

# Energy Efficiency in Buildings etc

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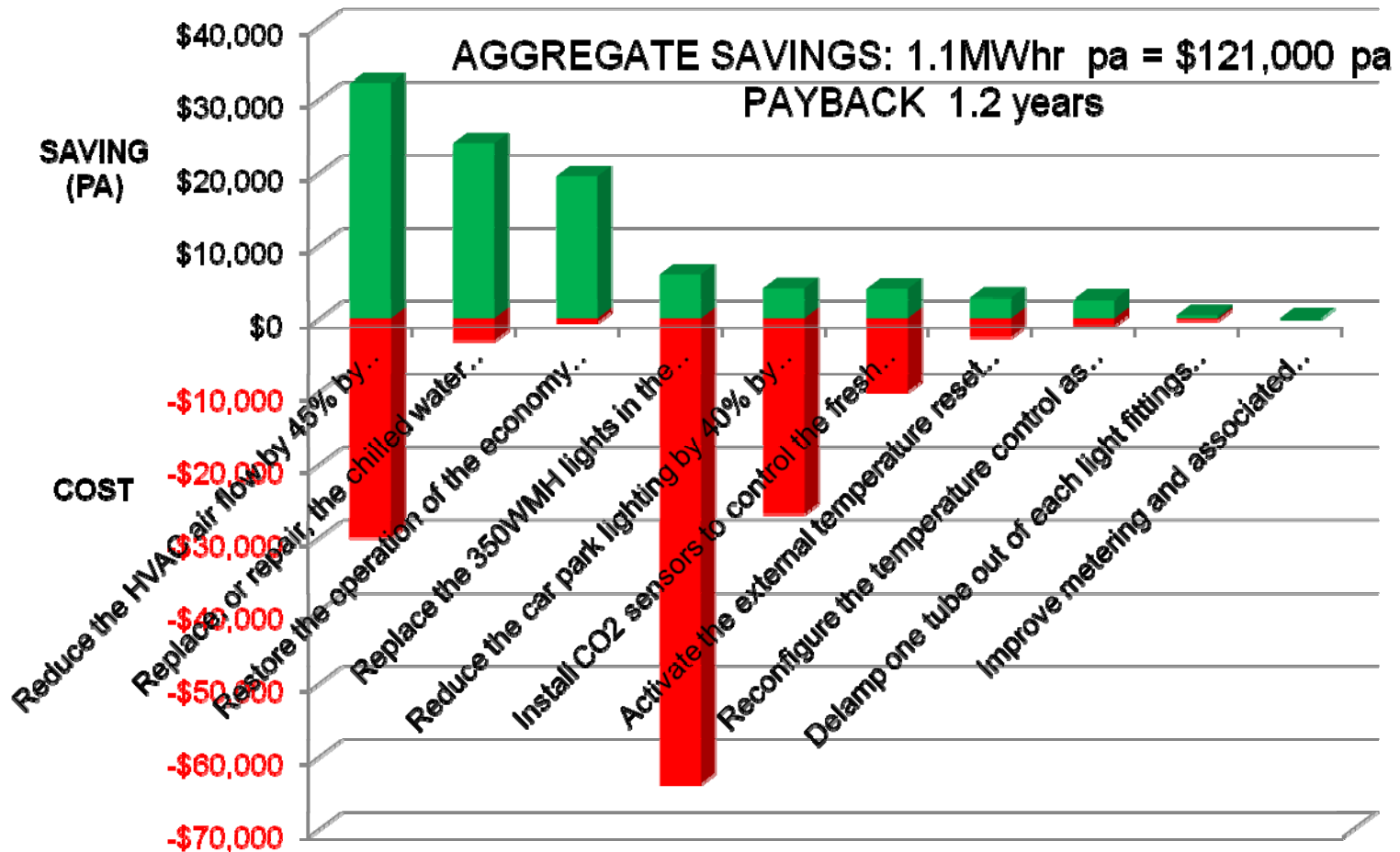
# A Challenge for you

- **Can anyone in this room honestly tell me that they could not save energy in their home or at work?**
- Can anyone in this room only achieve this saving at significant cost (eg building work/rewiring rather than buying new light bulbs)

# Outline

- Some REAL examples
  - Commercial building energy savings
    - How big are the savings?
    - How are they achieved?
    - At what cost?
  - Domestic energy savings
- New technologies coming over the horizon
- The Future – combining energy efficiency with renewable energy?
- Conclusions

