

# Local Power PV solar goes mainstream

**Hatch – Sustainability Week 2010**

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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.**

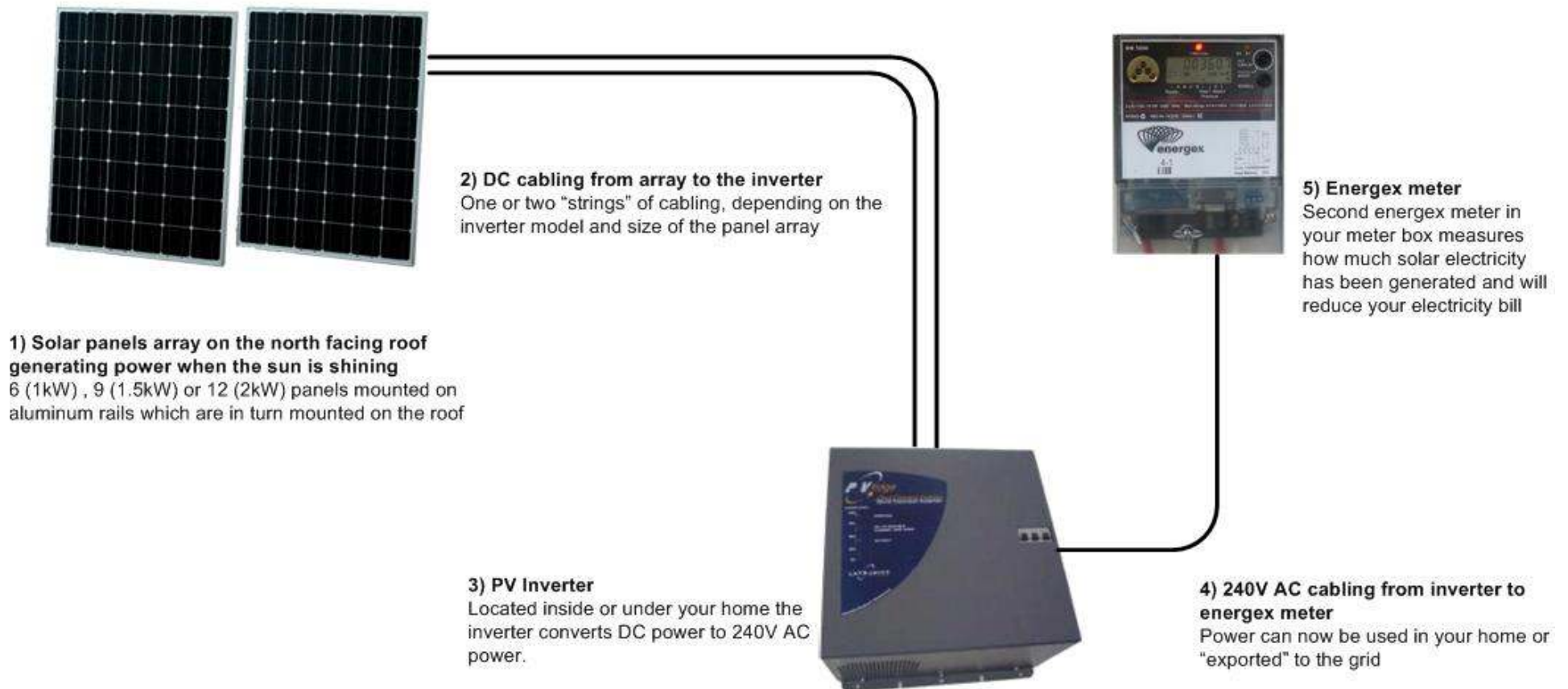


# Outline

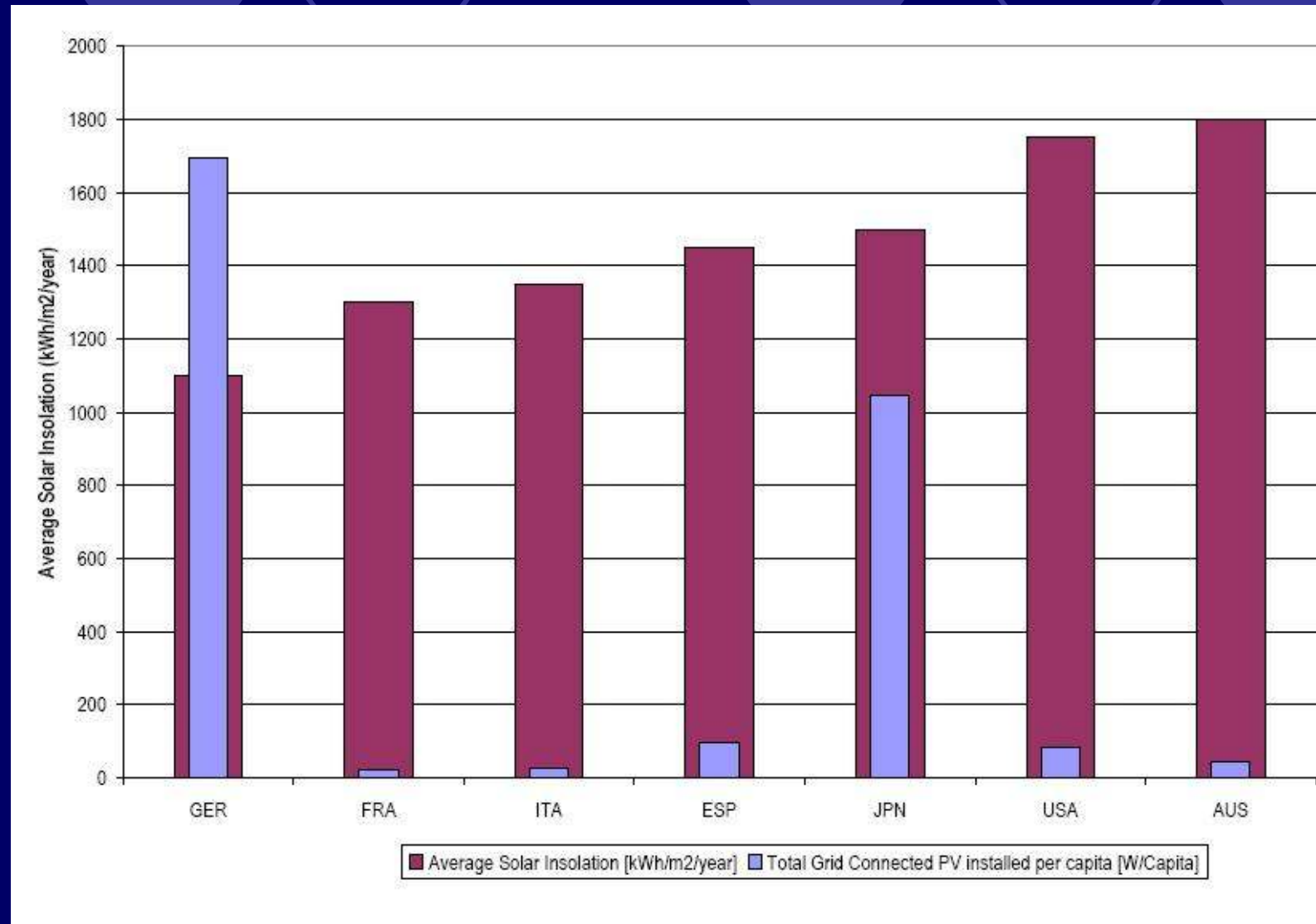
- How PV works
- How much PV is out there?
- Local Power - PV rollouts in Brisbane
- Grid Parity is coming
- Recent innovations in PV Solar
- Grid challenges
- The near future
- Questions?

