HOLISTIC DESIGN APPROACH FOR A SMALL SCALE DOMESTIC SAPS ON THE CENTRAL WHEAT BELT OF WESTERN AUSTRALIA

Presented by

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TOP: Proposed domestic SAPS site near Cunderdin Air Field
(sourced from the site owners, 2009);
BOTTOM: Jura International, Impressa S9 One Touch Coffee Machine
(Jura International, 2010)

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August, 2010

DECLARATION

Except where otherwise indicated the work presented

in this dissertation is the outcome of my own research.

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ABSTRACT

The objective for this research project was to develop a commercially feasible holistic design approach for small scale stand alone power supply (SAPS) systems. Technical and economic performance expectations may conventionally be viewed as dominant design influences. A feasibility study for the options available to a proposed small scale domestic SAPS on the Central Wheat Belt of Western Australia fulfilled the role of a case study in exploring the holistic design approach.

Overall the research project comprised developing together with implementing the holistic design approach through the SAPS case study and analysing the outcome. The principal tools involved in the design approach were AS4509 part 2, HOMER and a holistic design tool that was developed for the purposes of holistically screening and ranking the prospective energy system solutions.

An important feature of the holistic design tool was considered that it assisted in transparently capturing together with communicating the reasoning behind the recommended holistically optimal solutions. Opportunity costs were included in the HOMER simulations to account for the time commitments of the clients that were projected to be involved in the solution options.

A commercially feasible structure was considered to have been established for the holistic design approach as an outcome of the research. The structure provided the foundations for progressive enhancements to the consistency, repeatability, productivity and meaningfulness of the approach. In the short run the structure was viewed to have achieved a practical solution for the case study in the form of a prospectively holistically optimised system for recommended implementation.

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ac	alternating current
BOM	Bureau of Meteorology
BOTECs	Back of the Envelope Calculations
BPA	Bullet Points Analysis
CFs	Capacity Factors
CWB	Central Wheat Belt
dc	direct current
DOD	Depth of Discharge
genset	generator set
HBP	Holistic Balance Point
HI	Holisticity Indice
HW	Holistic Weight
MHI	Mean Holistic Imbalance
MPPT	Maximum Power Point Tracker
NWIS	North West Interconnected System
O&M	Operating and Maintenance
PV	Photovoltaic
RAPS	Remote Area Power Supply
RE	Renewable Energy
REC	Renewable Energy Certificate
SAPS	Stand Alone Power Supply
SDPR	Small Domestic Periodic Residence
SSD	Small Scale Domestic
SWIS	South West Interconnected System

ACKNOWLEDGEMENTS

My sincere gratitude and appreciation is expressed to

My supervisor Dr Trevor Pryor for all his time and guidance in making it happen

Dr Jonathan Whale for his time and help in keeping things moving

Colin Black for keeping things real

The team at RISE for all their support, resources and valuable information

The SAPS clients for providing the opportunity and their enthusiasm

My family and friends for encouraging me to follow my path

All the new friends I have met along the way

My niece Frankie for her part in inspiring the research concept

Aunty Anne (Fyers) Tunnicliffe 1943 to June 2010

All those that I cannot appear to fit on this page whom patiently and openly shared their knowledge along with experience in making it all possible.