Scenario Analysis of Possible Sustainable Energy Futures for Alice Springs
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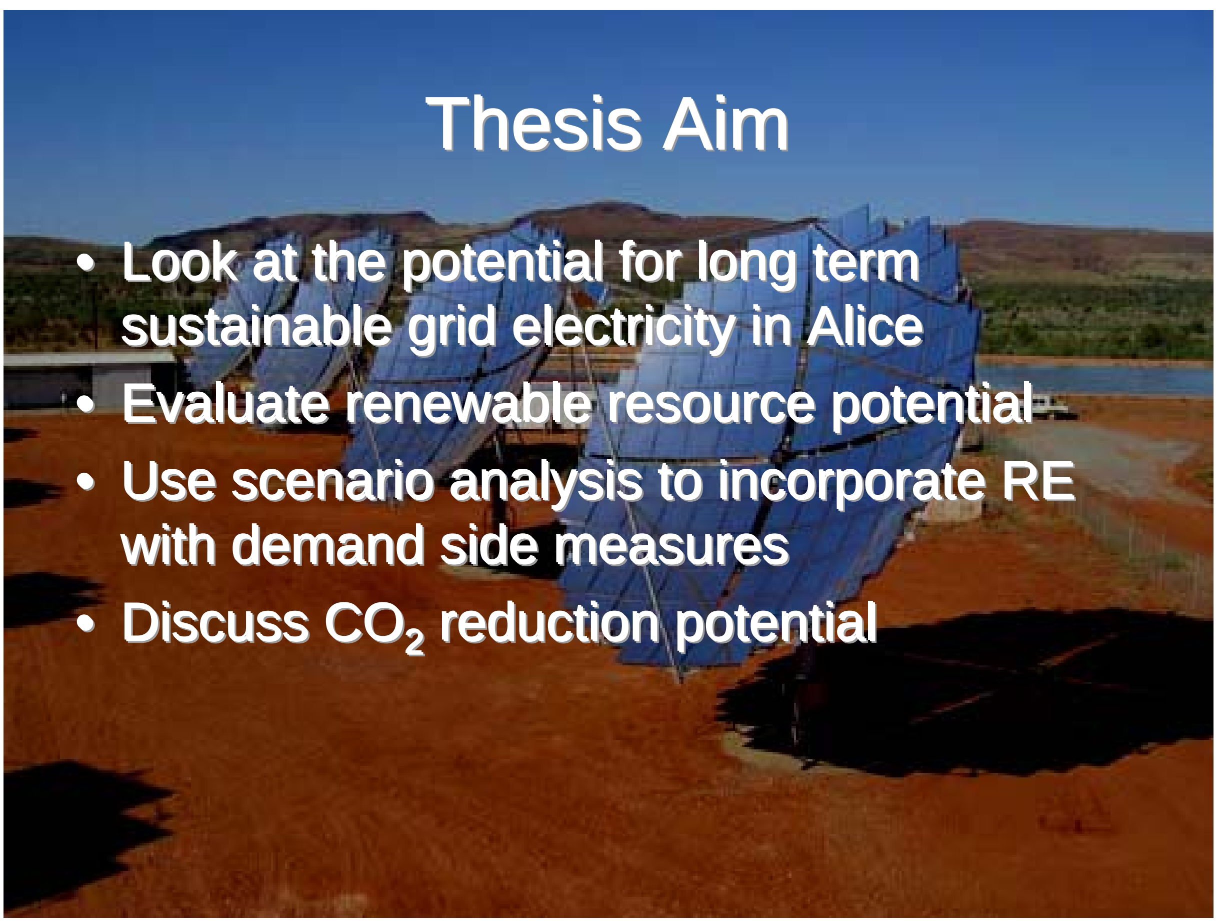


Thesis Aim
• Look at the potential for long term sustainable grid electricity in Alice
• Evaluate renewable resource potential
• Use scenario analysis to incorporate RE with demand side measures
• Discuss CO_2 reduction potential

Alice Springs

- Population 24 000
- Approx 6.5 psh solar isolation for 24º tilt in 2005
- 3.8ms^{-1} wind speed at 10m height
- Current generation: open cycle natural gas turbines and reciprocating engines

