



The Innovation Hub

for Affordable Heating and Cooling

Stakeholder Consultation and IoT Forward Plan Report

Sustainability monitoring and energy innovation in 5 NSW Govt Buildings

Project DCH4

27 May 2022

PROPERTY NSW



About i-Hub

The Innovation Hub for Affordable Heating and Cooling (i-Hub) is an initiative led by the Australian Institute of Refrigeration, Air Conditioning and Heating (AIRAH) in conjunction with CSIRO, Queensland University of Technology (QUT), the University of Melbourne and the University of Wollongong and supported by Australian Renewable Energy Agency (ARENA) to facilitate the heating, ventilation, air conditioning and refrigeration (HVAC&R) industry's transition to a low emissions future, stimulate jobs growth, and showcase HVAC&R innovation in buildings.

The objective of i-Hub is to support the broader HVAC&R industry with knowledge dissemination, skills-development and capacity-building. By facilitating a collaborative approach to innovation, i-Hub brings together leading universities, researchers, consultants, building owners and equipment manufacturers to create a connected research and development community in Australia.

This Project received funding from ARENA as part of ARENA's Advancing Renewables Program. The views expressed herein are not necessarily the views of the Australian Government, and the Australian Government does not accept responsibility for any information or advice contained herein.



ARENA



Primary Project Partner

Property NSW

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The i-Hub Initiatives



**SMART BUILDING
DATA CLEARING HOUSE**



**LIVING LABORATORIES -
GREEN PROVING GROUNDS**



**INTEGRATED
DESIGN STUDIOS**



Stakeholder Consultation and IoT Forward Plan Report

Lead organisation	Property NSW		
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Project title: Sustainability monitoring and energy innovation in 5 NSW Govt Buildings (DCH4)

This project aims to evaluate the suitability of DCH as a data platform for Property NSW (PNSW) IOT Smart Building System.

Lead organisation

PNSW

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Background

Property NSW has implemented an IOT Smart Building System for its property portfolio. Property NSW has a diverse portfolio of commercial buildings across NSW, including properties and tenancies in Sydney and major regional centres, to properties in rural and remote areas of NSW.

This project aim is to ingest data from 5 buildings into the Data Clearing Hub (DCH), and evaluate the ability of the DCH to store, organise and structure the data in a standardised framework, such that anyone can query the information with high level of confidence, in order to generate business insights and actions that help optimise building performance, manage energy consumption and solar PV generation, and reduce R&M costs.

PNSW selected Jones Lang LaSalle (JLL) Command Centre software platform and implemented the system across 5 properties initially and subsequently expanded to a further 6 off sites across regional areas of NSW. The IOT system integrates data from a wide variety of sources including Building Management Systems (BMS), utility electricity, natural gas and water meters, wireless temperature, humidity, air quality and occupancy sensors.

JLL's IOT provider developed an API connection to onboard the data from the buildings to the DCH platform. The IOT platform and the DCH have been assessed and DCH applications reviewed with stakeholders to evaluate:

- The capability of PNSW IOT platform to provide facility managers the tools to investigate and analysis building performance.
- The use of applications developed on the DCH to provide insights to PNSW sustainability team and facility managers.
- The potential for PNSW software service providers to ingest data from the DCH and to develop applications using the DCH.

DCH Platform Assessment

Following the successful onboarding of data from the 5 off building at the following sites the following activities were undertaken to assist in the project evaluation:

- Access to the DCH platform to PNSW Sustainability team to assess the DCH user interface.
- Access to the DCH platform and associated technical consultation to PNSW software service provider to provide feedback on the potential for them to utilise the DCH to access data and / or to develop applications on the DCH platform.

DCH User Interface

The DCH user interface has the following primary uses:

- To analyse and review the properties of the data model and data within the DCH.
- To access, configure and operate applications within the DCH
- As an administration interface.

PNSW review of the DCH user interface is that the platform has made great progress during the milestone report period. Users are able to login the platform and reasonably easily access and review each building's data points and data model.

For general usage within the PNSW context the DCH would be accessed only by 'power users' who have a high level of technical understanding of the platform rather than general users such as facility managers. PNSW has developed a user friendly IOT interface via the JLL Command Centre platform and this is the primary access pathway to the IOT data for general FM and other users.

