% for Solar PV*
 - 13% for Wind Power
 - 15% for Ethanol
 - 6% for PV inverters
 - 3% for Solar Thermal
- 80% of historical learning rates have been assumed through 2030 in our model
 - 18% for solar PV modules
 - 11% for wind
 - 11% for geothermal
 - 5% for small hydro
 - 5% for biomass

Grid challenges

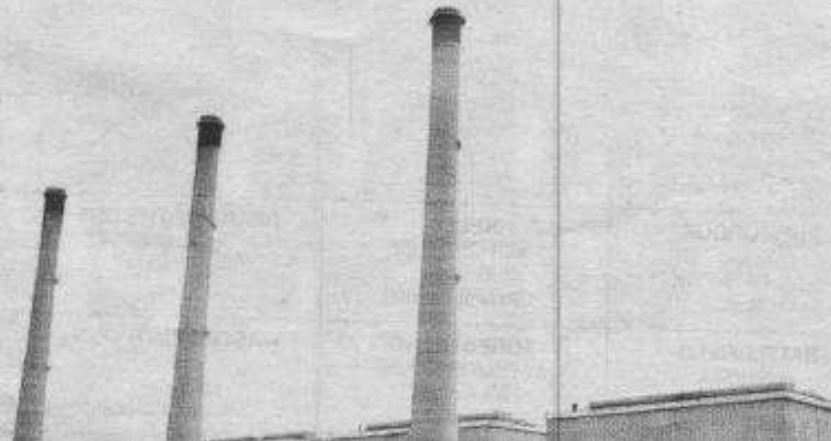
Powerful forces double your bills

If you think this month's 15 per cent plus increase in electricity prices is shocking, just wait.

Australia's power generators predict that retail prices could double by 2020 because of the Federal Government's proposed carbon pollution reduction scheme and planned renewable energy targets.

The Federal Government disagrees, but even its own studies point to a 20-25 per cent increase "in the initial years" of the new regime, scheduled to begin in 2011.

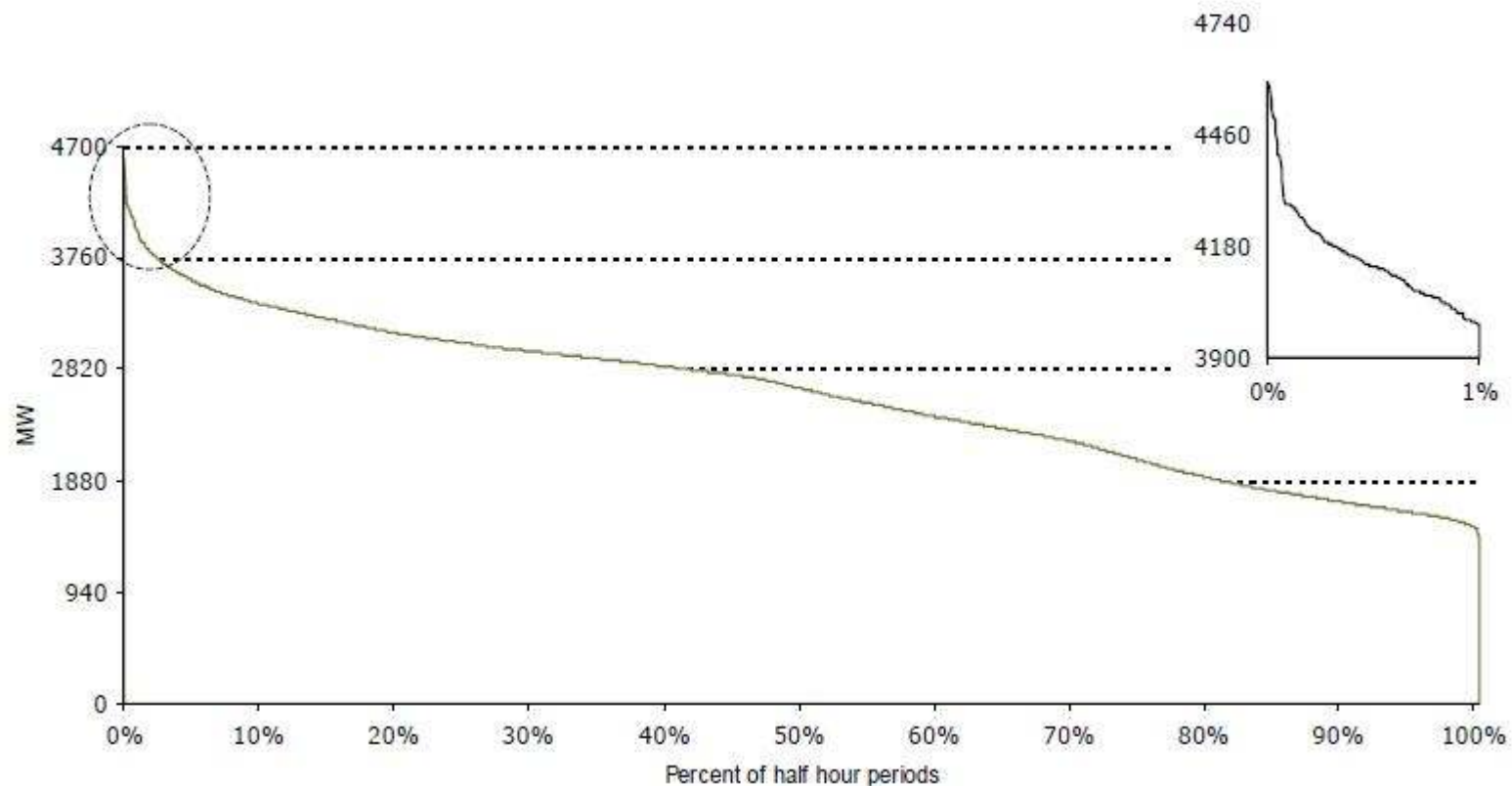
And the State Government, despite its claims that it is doing all it can to keep price rises to a bare minimum, is actually adding to the upward price pressure.