# PV (PhotoVoltaics) - How it works

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



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

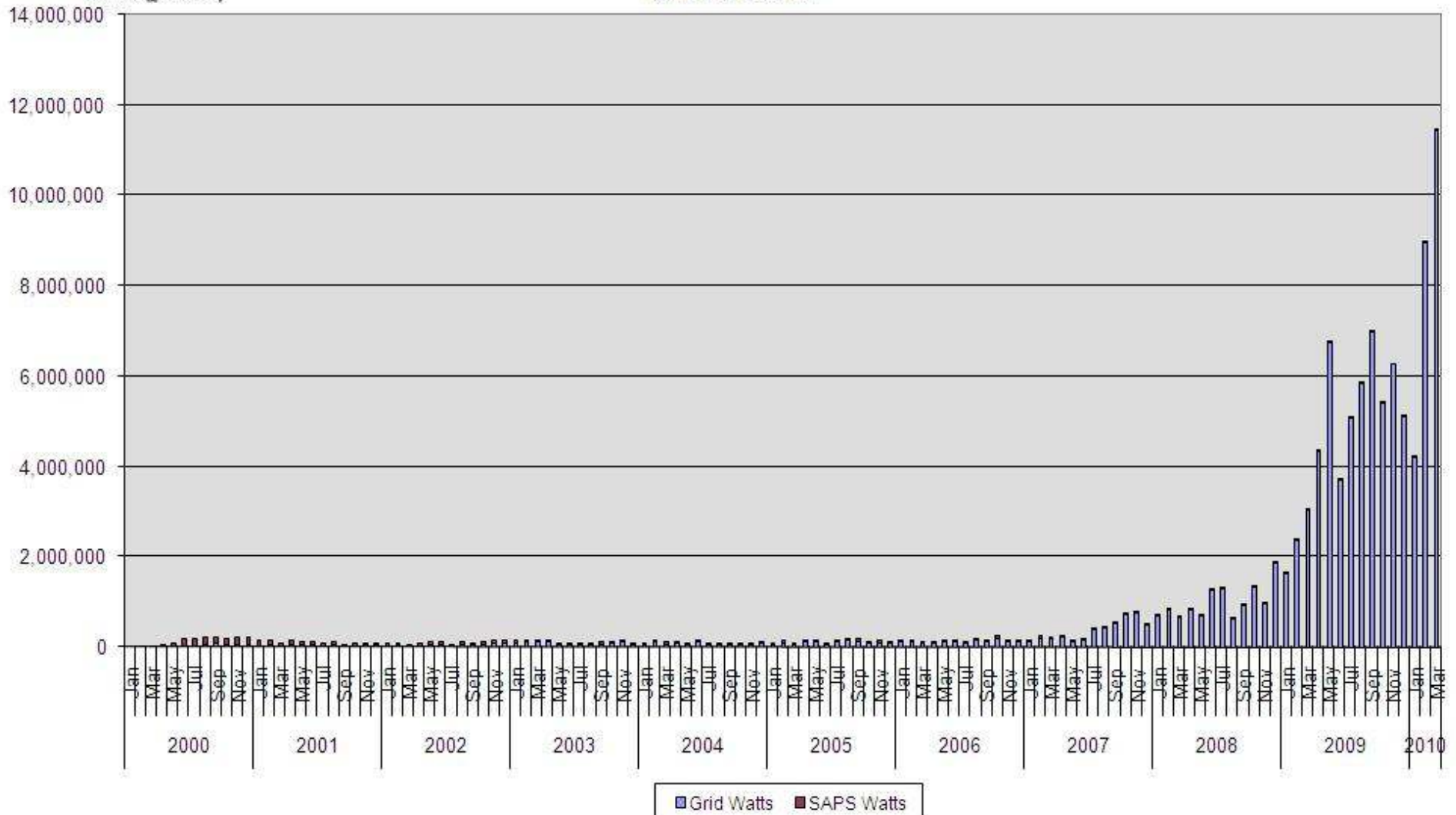


# PV solar in Australia (SHCP rebate only)



Australian Government  
Department of Climate Change  
and Energy Efficiency

