TSP THE SOLAR PROJECT

Maximising Energy Utilisation & Lowering OPEX,

David Buetefuer, Director of Sales and Business Development

The Solar Project | 19th June 2014

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About Us:

- **Adelaide-based project management office:** builder, electrical contractor, consultancy & renewable energy project system integrator
- **2013 Wine Industry Supplier Association Joint Supplier of the Year**, Sustainability & Environment (for the De Bortoli Wine Solar Projects)
- **Team responsible for building 4 of SA's 5 largest Solar PV arrays**, ranging from 200kW – 1.0MW
- **Technology agnostic, quality focused, Value for Money project delivery.**

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Agenda

- Determine customer requirements
- Operating a Solar Power System
- Integration into a facility
- Performance
- Lowering operating expenses

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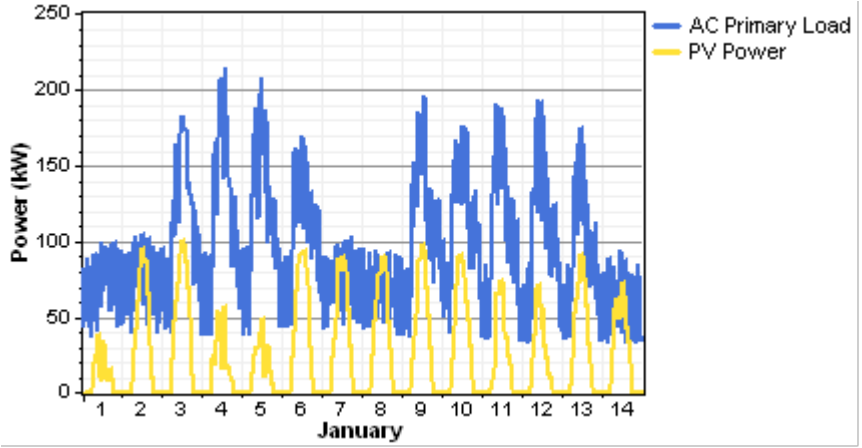
Determine customer requirements

A detailed load analysis is crucial to determine the customer requirements

- Interval data from grid operator or electricity retailer
- Monitor site and sub boards with power analyser
- Data analysis with solar specific software: Homer, PVsyst, PV Sol



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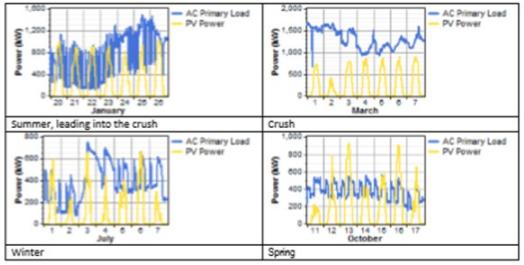
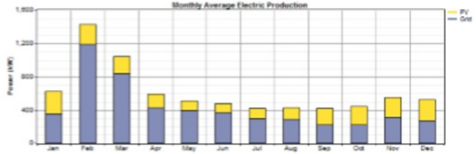
The below graph shows the deemed typical week load profile overlayed by the PV yield of a 1,000kW solar power system for various times in the year.



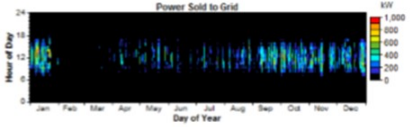
Summer, leading into the crush | Crush

Winter | Spring

The below graph shows the estimated monthly average electricity supply to site from the 1,000kW solar power system and from the grid.



The below DataMaps show export (grid sales) for a 1,000 kWp system



Limited export of electricity form the facility is to be expected on any day of the year, outside the crush.

Preliminary Analysis: Solar PV Generation against site load:

For the facility the electricity usage is summarised in the table below, based on the provided data, as described above.