Courier Mail Saturday 4 July 2009. Electricity prices could double by 2020 due to combination of RET, CPRS and \$9 Billion in electricity grid (transmission & distribution) investments in Queensland over the next 5 years by Energex, Ergon & Powerlink (grid charges are around 47% of the retail bill)

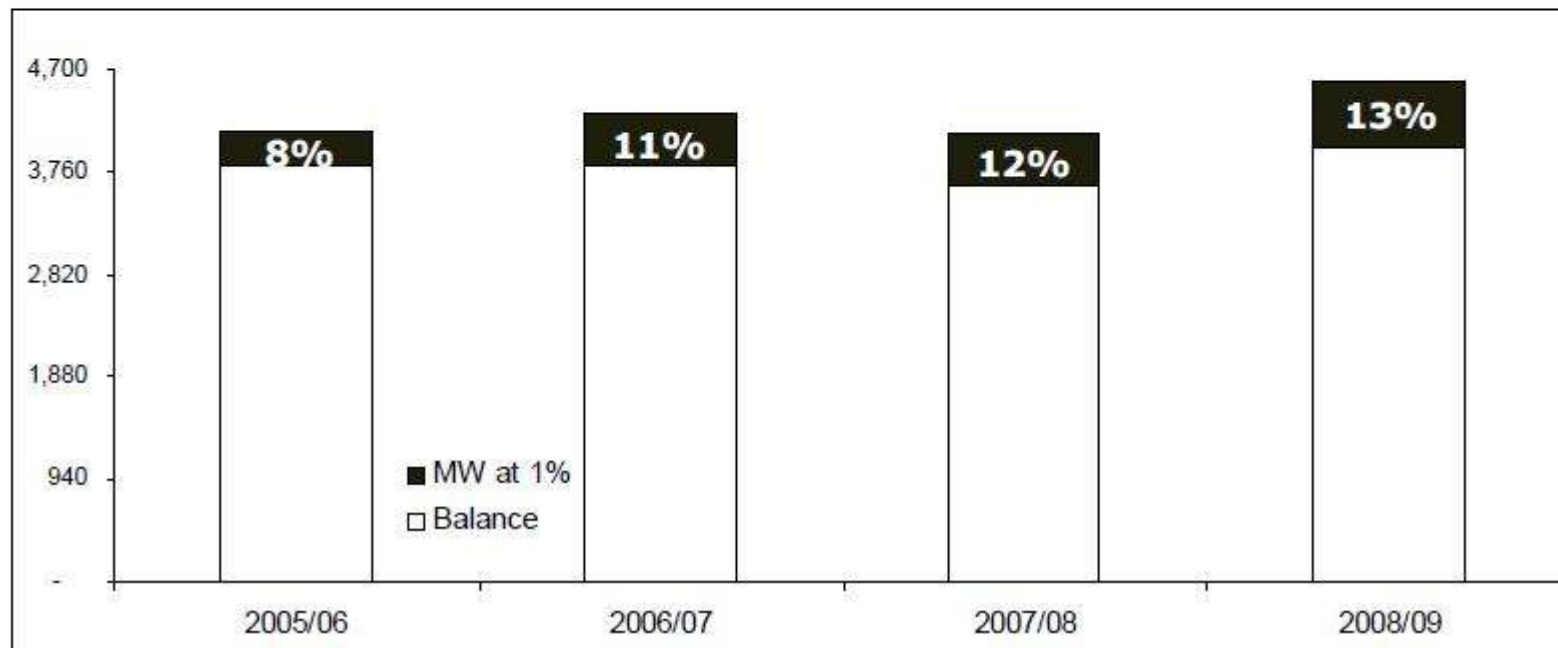
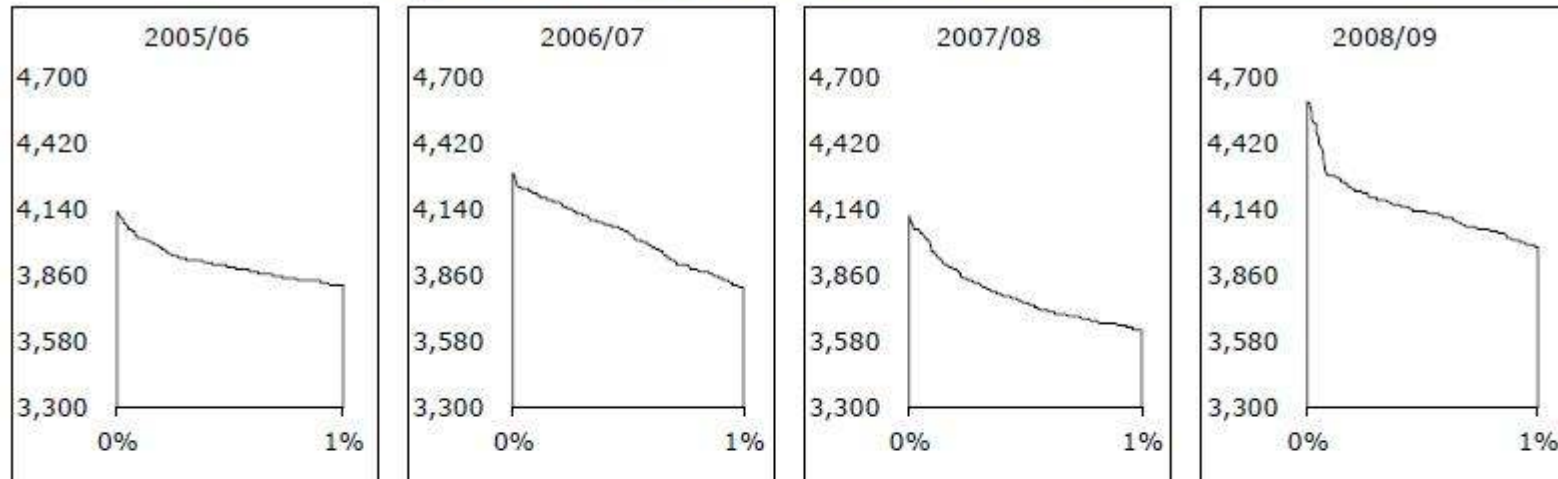
13% of the grid is used 1% of the time...