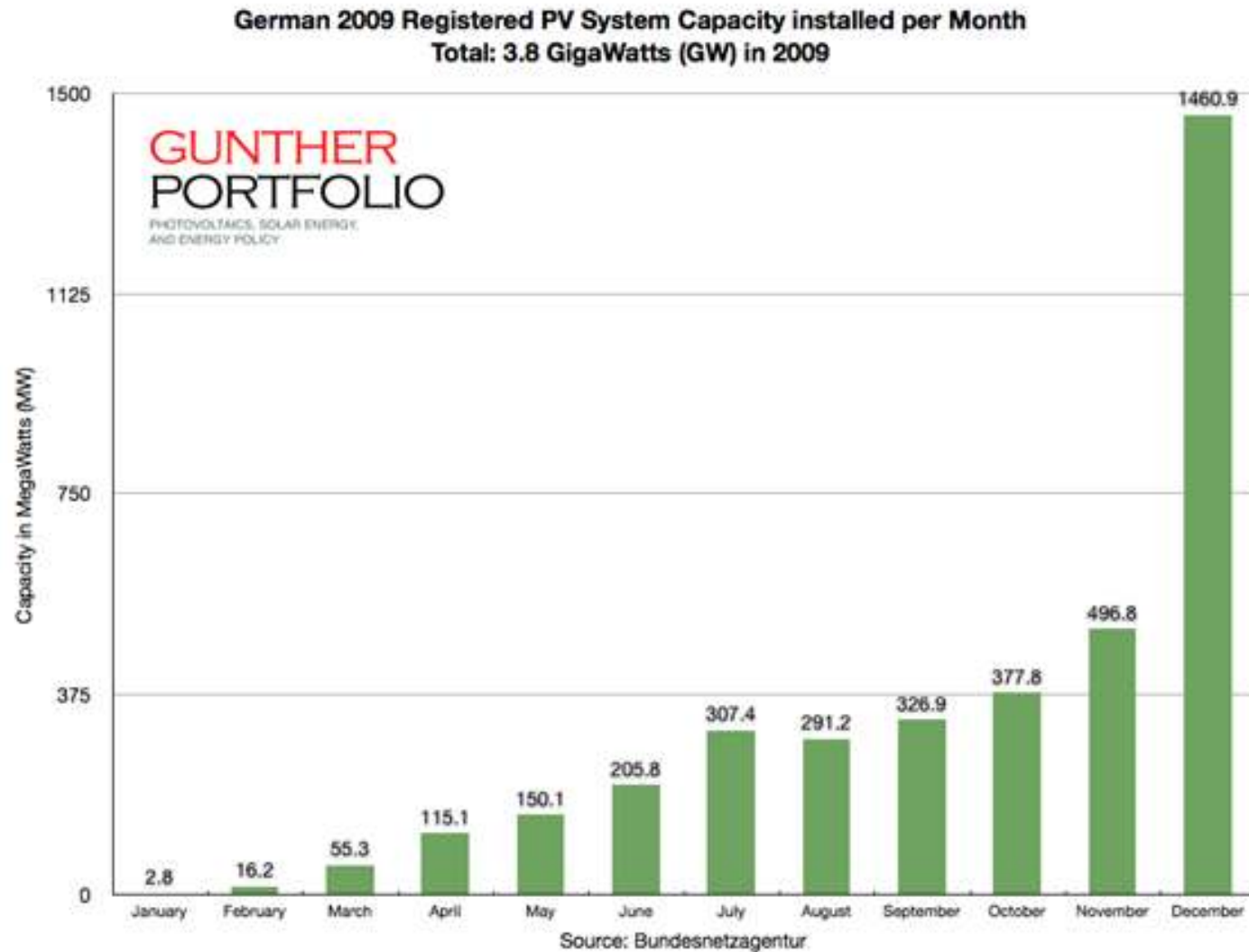
Watts Installed by Month  
to March 2010



57 MW in 2009, 25MW in 2010 (first 3 months only)

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# PV solar in Germany



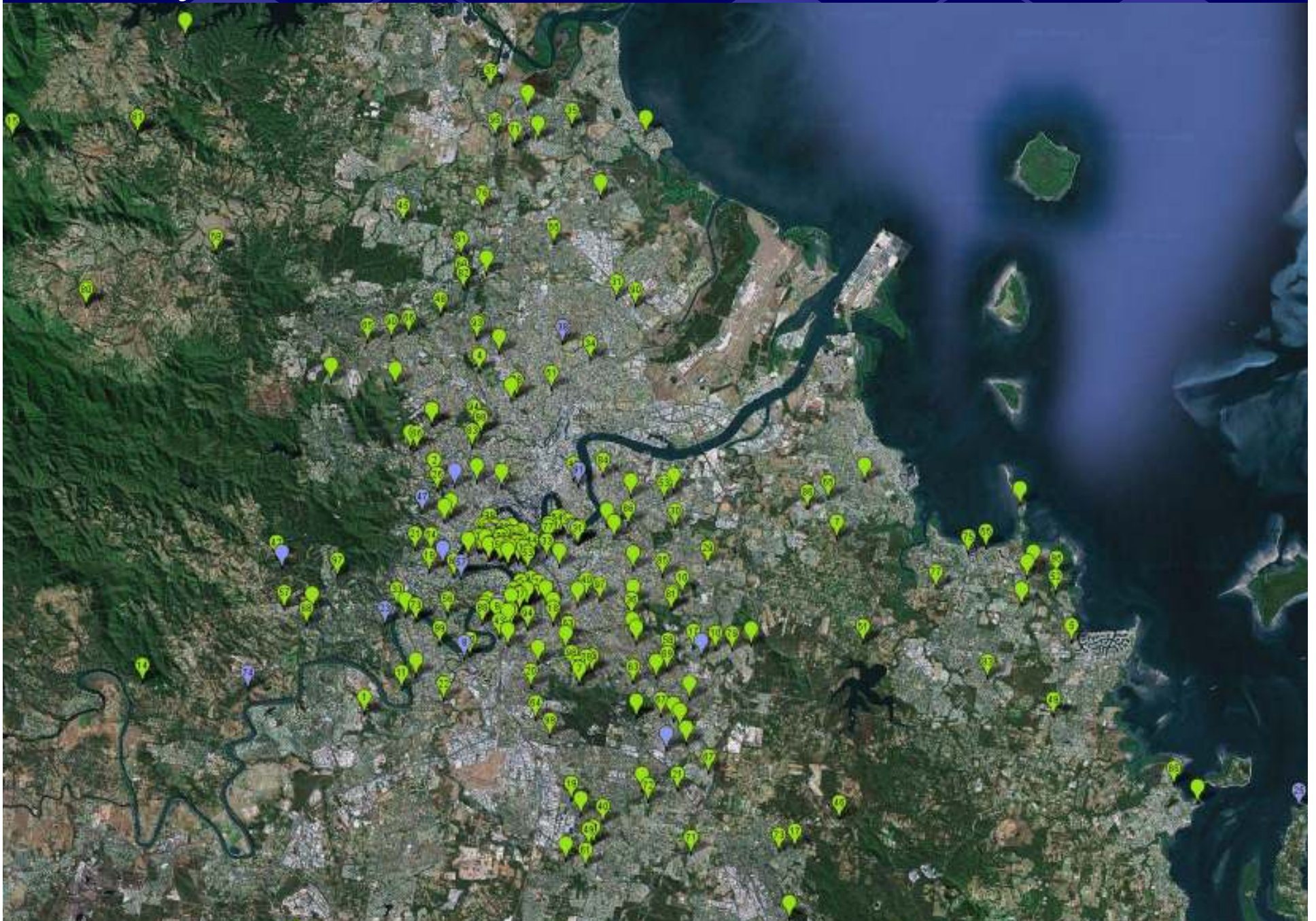
Germany installed 67x what Australia installed in 2009 (not including Solar Credits)