The key functionality required of the DCH in the PNSW context is to:

- a) Access the Apps on the platform, administer and run those apps across the data in the platform.
- b) Manage the data model for the buildings, such as adding zones, etc
- c) To manage and create API keys for service providers usage.

The visualisation of the building data model is an area that will need to improve so that users can more easily see relationships between data points and the building infrastructure. At present CSIRO buildings the data models, however over time it will become more of a requirement for users to be able to undertake this activity.

We would recommend that best practice guidelines are developed as it continues to be an issue of conjecture as to how detailed the building models and relationships continue to be.

DCH App Usage

User find accessing the DCH applications easy to access and run. An example of using a DCH M&V application for the Wagga Wagga site is shown below. M&V of energy savings following implementation of energy savings activities is an important ongoing activity as initiatives are undertaken to show actual against predicted performance.

Additionally the team ran the PMV thermal comfort app across all of the sites and found that this App was able to provide insights into opportunities for space temperature reset control strategies application during

summer times. An example of the PMV thermal comfort showing clearly overly tight space temperature control is shown

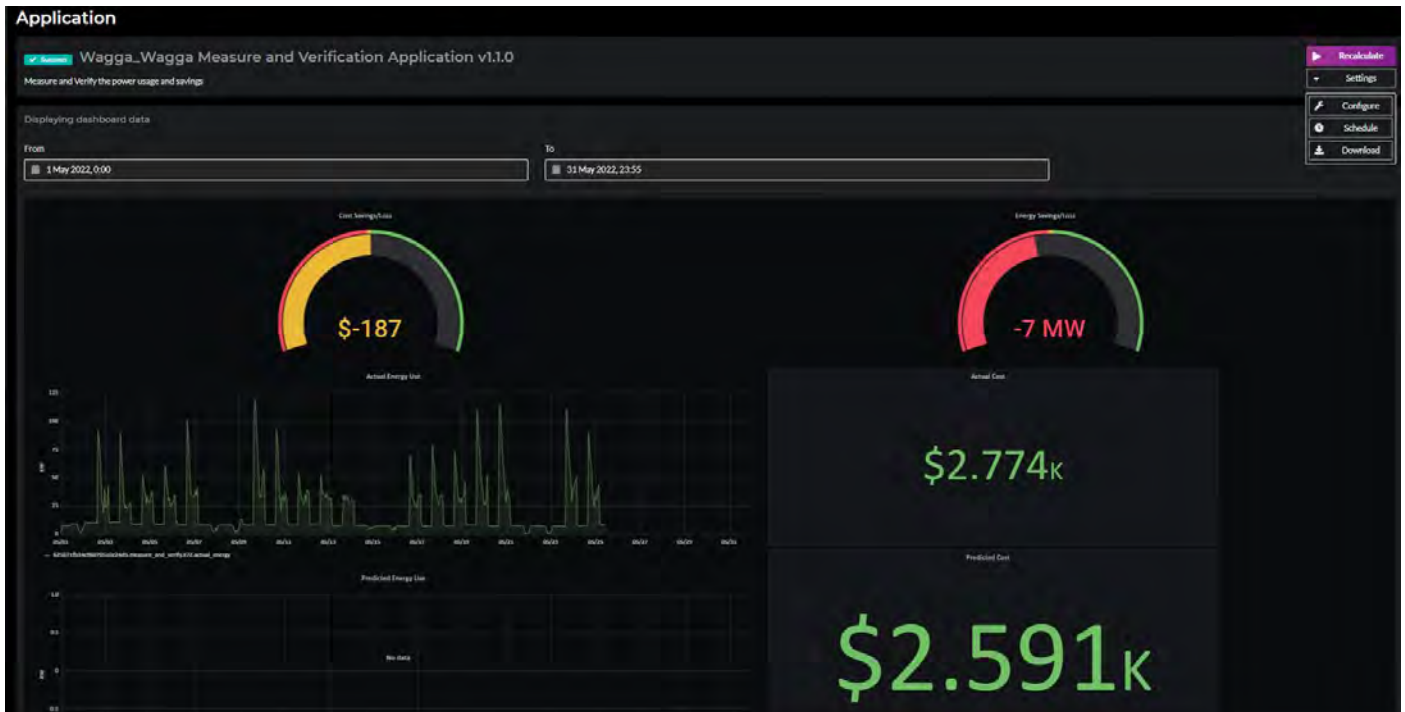


Figure 1: M&V Application showing actual vs predicted energy costs for Wagga Wagga site – May 2022