Figure 3.1: Load duration curve 2008-09



...and it's getting worse over time

Figure 3.2: Load duration curve over time



It can't continue...

...so "smart meters" (& "smart grid") are coming

Dynamic Saver explained

When you choose our Adelaide Solar City Energy Plan*, you can take your pick from our Smart Electricity pricing plans – Dynamic Saver and Smart Time of Use.

Dynamic Saver

You'll pay a cheaper rate for electricity all year round, except during 2pm-8pm on 10 critical peak days per year. The critical peak days will be advised in advance. On these peak days the electricity rate is higher however overall on this tariff the potential savings could be greater.

Choose from two different options, dependent on your anticipated level of usage during peak days.

Dynamic Saver - Option 1

Usage	Rate
Cheaper All Year Round	14.92 (c/kWh)
Critical Peak Day*	\$2.035 (/kWh)
Supply Charge	37.04 (c/day)

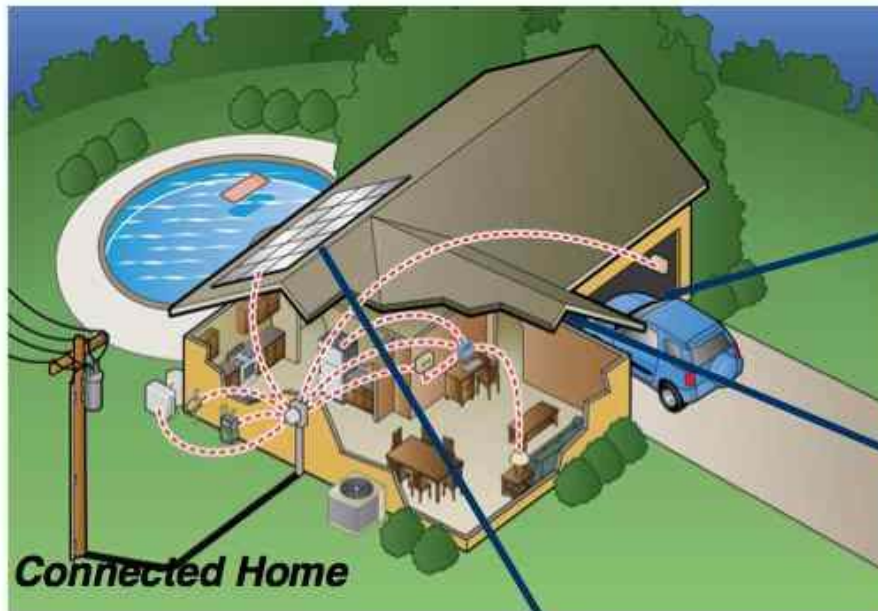
Dynamic Saver - Option 2

Usage	Rate
Cheaper All Year Round	17.08 (c/kWh)
Critical Peak Day*	\$0.93 (/kWh)
