

Suitability Assessment of Energy Allocation Principles in Multi-Owned Buildings

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Introduction

The burgeoning population demands the vertical development of cities that progressively paves the way for high-density 'Multi-Owned Buildings' (MOBs), which can act as micro-energy communities to generate the necessary energy to sustain the occupants. However, while approximately 1 in 4 detached homes has embraced solar panels in Australia, the rate in apartment buildings is merely 0.6% (Choahan, 2017), not utilising around 4GW of rooftop solar potential (Roberts, Bruce, & Copper, 2018). Australia follows the strata title system that confers the apartment owner with the ownership of their unit and shared ownership of the common property. The spatial limitation in high-rise buildings necessitates the installation of solar panels on the rooftops that the residents jointly own. Moreover, any modifications to the rooftop mandate the unanimous consent of the residents, of which the percentage varies based on legislation. Disagreements over cost allocation, the energy consumption of units, and the distribution of benefits among residents intensify the issues.

The allocation of common costs and benefits through lot entitlements has been a contentious issue with legal consequences. To achieve the net-zero targets in buildings, it is essential to establish a framework that delineates the ownership of energy from a collectively owned renewable energy system (RES) backed by policy and regulatory repercussions. The 'Energy Entitlement', which defines the fair share of renewable energy that each unit is entitled to manage (Poshnath, Rismanchi, & Rajabifard, 2023), is such a concept that plays a crucial role in advancing the implementation of RES in MOBs. Figure 1 illustrates the various factors that can potentially influence the 'Energy Entitlement'.

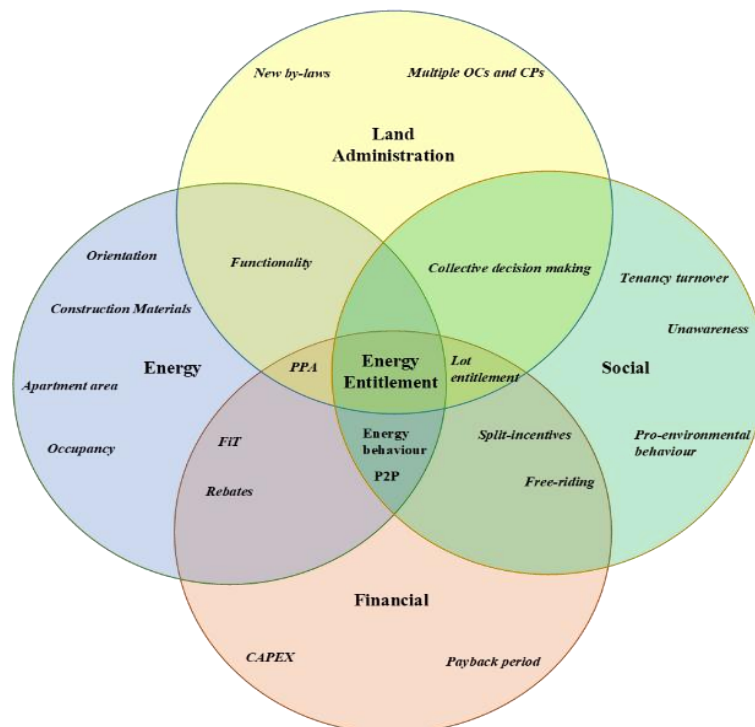


Figure 1: Factors influencing the Energy Entitlement under various categories

The Victorian Current Acts state that ‘lot entitlement in the plan must be allocated on the basis of the market value of the lot and the proportion that value bears to the total market value of the lots’, while ‘lot liability’ should be allocated equally between the lots unless there is significant variation in size of the lots, usage of common properties, or the number of occupants. However, none of these principles caters to unique attributes of energy that can differ due to factors such as apartment characteristics, building height and energy efficiency standards. Due to the inferior RES adoption rate in MOB, discussions surrounding the energy allocation process and energy ownership within apartments are scarce. The report aims to address this void by introducing a unique perspective of assigning the established attributes of common property to renewable energy generated and analysing the repercussions of the energy allocation principles. Considering the suggestions put forward by (OCA, 2006) and (Victorian Current Acts), allocation based on lot entitlement, floor area, number of occupants and equal allocation are considered for the suitability analysis.

Performance of Allocation Principles

This study examines a hypothetical MOB consisting of ten apartments with varying floor areas, occupancy, and lot entitlement with a total renewable energy generation capacity of 100 kWh/day. To estimate the average daily usage based on occupancy, the fact sheets of Victorian electricity retailers are considered. Figure 2 illustrates the variation of allocated energy for each apartment based on the chosen allocation principle with features of the building tabulated in Table 1. Thus, it is evident that the choice of allocation principle plays a vital role in the apartment’s individual energy entitlement, thereby impacting per-capita cost and benefits.