# 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



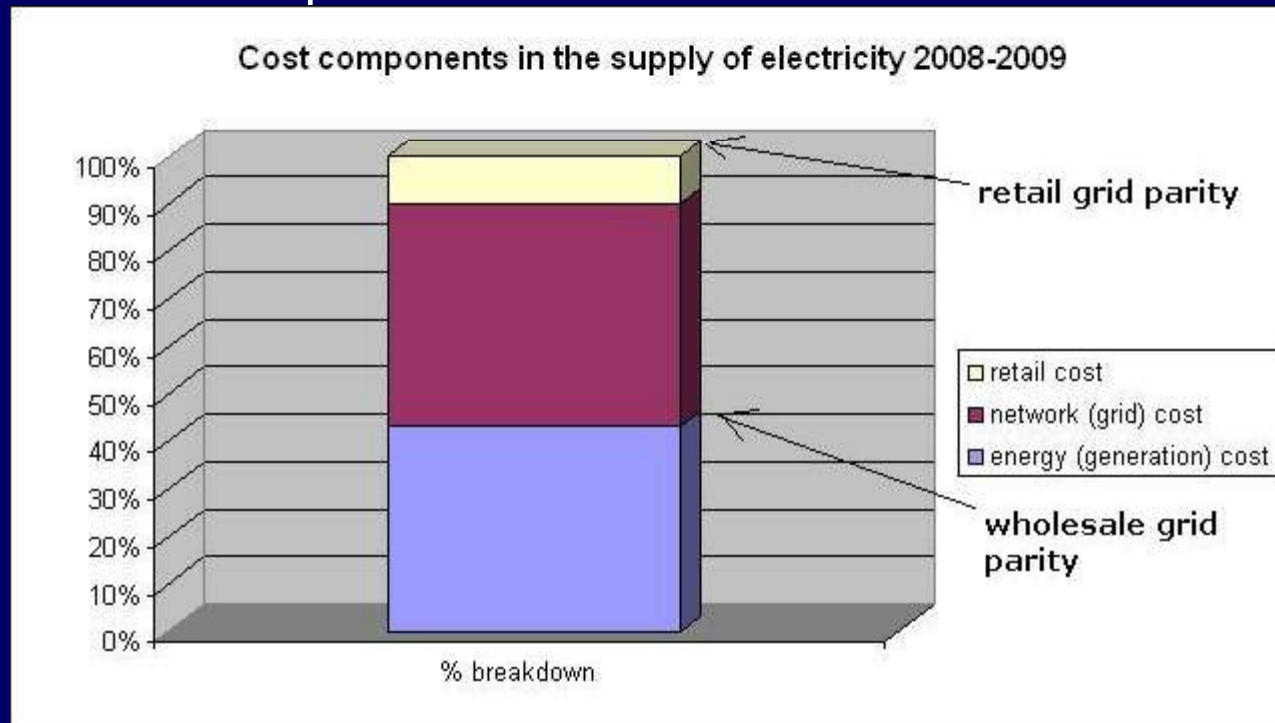
350 systems installed to date in Local Power BG#1 2 3





# 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 2009, retail electricity from the grid is 18.8c/kWh in Queensland.
- A retail bill is composed of \*



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\* <http://www.qca.org.au/files/ER-NEP910-QCA-DraftDecBRCI-Report-1208.PDF>

# How close are we to Grid Parity now?

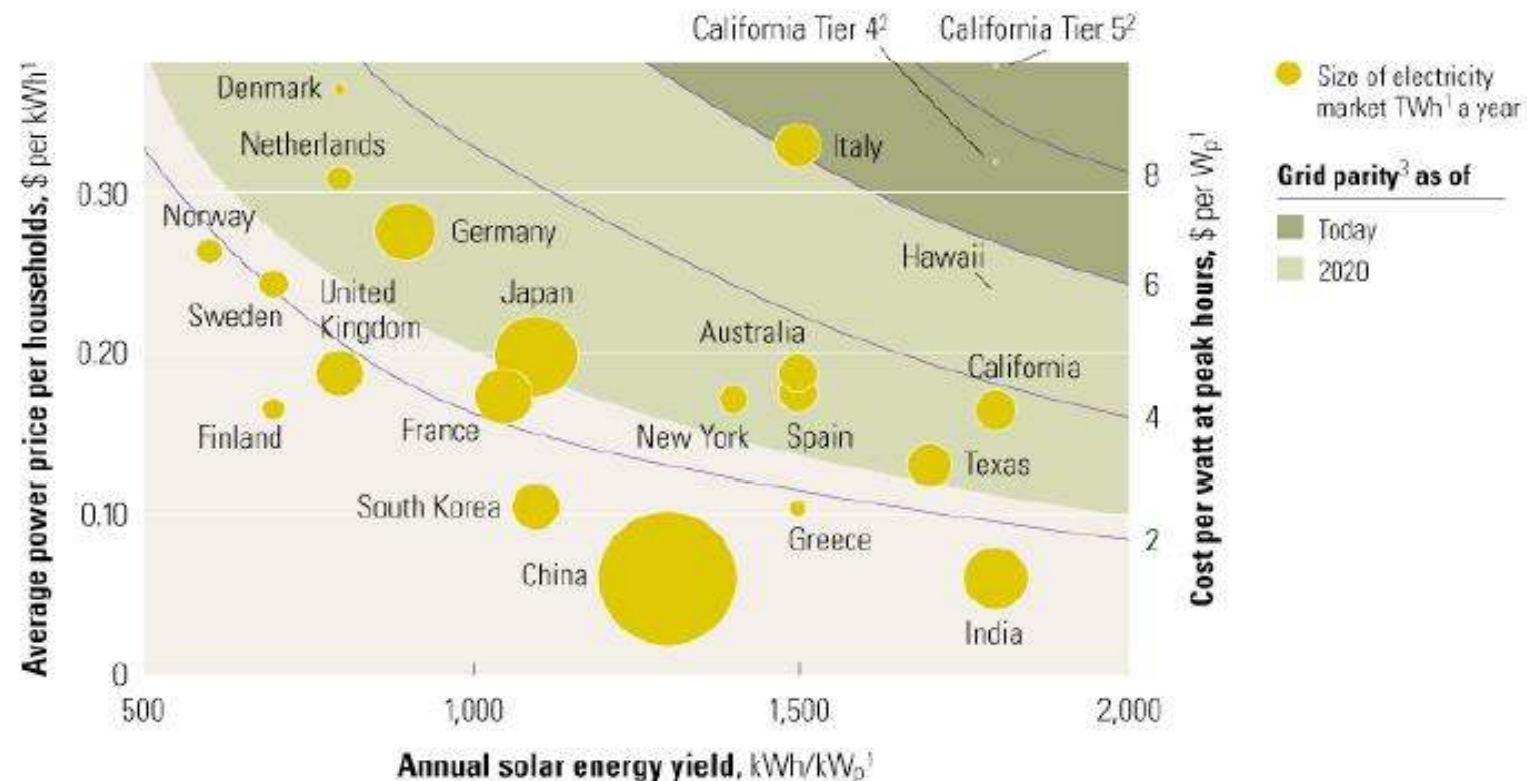
- April 2010 - **unsubsidised** Local Power 3kW PV system generates at 19.9c/kWh in Brisbane

