QUESTION TAKEN ON NOTICE:

How much electricity can be generated from solar panels on a typical apartment building?

ANSWER:

There is often not enough roof space in an apartment block for all the power needed by the apartment owners.

In Australia, the average electricity consumption of apartments is about 8.9 kWh per day, compared with 17.7 kWh for houses (due mainly to the fact that the average occupancy rate for apartments is 1.9 compared with 2.7 for a house – benefit per person is another issue)[1].

Approximately 4kWh of electricity is generated by a 1 kW solar panel per day[2]. For 8.9 kWh you would need 2.2 kW of panels – or about 6 panels each generating 400W (= 2.4 kW). Solar prices for units this size currently cost about $3,000 - $4,500 after government rebates[3].

If, for example, three apartment owners together bought a 6.6 kW system (typical now for single houses) that would only cost around $5,500. However, the key consideration is if they have sufficient roof space. Each 400W solar panel is about 1.7 square metres in area[4]. In this example, about 10 square metres of roof space per apartment will be needed – assuming the panel is correctly oriented on the roof. Not all the roof space is usable – ducts, air conditioning, walls, maintenance access, guttering, etc. might reduce the usable area by about half – so at least 20 square metres would be needed per apartment.

An average apartment in New South Wales, for example, would be about 120 square metres. That means you could stack six apartments on top of each other and just have enough roof space to generate enough electricity each day – assuming 50% available roof space, and perfect orientation of the panels facing the sun.

If the orientation isn't perfect or the available roof space is less, then the maximum solar-powered apartment block might only be four or five stories tall.

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[1] Roberts, MB, Haghdadi, N, Bruce, A, and MacGill, I 2019, 'Characterisation of Australian apartment electricity demand and its implications for low-carbon cities', *Energy*, vol. 180, pp. 242 – 257, https://doi.org/10.1016/j.energy.2019.04.222

[2] Barnes, C 2024, 'Sizing your solar panel system', *Choice*, accessed from <https://www.choice.com.au/home-improvement/energy-saving/solar/articles/how-much-solar-do-i-need>

[3] Solarquotes, n.d., '2kW solar system', accessed from <https://www.solarquotes.com.au/systems/2kw/>

[4] Sykes, J 2024, 'Solar panel sizes and dimensions', *Solarchoice*, accessed from <https://www.solarchoice.net.au/solar-panels/sizes/>

Apartments also need to factor in electricity for common areas, which can be as much as half the total power needed[5]. This suggests a maximum height of just three stories in such cases.

Further complications are introduced by legal and connection issues[6].

In summary, solar for apartments is not straightforward, and in many cases can't generate the electricity needed unless the building is just a few stories tall.

One solution is to allow apartment dwellers to have a share in off-site solar. However, this means they lose out because it is not 'behind the meter' i.e. they don't self-consume the electricity. They then must involve transmission and distribution networks as well as retailers to get the electricity from the off-site location to their apartment, which dilutes the savings. There is a failing in the economics of off-site solar in that you are paying an extra 'rent' for the distant land on which it is located and on the means of getting the electricity to you – a rent that the owner of the rooftop avoids.

[5] City of Sydney, 2022, 'How to switch your building's common areas to a GreenPower electricity plan', accessed from <https://getgreenpower.sydney/how-to-get-greenpower-for-apartment-block-common-areas/>
[6] Sykes, J 2023, 'Solar for Strata Apartment Buildings', *Solarchoice*, accessed from <https://www.solarchoice.net.au/blog/solar-for-strata-apartment-blocks/>