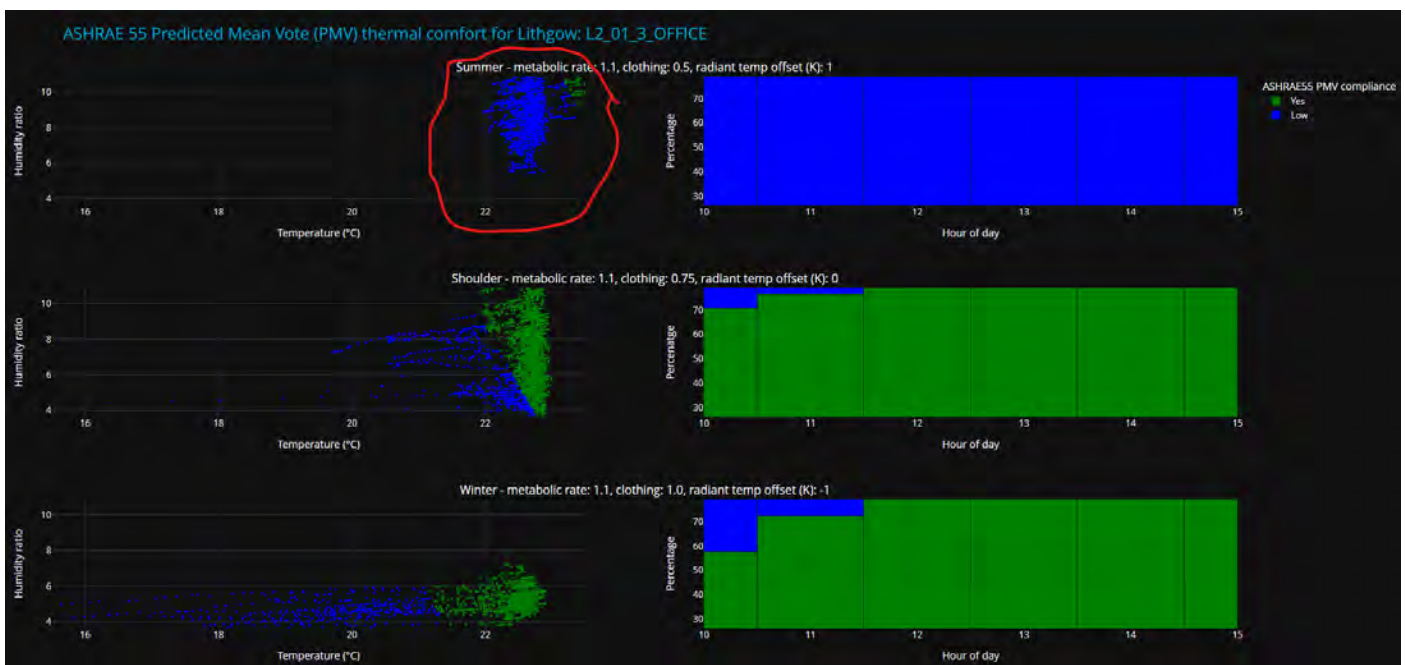


Figure 2: PMV App output showing summer temperature reset opportunity at Lithgow Site.

