Energy monitoring according to the National Construction Code

New changes to Section J8 and what that means for you

ENERGY MANAGEMENT AND BUILDING AUTOMATION

Australian National Construction Code 2019 - New changes to Section J8

And what that means for you

Focusing on Section J8 of the Australian National Construction Code (NCC), this document provides readers with greater insight into important changes released in May 2019 and will take full effect in May 2020.

Introduction to National Construction Code

The Australian Building Codes Board (ABCB) produces and maintains the NCC on behalf of the Australian government and each state and territory government. Its purpose is to outline the minimum performance-based requirements for a new and refurbished building's safety, accessibility, health, amenity and sustainability. To cover these requirements in detail for the design, construction and performance aspects of all building types the NCC publishes the Plumbing Code of Australia (PCA) and the Building Code of Australia (BCA) Volume One and Volume Two [1].

Volume One of the BCA focuses on large buildings that are likely to include multiple stakeholders such as apartment buildings, public assembly areas and all other commercial buildings. Volume Two covers small scale buildings such as residential houses.

Working with relevant industry groups the ABCB routinely updates the NCC every three years. This ensures that the requirements are relevant to the current pressing issues such as global warming and sustainability and are achievable through industry known methods and technologies.

Who is effected by the change?

Any building in the design stage that hasn't proved its compliance with the NCC 2016 BCA – Volume One by May 2020 should comply with the NCC 2019 BCA – Volume One.

What is Section J?

Section J outlines the minimum requirement level of sustainability and energy efficiency of a building's performance. This section includes a set of guidelines that facilitate the building's compliance, which have been subdivided into parts as listed below. This section also outlines the methods of verifying the building's conformance.

- Energy monitoring facilities
- Lighting control systems
- Temperature control and ventilation systems
- Other requirements (i.e. structural requirements and water heating)

The amendments to Section J of the 2019 NCC aim to further improve the building's performance with respect to energy efficiency without compromising performance or the comfort level of its occupants. These changes utilise the technology available today to reduce the building's greenhouse gas emissions by better monitoring and controlling its loads. The full list of amendments can be found on page 739 of the NCC 2019 BCA – Volume One standards.

[1] *NCC 2019 Building Code of Australia - Volume One page 9*

Energy monitoring (Part J8.3)

Part J8.3 outlines the energy monitoring requirements for new and refurbished buildings based on the building class and floor area (total and common area considered).

For small buildings (i.e. floor area less than 500m^2), an energy meter must be installed to capture electricity and gas usage in accordance with J8.3(a). This is usually captured by default by the utility meters installed by the energy retailer.

For larger buildings, 8.3(b) requires building class 2 to 9 [2], with floor area more than 2,500m^2 and a common area above 500m^2, to record the energy consumption of the following loads [3]:

- Air-conditioning including, where appropriate, heating, cooling and air handling fans
- Artificial lighting
- Appliance power
- Central hot water supply
- Internal transport devices including lifts, escalators and moving walkways where there is more than one serving the building
- Other ancillary loads

One of the challenges currently faced in utilizing the data captured as per 8.3(b) is the ability to access this information quickly and easily.

A **NEW** criteria in the 2019 NCC is Part 8.3(c), requires the energy data captured as per 8.3(b) to be centralised via a single-user interface where this information is to be stored, analysed and reviewed.

This new clause will ensure that in data gathered by the individual meters is not lost or stored in an unreachable database and is made easily accessible to stakeholders for better analysis.

