HARD SOFT WARE

Optimizing the Future: Energy Optimization to Open-Source Solver Opportunities

OUR MAIN PRODUCTS

INFOLITE

Infolite a comprehensive solution that provides all the trading and operational requirements for profitably managing and running a renewable wind or solar farm in the Australian NEM.

AUTOMATED VRE TRADING

A recent development is enhancing our Infolite product with an automated bidding solution for solar and wind farms to provide optimized revenue trading at a much cheaper end-user cost than other automated solutions or 24 x 7 trading operations.

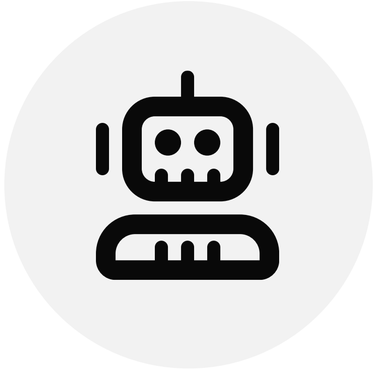
OPTIGEN

HARD software has recently launched Optigen, which is a cost-effective and reliable solution that seamlessly integrates with renewable energy generation and battery control systems to enhance revenue and manage risk.

INDUSTRY TRENDS

MULTI-MODAL SYSTEMS

Increasing numbers of renewable generators are looking to integrate BESS into their existing and planned sites. Proposed rule changes will make flexible optimization of these combined generation types necessary for generator profitability.



AUTOMATED TRADING

Automated trading of VRE generators is the most cost-effective solution for both single and multi-modal generation. Many existing alternatives have oversold the benefits or are too costly and many are now being replaced.

SYSTEMS SECURITY

Systems compliance and increasing security requirements for all the NEM trading and operational systems are becoming a priority for the security of the critical national infrastructure. It is expected that audits and penalties for non-compliance will become common.

