The Innovation Hub
for Affordable Heating and Cooling

Onboarding Report

Increasing the value of onsite renewables in Darwin through data driven analytics

Project DCH10

31 May 2022

Charles Darwin University

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.

Primary Project Partner

Charles Darwin University

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The i-Hub Initiatives

SMART BUILDING DATA CLEARING HOUSE

LIVING LABORATORIES – GREEN PROVING GROUNDS

INTEGRATED DESIGN STUDIOS

i-Hub Onboarding Report

Lead organisation	Charles Darwin University		
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Overview

This short report provides an overview of onboarding process for DCH10, which included the following objective - Onboard three buildings in Darwin region (two from Charles Darwin University (CDU) and one from City of Darwin (COD)) to the Data Clearing House (DCH) and record the onboarding experience.

Buildings on-boarded

The project team onboarded two buildings from CDU CDU's Casuarina campus:

- Blue 1 is an older (legacy) building with a Honeywell BMS, multiples of zone sensors controlling VAV's in the ceiling space. One large chilled water cooled AHU supplies air to the majority of the building, with two smaller ones supplying other zones.
- Pink 9 is a newer two storey building with a Trane (Trend) BMS. Pink 9 is fitted with rooftop solar PV with a capacity of 123kW with the power monitored using AZZO via the Schneider BMS. Utility data and onsite generation data will be ingested to DCH.

The other building onboarded was the Civic Centre, which is a legacy building of City of Darwin. Monitoring of this building will provide a baseline that can inform design of new buildings and improve the energy efficiency of the existing building and identify opportunities for use of on-site renewable energy. The existing

Process

The process of installing the Tridium JACE-8000 gateways was relatively simple. Our main points of contact were the IT and Facility teams at CDU and City of Darwin. Several meetings were held with these teams to determine the process and permissions needed to install the gateways and ingest data for the DCH. This included being granted network permissions to set up the JACEs.

The partner organisations allocated a physical location for the gateway to be installed and also provided network cabling to connect the gateways in their designated network (Figure 1). A CSIRO engineer travelled to Darwin to help oversee the installation of the JACE gateways, which was undertaken by qualified personnel from CDU and City of Darwin. The indicative system architecture to connect JACEs to DCH is provided in Figure 2.

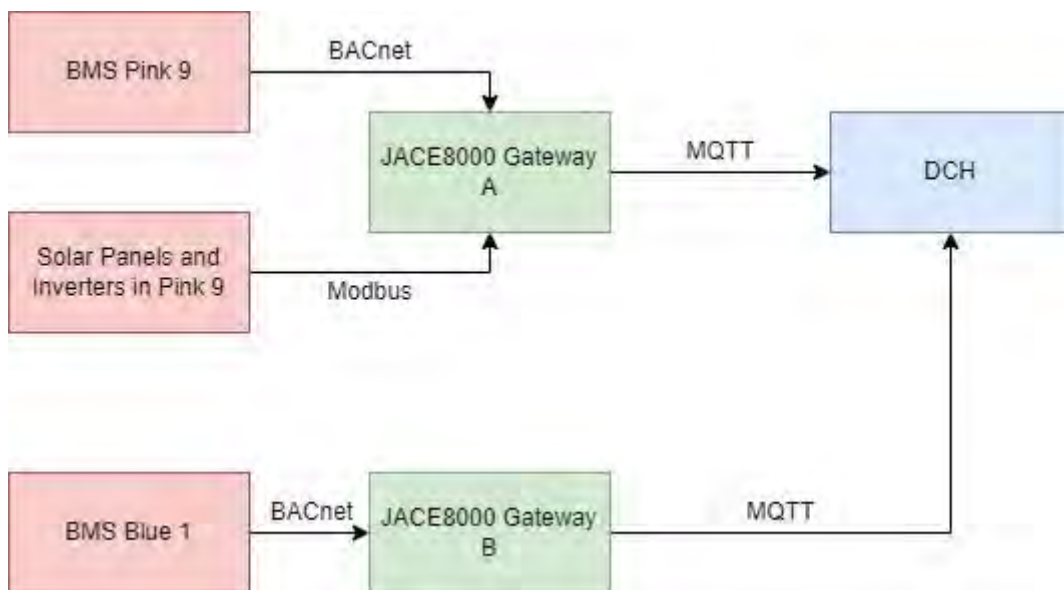*Figure 1: Installation of JACE gateway at Building Pink 9 (CDU)*

Figure 2: System architecture for onboarding selected buildings at CDU

Outcomes

The buildings from City of Darwin and CDU are onboarded and viewable in SENAPS. However, there is still no useful data flows that could be used for analytics or investigating energy efficiency strategies. The lessons learnt report provides more details on issues faced and implications for future onboarding of legacy buildings, but summary challenges faced included:

- Proper remote access: Since the engineers at CSIRO are bound by the CSIRO Cybersecurity protocols, using CDU or City of Darwin's VPN was a challenge. Several solutions were tested, but in the end a Vanilla Microsoft Windows 10 license was purchased by CSIRO and installed on a VM. CSIRO's VPN was disabled, CDU and City of Darwin's VPN software were downloaded on the VM and network testing was done. A Niagara license was also purchased to be used on the VM. Ports tcp_4911 and tcp_5011 were opened for our VPN access, while UDP and tcp_8883 were opened for the Jace gateway itself. This allowed us to configure and maintain the Jace remotely and send the site data to the DCH MQTT broker. This was the first project where CSIRO maintained the clients' gateways and this solution proved to be a scalable, secure and cheap method to treat these projects with.
- Stale/Faulty BACnet nodes and points: After the remote access was setup, we noticed a large amount of points at CDU were stale or faulty. Further conversation with the BMS provider and facility managers at CDU was required to debug these issues and identify the correct HVAC and Plant points.
- BMS vs. EMS data at City of Darwin site: The only device exposed to the JACE gateway at the Civic Centre site, was the EMS which measured some 3-phase power and energy points. These points were not labelled properly and it was difficult to understand their origin. The BMS device itself (which contains HVAC and Plant points) was completely hidden from the JACE. It was found this was due to proprietary data protocol from BMS provider. Further conversation with the BMS provider, IT team and facilities teams is under way to give JACE the access required to acquire these points.