Barriers to sustainable suburbs

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Abstract

Under the rapid technological advancement within the building industry and booming economic conditions regionally it has been an ideal environment for the uptake of environmentally sustainable development (ESD) and progressive urban planning practices. Then why is there considerable lag in the implementation of new ESD technologies and master planning practices that address important issues such as greenhouse gas emissions and waste generation within building, design and construction? This paper is the result of localised research into the perceived and real barriers preventing broad adoption of ecologically sustainable development practices in the Australian land development context.

Through this investigation a consistent theme exposed the lack of regulatory direction and training of industry players, including local government planners and building contractors. The industry shortfall has lead to a wide gap between best intentions and actual built results. This paper offers insight into a common dilemma of local government development applications not offering guidance aimed at delivering higher standards of sustainability within built form outcomes.

Keywords: Sustainable development practices in local government, sustainable land development practices, energy efficiency in sub-divisions, solar suburbs.

1 Introduction

At this point in history the industrialized world is confronting significant challenges with rapid climate change and resource depletion. Scientific research concludes the inevitability of having to alter our current pattern of consumptions and waste production in order to prevent further environmental detriment. Wealthy nations are presently in a period of unprecedented self-indulgence and
consumption, as a by-product of post-industrial economic expansion. Social consciousness has shifted from traditional values that embraced broad community benefit, towards values of individual private benefit. To combat these patterns a rapid deviation of behaviour from the development industry needs to be implemented.

As the relationship between banks, excessive consumptions and social expectations gained momentum, the land development industry has expanded and matured with the demand. The introduction of the bank guaranteed term mortgages and other financial mechanisms in the 1920’s underpinned and supported these business practices. These financial tools became both the lubricant and a significant driver for the feasibility and massive expansion of residential development within Australia. In fact, this relationship has become a building block of national economies of consumption - further encouraged by Australian policies. As the building construction industry in Australia accounts for over 14 per cent of Gross Domestic Product [1], financial institutions dictate the variety of housing and the components within development.

1.1 Orientation

Within the building and development industry the response to environmental challenges has been slow with substantial short falls still impeding a sufficient response. In South East Queensland [2] where rapid growth rates in population have spawned unmitigated sprawl, the Collaborative Research Centre for Construction Innovation (CRC CI) [3], embarked on research to gain further knowledge about the issue. The research sought to investigate why we are experiencing short falls in successful adjustment to rapid change. Additional objectives of the research were to identify what sustainable development practices were currently implemented by the development industry participants. This necessitated that within the culture of industry processes and market demands, the barriers to sustainable practices needed to be explored. Questions arose: In the process of creating new communities, what are the guideposts? Are professionals, trained in sustainable outcomes required to be involved in drafting master planned communities? Or, do developers literally interpret planning scheme regulations? What are the outcomes of purely prescriptive place making doctrine? Is it sustainable? Is the deeper awareness for long-term environmental impacts within the grasp of corporate land developers or within the regulatory framework of creating new communities? Is it possible for industry practices to include new innovative approaches within corporate environments permeated by a technical trade ethos?

Certainly, the industry is performing. But, the assumption of that performance needs to be clarified. Sustainable communities rely on many variables coexisting in the creation of truly sustainable habitat. Overcoming the barriers to achieving sustainable communities is essential to combating global environmental issues.

In order to develop a base level to measure the perceived barriers to incorporating sustainable technologies on Greenfield sites it was necessary to know more about advanced industry practices. Therefore the research looked to
identify the difficulty the development industry is experiencing in overcoming the barriers to changes when finance institutions and government subsidies, coddle ‘business-as-usual’. Comparison was made between conventional construction practices and the move to adopting alternative practices, aiming to reduce overt human impact on the earth’s natural capital. This work captured market indicators and perceptions in an area experiencing rapid growth with the resulting unmitigated urban sprawl, which is highly evident in South East Queensland. This research also highlighted opportunities to include and promote sustainable practices in development.

2 Environmental sustainable development in Queensland

Within Queensland there has been a significant population migration to urban areas. This increased demand in housing has dramatically intensified greenhouse gas generation and created dependency on a limited supply of natural capital. In an effort to promote sustainable development practice, an increasing number of governments and some private development companies are moving from a conventional approach, and initiating major Greenfield projects that aim to deliver enhanced environmental outcomes.

Early initiatives such as Local Agenda 21, assisted in prescribing actions to lead toward reductions in greenhouse gas emissions and promote greater social equity. As a result of this, sustainable development projects in South East Queensland have been on the rise in the past few years. Examples of these are the master planned Greenfield developments such as Springfield Lakes [4], North Lakes [5] and Varsity Lakes [6].