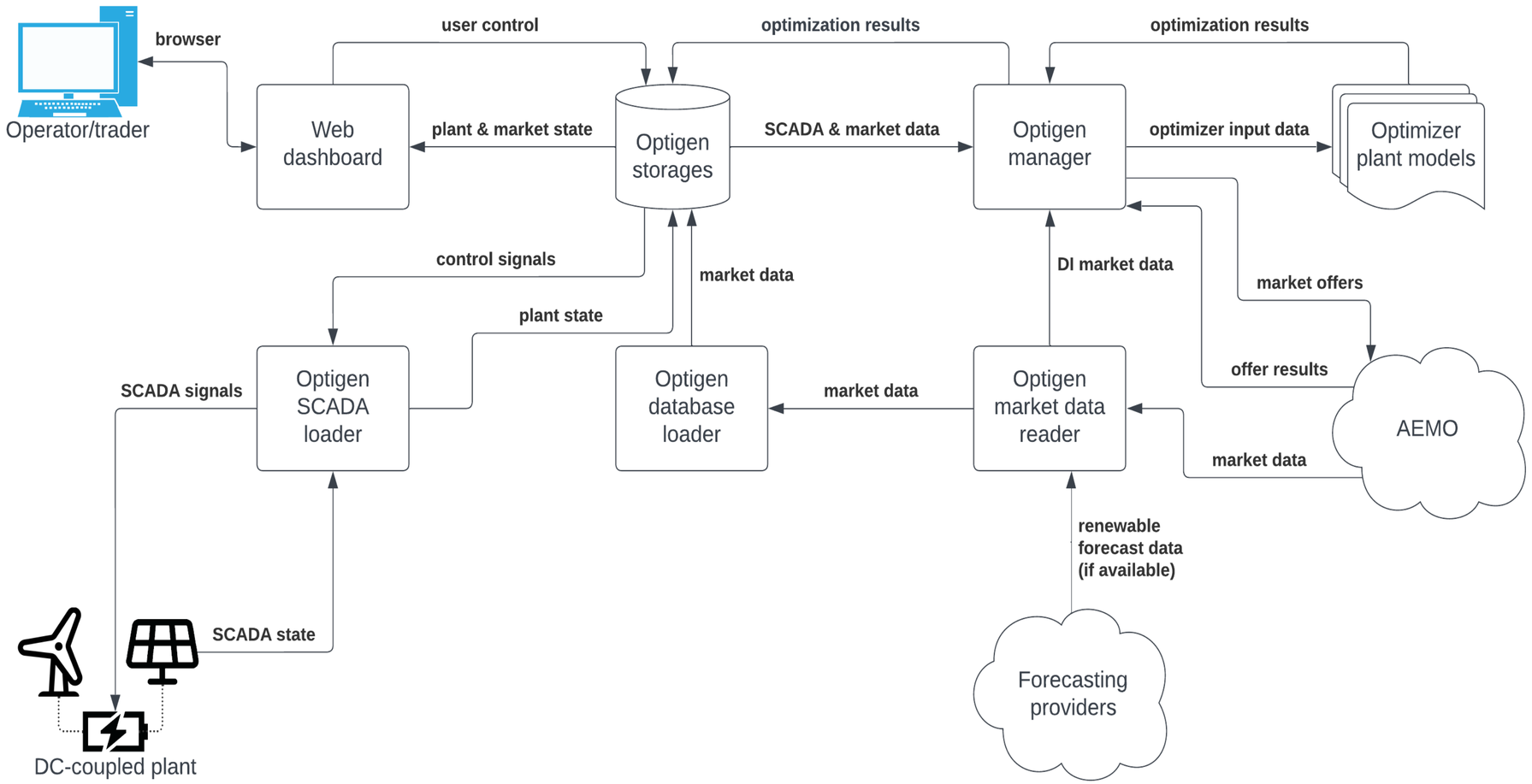
HORNSDALE TESLA/NEOEN POWER RESERVE

SOFTWARE DESIGN STARTED 1 AUG 2017
IN PRODUCTION ON 1 DEC 2017

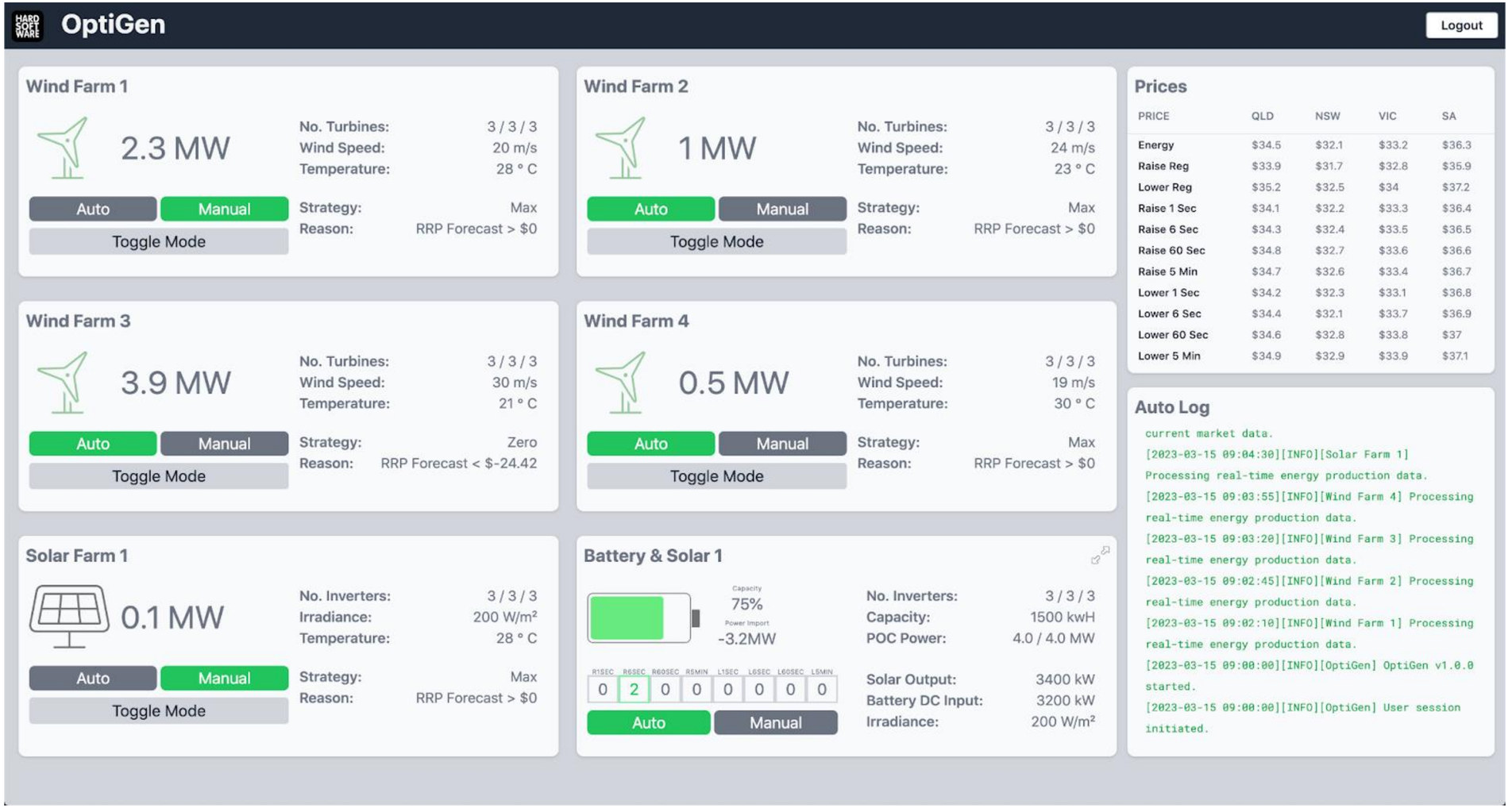
OPTIGEN OPTIMISED TRADING SOLUTION

Optigen scalable hosted solution logical diagram

February 2024



OPTIGEN OPTIMISED TRADING SOLUTION



OPTIGEN TECHNOLOGY

JULIA/JUMP

The optimisation multi-threaded module is written entirely in Julia using JuMP to interface to HiGHS.

MULTI-TENANTED

A principal feature of the design is to be able to run multiple site models on a single instance to allow for scaling the solution.

DISCRETE MODULES

Each other component of the Optigen framework is entirely independent and uses a unified Python multi-threaded architecture.

OPEN SOURCE

All programming & modelling languages, application infrastructure & operating systems are open source.

