

STATEMENT OF CAPABILITY

BACKGROUND

James has been with Balance Group since its inception in 2012, leading the engineering team in various roles until his current position of CTO in 2017. James is an electrical and electronic engineering graduate from the University of Western Australia with 17 years' experience in the power industry. He has worked in both private industry and public utilities, previously with Horizon Power for three years.

James' passion is for renewable energy sources and their interconnection with utility infrastructure and/or hybridising with conventional plant. He was awarded an Australian Post Graduate Award from Curtin University to investigate and develop technology to control and stabilise renewable systems. In 2010 he was awarded a PhD for this work and SMA and other leading micro-grid manufacturers have used the method, this is now a leading control strategy for micro-grids across the world.

James has extensive experience in the design, installation and commissioning of micro-grids and utility scale solar systems in remote locations. He has designed and installed over 200 MW of photovoltaic solar systems incorporating inverters, charge controllers, batteries and diesel and gas generation for various projects across Australia, Asia, and the Pacific. Many of these projects were remote, complex, and required high levels of technical and project management skills.

Recently James had led Balance develop the PowerCore Microgrid Platform. This is a modular and scalable hybrid system architecture which can be applied to various cutting edge renewable applications to facilitate an increase of renewable content for on and off grid system while ensuring power system stability.

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Design Optimisation

James has outstanding experience and skills in determining, analysing, and optimising options for mixed generation developments. The purpose is to ensure that the best possible balance of outcomes, including capital and operating cost, renewable energy penetration, security, and reliability, are delivered by the technology choices made. James has a pragmatic view of what is technically feasible and regularly models new technologies to assess potential future benefit.

Renewables Integration

James is regarded internationally as a leader in the field of renewable integration into grid, diesel and gas generation and optimisation with energy storage. James is regularly asked to speak in a variety of Australian and international forums on energy storage technologies and renewable integration issues, in both on, off grid and micro-grid scenarios.

Control Systems

James has developed a deep and practical understanding and capability in the design and implementation of generation control systems. This capability has been crucial to his role as project technical lead in a variety of iconic and industry leading hybrid energy projects. He is leading the

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development of the Balance Island model allowing a smooth transition for conventional generators to hybridise their operating plant.

Electrical System Protection

Over the past five years James has expanded his expertise into power system protection and modelling analysis, especially where it is related to microgrid systems or grid connected inverters. This area of expertise is rapidly changing as the tradition centralised generation model is shifting to a distributed system. James has unique experience regarding protection design for grid connected microgrids and is frequently asked assist with major Australian utilities.

Project Implementation & Commissioning

James has led and had hands on involvement in the commercial and practical aspects of several generation projects, solar, wind, battery and micro-grids. His technical expertise in inverter technology combined with a broad knowledge of generation plant ideally equip him to lead the technical development of conventional, hybrid and renewable generation projects.

CORE COMPETENCIES

Power Systems

- Utility Connection Compliance for Inverter Coupled Systems
- Renewable System Integration and Control System Development
- HV & LV Power System Modeling and Protection Design
- Conventional Generation Plant Design
- Island System Power Feasibility Study and Design

Renewable Systems

- Expertise in Micro-grid control systems
- Renewable Resource Assessment & Power System Design
- Multi-resource Hybrid Solar/Wind/Wave/Water with Diesel/Gas Power Systems
- Interconnection design for Renewable plant to utility/power station

Energy Systems

- Comparative Technologies Assessment
- Battery Energy Storage Assessment, Design & Integration

Project Implementation

- Project Development & Management
- Independent Design Assessment
- Commissioning Planning & Management

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ACHIEVEMENTS

- Project Director and Technical Lead for GMA Garnet Microgrid (ARENA funded) 5.6MW/586kWh novel back-to-back converter topology with Western Power connection, 1.1MW PV and 5 x 500kW wind turbines.
- Technical Lead for Euston Microgrid, 300kW/1.1MWh microgrid with 400kW PV. First grid connected on a social club to provide system redundancy and reduced capacity and energy charges (Essential Energy).
- Technical Lead for 5.8MWp Mobilong Solar Farm, grid connection, compliance, and testing activities with SAPN. Balance at the time were the only proponent to pass the witness testing on the first attempt.
- Design & Commissioning Manager for 13.154MW PV plant, ARENA funded as the first to be integrated to a Wind Farm, Gullen Range Wind Farm, 2017.
- Design & Commissioning Manager for 2.8MVA/1.1MWh Battery Energy Storage, include whole of town UPS, Wester Power Perenjori BESS, 2017.
- Led technical design team for the development of the PowerCore, Balance PV battery integrated system for application on-grid, off-grid & microgrid.
- Director of Solar Balance, overseeing installation of over 1MW of PV and PV/battery systems across Western Power and Horizon Power networks.
- Design & Commissioning Manager for utility grade solar hybrid bore, 45kW dual axis tracking with 120kWh battery storage, Water Corporation, Broome, 2016.
- Project Director for ongoing work on power system prototypes for Square Kilometre Array Low Frequency Aperture Array, ongoing.
- Project & Design Manager for Square Kilometre Array Low Frequency Aperture Array power investigation taskforce, 2014 - 2016.
- Design & Commissioning Manager for 6MW Standby Diesel Power Station with HV integrated switching for Perth Market Authority, 2014.
- Design & Commissioning Manager for 100kW PV grid connected system on Guam for Vital FSMPC, 2013.
- Design & Commissioning Manager for 2MW Diesel Power Station for Vital FSMPC in Pohnpei, Micronesia, 2013.
- Design & Commissioning Manager 2 x 27kW Solar-Battery Systems connected to the Horizon Power network in Pt Hedland and Wiluna, 2014. First Class 2 systems ever connected.
- Design & Commissioning Manager for 97kW grid connected PV system for Mazenod College, Lesmurdie interconnected to Western Power, 2014.
- In 2010 James was the commissioning engineer for Horizon Power's hybrid solar-diesel power stations at Marble Bar and Nullagine.

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- Designed and implemented the renewable control system for Carnarvon gas/diesel power station allowing the interconnection and control of the EMC 300kW Solar Farm, 2011.
- Worked as project engineer and manager to design, procure, install and commission the renewable diesel hybrid power system for Eco Beach Resort, South of Broome, Western Australia in 2009. At the time the largest hybrid in Australia.
- Engineering design of three stand-alone solar/wind/battery/diesel power systems on the Maldivian islands of Uligam, Kondey and Raimandoo islands in 2008.

QUALIFICATIONS

- PhD in the application of power electronics for renewable energy systems from Curtin University, 2010.
- Bachelors with honours in Electrical & Electronic Engineering from the University of Western Australia, 2003.