	Option 1: p-Si 1,000 kW
Load on site [MWh p.a.]	5,092
Yield of solar power system [MWh p.a.]	**1,658**
Self-consumption of solar electricity [MWh p.a.]	1,392
Self-consumption of solar electricity [% of solar yield]	**84**
Self-consumption of solar electricity [% of site load]	27
Exported solar electricity [MWh p.a.]	266
Exported solar electricity [% of solar yield]	**16**
Exported solar electricity [% of site load]	5

A 1,000 kWp Solar power system could cover just over a quarter of the site load and would export about a sixth of the produced electricity. The export fraction would represent about a twentieth of the site load.

The levelized cost of energy (COE) is calculated to be 0.132 $/kWh. The value of the offset energy is approx. 0.216 $/kWh. The value of the offset energy includes energy costs, network costs charged per unit (kWh), renewable energy charges and other fees, but also income generated from LGC's. The value takes peak and off peak prices into consideration. Reduction in network charges for actual demand has not been considered. The COE from the solar power system is lower than the value of the offset energy.

The above report and recommendations are intended to form a basis for discussion around the suitable sizing of a solar power system. Available roof space has not been considered. For the sizing of a solar power system I recommend that financial parameters are to be further explored:

1. Project Return parameters: Internal Rate of Return and Project Payback-time
   15 – 17% IRR; 5 years 9 months – 6 years 5 months
2. Determine system size according to available roof space
3. Site visit to determine AC integration and thus Capital cost
4. Value of Large Generation Certificates for a 1,000 kW option
5. Project finance options: CAPEX, Leasing, PPA

Name	Company	Position	Signature	Date
Theo Strecker	TSP	Director of Engineering and Projects		31/08/2013

Load analysis report

- Description of load profile; including peak kVA demand
- Base line of quality of supply; in particular Power Factor
- Overlay of load and production
- Estimation of yield, onsite consumption and export
- Identification of loads and load management measures, including PFC and voltage control
- Recommendation for system size and other measures

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Operating a Solar Power System

- Know how your solar power system is performing by logging data to
  - Verify performance
  - Quickly establish faults (AC fault, maintenance on AC boards, DC faults, etc.)
  - Recognise long term trends (cleaning requirement, shading from new vegetation, etc.)
- Incorporate solar power production into load management of the site

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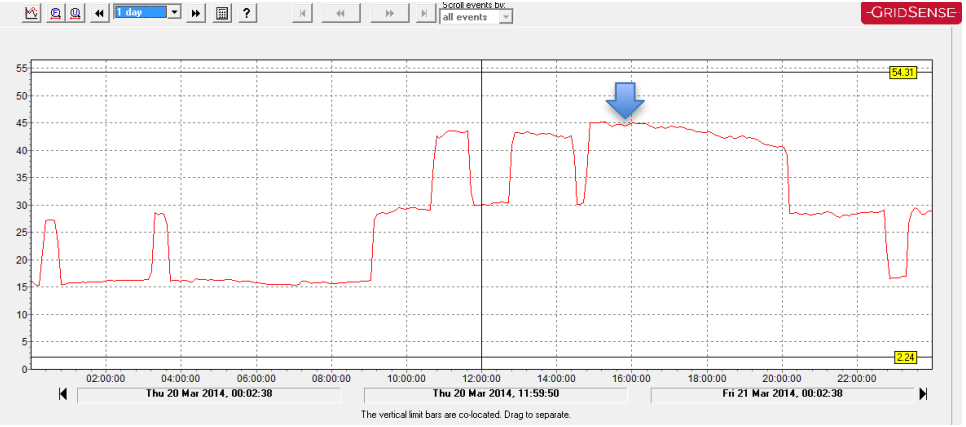
Integration into a facility



Examples

- Export control measures load shifting (dump loads) to times of high solar power generation
  De Bortoli: Load management integrated by Winery engineers
- Peak demand control measures by load shedding
  Small winery in SA: Solution developed by TSP