MESSAGING

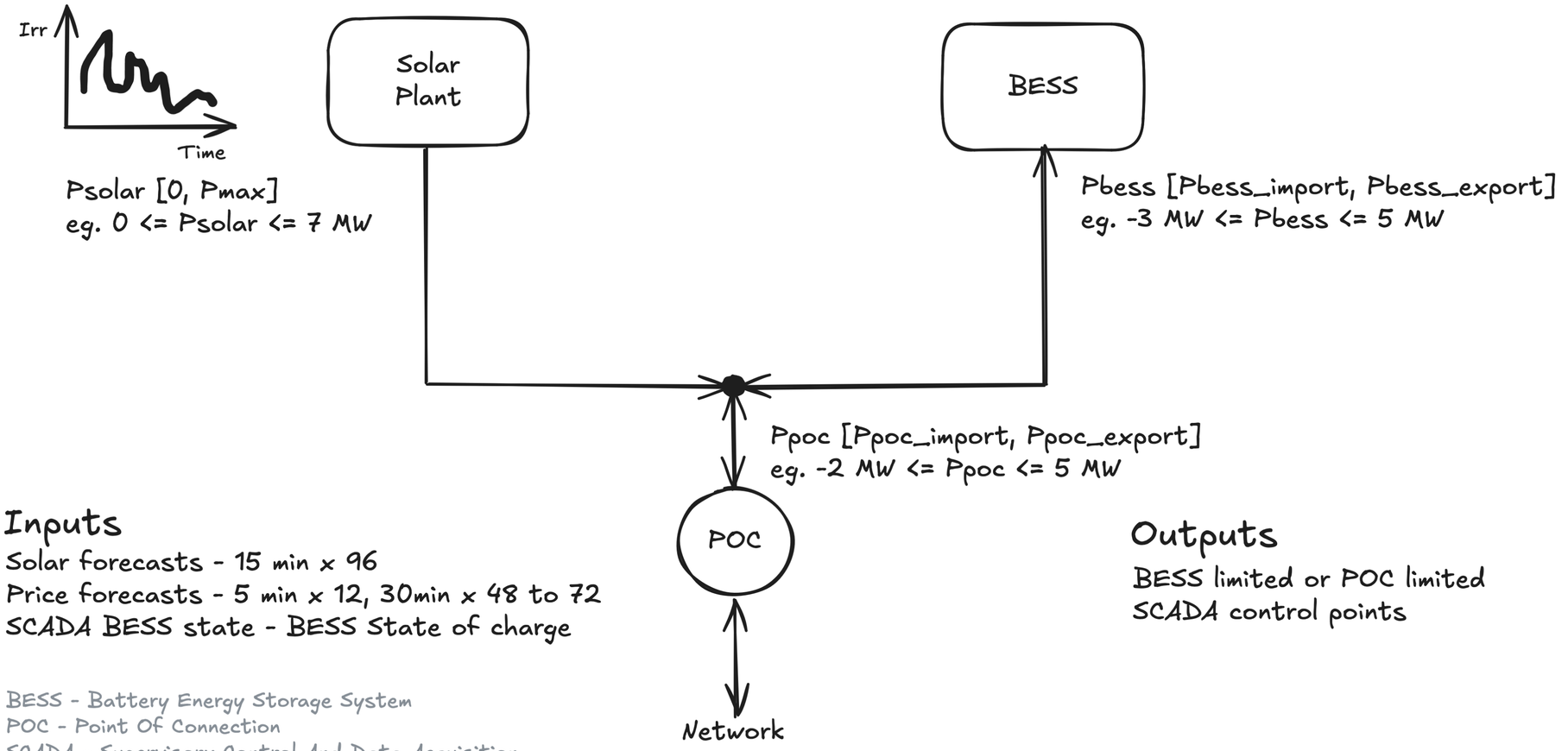
All inter-process communication is implemented using a unified messaging framework and message format.

DEPLOYMENT

A small, economical industry standard RTU device is used to provide the interface directly to the plant SCADA.

