RATCH-Australia Corporation

Collinsville Solar Thermal Power Station

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Background

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Collinsville Power Station – 180MW, coal-fired

Proposed Solar Thermal Power Station at Collinsville

Collinsville Power Station	Coal-fired plant: 4 x 30MW + 1 x 60MW generators. Approaching end-of-life, RAC investigating options to redevelop the site with one or more new forms of electricity generation – solar thermal, solar PV, gas.
	2010 Solar Flagship investigation of 150MW solar thermal project.
Opportunity	Assess the viability of converting RAC's decommissioned coal-fired power station to a 30 MW hybrid solar thermal/gas power station (re-use one existing generator).
Funding	50% ARENA funding for gas-hybrid feasibility study (Measure Study).
Advantages	Existing infrastructure: steam turbine generator, electrical infrastructure, water storage, light fuel oil storage, warehouse, offices, car parking, etc.

Collinsville Energy Park

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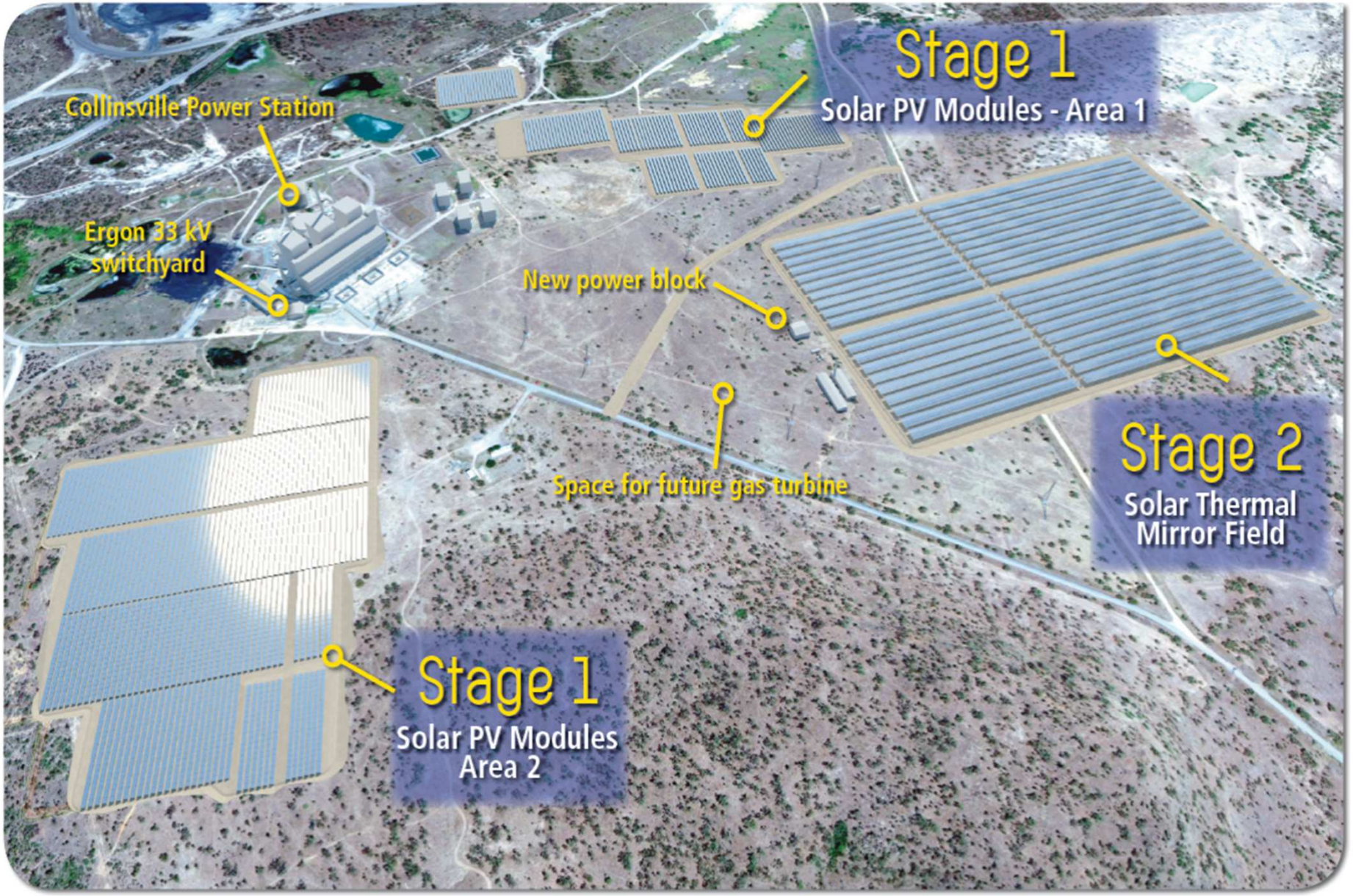