- 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 2009 – tariff 11 - residential is 18.84c/kWh
  - July 2010 – tariff 11 - very likely 20c+/kWh

# Country specifics - McKinsey

## The growing competitiveness of solar power



¹kWh = kilowatt hour; kW<sub>p</sub> = kilowatt peak; TWh = terawatt hour; W<sub>p</sub> = watt peak; the annual solar yield is the amount of electricity generated by a south-facing 1 kW peak-rated module in 1 year, or the equivalent number of hours that the module operates at peak rating.

²Tier 4 and 5 are names of regulated forms of electricity generation and usage.

³Unsubsidized cost to end users of solar energy equals cost of conventional electricity.

Source: CIA country files; European Photovoltaic Policy Group; Eurostat; Pacific Gas & Electric (PG&E); Public Policy Institute of New York State; McKinsey Global Institute analysis

# Recent pricing trending down

Q: So the smart thing is to wait?

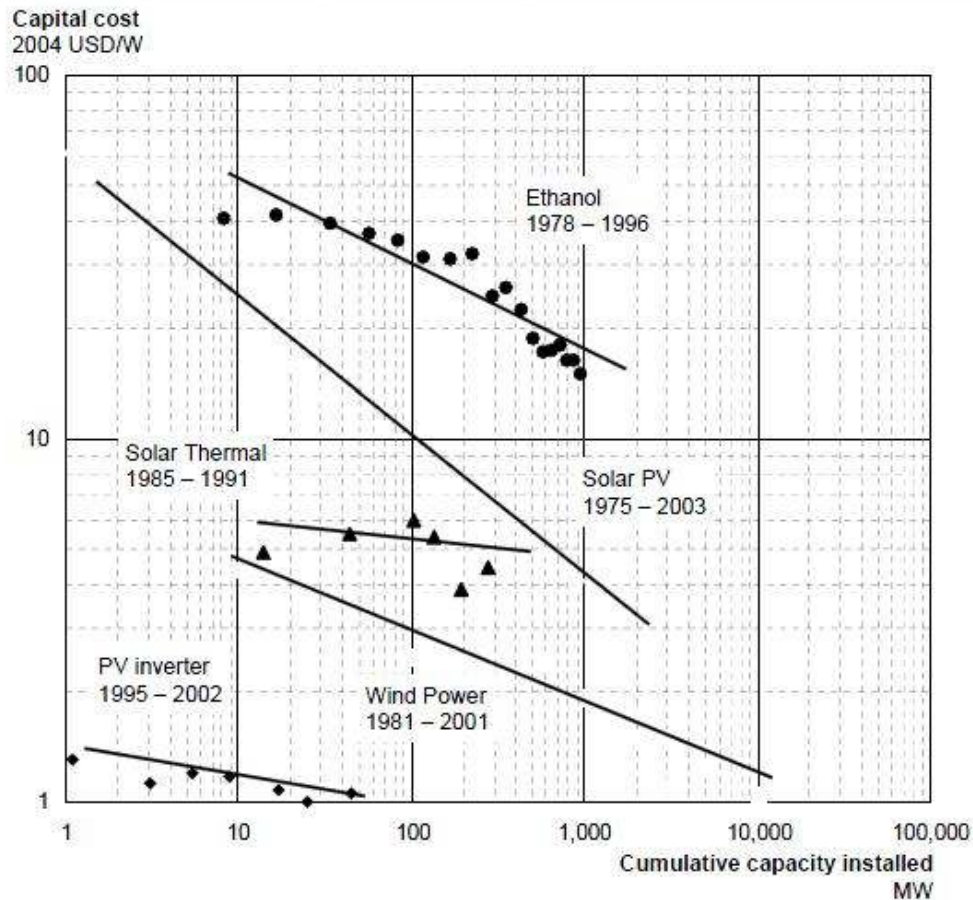
A: No. government incentives change regularly!