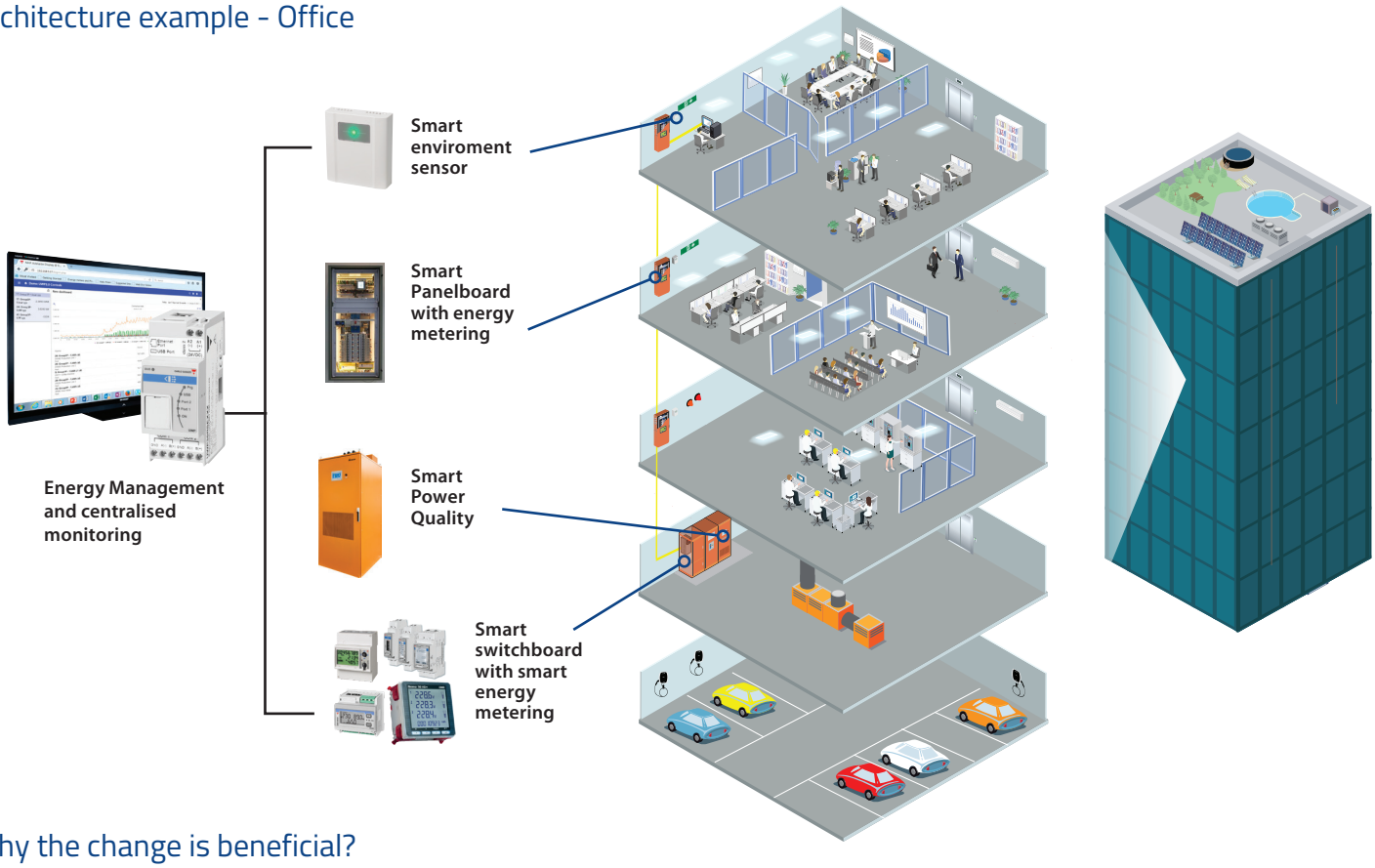
Key takeaways

- Energy meters must have the facility to communicate to a single user interface (i.e. through a common method such as MODBUS communication).
- The single user interface must be able to collate information from various types of energy meters (meter type and brand).
- The information captured must be time stamped. (i.e. energy consumption recorded with reference to time and date).
- Ideally the information captured should be easily identifiable (i.e. loads outlined in 8.3(b) should be grouped and/or labelled appropriately within the single user interface).
- The single user interface must have the facility to store energy consumption information for a reasonable period of time (data storage capacity not specified).

[2] *Building Classification table located on Appendix 1*

[3] *NCC 2019 Building Code of Australia - Volume One Part J8.3 page 386*

Architecture example - Office



Why the change is beneficial?

The old saying remains true: if you do not measure, you cannot improve. Understanding how a building is performing with respect to energy consumption, begins with having access to the right information, which should be easy to find and interpret.

With the introduction of the requirement for a single user interface to collate and store energy data (Part J8.3(c)), decision makers will have greater visibility into where and how the energy within a building is being used. Providing a platform, this energy data is useful as a benchmark against industry standards and business objectives. It can also lead to identifying further energy efficiency improvement opportunities.

A well-functioning energy monitoring system can provide benefits such as:

- Valuable insight into the building performance with reference to energy targets and other requirements as highlighted by the NCC (i.e. maximum usage attributed to air conditioning as per Part JP1 and Part J5 [4] [5].
- Facilitate the implementation of an energy plan and manage peak demand more effectively.
- Identify irregularities, which can assist to prevent downtime and proactive maintenance scheduling.
- Improved suitability and performance rating that can help achieve better returns and higher occupancy.
- Greater visibility to asset's energy data helps protect assets and improve capital value.