Benefits of the Preferred Option: Dispatchable / Base Load Power

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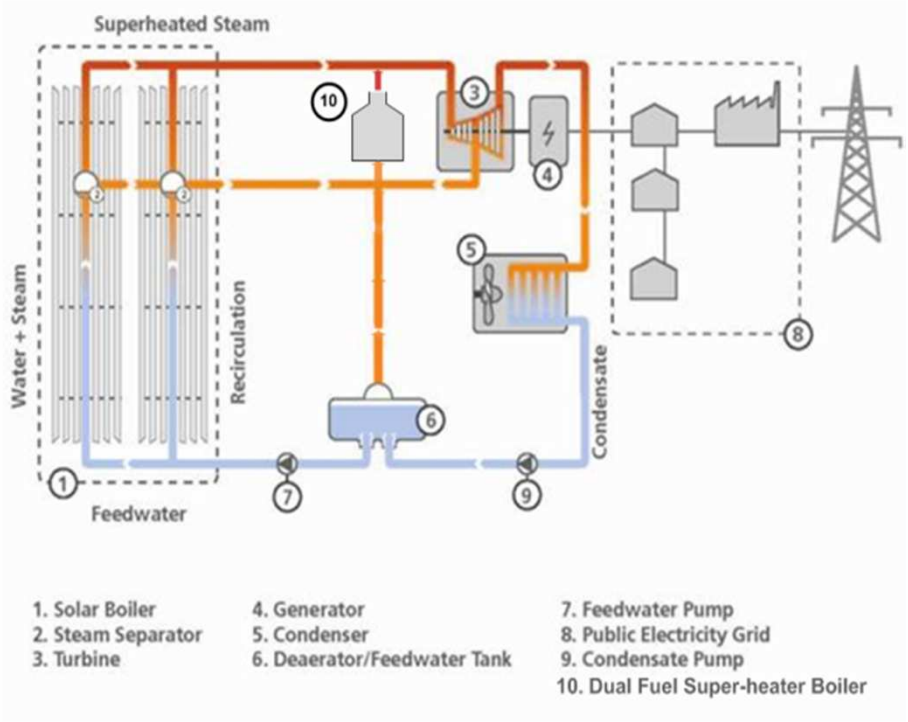
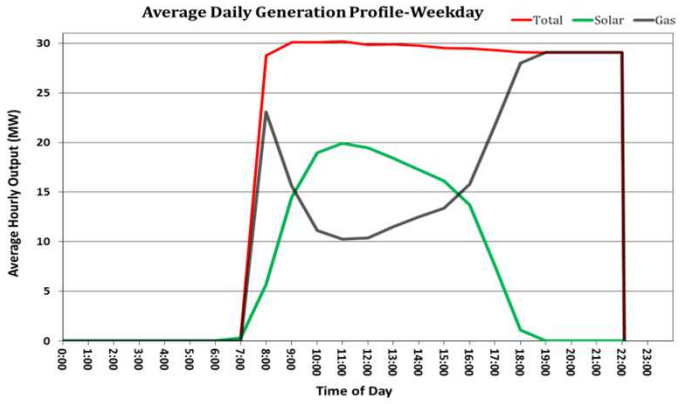
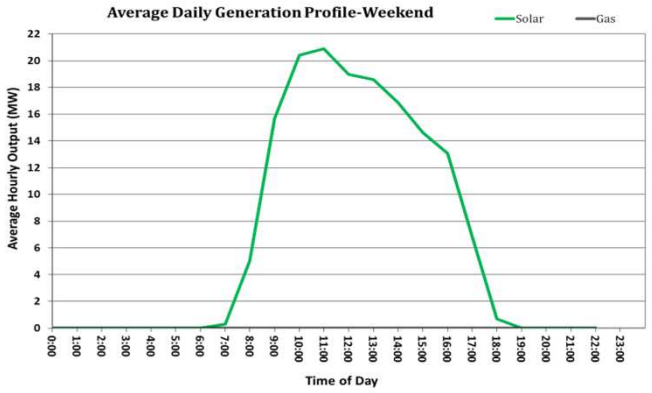
- Using gas with solar would provide a **reliable source of dispatchable electricity** even during periods of low solar irradiation.
- Effectively cheap solar thermal storage solution.
- The solar-gas hybrid plant would be a world first direct solar-to-steam turbine plant capable of **dispatchable power.**