Unsubsidised installed PV AUD\$/Watt



# System & panel prices - Vattenfall

## Historical cost development for renewables, and assumptions going forward



- 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

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



# 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



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

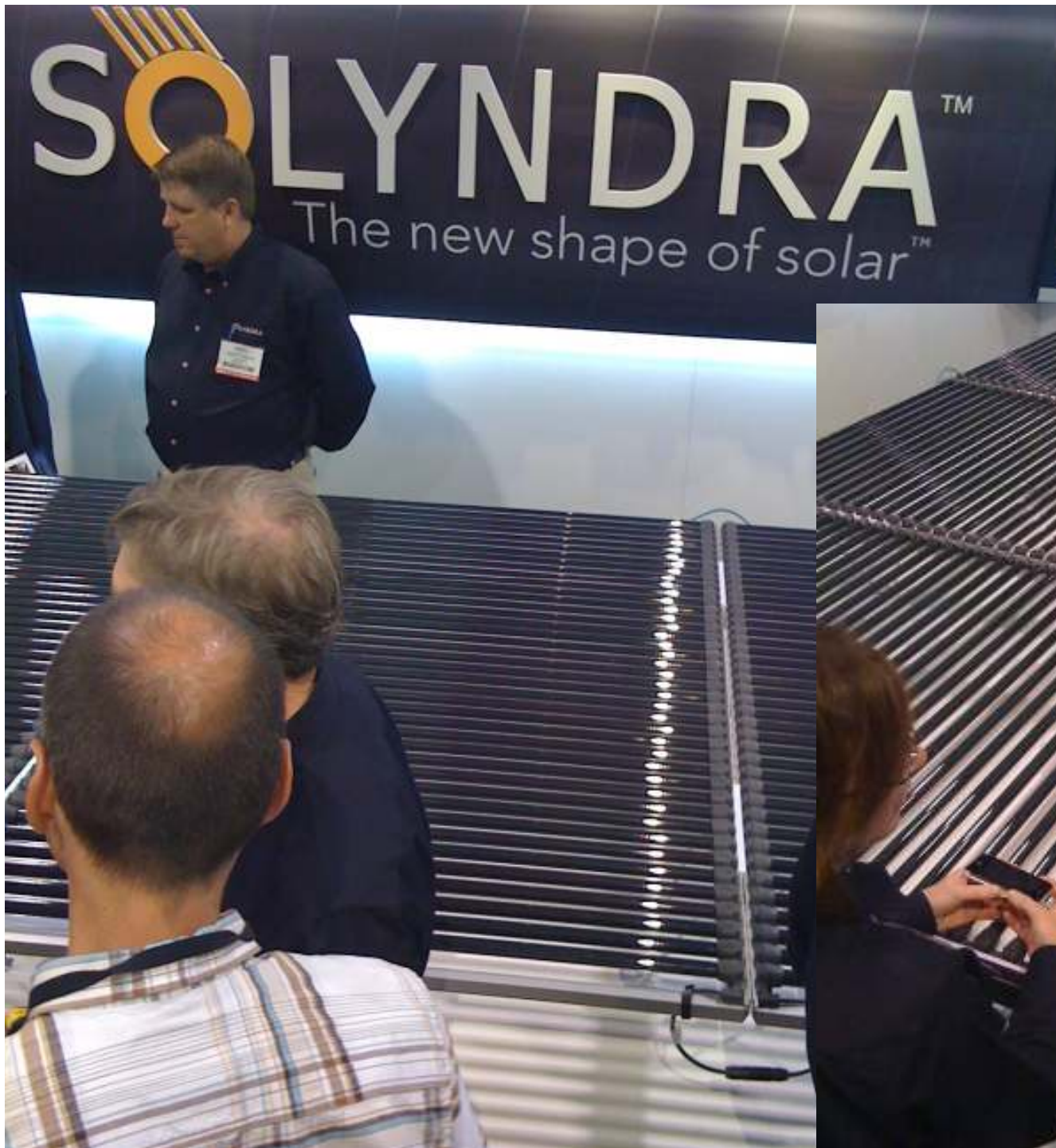


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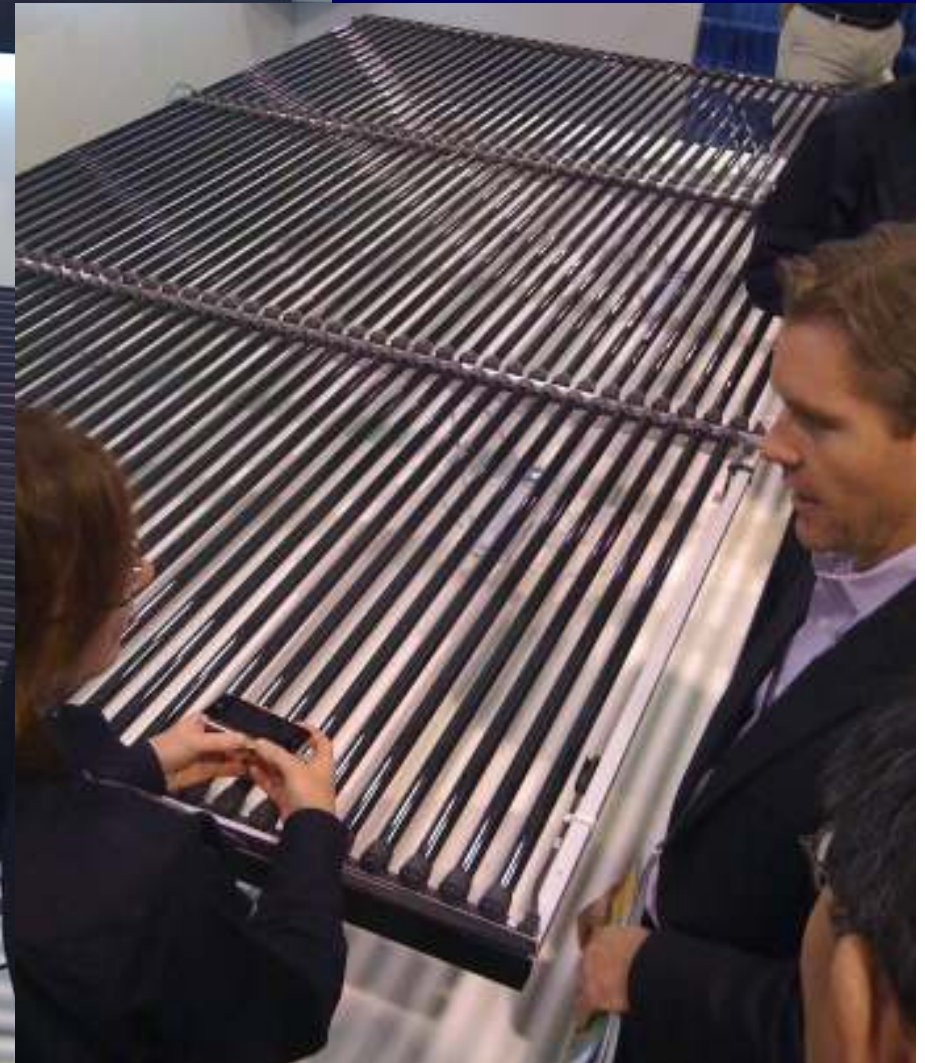
Aesthetics is  
becoming  
more  
important







New form factors  
are emerging for  
commercial  
rooftops





Concentrating PV,  
has it's time come?