2.1 Individual houses within Queensland

Springfield Lakes is one of the largest master planned community sites in the southern hemisphere. It is comprised of 2,850 hectares of Greenfield holdings situated along the “Western Transportation Corridor” between Brisbane and Ipswich. Within this development three display homes called 'The GreenSmart Village' [7] have been constructed to exhibit the leading edge of environmental practices in residential development. Through the sole use of innovative design and materials, these homes, predominately emphasise sustainable technologies that promote energy efficiency, waste minimization and minimum soil/sediment pollution.

2.1.1 Rockhampton

A further example of sustainable and innovative housing, achieved through innovative design and material and in conjunction with the initial consideration given to orientation, is the Research House, located in Rockhampton. This home was constructed under the guidance of the Queensland Department of Public Works and University of Central Queensland as a collaborative project.

This house was developed to be an exemplar of construction methods, materials and design, demonstrating that sustainable construction methods and
appropriate materials are physically viable as well as economically beneficial to a residential home. The house is also an ongoing laboratory of environmental sensory equipment where the consumption, waste and environmental conditions created by an average sized residential family are constantly monitored [8].

However, the sustainability of Research House has enhanced sustainability due to the initial attention given to the orientation of the structure and topography of the site. Using passive solar design techniques with north facing openings, and allowances for conventional breezeways alleviates the need for air conditioning. In addition, appropriate landscaping improves the light and sun penetration as well as shading in and around the building. The consideration for these alternatives to conventional housing orientation is highly relevant in a subtropical location such as Queensland.

2.2 Solar suburb approach

The concept of maximising all homes' solar orientation to attain energy efficiency, gives substance to the solar suburb approach. The fundamental objective of a solar suburb is to maximise the number of allotments orientated to promote solar access and energy efficient design. This occurs when the initial vision for a master plan development gives priority to the orientation of residential layouts.

Under this format of sub-division the hammerhead allotment layout promotes dwelling orientation that enhances solar access, as opposed to the traditional cul-de-sac layout where poor solar access is inevitable. Although additional consideration needs to be given to elements such as building envelopes, bulk, density, solar-setbacks and topographical variables, improved solar access can be obtained by:

- The provision for allotments large enough to permit sufficient flexibility to site a dwelling north,
- Design allotment [no less than 500m²] with side boundaries running east west.
- Allotments suitably shaped to allow the dwelling solar access, personal space and cross ventilation
- Allotments that permit dwelling setbacks from single story buildings to the north and 10 meters from a double-storey building in the same direction [9].

To reach these goals innovative techniques need to be applied in the early phases of land development. When green technologies and solar sub divisional layouts are implemented during the initial phases of the site analysis, reduced energy consumption can be achieved.

3 Research findings

The term sustainability is frequently interpreted with ambiguity, resulting in the misconception of the broader objective of reducing human impacts. The lack of knowledge brings in an element of uncertainty for what lies in the future, which
further encourages scepticism. The fear of the unknown becomes a barrier in itself. The key respondents confirmed that the lack of understanding the concept of sustainability became an obstacle to implementing sustainable practices.

Incorporating sustainable principles were also perceived to be too expensive and many developers felt there was little market demand. In this context the lack of understanding the concept of sustainability became a barrier to implementing sustainable practices. Other concerns that needed further definition included how to measure improvements in performance, economy of scale and cost benefit analysis. Often the term sustainable subdivisions needed to be explained to the developers. With no uniform agreement or interpretation of what sustainability entails, it becomes difficult to measure sustainability.

3.1 Discussion on barrier to sustainable development

Despite the lack of understanding from some developers used as key informants, others were proactive when it came to incorporating sustainability practices into land subdivision practices. Within this category of informants lay a variable rate of compliance to new ways of implementing land development. Some developers would be compliant to implementing sustainable practices in both land subdivision and during housing construction however it was also identified that numerous barriers to full implementation had yet to be overcome within the development industry.

3.1.1 Supply-side economics in development

As the market supply fulfils what the customer demands, there are many developers whose practices have not changed over the last few decades. These developers supply a product they are familiar with, providing a cosy relationship with the consumer and financial institutions, which maintains the status quo. The result is the traditional project home and land package, a model commonly found throughout the world.

Contrasting this traditional supply, there are numerous proactive developers who are aware of sustainability issues, engage sustainable principles in subdivisional outlays and construction, and promote this to their clients. Some developers even go as far as providing environmental plans and site analysis-recommending layout for a home suited to each specific site.

Overall, when a developer adds sustainability principles into the customer’s package, it is very generally received as an additional bonus that gives the particular development a market edge. This does not necessarily equate to suitable housing design and construction, as the majority of houses are off the plan project homes with predetermined components not conducive to site-by-site variables. Too often the deciding factors in housing choice are dictated by constraints such as personal preference in housing layout, budget constraints, lot size and configuration.