Supply Charge	37.04 (c/day)



From <http://www.originenergy.com.au/2934/Dynamic-Saver>
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Local grid solutions for the Future



Connected Home

**Enable Net Metering,
Discrete Metering
and Integrated
Energy Management
w/Solar Panel**



**Long-Term
Opportunities through
Plug-in Electric
Vehicles**



**Home Energy
Storage Creates
Opportunities for
Increased
Renewables**



loc

Any Questions?



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29 July 2010

PV technology innovation

- Pictures from Solar Power International 2009
- Panels
 - Efficiency gains, thin film, aesthetics, new form factors
- Inverters
 - Per panel to large centralised
- Concentrating PV
 - Will it be commercial soon?

Innovation in Panel conversion efficiency





Thin films promise lower \$/Watt, but are still a niche...



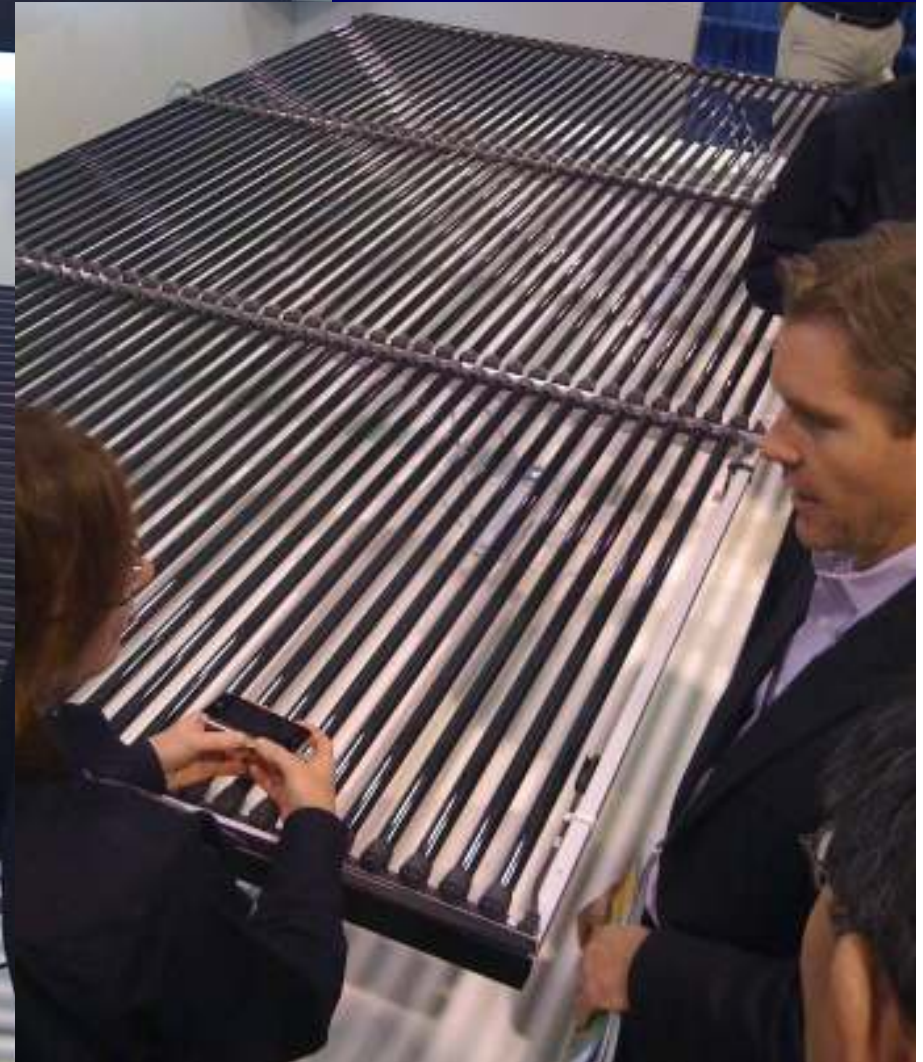


Aesthetics is becoming more important





New form factors are emerging for commercial rooftops



Concentrating PV,
has it's time come?



