



Industrial & Commercial Solar Thermal Specialists

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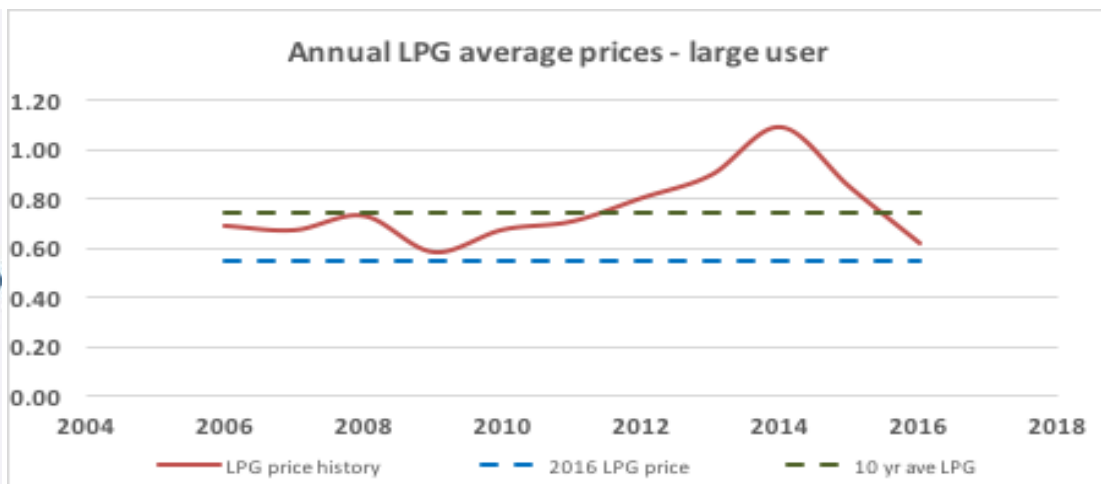
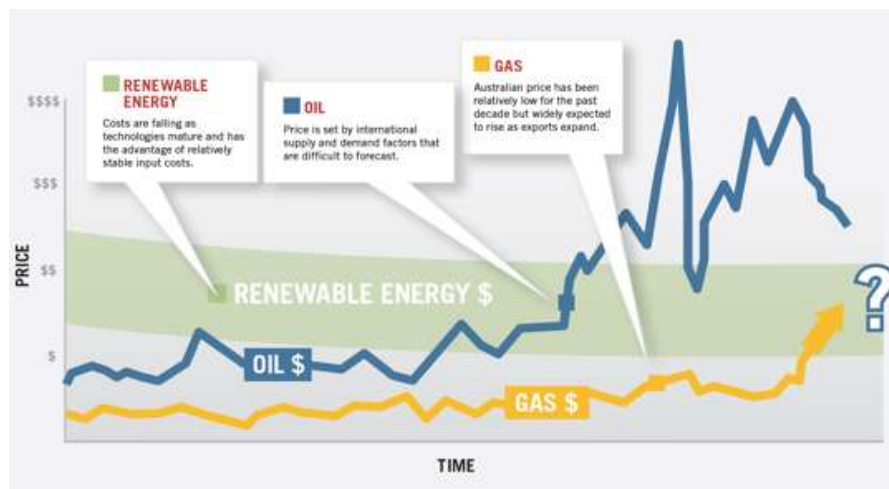
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Who we are & what we do

- **Specialist:** team focused on Solar Thermal equipment, system control and thermal energy storage solutions
- **Capability:** equipment manufacture and project development.
Collaborate with experienced Engineering firms for large projects
- **Differentiated:** deliver custom solutions for each site's circumstances
- Replace fossil fuels for heating with **renewable thermal energy**,
resulting in:
 - lower operating costs & sustainability outcomes

Why renewable heat?

- LPG is the highest cost heating option ~\$0.65 / Ltr = \$25 / GJ
- Nat. Gas:
 - International reflective pricing
 - Physical tightness = possible supply shortages = \$16-20 / GJ
- Broad range of heating applications