Table 1: Characteristics of Apartments

Households	Floor Area (sqm)	Lot Entitlement	No. of Occupants
Apartment 1	60	83	1
Apartment 2	60	76	1
Apartment 3	60	83	2
Apartment 4	60	61	1
Apartment 5	100	98	2
Apartment 6	100	91	3
Apartment 7	100	91	4
Apartment 8	150	128	3
Apartment 9	150	143	4
Apartment 10	150	151	5

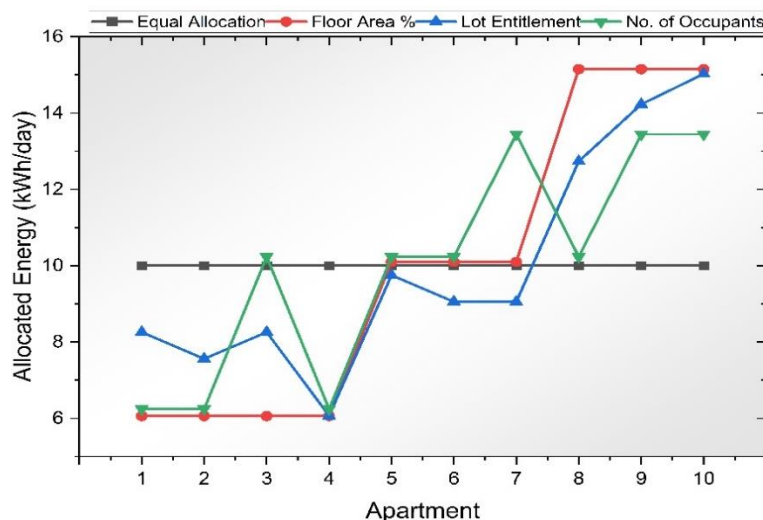


Figure 2: Performance of Allocation Principles

Dispute Analysis

The suitability of the allocation principles may vary depending on the building typology. Each allocation principle carries an inherent risk of disputes that can potentially hinder the adoption of RES. However, there is limited literature on disputes specifically related to the allocation principles due to the inferior adoption rate of RES or lack of documented disputes. Thus, this section considers the various cases registered against the distribution of common services to conclude the potential suitability of energy allocation principles. Table 2 briefs the suitability of the allocation principles against implementation, equitability and potential to achieve net-zero energy.

- **Equal Allocation** – Despite the easiness of implementation, the inequitable nature of equal allocation is expected to sprout issues. For instance, in ("The Owners – Strata Plan 74602 v Eastmark Holdings Pty Ltd," 2015), the equal allocation of costs arising from the electricity consumption from a common switchboard raised concerns. The equal allocation may result in some units benefitting from surplus energy due to lower demand, not benefitting equitably, forcing them to depend on the grid to draw energy. Such imbalances significantly hamper the transition to a net-zero energy building.
- **Lot entitlement** – Backed by law, lot entitlement is a validated approach for allocating benefits and liabilities of common properties. However, lot entitlement reflects the property's market value and does not directly influence the energy demand of a unit. In ("JM Properties Pty Ltd v Strata Corporation No 13975 Inc, [2006] SADC 12," 2006), the common expenses were allocated based on the lot entitlement of individual units, with two units having a higher lot entitlement and rental values due to the mall frontage. However, contributing more to the common property expenses will negatively affect the property value. A similar issue arose in ("Council of Owners, Strata Plan 8969 v Cleaver-Wilkinson," 2013), where an individual unit sought to install their own RES on an equity basis. However, concerns were presented about whether the rooftop could accommodate the RES installation of all units, and regarding the responsibility of repair and maintenance of the roof. The higher the lot entitlement, the more will be the voting power over common property decisions, as seen in ("Sahade v Owners Strata Plan No 62022," 2014), where the value of a lot was proposed to be more than 50% of the total, giving an unfair advantage to an individual. Additionally, whether the allocated energy aligns with the units demand is often debatable ("Hutchison v Canciullo," 2020).
- **No. of occupants** – In ("The Concept Developer Pty Ltd v Conroy," 2015), the lot liability was proposed to be apportioned based on the number of persons potentially inhabiting each lot. However, the no. of occupants is very dynamic and hard to monitor. The complexity is exacerbated in rented apartments, where the high turnover rate leads to the frequent recalculation of entitlements.
- **Floor area** – In ("Woodley v The Proprietors of Quay West Community Title Scheme 16610," 2006), an argument surfaced concerning whether the common electricity cost should be divided equally or based on the floor area of each unit among apartments. Being a static number, floor area could be a feasible option to allocate energy, nullifying the need for recalculations. Additionally, floor area could be a direct indicator of the energy demand of units. However, external atmospheric conditions may affect the energy demand of two apartment units with the same floor area. Moreover, asserting twice the cost for twice the area is contentious ("Woodley v The Proprietors of Quay West Community Title Scheme 16610," 2006).

Table 2: Suitability of Allocation Principles

Allocation Principle	Implementation Feasibility	Equitable Distribution	Net-Zero Energy Potential
Equal Allocation	✓	X	X
Lot Entitlement	✓	✓	!
No. of Occupants	X	✓	!
Floor area	✓	✓	✓

✓ - Good; ! – Moderate; X - Poor

Conclusion

Each allocation principle has inherent advantages and limitations based on the building typology and plays a crucial role in achieving the net-zero targets. While equal allocation is inequitable, lot entitlement, floor area and occupancy-based allocation may not truly reflect the energy demand of the unit. The suitability of the allocation principles varies with the prioritisation of objectives such as attaining net-zero goals. The characteristics of each apartment need undue consideration in an allocation principle to ensure the smooth management of the solar panels.

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