# Example 1 – a retail complex



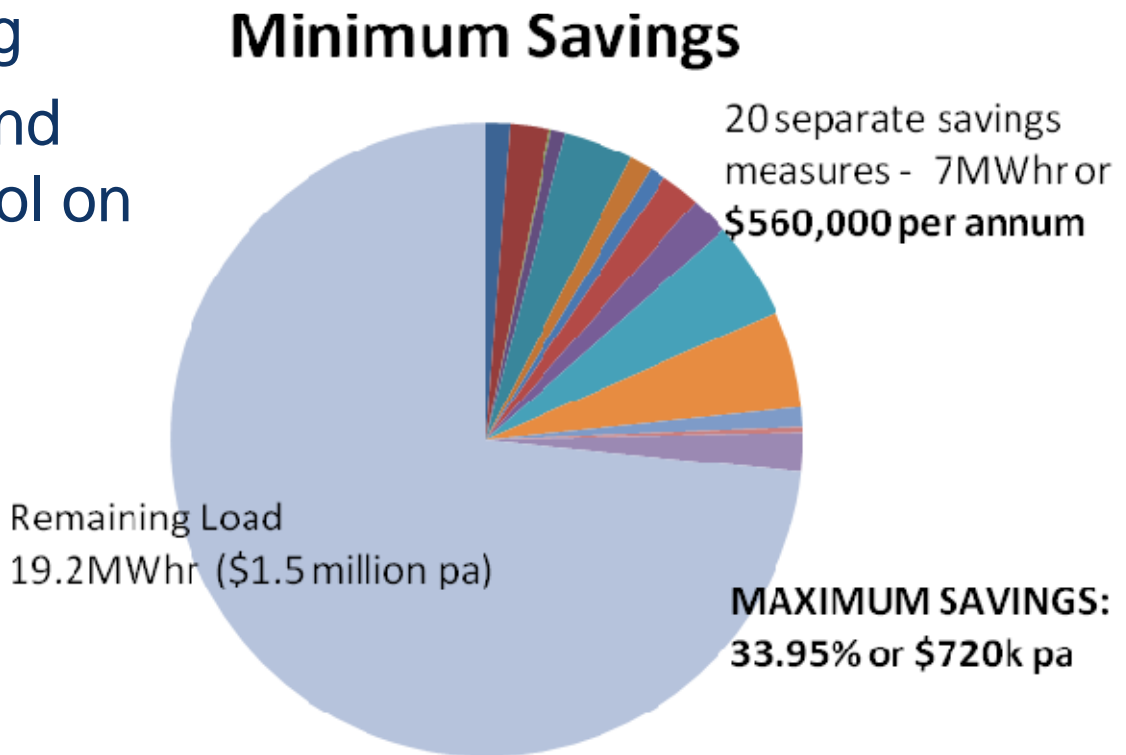
## Example 2 – an industrial Building

Measure	Capital cost	Saving pa	Payback period
1. Chiller lockout	minimal	\$5,000	Immediate
2. Supply air temperature control	minimal	\$1,700	Immediate
3. Restoring consistent zone temperature set points	minimal	\$1,000	Immediate
4. Reheat lockout	minimal	\$2,200	Immediate
5. Lunchroom VAV control upgrade	minimal	\$500	Immediate
6. Changing compressor control to on/off	\$5,000	\$2,500	2 years
7. Apron lighting operation	\$15,000	\$12,500	1.2 years
8. Run time reduction	minimal	\$5,000	Immediate
9. Front door control change	minimal	\$200	Immediate
10 Shut down comms room VAV	minimal	\$100	Immediate
<b>Total</b>	<b>\$22,000 (say)</b>	<b>\$30,700</b>	<b>0.7 years</b>

<b>Implement reheat lockout</b>	
Background	Reheat operation is unnecessary at outdoor air temperature of above 23°C, when the building should be in pure cooling mode. Under these conditions, the only reheat operation will be in response to other failures in the HVAC system (i.e. VAV box not achieving flow turn-down, inappropriately located temperature sensors etc). Operation of the reheats will allow the HVAC system to self-compensate for these failures at the expense of energy efficiency; the failures will effectively be 'invisible' to facilities management.
<b>Scope</b>	<b>Lock out the VAV and FCU reheats at outdoor air temperature above 23°C.</b>
Comments	
Savings calculation description	The saving calculation is based upon an average of 8.5kW of reheat operation when outdoor temperature is above 23°C, which was the observed situation during our site inspection. Based upon weather data provided by the Australian Bureau of Meteorology, there are a total number of 2667 hours from February 2008 to January 2009.
Savings	
Energy savings	Electricity: 22,000kWh
Energy cost savings	Total: \$2,200/year
Maintenance cost savings	
<b>Capital cost</b>	<b>Minimal as it only involves some reprogramming</b>
Payback	Immediate

# Example 3 – a large retail/commercial space

- Examples of savings:
  - Improve lighting
  - Maintenance and improved control on HVAC