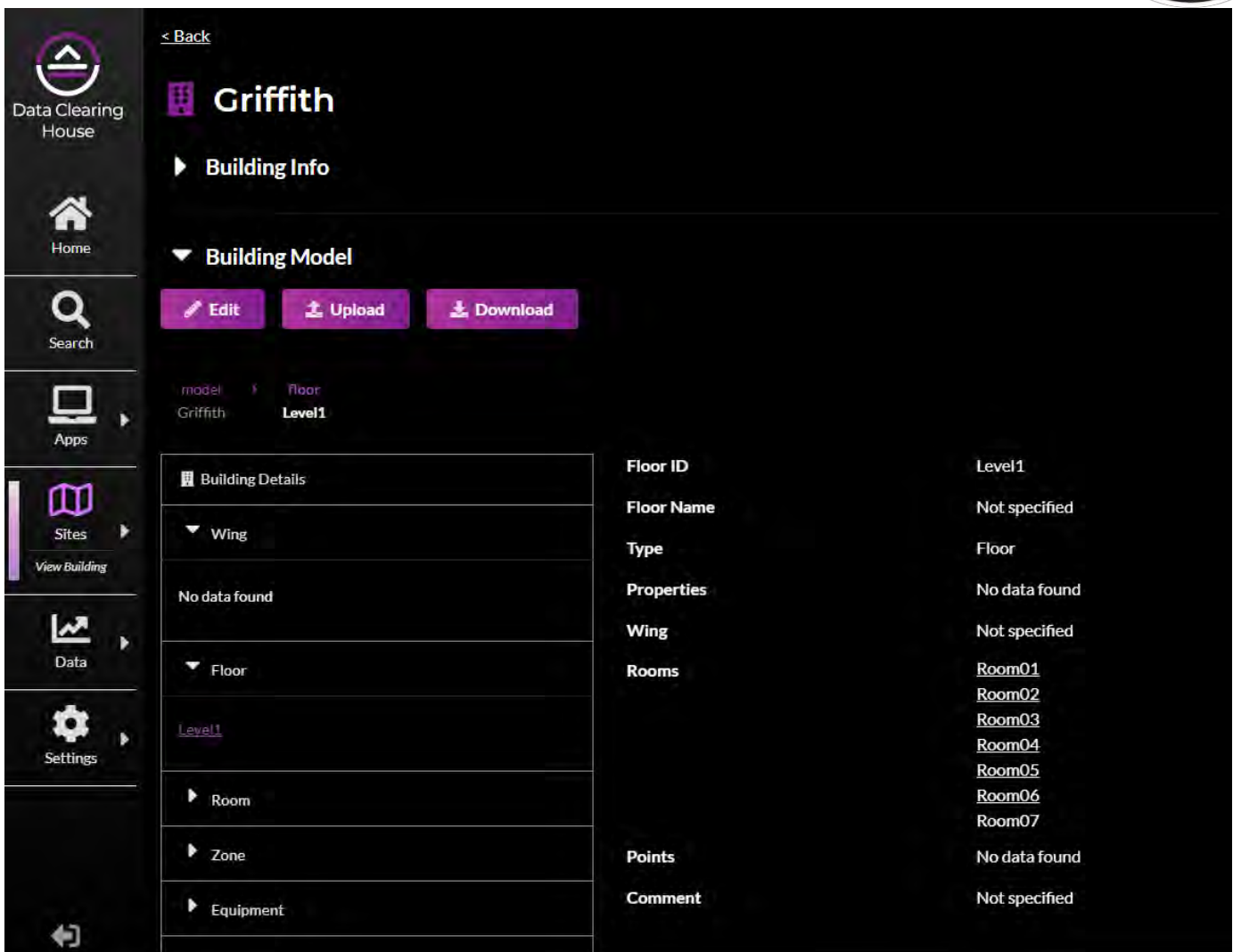


Figure 3: DCH Data Model configuration interface.

PNSW Service Provider Consultation

PNSW engaged with both JLL with respect to their Command Centre IOT application and with a service provider to PNSW who provides ongoing energy and utility performance monitoring based on analysis of utility performance on a daily basis which are used the PNSW sustainability team to provide continuous review and management of building performance.

JLL developed an API connector to the DCH platform to export data to the DCH from their IOT platform. The other PNSW service provider was asked to review the DCH to assess the potential of the platform currently to easily allow data export and to develop apps on the platform or using DCH data.

Data Export to DCH Commentary and Recommendations

JLL developed the API connector to allow all data types in their IOT data platform and provided feedback that this approach was an efficient approach in terms of the software development activities and future proofed the application by ensuring data additions, deletions and changes to the IOT data platform were automatically reflected in the data feed to the DCH.

On the DCH side the changes in the data feed are flagged to allow the appropriate data model changes to be undertaken. The approach taken with the JLL API meant that when six off additional buildings were

added to the IOT platform the effort to onboard to the DCH allowed a rapid export of the additional data to the DCH.

DCH Data Ingestions Commentary and Recommendations

A PNSW service provider reviewed the DCH platform with PNSW Sustainability team during the period November 2021 – March 2022 with the goal of addressing the following questions:

Q1: What is the ease of getting data from DCH?

The feedback was that the level of documentation and technical assistance provided by the DCH allowed software developers to interrogate the DCH quite readily, however as there is a large amount of data within the platform this presents practical problems for developers in developing efficient processes to filter data.