Despite these constraints, the move to adopting sustainable principles in housing developments and the education of the development industry about these
principles, will offer long-term benefit. Such measures will generate market demand where suppliers will be more confident to respond.

3.1.2 Regulatory action
In Queensland, development is assessed under IDAS, the Development Approval process legislated by the Integrated Planning Act (IPA). Within IPA a town plan is established under the guidance of the local regulatory body, City or Shire Councils. The implications of this is that if local regulatory guidelines such as Planning Schemes, may retard the uptake of innovated applications of sustainable planning and design principles due to the inadequacy of the scheme. Proactive development models are then handicapped due to their unusual nature and approvals may take many times longer to process and thus costs are significantly higher or the approval may not be granted by the local planning agency.

Although there is a legal conformity, regulatory mechanisms vary from one local jurisdiction to another where some local governments are more receptive to sustainable initiatives; others are not. For example one regulatory body would not allow hammerhead cul-de-sacs to enhance solar orientation for housing placement where others prefer this sub divisional practice. The local political proclivity can have significant impact on road layouts where the will of local councils vary accordingly. A change in lot layout for solar orientation will come under a myriad of unpredictable conditions affecting infrastructure cost, site coverage and public safety. It also impacts on the standards of performance undertaken by financial institutions that under write development projects. The confines of funding mechanisms dictate the procedures that developer’s implement within their project brief and eventual built form outcomes.

Generally, planning schemes do not incorporate guidelines for innovative approaches to new types of development. In addition, planning staff is not trained to identify design issues or to address sub-divisional designs that are out of the ordinary. In addition, planning staff are not trained to encourage alternatives that may be based on international examples not commonly found in Australia. Key informant’s spoke of receiving little leeway from regulatory bodies with ‘no rule book to measure if what they are doing is good or bad’ [1]. The cautious nature of regulatory bodies finds it easier to avoid some sustainable innovation, rather than take on uncertainty of unknown maintenance and replacement costs of the unknown and unfamiliar. Whereas some developers persistently challenge the system to incorporate change, others find it all too hard and don’t bother. One developer summed this up well with the statement; ‘regulations do not keep up with motivation’ [1].

3.1.3 Creating incentives for sustainable development practices
All key informants who participated in interviews commented that there is little reward for implementing sustainable principles into developments. It is not recognised or rewarded within the industry, especially with regard to new alternatives to sub divisional layouts. This is due in part to appraisers assessing the value of houses through comparative value to like houses and similar settings
and not take into account factors such as allotment orientation or other economic benefits such as extended eaves, access to natural light and breezeways. This has a lead on effect to financiers who undervalue the investment necessary to reduce environmental impacts. The sustainable factors implemented into the development project are therefore belittled and not valued.

3.1.4 Measuring progress in achieving sustainable outcomes
Participants questioned the uniformity of measurement approaches and the discrepancies of measurement methods. Overall, they expressed that the range of what was being measured was too narrow and no rating tool was site particular. Programs such as Building Energy Rating System (BERS) and Nationwide Housing Energy Rating Scheme (NatHERS) that specifically rate energy efficiency in buildings were typically referred too, but considered too crude to make meaningful and significant differences on such impacts as greenhouse gas emissions.

Survey participants doubted the possibility of developing viable standardised measurements that would ensure significantly reduced environmental impacts. Interviewees considered that the scope of elements necessary to make a rating tool meaningful was too complex. Further they complained that this information was often highly detailed and articulated how environmental impact factors should be site-specific. For example the complexities involved to measure the performance of sustainable suburbs over the life span of a development would have to include the life cycle of the physical materials, and their embodied energy from origin to expenditure - long after construction had been completed. These conversations gave indication to the level of sophistication and concern that some developers had regarding environmental sustainability and the impact of Greenfield development within our biosphere.

3.1.5 Looking for an even playfield
The majority of informants noted that there was no broadly recognised rating tool being universally applied. Shortfalls in some rating tools gave a residential housing project in South East Queensland a three star rating with not consideration for home site orientation. Despite this all informants expressed a need to meet a regionally excepted criteria so that it would be an even playing field on which to base a competitive market. This entailed detailed description on what was expected as a minimum standard of practice and some guidance on how to meet these minimum performance criteria.

The tool to be adopted needed to offer enough flexibility to account for site variables such as orientation, ventilation and lighting with consideration for the limitation of the unique qualities of the site under examination.

3.1.6 Integrated approach
It was clearly stated throughout the interviews that there is a strong need for professionals to work together toward an integrated approach to achieving sustainable communities. This is of particular importance in the early stages of the project where the specialities of various disciplines need to be applied in a
team effort. For example, a town planner offers expertise in land use issues, architectures in site-specific design issues and surveyors from an engineering perspective. Pre-lodgement meetings are key in identify clear objectives and achieving a comprehensive sustainable approach to the design and implementation of new construction. This gives rise to the potential for a design review committee establishing by Local Government aiming to facilitate changes in industry practises.