TYPICAL GENERATION PLANT SCHEMATIC

BESS with DC-coupled Solar



Inputs

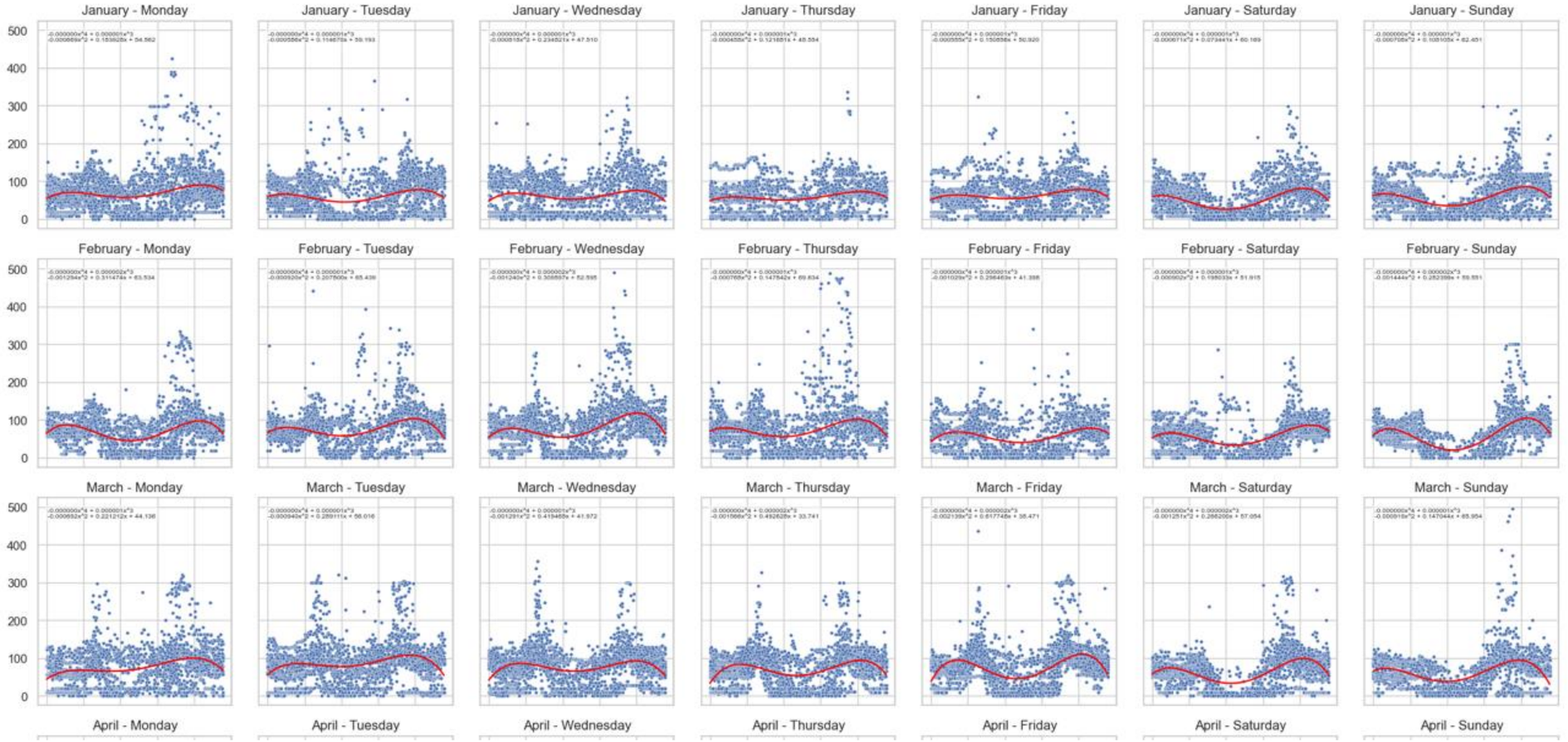
Solar forecasts - 15 min x 96
Price forecasts - 5 min x 12, 30min x 48 to 72
SCADA BESS state - BESS State of charge

Outputs

BESS limited or POC limited
SCADA control points

BESS - Battery Energy Storage System
POC - Point Of Connection
SCADA - Supervisory Control And Data Acquisition