# Grid challenges

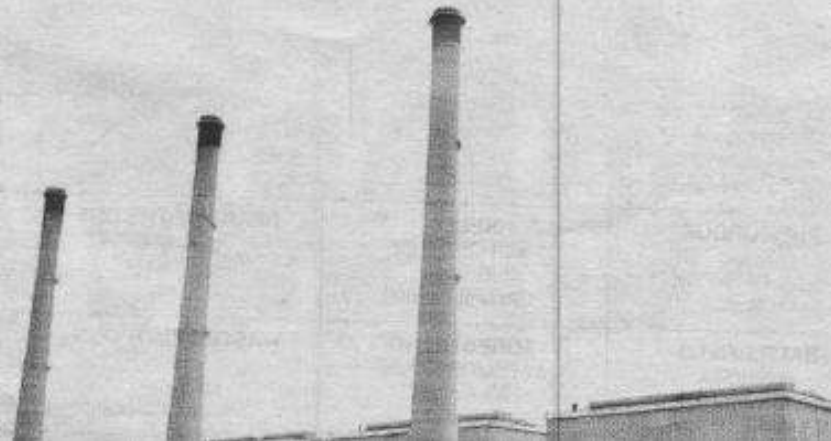
## Powerful forces double your bills

**I**f 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.

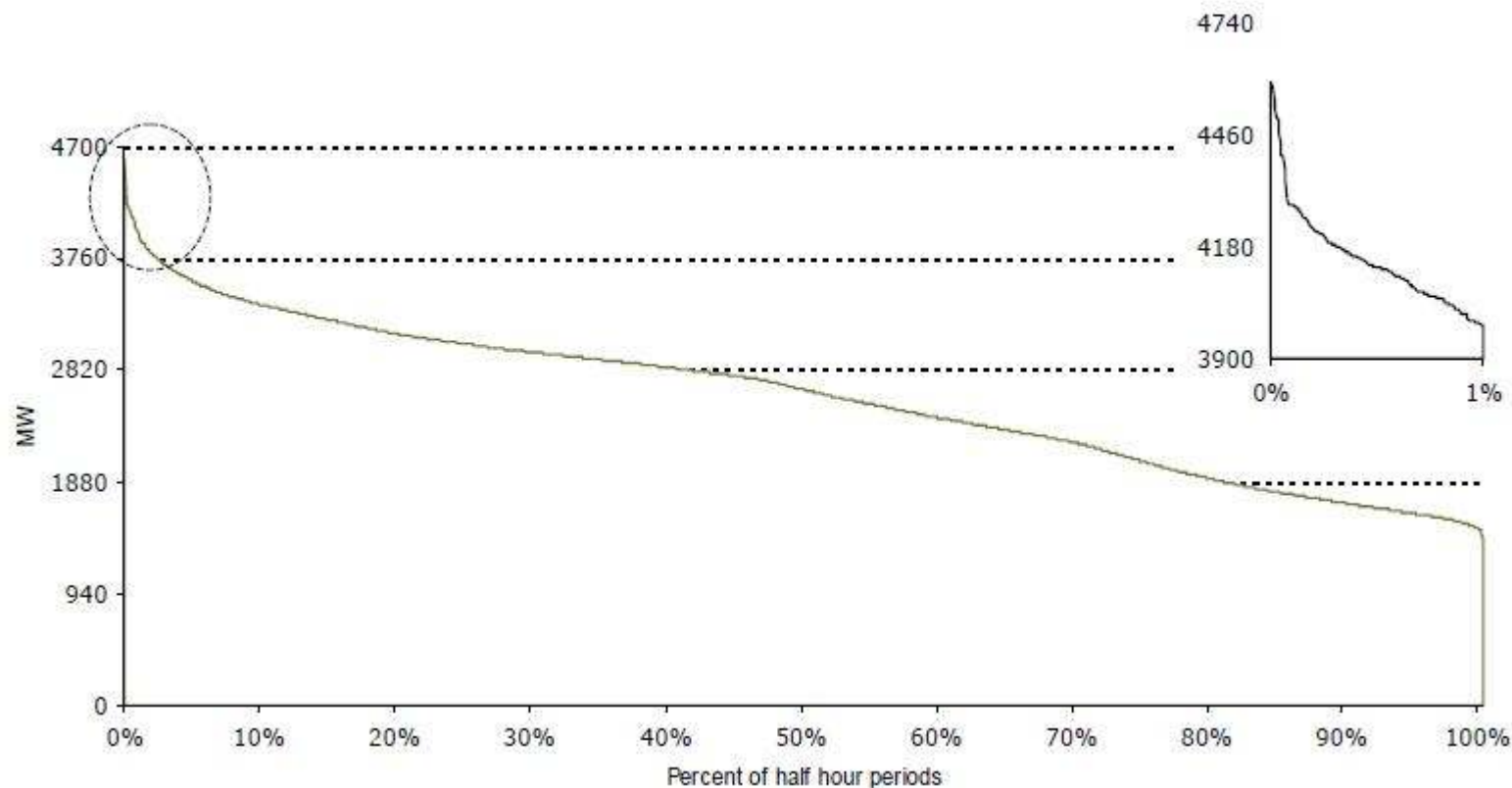


Courier Mail Saturday 4 July 2009. Electricity prices could double by 2020 due to combination of RET, CPRS and \$9 Billion in electricity grid (transmission & distribution) investments in Queensland over the next 5 years by Energex, Ergon & Powerlink (grid charges are around 47% of the retail bill)

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

ENERGEX Development of Network Tariff Structures  
Discussion Paper  
September 2009