Improving building energy efficiency is one of the quickest and most cost-effective ways to reduce greenhouse gas emissions and help mitigate climate change. While there are many important updates to the other sections of the 2019 NCC, the amendments to Section J provide an important step towards raising the standards of Australian buildings and reducing the sectors carbon footprint.

NHP's Energy Monitoring Solutions

NHP have a wide range of energy meters available to monitor all types of loads within your building. NHP's own Concept panelboards series includes the dual energy meter EM270 which is capable of monitoring 2x 3 phase loads or 6x single phase loads within the single meter. This means Light and Power metered sections or individual branch feeder sub circuits metering provide energy consumption data and power analytics which can be exported for reporting and centralisation.

HVAC, lighting and water storage control is also available via time clocks, PE cells and sensors reducing unnecessary consumption. All these systems allow more efficient management of the technologies contained within the Concept Panelboard and also provide switchgear health analytics. For greater granularity, the WM50 branch circuit energy meter can monitor up to 96x circuits from the single unit, giving the option to monitor energy usage down to a single circuit and appliance. Communication options such as MODBUS and BACnet available across the NHP range of energy meters.

[4] *NCC 2019 Building Code of Australia - Volume One Part JP1 pages 338*
[5] *NCC 2019 Building Code of Australia - Volume One Part J5 pages 365 - 376*

Centralising all the energy data into a single user interface is a key requirement of the new 2019 NCC and an easy solution to this is the VMU-C energy management controller. The VMU-C is a powerful energy monitoring tool that collates and stores energy meter data and displays this information in an intuitive and configurable user interface. Featuring an in-built webserver, all captured information in the VMU-C is remotely accessible via an internet connection.

With its integrated machine to machine functionalities, the VMU-C is also capable of automatically transferring data via FTP, HTTP or MODBUS/TCP to a remote server where a SCADA, BMS or any other database is running.

For medium sized installations, the UWP 3.0 has the capacity to centralise even more meters, smart BMS, power distribution devices, and other web-server based energy management systems (ie VMU-C). In addition to being compatible to SCADA and BMS it offers flexibility to transfer data to Microsoft Azure or Amazon AWS cloud based systems.

Large installations are supported through advanced softwares systems, EM² which provides valuable insights into building operations and improvement opportunities. It delivers a multi-site building intelligence platform, including advanced analytics, fault detection, smart alerts and in-built reporting capabilities.

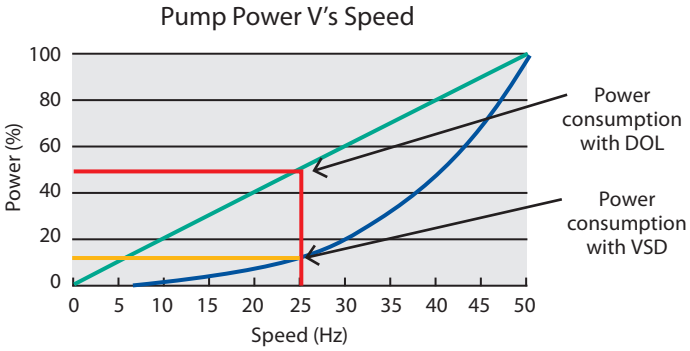
Other Technologies for Energy Efficiency available from NHP

A side from meeting the section J NCC requirement, the benefits of achieving energy efficiency includes the reduction of business operational cost, flexibility of building design and saving time on maintenance. Not all technologies that are currently available in the market have been utilised in this version of the NCC requirements. As the NCC covers provisions for all building types, the energy efficiency requirements have been kept to loads that buildings in all industries are likely to use. For sites that have larger energy usage additional step towards sustainability might be desired in order to fully save on daily energy usage costs. Below is a list of technologies that can be utilised to reduce energy costs and greenhouse gas emissions of a business.

- **Soft Starters** – are designed to maximise the efficiency of motor starts and stops. Using a soft starter instead of a traditional starter solution can help reduce the amount of wear and tear on motors and equipment by reducing the energy supplied to the motor during startup. The SMC-50 soft starter from Allen Bradley includes system maintenance and equipment health tracking for ease of maintenance management as well as power factor calculations for energy consumption tracking.

- **Smart Switchboard** – an AS/NZS61439 Design Verified solution that allows for the integration of metering, circuit breakers and panel mount sub circuits to provide energy demand behaviour. The Terasaki Air Circuit Breaker with 'cluster on body' design allowing for complete maintenance with minimal down time.