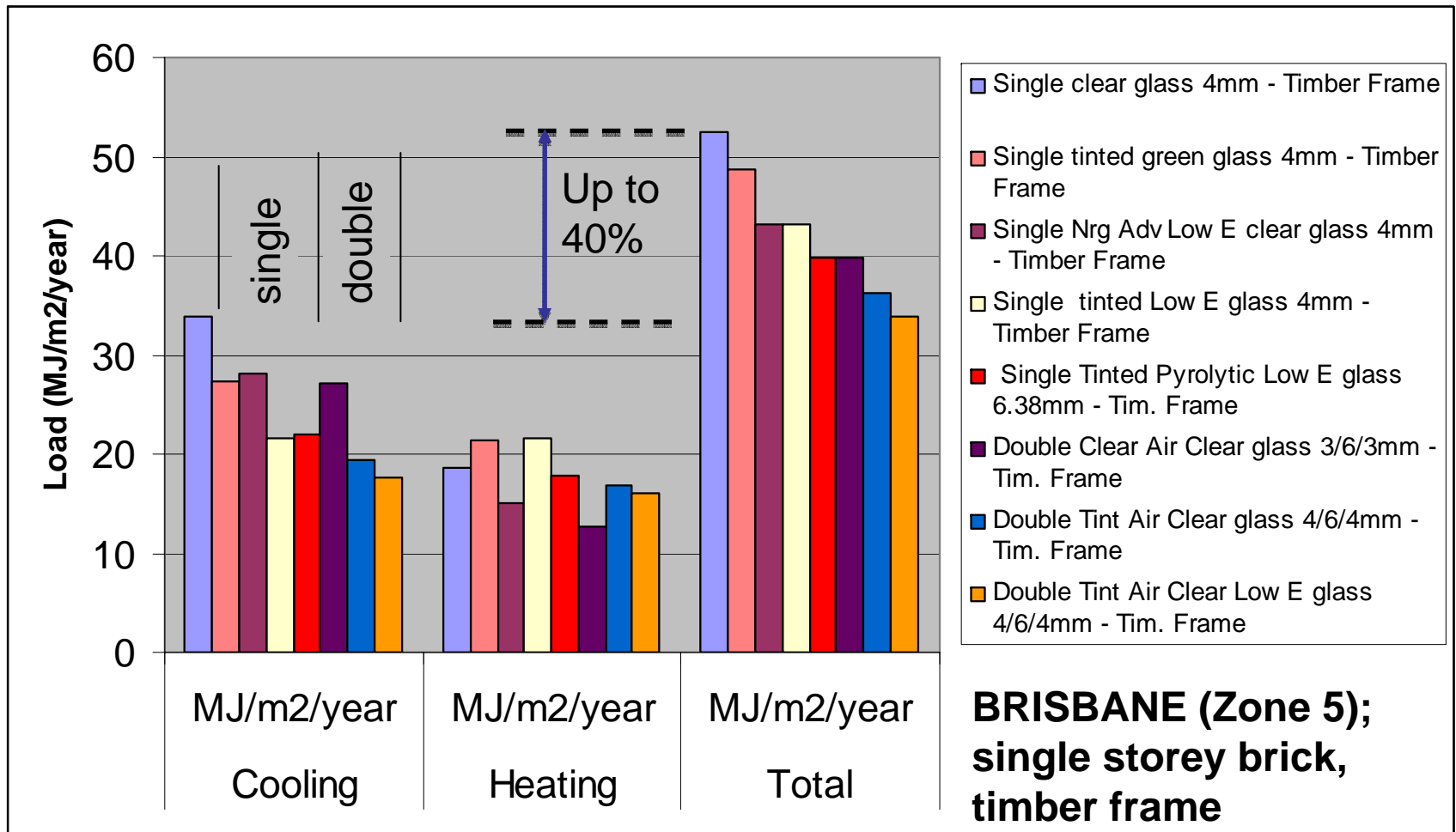


# Domestic Energy Efficiency

- Air Conditioning usage is rising
  - 100% increase 2000 – 2006; projected to increase another 60% by 2014
- Insulation and advanced window glazing can reduce energy consumption considerably
- We have conducted a major study of the impact of glazings on buildings – tinted, reflective and double glazing

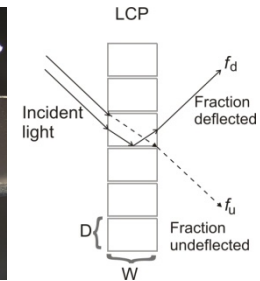
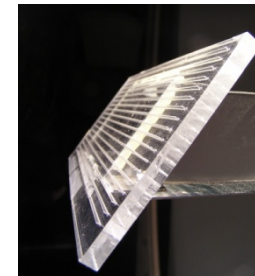


# Results – Brisbane



# New Technologies on the Horizon

- Even more efficient lighting
  - High efficiency LED lighting -  $>150\text{lm/W}$  (overall luminous efficiency of  $\sim 18\%$ )
  - cf incandescent  $10\text{lm/W}$ ; compact Fluorescent  $\sim 100\text{lm/W}$
- More Innovative Daylighting Solutions
  - Laser cut panels
  - Vertical/Horizontal light pipes



