NODE OF EXCELLENCE IN HIGH PERFORMANCE ARCHITECTURE

# RETROFIT DECISION SUPPORT MODEL FOR THE NET-POSITIVE DEVELOPMENT OF MEDIUM-HIGH DENSITY RESIDENTIAL PRECINCTS

## Aim

This research aims to develop a retrofit decision support model for the management of medium-high density residential precincts to achieve net-positive outcomes.

## Research Problem

Many argue that sustainable design in the Built Environment is becoming largely about achieving performance targets and 'reducing' negative impacts. Essentially, we need to do better! The idea of 'net-positive', despite having widely varying interpretations, is built on the premise that we must change from this mechanistic worldview to that of a regenerative one. This is starting to become evident in new precinct developments. However, the challenge still remains for existing precincts to make this transition to net-positive.

Potential issues with current research on retrofit decision support models are that:

- Very few are making this shift to a regenerative focus.
- The focus is still predominantly at an individual building level.
- They are extremely complicated and time consuming with multiple, and sometimes competing, objectives – the irony here is that sustainability itself (especially a 'net-positive' agenda) is a multi-objective problem.

## Research Questions

- Can the appropriate use and management of renewable energy technologies lead to net-positive outcomes in medium-high density residential precincts?
- How do building & precinct characteristics influence retrofit management decisions in achieving net-positive outcomes?

## Proposed Conceptual Framework

The proposed conceptual framework (Fig. 1) gives a broad outline of the key concepts and questions related to achieving net-positive outcomes. The 'below-the-line' concepts form the foundation of net-positive outcomes by producing high performing individual buildings, but this doesn't tell the whole story. The 'above-the-line' concepts suggest an interaction between buildings, their occupants and the community within a larger system. It is not about treating these concepts in isolation but how they can work together to achieve net-positive outcomes.

> Not simply about producing more energy but "identifying the purpose and designing how the excess resources will be deployed." (Cole & Fedoruk, 2014)

## Net-Positive Retrofit Decision Support Components

Fig. 2 highlights the proposed components that are related to achieving net-positive precincts specifically through retrofitting. Primarily this involves the effective management of excess resources that goes beyond a building scale to develop interactions between buildings at a larger precinct scale. However, in order to produce this excess, consideration should be given to the building/precinct characteristics and climate. This also wouldn't be possible without the appropriate management of more conventional retrofit components such as policies and regulations, value for money and client expectations and resources.

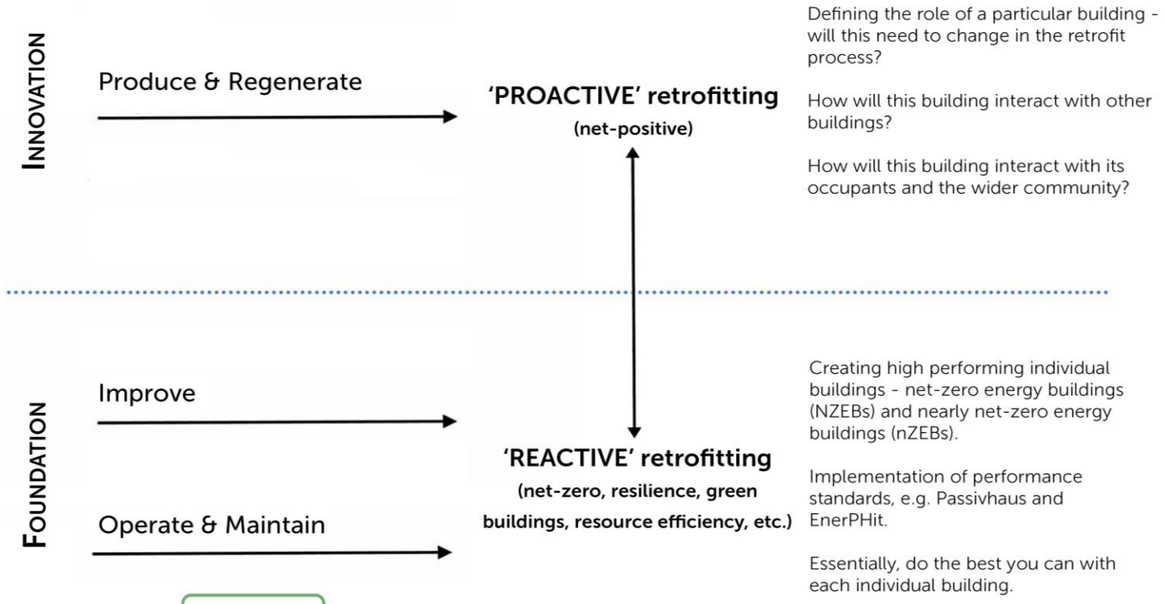


Figure 1: Proposed Conceptual Framework based on Charles Krone's systematic framework 'Levels of Work'.

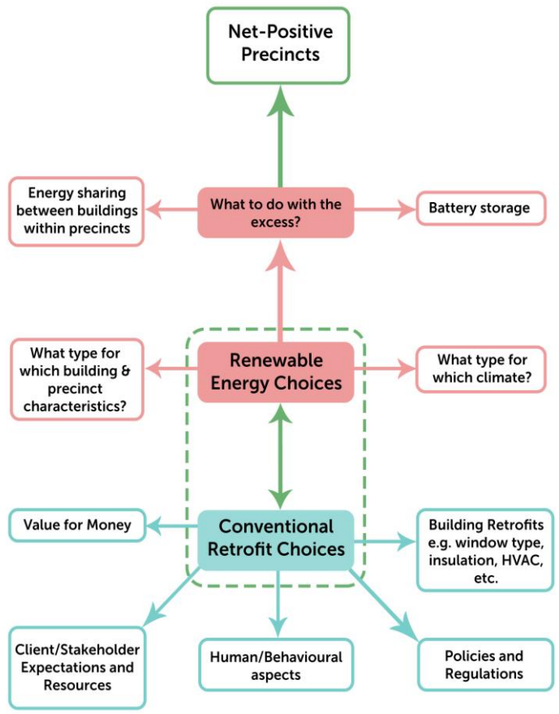


Figure 2: Net-Positive Retrofit Decision Support Components.

## Further information

I commenced a Masters by Research program associated with CRC LCL's Node of Excellence in High Performance Architecture at UNSW in 2nd Semester 2015.

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