- **Variable Speed Drives (VSD)** – by running motors at lower speeds, the use of a VSD can save up to 50% of the power usage. The Allen Bradley PowerFlex range has communication capabilities which allows it to monitor the motor's health to identify potential issues and opportunities for improvement.

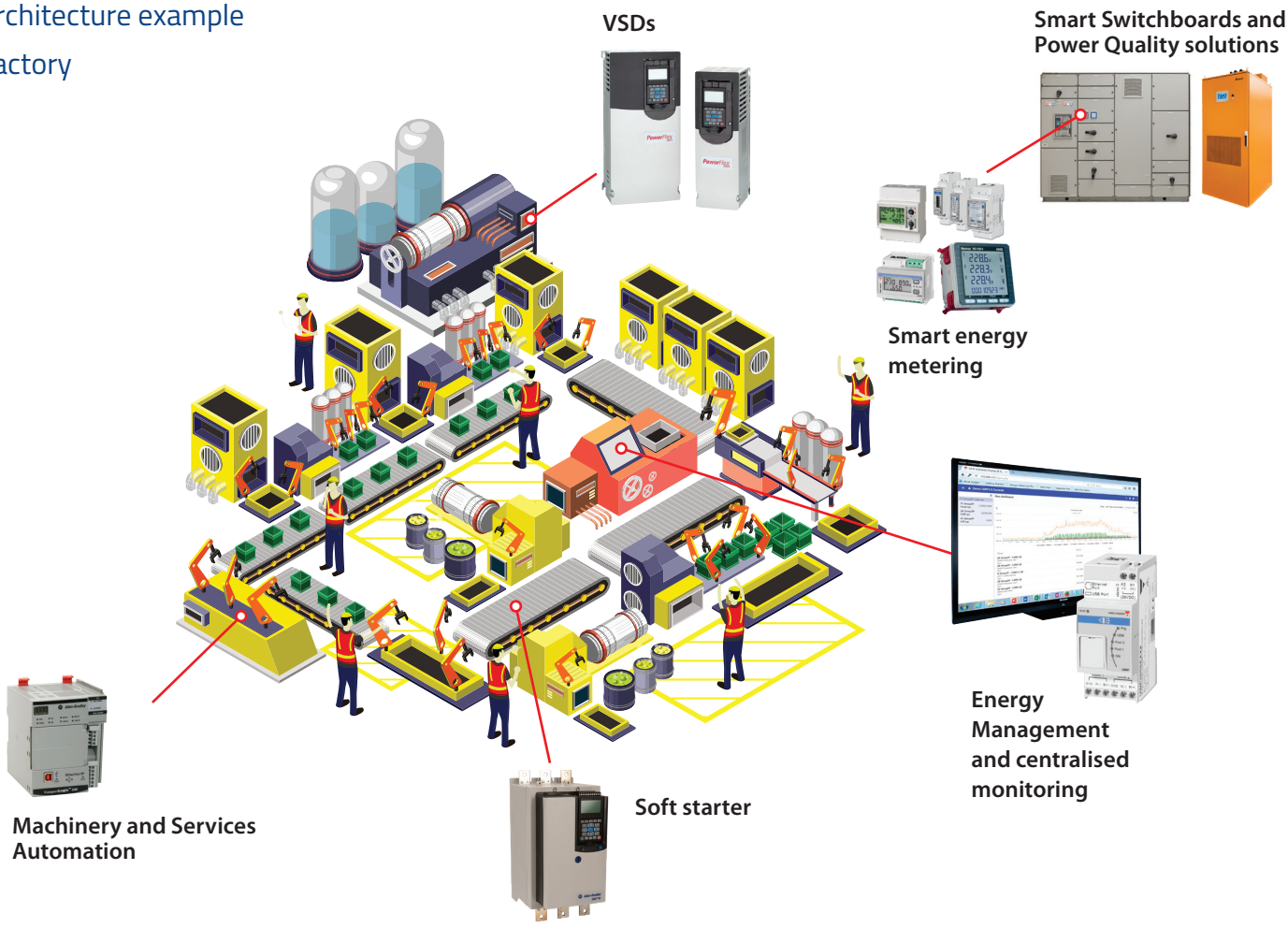


- **Smart Power Quality Solutions** – power factor correction and harmonic mitigation ensures the site has clean, balanced power which would contributes the longevity of the site equipment's lifecycle as well as reducing the energy cost on wasted power (ie. cost of power factor).