STORAGE VALUATION APPROACH

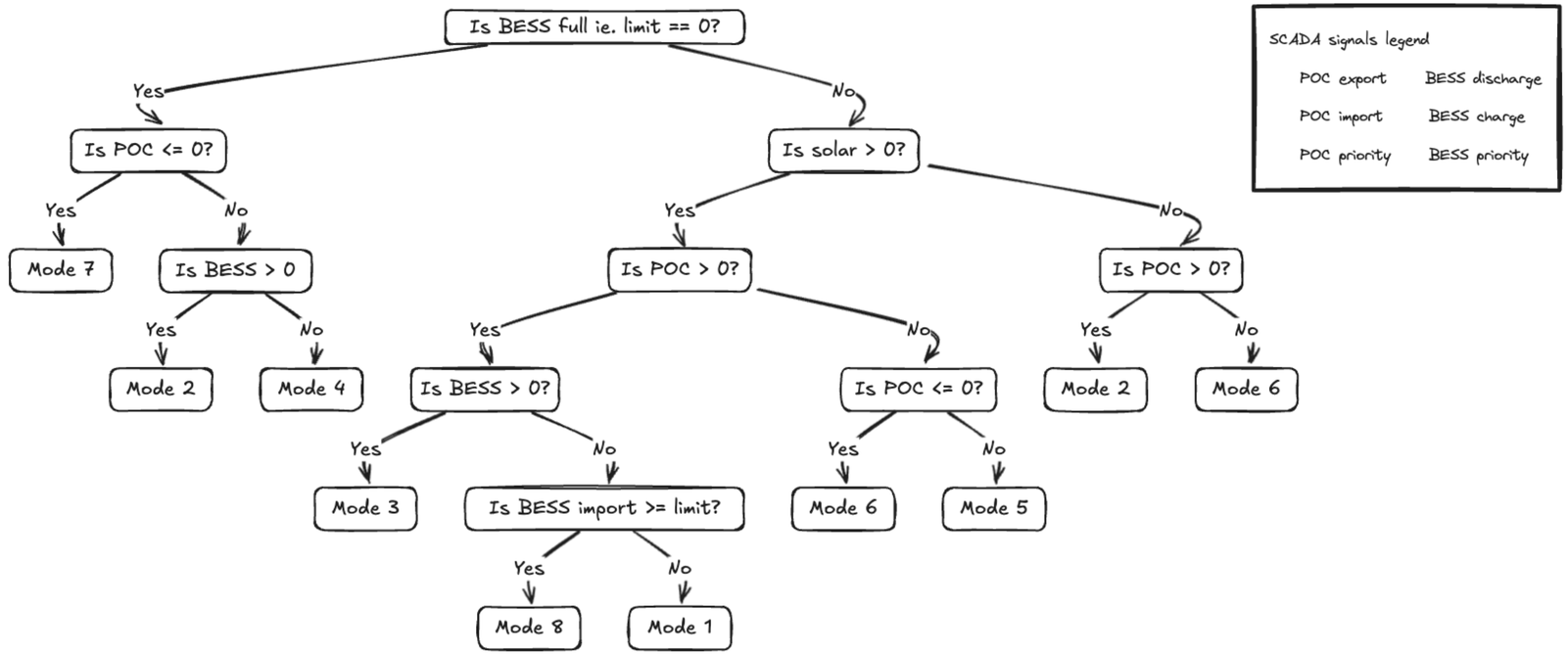


OPTIGEN CONTROL LOGIC

BESS DC-coupled solar optimisation scenarios

19 September 2024 - Dr. Harley Mackenzie
HARD software

Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7	Mode 8
max POC exp excess BESS	max POC exp & no BESS imp	max POC exp & BESS exp/imp	No BESS POC export	solar to import BESS	max imp BESS & POC import	No BESS or solar	max imp BESS & POC export
T F F T T F	T T F F T F	T T F T T F	T F F F T F	F F F T F T	F F T T F T	F F F F T F	T F F T F T



WHY DEVELOP A JULIA LP SOLVER?

UNDERSTANDING

Build upon insights from previous modeling projects to deepen understanding of solution techniques applied in Mixed-Integer Linear Programming (MILP).

IMPROVE SKILLS

Improve proficiency in writing fast, efficient and readable Julia code, with a focus on advancing optimization skills.

POTENTIAL RESEARCH

Create a research platform focused on MILP solution techniques to support potential postgraduate studies.

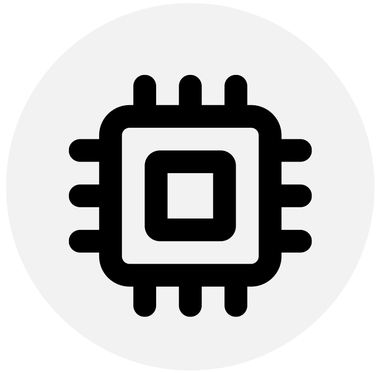
WHAT ARE THE ADVANTAGES OF JULIA?

MATHEMATICAL

Julia’s mathematical syntax and support for LaTeX-style symbols make the code both succinct and expressive.

FAST

Julia offers the rapid development advantages of Python while achieving performance comparable to C/C++, without the associated complexity.



GPU INTEGRATION

Julia provides robust support for GPU integration, enabling modern linear programming approaches like cuPDLP.jl.

WHERE IS THE JULINEAR.JL PROJECT?

GITHUB

A GitHub repository has been established for the project, with a strong focus on documentation and structure.

DISCORD

To build an active community around the project, a Discord server has been established to facilitate discussions and interactions between users and developers.

COLLABORATION

The project fosters collaboration and contributions, initially following a 'benign dictator' governance model, with plans to transition to a more democratic board over time.

KEY RESOURCE QR CODES

HARD software

juLinear.jl

Discord server

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