Key attributes

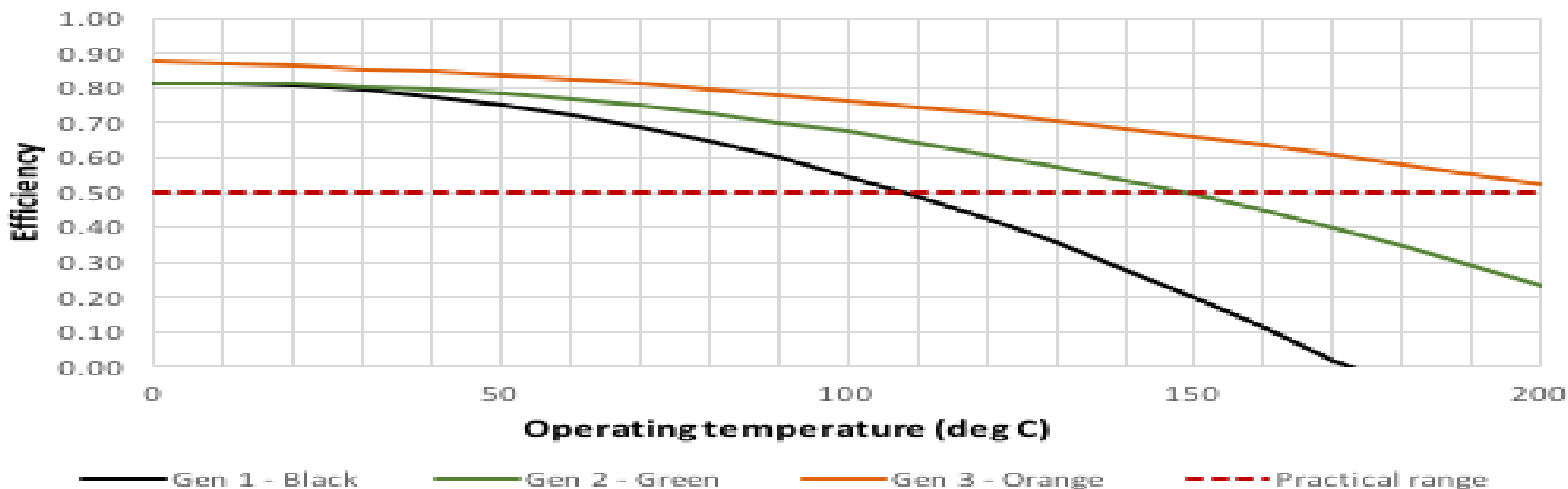
- Static & non concentrating system
- robust & nearly maintenance free,
- no moving parts or concentrators,
- hail and cyclone tested beyond standards
- 40 years + life
- Indirect = easy replacement
- Modular to large scale



Technology evolution...

- Ultra high efficiency evacuated tube design
 - Gen 1 - to ~110-120 deg. C
 - Gen 2 - to ~140-150 deg. C
 - Gen 3 - to ~180-200 deg. C

Efficiency curves: Incremental evolution



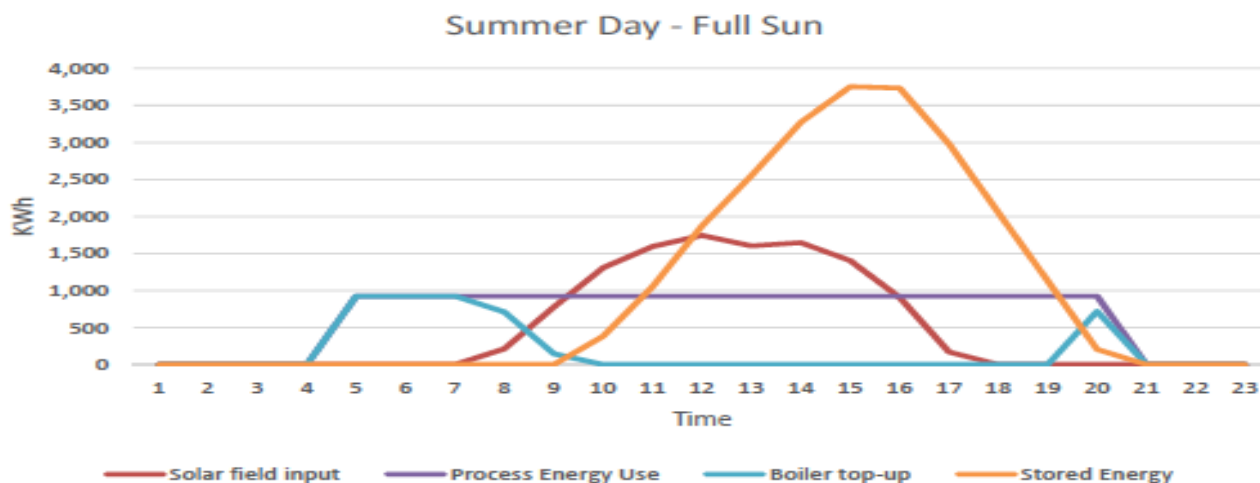
Heating output - what it means for the greenhouse