# Smart

- Switchable glazings (electrochromic)
  - switchable between a high transmittance state and a dark/coloured/low transmittance state
  - control over both solar heat gain and glare



# Smart Controls

- Ecovision system for domestic and commercial buildings

*“end-user touchscreen interface which helps protect our environment by raising consumer awareness around resource consumption and empowering building occupants to reduce their environmental footprint.”*



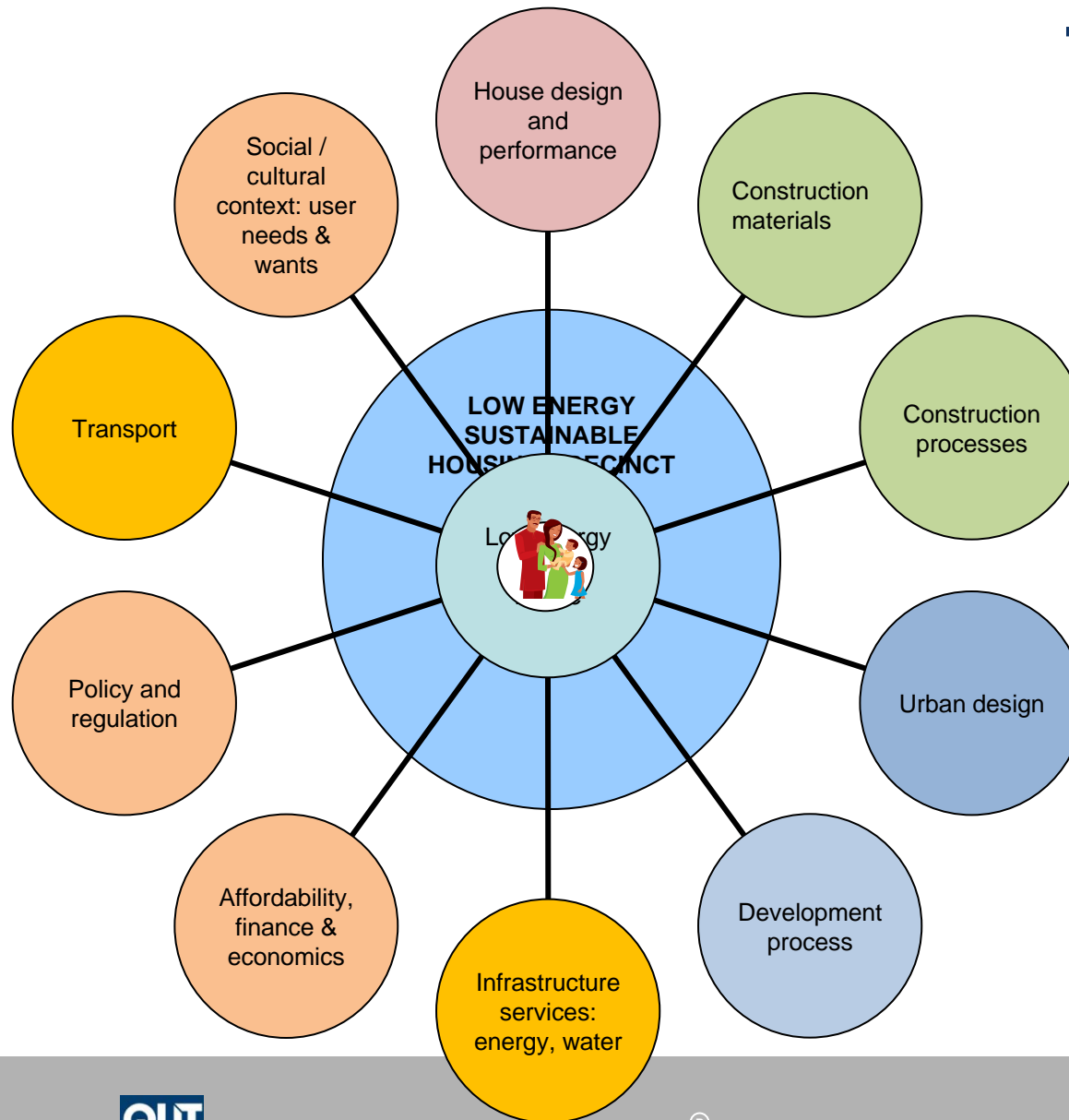
<http://www.ecovisionsystems.com.au/>



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# The future?



# Summary

- We can all improve energy efficiency ...
- 30% saving is “normal”
- 50% is getting harder and will cost more
- ... But we can design from the start and achieve 60-70% with existing and emerging technologies
- 30% of our domestic energy is easy to find using renewables at a local level.

# Acknowledgements

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*Thank you*

