Title:	**The Vertical Garden City: Towards a New Urban Topology**
Author:	Chris Abel, University of Sydney
Subjects:	Architectural/Design Urban Design
Keywords:	Sky Garden Verticality
Publication Date:	2010
Original Publication:	CTBUH Journal, 2010 Issue II
Paper Type:	1. Book chapter/Part chapter 2. **Journal paper** 3. Conference proceeding 4. Unpublished conference paper 5. Magazine article 6. Unpublished

The Vertical Garden City: Towards a New Urban Topology

Chris Abel

Author

Chris Abel, University of Sydney and University of New South Wales, Australia

13/80 New Dapto Road
Wollongong, NSW 2500
Australia

t/f: 612 4226 2058
e: chrisabel@iinet.net.au
www.chrisabel.com

Chris Abel
Chris Abel is the author of numerous publications of architectural history, theory and criticism. He has written on leading architects and movements in both the developed and developing world and is a recognized authority on the works of Sir Norman Foster. In 2003 he was co-curator with Foster for an international exhibition at the Royal Academy of Arts in London, Sky High: Vertical Architecture, for which he also wrote the book of the same name. He currently teaches at the University of Sydney and the University of New South Wales, where he runs his Vertical Architecture STudio (VAST).

"Understandably, architects have abandoned the flawed urban visions of the past century to focus on the new technologies of production and other more immediate issues. However, having now finally mastered the 'how' of production in the digital age, designers need to refocus on the 'what', and to re-imagine the shape of the modern city to meet the urgent challenges of this century."

Project for Barangaroo, Sydney, 2009, by Mohd Nor, Turner and Wang, University of New South Wales. Linked towers with "turbine sails". © Abel/UNSW