- Efficiently is important for high heat capability
- Greenhouse: 50 - 80 deg. C
- Nursery: 30 - 50 deg. C

2.4 KW GLX single unit			
Hot water pa	Brisbane	Sydney	Townsville
Litres pa @ 65 C	80KL	75KL	85KL
LPG replaced (L)	900 - 1,000	850 - 950	950 - 1,050
CO ₂ reduction	~1.3 - 1.5 t pa		

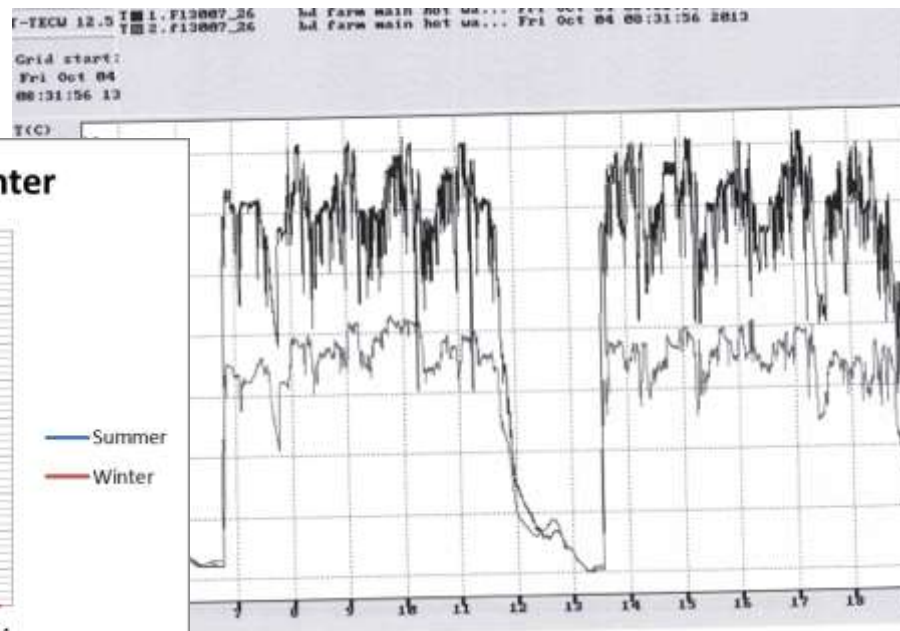
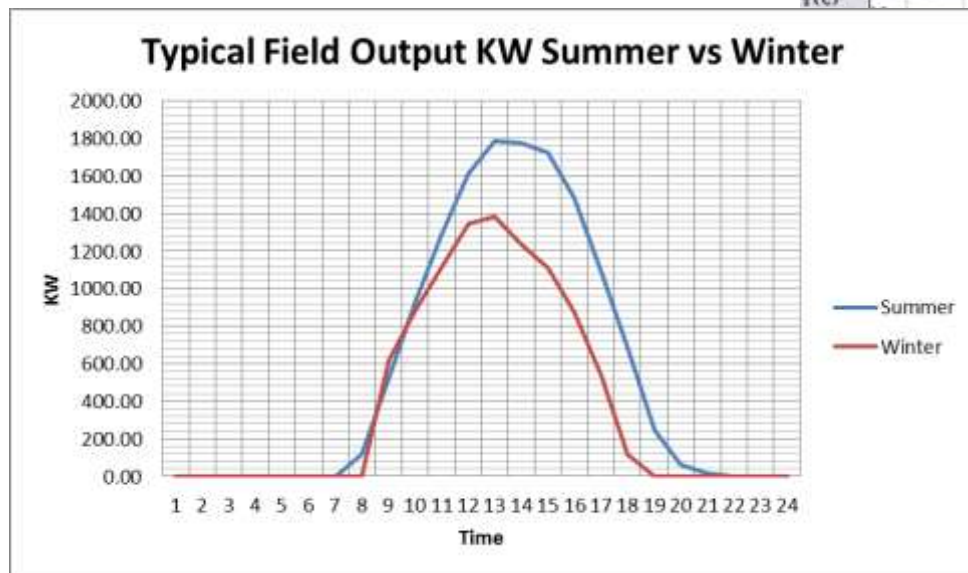
Energy storage considerations

- Co-incident Hot Water / heat load or is storage required?
- E.g. Greenhouse heating required at night / early morning
 - Assess & understand site heat usage profile
 - Match storage to site requirements
- Large Hot water tanks are cost effective way to store heat < 100 deg C