- **Allen-Bradley CompactLogix controller** – High-performance control for automating larger or multi-purpose machinery. It can be programmed to run the machinery in accordance to the site's working hours or used for peak shaving to reduce on energy costs. An ideal controller for site-wide integrated automation.

Architecture example

Factory



Appendix 1

NCC Building Classifications [6]	Description
Class 1	Single dwelling residential building (residential house)
Class 2	Multi-dwelling residential building or sole-occupancy unit (apartments)
Class 3	Accommodation building other than class 1, 2 and 9 (residential parts of hospitals, elderly living facilities, boarding houses and hostels)
Class 4	Residential part within a commercial building (caretaker's residence in a factory or storage facility)
Class 5	Office buildings (GP offices included in this class)
Class 6	Retail buildings or spaces
Class 7	Warehouses and storage buildings
Class 8	Factory and manufacturing buildings
Class 9	Public use buildings (schools, religious or civil buildings, hospitals and assisted living facilities with 24-hour care)

[6] "Understanding the NCC, Building classification" - https://www.abcb.gov.au/Resources/Publications/Education-Training/Building-classifications

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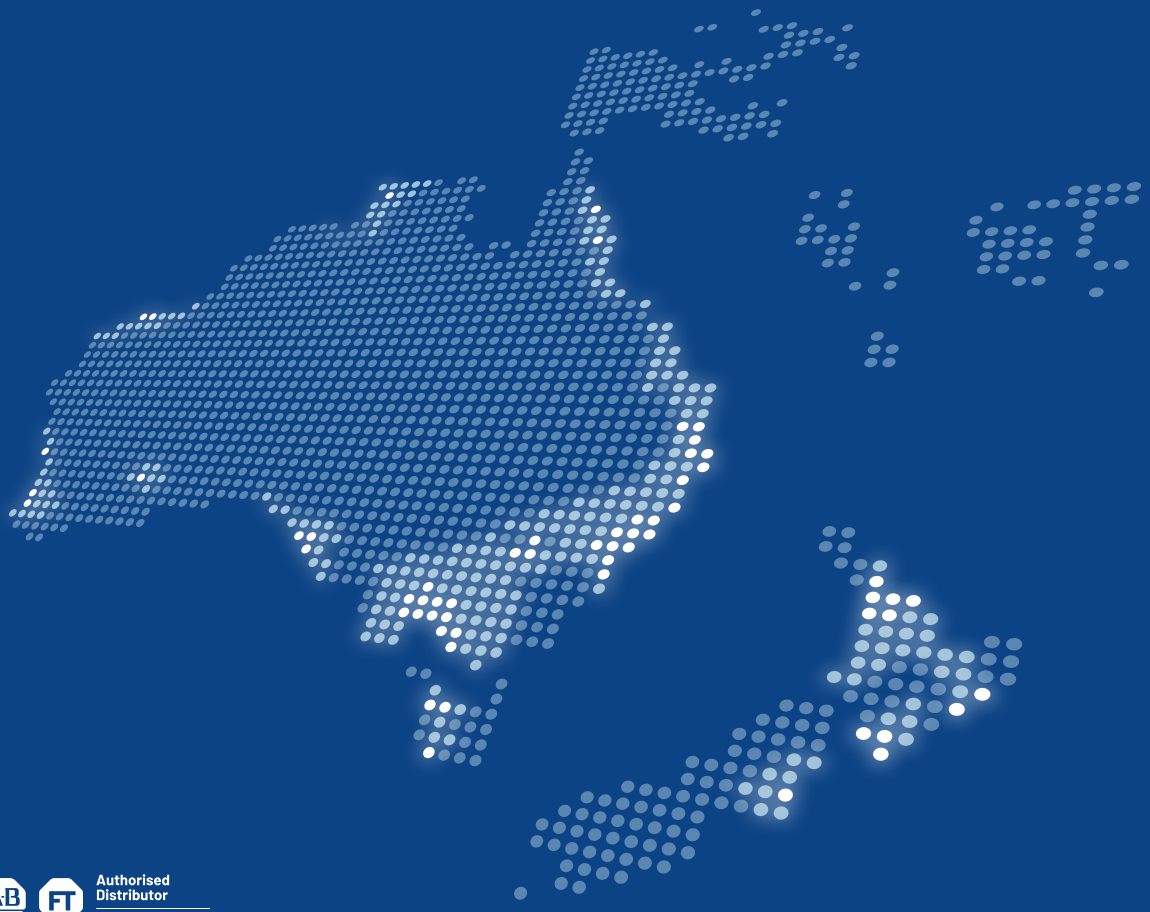

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