

Title – Density targets: Measuring everything except that which makes life worthwhile?

Diana Griffiths

Urban designer, Arup, Sydney AUSTRALIA
T:+61 (0)2 9320 9320 F:+61 (0)2 9320 9321

ABSTRACT

Everything that can be counted does not necessarily count; everything that counts cannot necessarily be counted. Albert Einstein

Over the history of city planning, density has been intrinsically linked to quality of life. In Victorian times, density was linked with crowding and disease. Today it is the quality of low density, car dependant suburbs which attracts the majority of criticism but in accepting current density measures have we missed out accounting for some of the real value of our suburbs?

There are many commonly used measures of density but as it is human nature to value what we measure, how we choose to measure density has a direct and occasionally dramatic influence on the potential solutions. By selecting a narrow definition of density, we risk measuring and rewarding only a small fraction of a cities complexities.

This complexity becomes particularly critical when we consider the interconnected needs of environmental, social and economic sustainability. Establishing communities that can adapt to a more sustainable future requires a detailed understanding of the complex interrelations of environmental integrity, economic viability, social welfare and efficient resource utilisation.

Density targets alone cannot create behavioural change and solve complex issues. While links between density and reduced energy use, increased public transport patronage and affordable housing exist have we become overly reliant on one measure to generate the desired transformation to the resilient suburbs of the future?

KEYWORDS: Sustainable, density, strategic policy.

1. INTRODUCTION

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Throughout the history of planning, density has been intrinsically linked to quality of city life. Initially density was linked with crowding, disease and low quality of life so maximum densities, heights and dwelling standards were established, however in more recent times, it is the qualities of low density, car dependant cities which is attracting the most attention. This paper explores issues linked to density, the way we measure density and a number of underlying assumptions. It provides an understanding of the implications, choices and ramifications of different types of density measures and the way we use density targets.

2. STRUCTURE

2.1 General

Density is not an absolute measure. The definition of net and gross density varies from state to state and country to country. It is human nature to value what we measure how we measure density will have a direct and sometime dramatic influence the solutions that become possible. For example a net residential density measured in dwellings per hectare not populations per hectare will bias solutions towards small dwellings and a target for a city that measures people per hectare (gross residential density) not people plus jobs per hectare (gross regional density) will fail to create the same incentives for job creation.

2.2 Ways of measuring density

There are many ways of measuring density and confusion is particularly common in the understanding of the difference between gross and net densities. A detailed review of density by Churchman (1999) is particularly helpful in addressing the majority of the key issues. It includes:

- Perception of density is subjective so the same density will be seen differently depending on culture and circumstance. This will be particularly significant in where existing densities are low and relatively low targets may be perceived as “crowding”.
- There are many ways of measuring density. A typical measurement is dwellings per hectare (dw/ha) however it is also possible to measure population density (people/ha) or urban density (people+ jobs/ha). A population density provides a better measure of the numbers of people who will use an area and a “gross regional densities” or “genuine urban density” measures both residential and employment.
- There is often confusion between gross and net densities. Typically the less land that is included in the measure the high the density will appear. Net dwelling

density generally only refers to land allocated to residential uses. Gross dwelling density refers to land allocated to residential uses and the roads required to service this land. Gross residential density includes land required for uses that are generated by the residential uses (ie roads, schools, parks, community buildings). Gross regional densities include the land requirements for all of city life including retail, employment education and civic uses.

- Measures of average densities are often inaccurate as they can be dramatically affected by variations in building type and/or large areas of no residential use or regional open space. For example the last Australian Census showed the City of Adelaide has an overall average population density of 14.6 people/ha but this figure is particularly low as it includes the Adelaide Reserve, North Adelaide Park and Botanic Park within the area counted.

2.3 What can happen when we measure density?

Without common, widely understood definitions of density it's difficult to compare what's being planned, to measure apples with apples. The exact same place can be described as 20dw/ha using net dwelling density or 15dw/ha using gross dwelling density or even 11dw/ha using gross residential density.

The potential flaws in measuring dwellings per hectare are illustrated in a comparison case study by the NSW Urban Design Advisory Service in 1998 illustrated that three storey apartments (at 69dw/ha) and 4-9 storey apartments (at 141dw/ha) with different occupancy rates (2.6 people/ha as opposed to 1.4 people/ha) could house the same population (about 168 people).

There is also general confusion about the links between density and height. A density study in London, illustrated in the Urban Design Compendium, showed how the same density of development, on the same size block could be delivered in various ways from three storey perimeter block buildings to four 32 storey towers to one 127 storey tower. The key factors were height, site coverage and building form.

The well known research by Newman and Kenworthy identified a fundamental threshold density to significantly reduce car dependence of 35 people per ha. This figure is based on a "genuine urban density" which uses total urbanised land and includes residential, commercial, industrial, local parks and open spaces. Their findings state that "The relationships shown in this article will not work with other measures of density such as residential density because they are irrelevant to transport issues". There is risk we may find ourselves relying on one unrelated density target, net dwelling density, to achieve complex transformational change including increased public transport patronage, decreased car use and increased walking and cycling.

2.4 What do our current planning policies measure?

In Australia planning controls predominantly rely on net dwelling densities as measured by dwellings per hectare (dw/ha) to establish a desired form of urban change. There is

also an underlying assumption that higher density living occurs in apartments and is directly linked to height. For example within Sydney's Metropolitan Strategy 2005 the definition of high density housing is "*Over 60 dwellings per hectare and generally five storeys or more high, for example apartment buildings*". And the definition of medium-density housing is "*Generally between 25 to 60 dwellings per hectare and not usually more than three or four storeys in height. Examples are townhouses and terrace housing.*" These definitions define density as a fixed number of dwellings, a minimum building height and a suggested building type.