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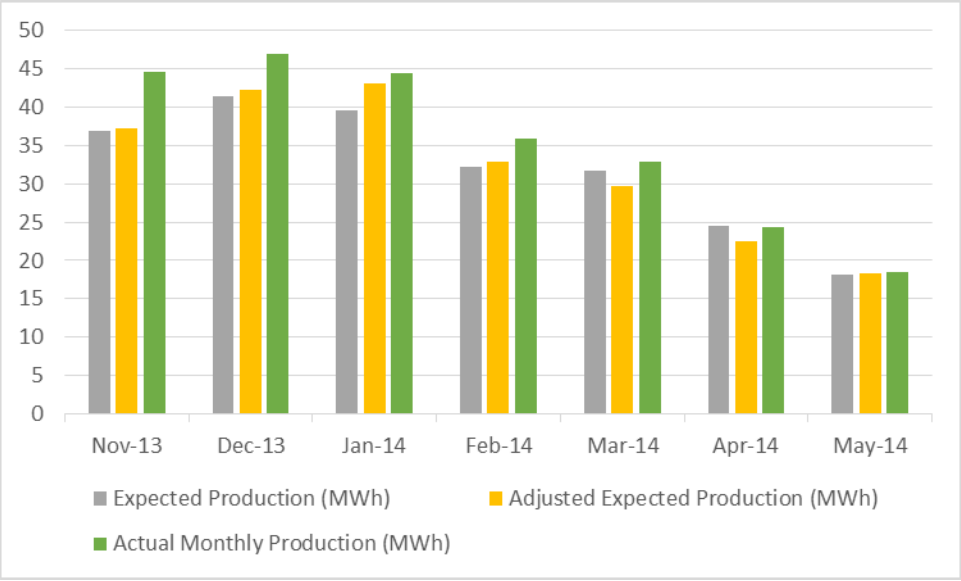
Performance at DeBortoli Wines



Actual yield exceeds simulated yield by almost 8% and is approx. 5% higher than adjusted expected yield (adjusted to solar radiation data provided by Bureau of Meteorology)

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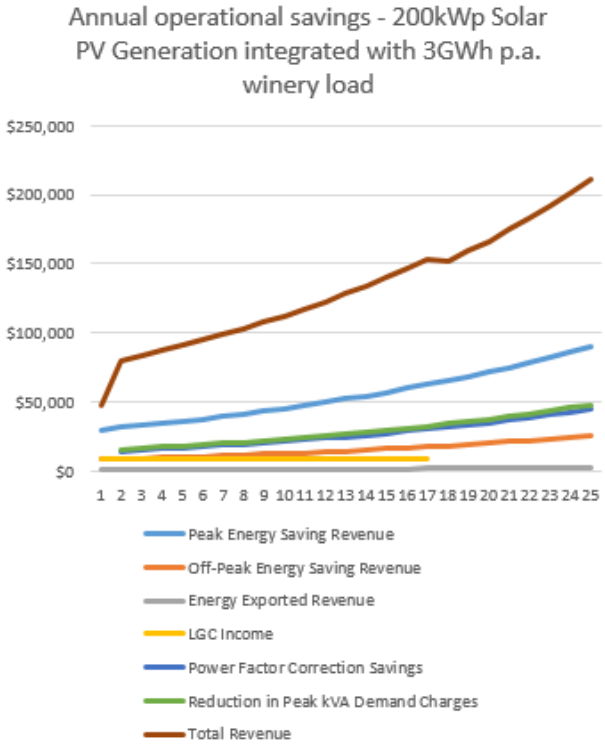
Lowering operational expenses

Measures to achieve maximal savings of operational expenses:

- Sizing the system to for optimal onsite use of Solar Power– determined by yield estimate factoring in local conditions and technology selection
- Data logging to inform load shifting measures to minimising export fraction
- Load shedding measures to limit kVA charges
- PFC to limit kVA charges
- Data logging to inform optimised maintenance schedule



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Debortoli Solar Array Images

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Debortoli Solar Array Images

Thank you

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