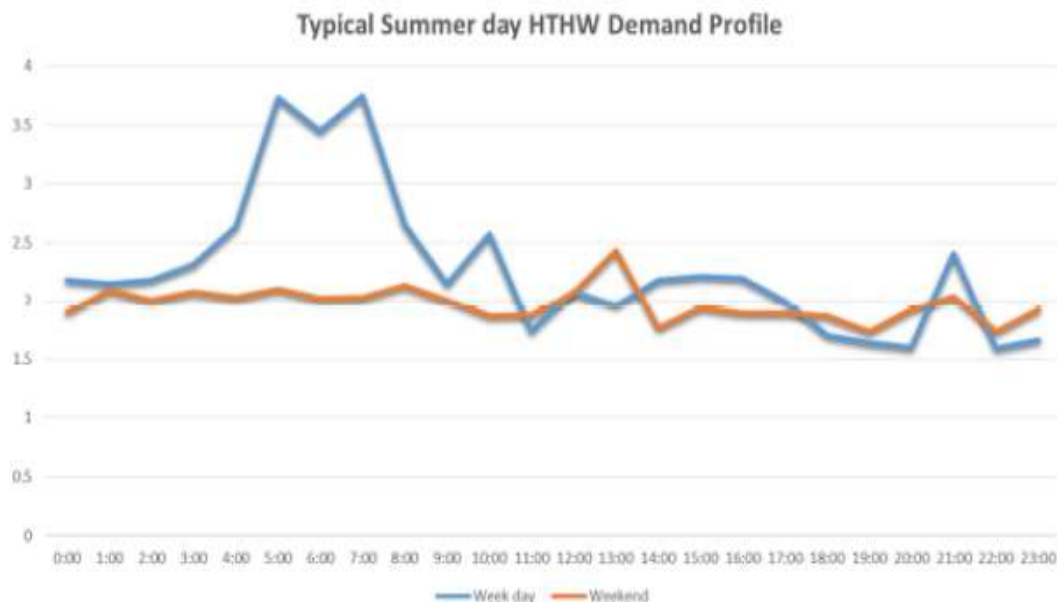
Design & integration considerations

- Thermal energy usage profile - daily / seasonally
- Reliably integrate solar with existing heating system
- Do not interrupt operations
- Safety and ongoing reliability



Case study: Monash Uni Low Load Boiler

- 1MW solar field, primarily as lead "summer boiler"
 - Replace old 8MW boiler, with low turndown 4MW unit
 - HTHW 120 to 160 deg. C, Solar field 160 to 190 deg. C
- Carry majority of campus load in summer months



Funding: various incentives & financing

- Government efficiency and renewable energy programs
 - STC's: ~30 STC's per GLX module
 - ESS: Project based methodology in NSW
 - ERF: >3MW of Solar thermal (replacing gas) to qualify
- Finance
 - CEFC backed loans via CBA & WBC: low interest rates
 - Equipment finance leases <7 years
- Solar heating, as with solar PV is now a “no brainer”