Collinsville Solar Thermal – Key Issues

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KEY ISSUES	*DETAIL*
Re-use of old plant	High refurbishment cost, less efficient, warranty issues.
Cost	$173/MWh initial estimate –> $297/MWh. Increase due to change in exchange rate, civil works, buildings, solar field specification.
Funding	Lack of certainty around ARENA funding meant that RAC struggled to be taken seriously by EPC tenderers, which led to lack of detail in tender responses particularly around scope, tests and guarantees. Even if 50% project funding was forthcoming, the tender pricing suggested that the project would still not be viable for RAC at the current time.
Policy	Policy uncertainty (RET, carbon tax, ARENA) makes business case harder.
Scope changes	During discussions with ARENA for funding for the 30MW project, it became apparent that the amount of funding that ARENA could provide would only support a much smaller project, which would have required RAC to modify the scope from 30MW to 5MW and potentially change from gas hybrid to molten salt storage.
Value Engineering	Detailed value engineering work would be required to identify cost savings and design improvements. Trade-off between efficiency and capital costs also required.

Collinsville Solar Thermal – Costs

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	Capital cost estimate, mid 2013	Capital cost, EPC bid	% increase	Comments
Solar field	$69,249,000	$98,845,829	43%	Changes to specification, changes to Thermoflex estimates.
Gas/Diesel boiler	$10,000,000	$12,172,687	22%	
Mechanical plant	$27,200,000	$29,792,239	10%	
Electrical plant, instrumentation and control	$9,328,000	$10,902,349	17%	
Transmission line relocation				
Civil works	$2,500,000	$14,971,466	499%	Increased solar field scope, road upgrades.
Development costs				
Construction insurance	$1,394,000	$1,926,000	38%	
Land acquisition	$1,500,000	$1,500,000		
New powerhouse & buildings	$250,000	$3,850,000	144%	Workshop, admin building, water treatment added.
RAC Construction management	$1,500,000	$1,500,000		
Gas supply infrastructure	$18,500,000	$42,301,000	128%	
EPC Contingency	$14,142,000	$25,991,000	84%	
Balance of plant		$7,800,000		Cannot reuse existing tanks.
Indirect costs (EPC scope)		$30,965,430		
Price adjustment estimate		$3,380,000		
TOTAL COST	$155,563,000	$285,898,000	84%	Exchange rate 1.04 -> 0.91

Cost estimate vs EPC tender price

Collinsville Solar Thermal – Lessons Learned

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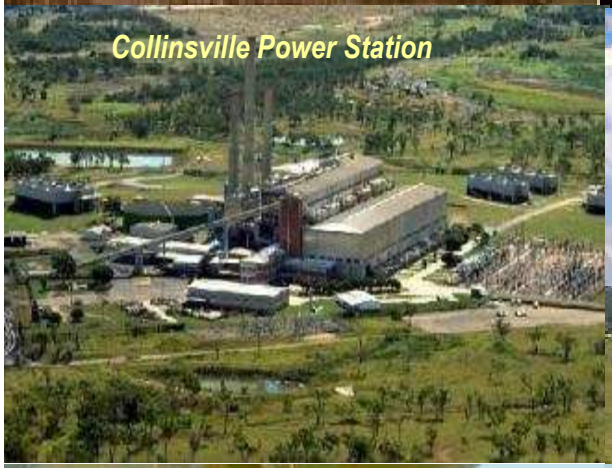
LESSONS LEARNED	*DETAIL*
Solar monitoring	Tracking instruments are prone to failures and have caused regular issues. Would be good to have a standard monitoring setup available.
Hybrid plant	Hybrid plant reduces LCOE (by ~12%) compared to solar only.
EPC challenges	High EPC risk margins, contractors unwilling to take on risks due to the emerging technology.
Community support	Strong community and council support.
Transmission lines	Transmission line relocation is prohibitively expensive.
Re-use of old plant	Not expected to be economically attractive due to warranty issues and higher efficiency of new plant.
PV	PV more competitive, particularly as offtakers not interested in storage.
Policy	To make solar thermal projects happen, would help to have a strong RET, a price on carbon, and a body such as ARENA to make such non-commercial projects viable.
Cost	Need to bring down costs significantly in order to be viable.
Knowledge sharing	Knowledge sharing reports available at the following website: http://www.ratchaustralia.com/collinsville/collinsville_solar_thermal.html


BP Kwinana Cogen (30%)


Townsville Power Station


Kemerton Power Station


Collinsville Power Station


Windy Hill Wind Farm
Thank You


Toora Wind Farm


Starfish Hill Wind Farm