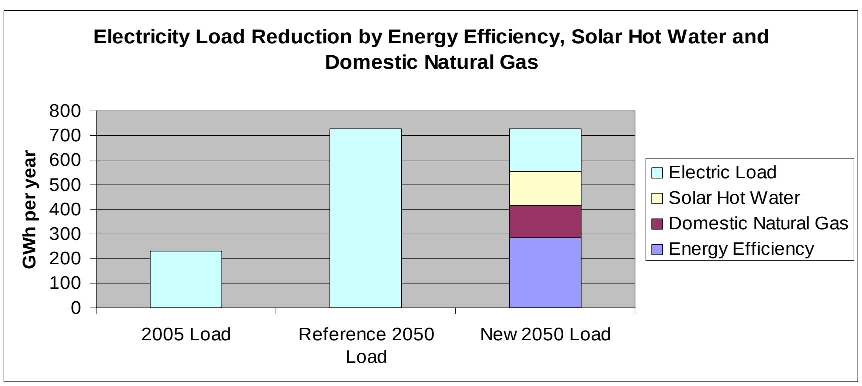
Energy Use in Alice

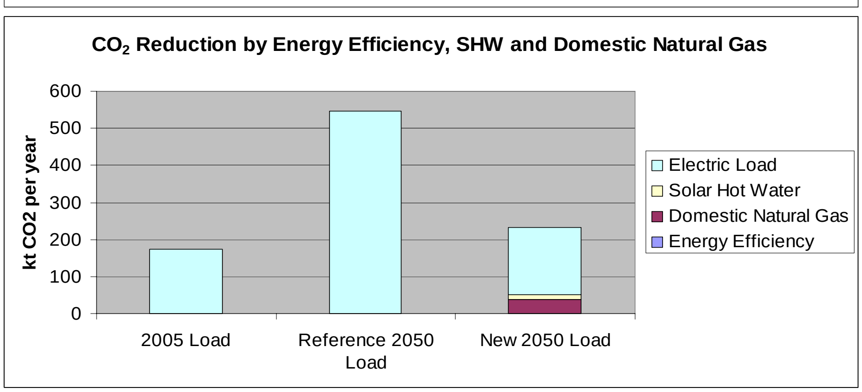
- Predominantly residential load
- Large residential SHW (60% in 2002)
- Current domestic tariff 15.1c/kwh (+29.59c fixed daily charge)
- Flat commercial 17.46 c/kWh (+ 46.21c fixed daily change)

Thesis Method

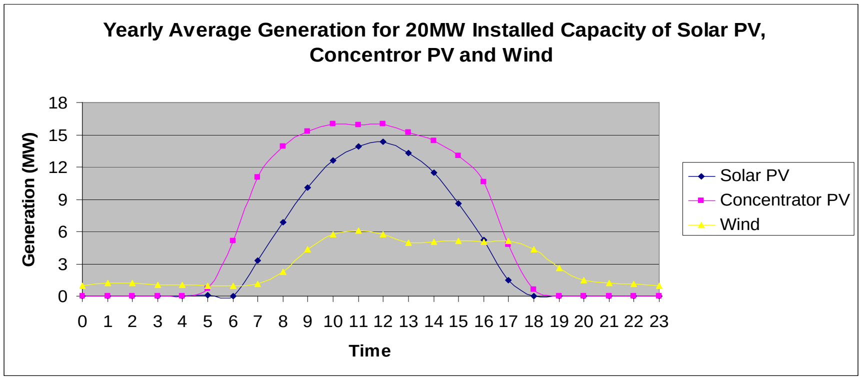
- Use 2005 load and weather data to create 2050 scenarios
- First reduce load by energy efficiency, solar hot water and natural gas
- Then model renewable generation potential
- Maximise CO_2 reduction and minimize cost for different RE targets
- Discuss the possibility of a 60% CO_2 reduction by 2050