Another example can be found in the Guidelines for Higher Density Residential Development published by the Department of Sustainability and the Environment in Victoria. The purpose of these guidelines was "*to ensure higher standards for higher density housing developments as more Victorians choose to live in apartments and units (...)*" and applied to buildings of four storeys and above. This guideline equates higher density development with residential use, a minimum building height and a suggested building type.

A final example of the use of dwelling density in planning controls can be found in Queensland's SEQ Regional Plan 2031 which sets the following targets; *activity centres: 40–120 dwellings per hectare (net) or greater, suburban and neighbourhood locations: 30–80 dwellings per hectare (net) or greater and priority transit corridors: 40 dwellings per hectare (net) or greater.* In this example the definitions are improved by the knowledge that the density is a net dwelling density however the ranges are so wide that it may be hard to know exactly what is envisaged.

2.4 What aren't we measuring?

The population structure of predominantly high density, high rise areas are different to those of low rise low density areas. There are limitations in the diversity of housing mix, with a predominance of studios and one and two bedroom apartments that fails to respond to the needs families and may create an unbalanced demographic of singles, couples and empty nesters. This has an implication on the distribution and location of facilities such as schools (Troy 2004). The popularity of the apartments for investors also creates communities with high number of tenants who are statistically more transient. While high amenity, inner city high rise developments can attract high income market high density low rise development in suburban locations tend to attract a low income, immigrant, rental market. Bunker and Holloway (2006) warn that adding high density housing to areas with existing concentrations of disadvantage may only compound the challenges these areas face.

The methods available to deliver different housing models should also be considered. The cost effective project home model is mass produced and designed to maximise dwelling size and minimise costs and pre-ordered with incremental payments during construction to reduce risk. With the high rise high rise apartment model however the bulk of the costs are born by the developer until the end of the project (although there is a level of pre selling to minimise risk). Brendan Crotty, Australand's former managing director, identified the cost of medium to high density housing as a major issue in

creating a supply of this type of housing. Crotty quoted the cost of building apartments at \$3,200 per square meter plus \$30,000 per garage but detached dwellings at only \$1,100 per square meter plus \$12,000 per garage. Outside the high cost inner city apartments Crotty considered medium density projects in middle distance suburbs were likely to offer better returns and be more affordable for the average person.

Not all types of high density living have the same levels of flexibility and adaptability. What is built now not only needs to last, it also needs to be able to adapt to future household and community needs. Commentators have expressed concerns about the apparent limited capacity for strata titled developments to be renewed and adapted (Randolph 2006). Not only are simple ongoing maintenance like repairs and updating problematic but the structure fails to enable complex issues like redevelopment, increasing building height and changing building use to include home businesses also needed to be addressed.

The energy consumption of different building types also varies. A study by the NSW Department of Infrastructure Planning and Natural Resources (now Department of Planning) in partnership with Energy Australia in 2005 showed that high rise apartments (over 9 storeys in height) were the most energy intensive typology per dwelling. The study attributes the increased energy consumption in high rise apartments to common services including swimming pools and spas, common lighting, and car park ventilation. The next highest energy consumption was the detached dwelling followed by medium rise apartments (4-8 storeys) and low rise apartments (up to 3 storeys) and townhouses or villas. On a per person basis, this result was even more pronounced with detached houses out performing high rise, medium rise and low rise apartments. The least energy intensive typology was shown to be townhouses and villas. Medium and low rise apartments also resulted in substantially lower energy consumption than that of high rise apartments with low rise apartments up to 3 storeys creating only 1 additional GJ/person-year more than that of detached dwelling.

2.4 What could we be measuring?

The DBook, a recent benchmark publication that promotes the compact development of urban settlements analysed 64 collective housing projects from around the world. In assessing density the authors took an expansive view of the issues and concerns that needed to be considered and have included measurements as wide ranging as employment density, population density, dwelling type, dwelling density, housing tenure (eg rental), average income, occupant type (eg families), dwelling price/income, site coverage, floor area ratio and parking spaces/dw.

A study of density of neighbourhoods in London by the London School of Economics also took a wide view of density. The study measured (and compared to the Greater London average) a range of factors including the percentage of one person household, deprivation, of kid and teenagers, of elderly, car ownership and average housing prices, the percentage who were white, working, living in flats, renting and in one person households.

Arup also considers integrated multi-disciplinary planning to be critical for delivering better outcomes. In recent sustainability advice provided for the development of the Adelaide Plan for 2030, population density was only one of twenty four factors which were considered important in the delivery of key sustainability drivers. Other key factors which were considered as equally critical included in active transport, safety, social well being, innovation, active transport, accessibility and local employment.

3. CONCLUSION

Australia, as one of the most urbanised countries in the world, will need to establish cities and suburbs that are able to adapt to the challenges of the future, challenges which will include more than just the physical environment. Cities are not static structures and fixed systems. Buildings typically have long life-spans. So what is built now not only needs to last, it also needs to be able to adapt to future household and community needs and resource limitations. Promoting a system of metrics capable of delivering a wide variety of benefits and avoiding mono-cultural suburbs and inflexible built forms will be critical. We need to ensure that we will create strong communities.

As Robert Kennedy once commented about GPD but could equally apply to density:
The gross national product does not allow for the health of our children, the quality of their education or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages, the intelligence of our public debate or the integrity of our public officials. It measures neither our wit nor our courage, neither our wisdom nor our learning, neither our compassion nor our devotion to our country, it measures everything in short, except that which makes life worthwhile.

Planning a resilient urban system for Australia will need far more than density targets. What should we be counting to create cities and towns we will need for the future?

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