**Figure 3.1: Load duration curve 2008-09**

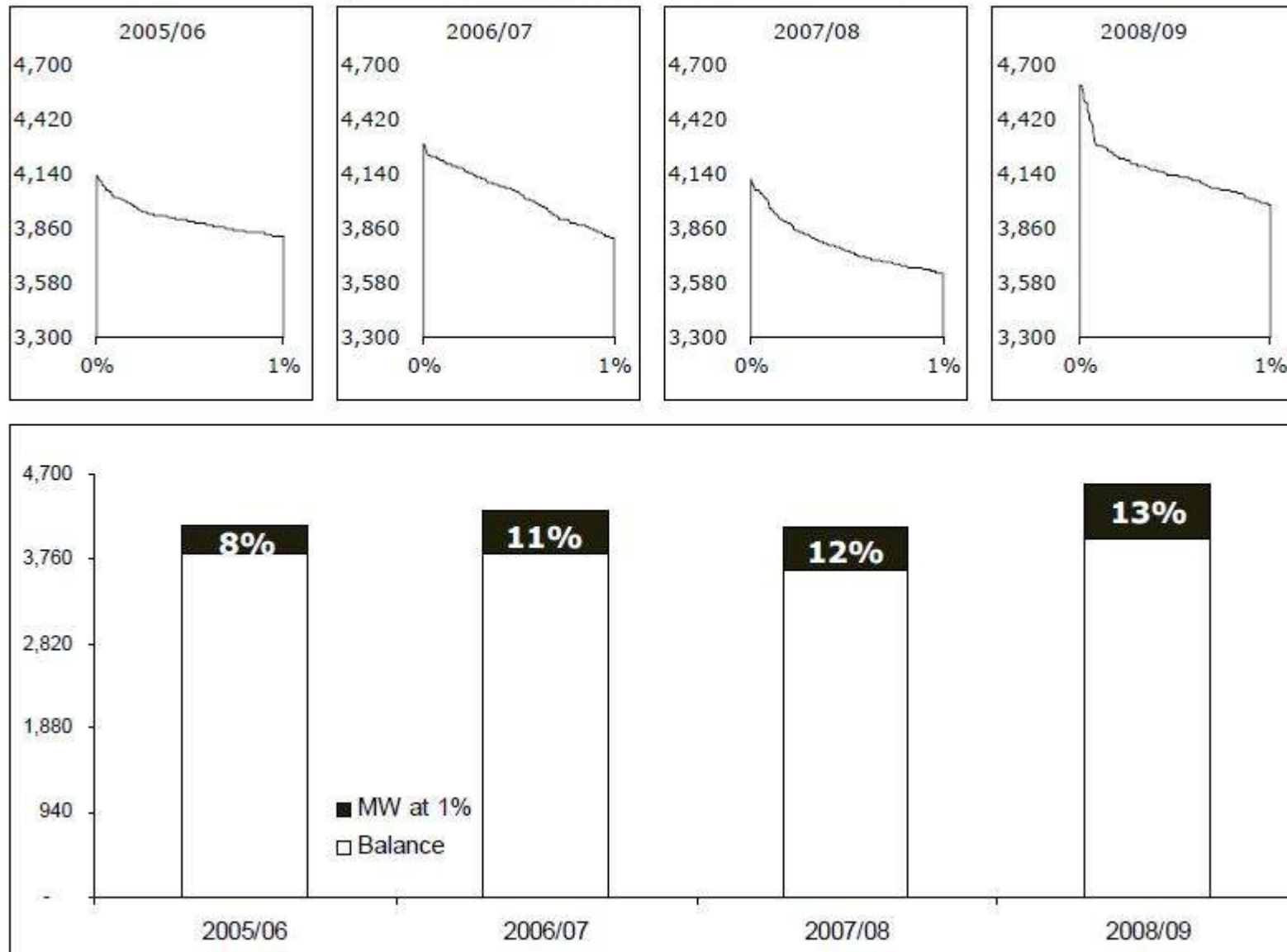


From [http://www.energex.com.au/network/network\\_prices/pdf/Development%20of%20Network%20Tariff%20Structures\\_Discussion%20Paper\\_Final.pdf](http://www.energex.com.au/network/network_prices/pdf/Development%20of%20Network%20Tariff%20Structures_Discussion%20Paper_Final.pdf)

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# ...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)  |

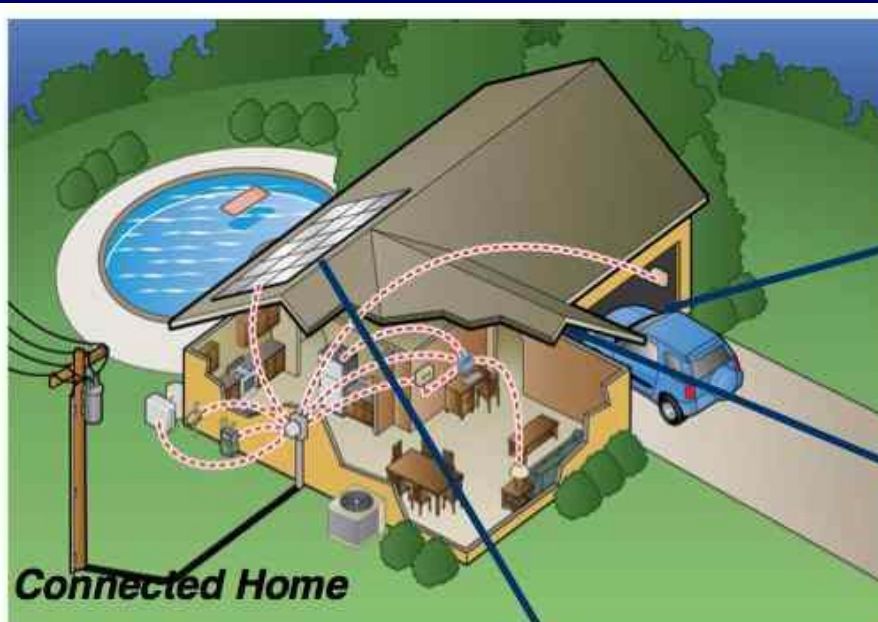
#### ☛ Dynamic Saver - Option 2

| 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



**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**







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# Any Questions?

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19 April 2010