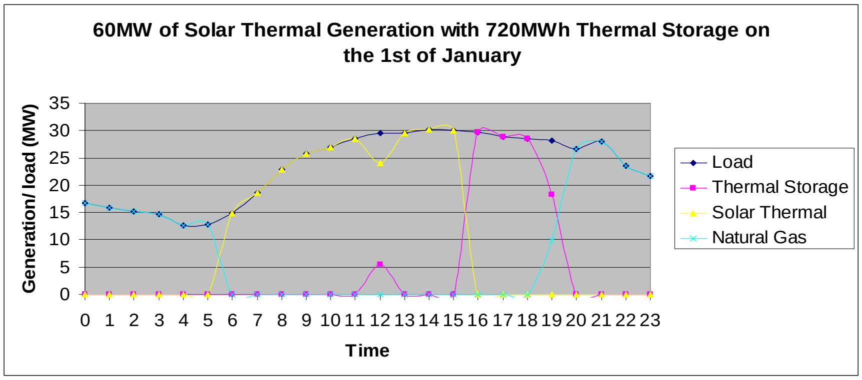
Load Growth & Improved Efficiency



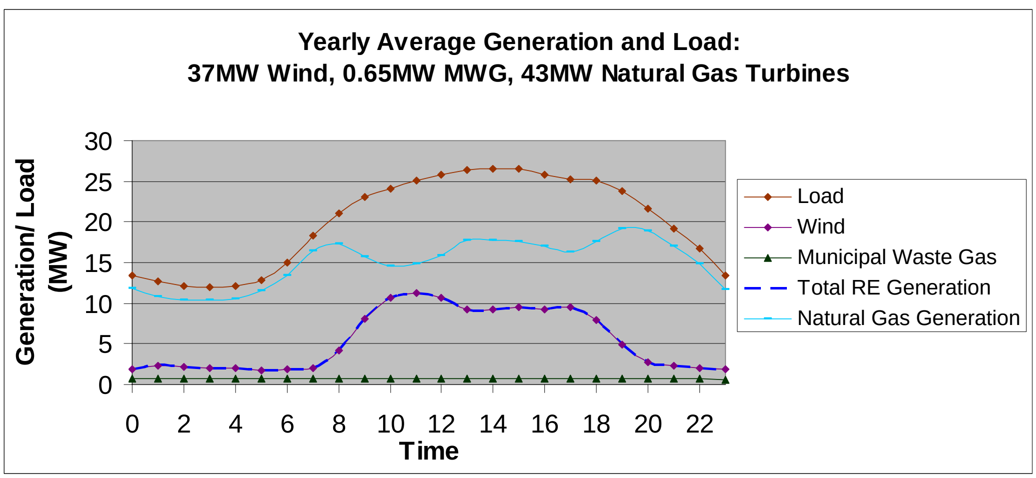


Generation Modelling



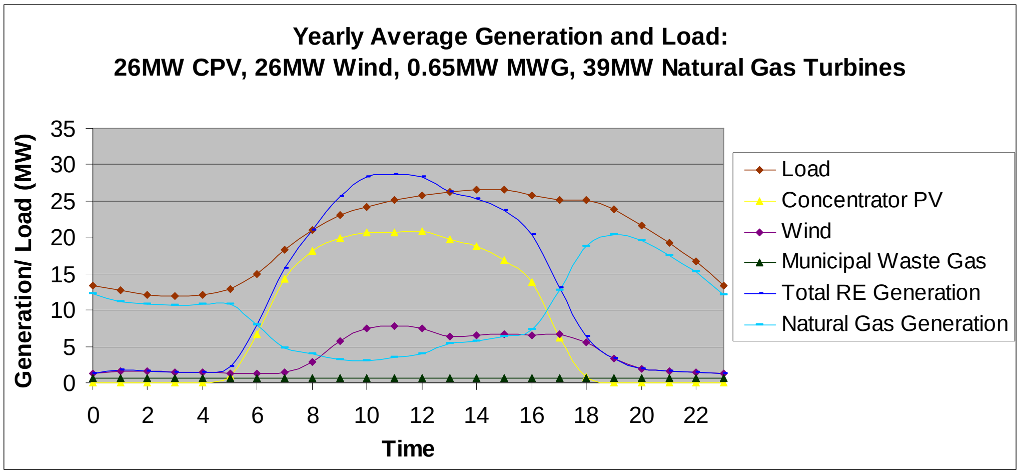


25% Renewable Energy Scenario



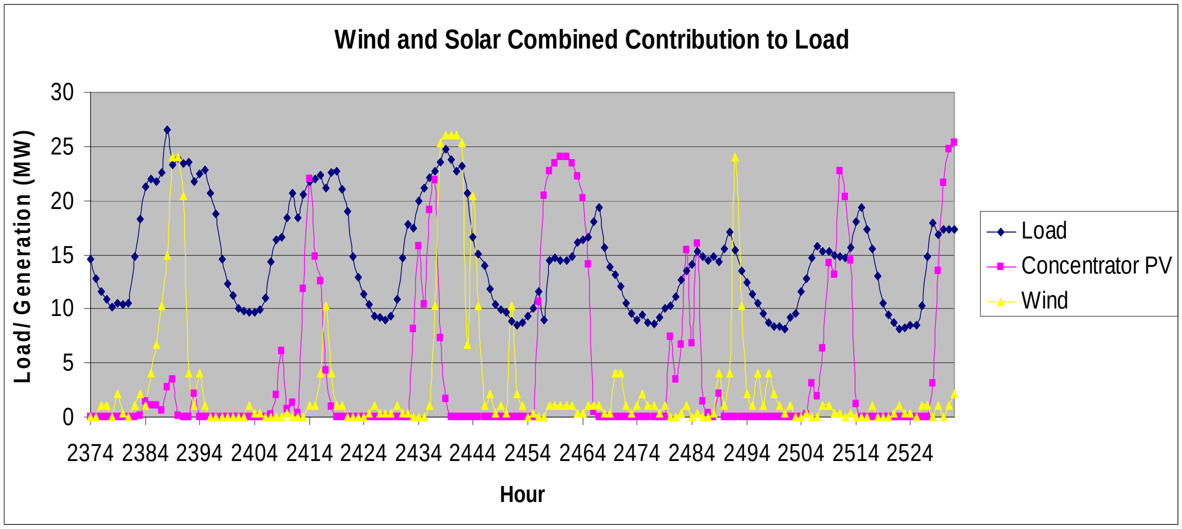