The DCH use platform assists in allowing users to filter and search for data types. Commentary from a developer:

“(The) Documentation requires more info about discovering what can be pulled (specific naming) of objects. Everything I’m learning about DCH will need to be re-learned by a developer and they cannot simply read up how it works.” – PNSW Software service provider.

“Sample app provided by DCH is useful, still working through the above data collection based on different data types from (the) example provided.

Q2: What recommendations would you make to assist DCH in developing the platform to assist app developers.

The developer praised the DCH team for being very responsive to issues and emails raised, they recommended that DCH provide a developer service page to provide service status and to provide notification of upcoming issues and upgrades. The PNSW developer provider requested that a API call that returns all sensor types will be useful.

Summary

In summary PNSW discussions with software service providers has shown that the DCH would be able to provide an alternative data source for their platforms, though further development and understanding of the interfaces is required. The wide range of data accessible through the DCH provide potential to develop performance models to integrate data such as occupancy and other BMS data to optimise energy models that assess building performance.

From a commercial perspective software developers are likely observe and assess whether the DCH is more widely adopted across the building space to determine their appetite to invest development resources in the data integration connectors, however the continual development of the DCH API should drive the actual costs down.

IOT Platform Consultation and Forward Planning

PNSW has continued to consult with its FM and Sustainability team in integrating the use of the JLL IOT platform into the FM functions as a ‘business as usual’ tool. The initial project involved the implementation across 5 off properties and this was expanded so the currently the IOT platform is rolled out across 11 off properties in the PNSW portfolio.

The goals of the IOT systems implementation enable FM's and stakeholders to interrogate both real time and historical data to enable timely notification and triage of issues, monitor and report on building thermal comfort and air quality, energy and occupancy performance.

PNSW continues to work with its teams to develop the use and efficacy of the system with a view to expanding the system as budgetary constraints allow.

Examples of feedback received from users:

"I find the system to be very user friendly and easy to follow."

"For remote managing FMs the use of this tool in conjunction with remote BMS access, permits much earlier resolution of issues that would otherwise be the case."

"Overall, the system is an excellent tool and provides an FM with early notification of issues and therefore resolution, and there will be a cost saving aspect to our client as a result."