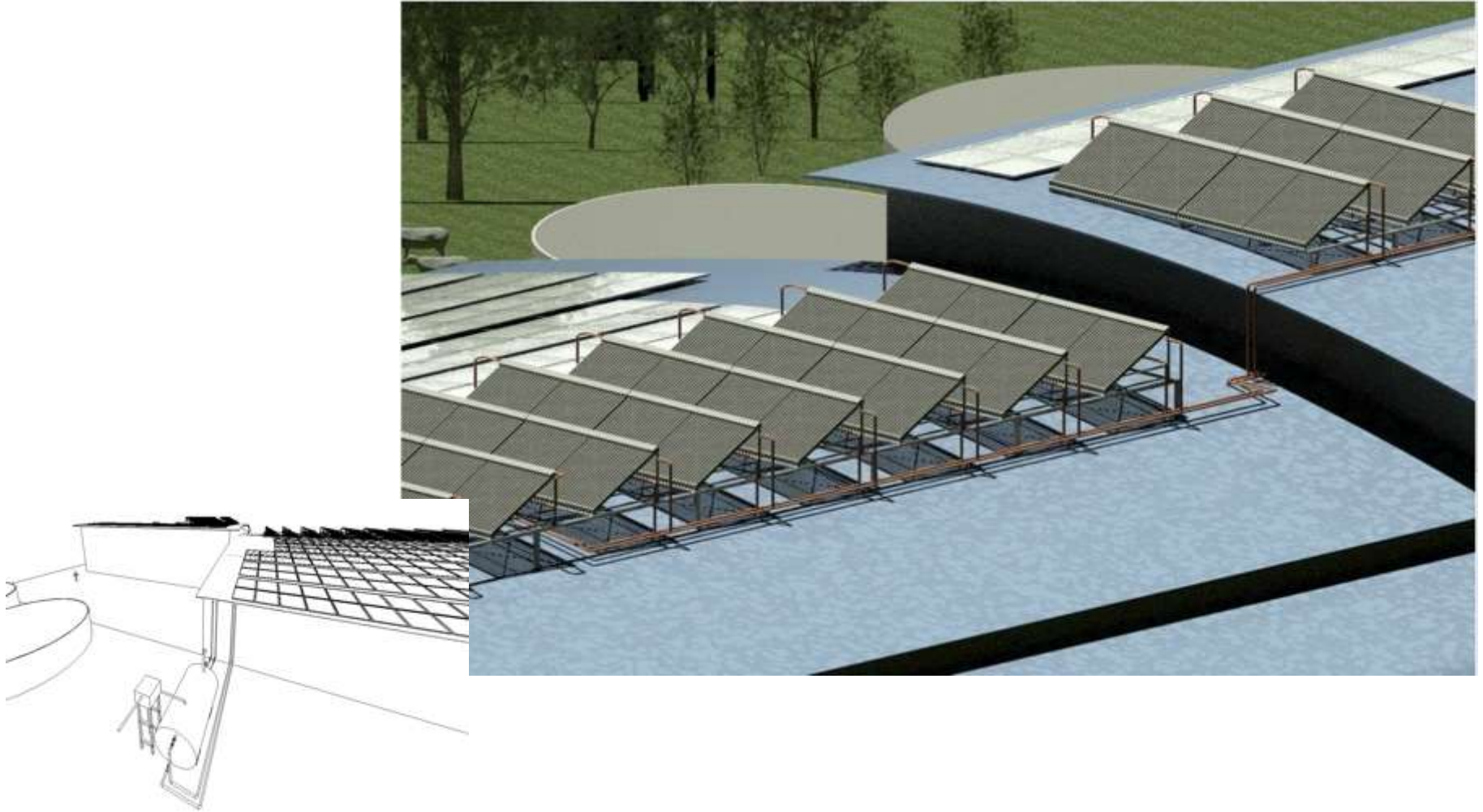
Summary & purpose

- **Provide economically viable alternative to LPG and Natural Gas for Commercial & Industrial Heating**
- **Improve customer Triple Bottom Line**
- **Be part of the solution**

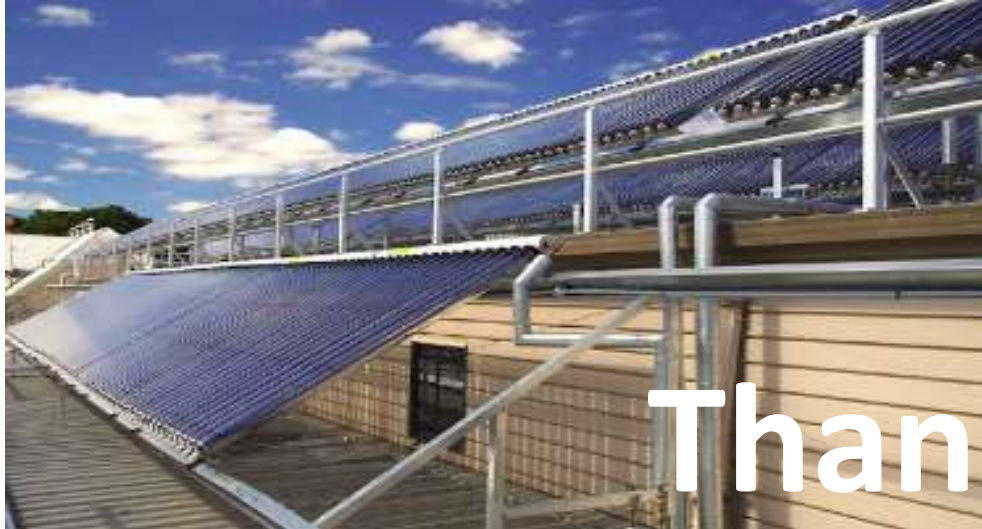


GREENLAND SYSTEMS
the solar thermal energy company

Solar Field 3-D



Operational commercial systems



Thank you