Electricity Cost ($/MWh)	*Energy Cost ($/MWh)*	*CO_2 reduction (%)*	*Wasted Energy (%)*
154	77	20	9

50% Renewable Energy

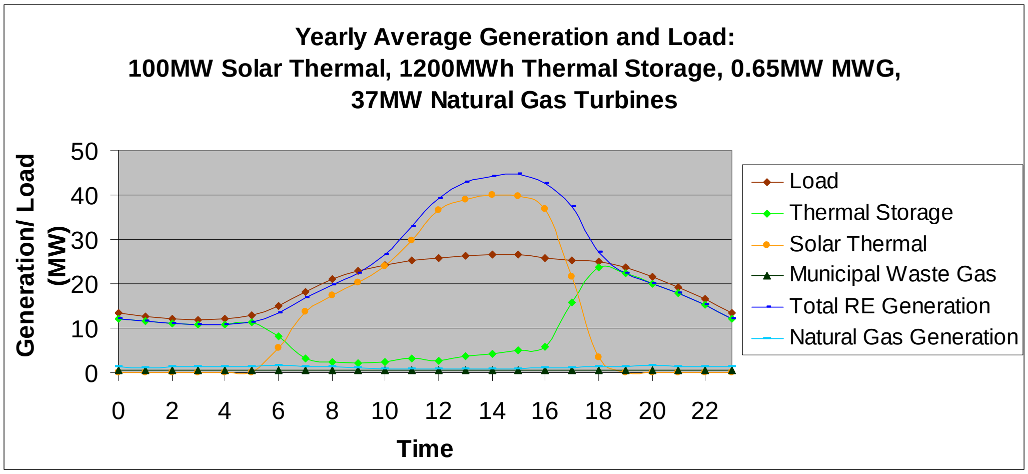


Electricity Cost ($/MWh)	*Energy Cost ($/MWh)*	*CO_2 reduction (%)*	*Wasted Energy (%)*
190	80	35	17