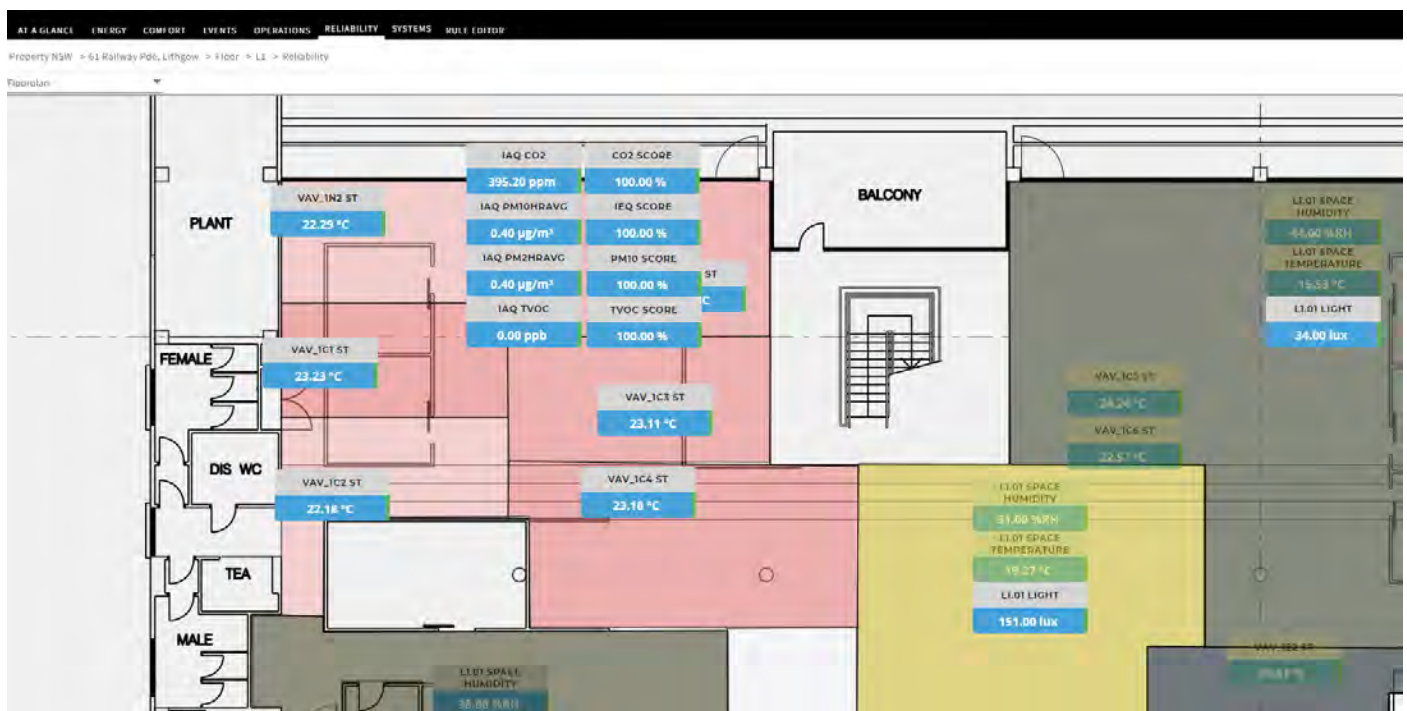


Figure 4: JLL Command Centre Real Time Display

In terms of integrating the IOT data with DCH all 11 sites are now providing data sets to the DCH. The most likely usage of the DCH for PNSW is to supplement the Command Centre IOT system with the Apps developed on the DCH to provide specialist functionality over and above that provided by the Command Centre system.

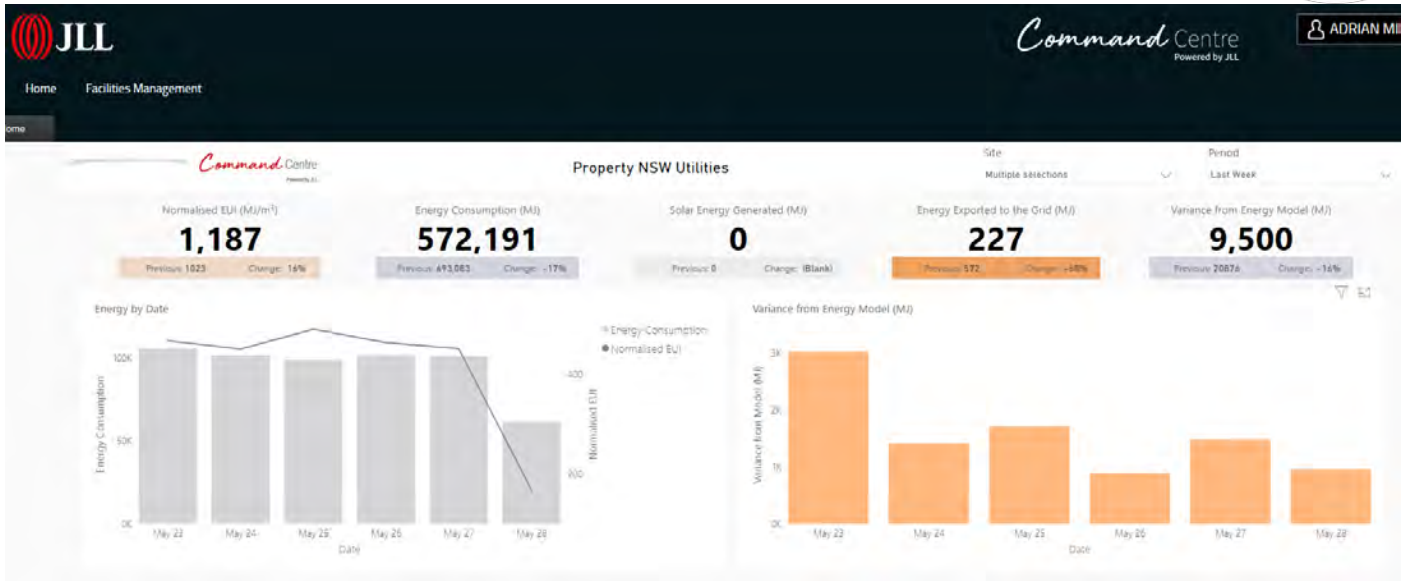


Figure 5: Energy performance reporting.

PNSW will continue to look to refine the usage of the IOT platform and to develop opportunities to expand the system as budgetary and operational conditions allow.