The pre-lodgement phase of a development project is highly significant in the manifestation of works. An emphasis of timely feedback into the expected outcomes has been identified as an important opportunity for critical information to be shared. At this point in the pre negotiation phase, before a development application is lodged to a local government, project expectations can be discussed in depth. The role of a Design Review Committee, established and funded by Council, allows for a structured approach that holds a fiduciary responsibility to the wider community, seeking a balance between public good and economic viability.

The majority of key informants indicated that the various degrees of commitment to sustainable development, incomprehension of the intent of the development outcome and lack of communication was a significant barrier to gaining meaningful sustainable outcomes. Some interview participants believed that civil engineers were more advanced in creating well-oriented allotment, others believed that well-meaning homebuilders were constrained by the configuration, boundaries and orientation of allotments. If an integrate approach is adopted in the very early stages, then much of the default can be avoided.

3.1.7 Incentives to conform
Much of the feedback from key informants was supportive of the incorporation of an incentive program aimed at encouraging the implementation of sustainable development practices. This action would give not only encourage new approaches to subdivision methods but also give the broader acceptance of such methods credibility as a new form of doing business. Suggestions for such incentives were the allocation of financial incentives such as tax credits on local, state and federal levels, flexibility in the development approval process allowing for innovation and the piloting of new ideas and considerations for reducing substantial demands on resources. Increased density and infrastructure changes could also be used as regulatory incentives.

3.1.8 Educating the consumer
Basically, notions of sustainability and energy efficiency are not priorities for homebuyers. Water and energy are still relatively cheap resources to consume. In addition the consumers understanding of the concepts of sustainability is poor at best. Developers consistently pointed out that indoor climates can be, and are, more frequently controlled with reverse cycle or ducted air-conditioning. Further they felt that energy and water consumption are not considered to be an issue, beyond building regulation and local mandates for energy and water sensitive urban design. To make sustainability a priority, the consumer needs to be educated to what sustainability is about.
4 Conclusions

Key informants believe that the supply of residential development in South East Queensland is slowly becoming more sustainable and less demanding on natural resources. The market for information and tools which provide energy ratings and analysis of building is continuing to grow as owners, tenants and regulators seek more energy efficient products and product providers seek to create these products at the lowest cost.

Although the momentum for the uptake of sustainability is slow, it is multi-directional, encompassing elements such as energy and water. However, key informants feel it is only a matter of time before momentum builds and energy efficiency becomes the standard. However to encourage this growth, this research has highlighted some areas that key informants believe there is need to be taken into consideration.

- There is a necessity to disseminate information regarding sustainable energy efficiency in order to boost the consumer’s awareness.
- Tools that measure energy efficiency need to be site specific, across the whole of industry, and take into account factors such as orientation, adjacent built forms, deciduous and evergreen vegetation, and a broad range of construction materials.
- Where possible, incentives need to be introduced into the industry to make sustainable practices more attractive to the building industry and the homeowner, as well as add weight to the importance of the practice.
- The specific industries that contribute towards the development need to be integrated and work together in the common goal and vision.
- Sustainable practices in development need to be recognised by the valuation and financial industry. Once recognised, the financial barrier to accessing sustainable energy efficiency will be overcome.
- Any regulations that are introduced need to be across the board, to retain the competitive nature of the industry.
- There is a need for research to demonstrate that new and innovative models of sustainable development are more affordable than traditional models of development.
- There is a need for collaboration between local authorities, agencies, landowners and developers – to share a vision that is of benefit to all parties.

In a list of priorities, the informants emphasises importance of; yield on the investment on the initial outlay and maximising the capital return through increased densities or the length of time in acquiring development regulatory approvals.

Greater energy efficiency is achieved through lot sub-divisional orientation, building placement, design, construction materials and choices in energy consumption such as appliance ratings, maximize existing micro climate advantages, cross-flow ventilation and solar access for both energy generation and light control. The energy efficient home needs to accomplish lower
demands on non-renewable resources, reduce the level of greenhouse gas emissions, and provide the occupant economy in costs.

References


[2] Although achieving sustainability in built environments is an issue nationally, the brief for this research project was confined to South East Queensland incorporating the Sunshine Coast, Gold Coast, Western Corridor and Greater Metropolitan Brisbane Area.

[3] The CRC-CI is an Australian research, development and implementation centre, focused on the needs of the property, design, constructional and facility management sectors. It was established in 2001 and headquartered at the Queensland University of Technology as an unincorporated joint venture under the Australian Government's Cooperative Research Program.