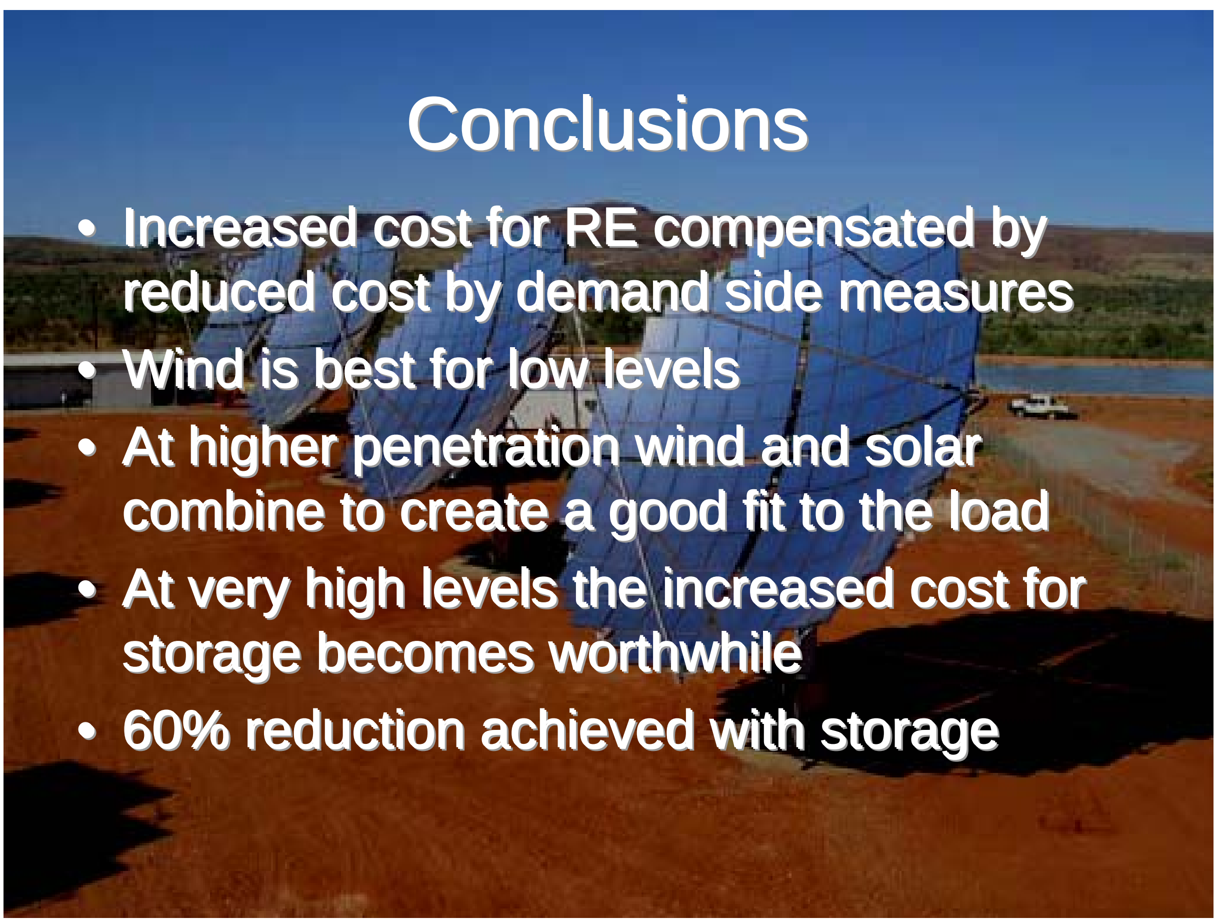
Advantage of Combining Wind and Solar



Higher RE Contributions



Electricity Cost ($/MWh)	*Energy Cost ($/MWh)*	*CO_2 reduction (%)*	*Wasted Energy (%)*
483	151	62	20




Further Work
• Inclusion of smoothing effects from spatial distribution
• Demand side measures for load shape manipulation
• Consideration of varying thermal storage capacities
• Investigation of wind profile at greater heights
• Policies to get us there!


Thankyou
Thanks for your attention
Special thanks to Steve Sawyer, Mark Dodemond, David Adams and my supervisors Muriel and Iain