The author argues that Ebenezer Howard's original concept of the Garden City has since been stripped of the planner's social agenda and subsequently developed in other ways and at far lower densities than Howard himself intended. The negative consequences of Howard's misinterpreted legacy are evident in the automobile dependent, low-density suburbs of Australia's major cities. Subject to extended droughts, shrinking farmlands and raging bushfires, the continent is particularly vulnerable to the effects of climate change. In response, most planning authorities in Australia are now implementing strategies of urban consolidation and densification. The author reviews recent innovations in high-rise architecture in search of relevant solutions but finds them still limited by conventional urban typologies. The work of the author's Vertical Architecture STudio © (VAST) is illustrated by selected projects for a prototypical Vertical Garden City produced by students at different universities in Australia and the USA. Examples include designs for integrating food production and power generation within multi-functional complexes. It is suggested that the topological features and qualities of these designs differ significantly from known urban forms and that similar topologies may eventually yield spaces above ground of equivalent character and quality to those found at street level in any great city. In conclusion, the author argues that the future development and success of the Vertical Garden City model ultimately depends on an expansion of the public realm above ground into hitherto wholly private territory – a strategy for which the example of Howard's social agenda may eventually prove to be of more enduring value than the physical plan.
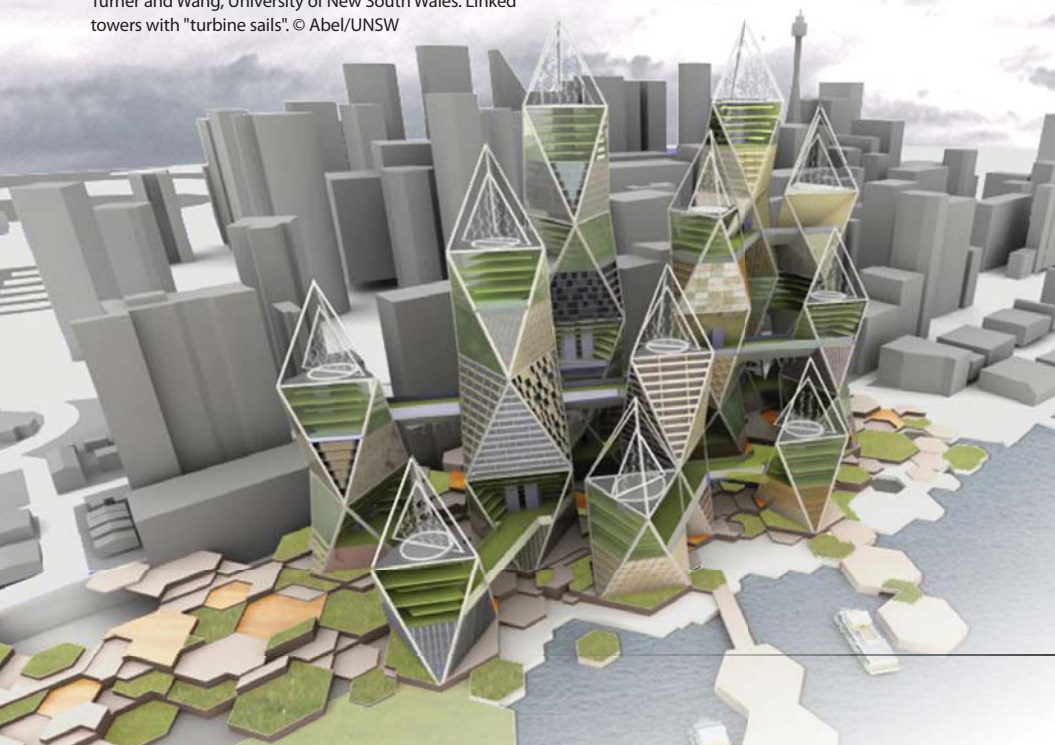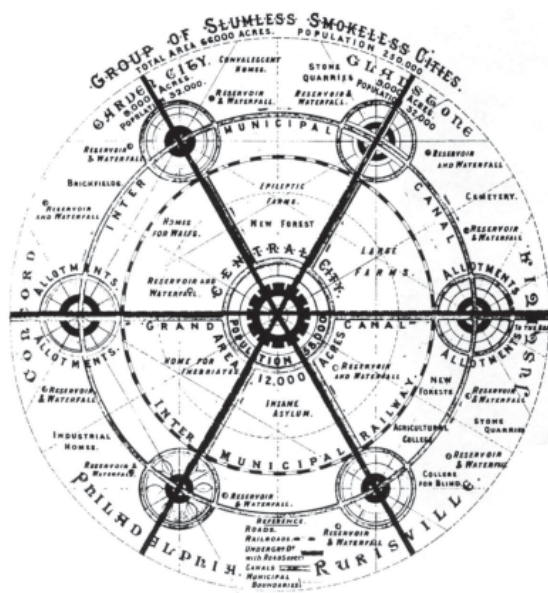
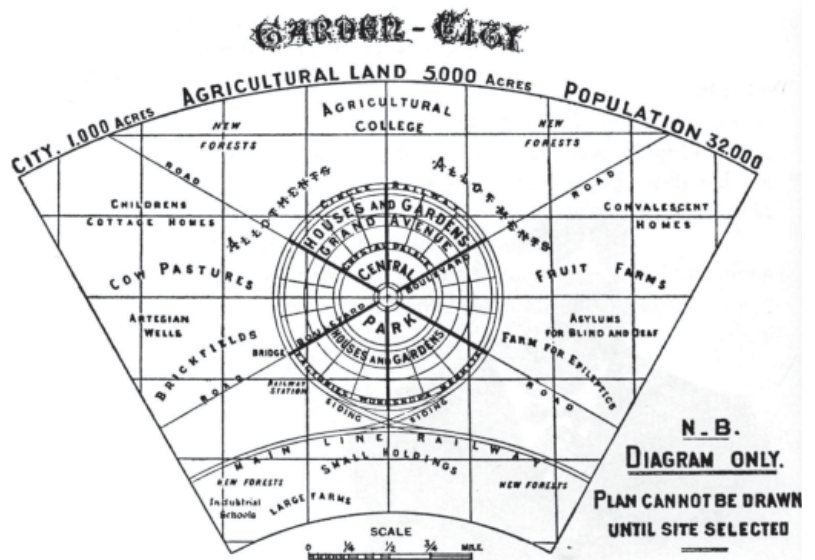Figure 1. "The Social City", by Ebenezer Howard, 1898. Original diagram. © Fishman, 1982

Figure 2. "The Garden City", by Ebenezer Howard, 1902. Segment of plan. © Fishman, 1982

Ebenezer Howard's Legacy

No other concept in architecture or urbanism evokes as powerful a response in the collective imagination as the Garden City (Howard 1898, 1902). Surveying the great figures that have influenced the way we think about urban life and form since the 19th century, the eminent planner Peter Hall (1996) unequivocally nominates Ebenezer Howard as "…the most important single character in this entire tale." However, as Hall explains, despite his fame – or maybe because of it – Howard's ideas have been widely misinterpreted. More than just a physical plan for decentralization, Howard's scheme for relocating industrial production in "Satellite Towns" to be built on cheap farmland well beyond existing urban centers was also a radical blueprint for socio-economic reform, the keynote of which was local management and self-government. As well as owning shares in the land, the increasing value of which would flow back into the community, citizens would build their own homes with capital financed by co-operative societies, unions and similar self-governing bodies, in turn boosting the general economy. As Hall puts it, "…forty years before John Maynard Keynes and Franklin Delano Roosevelt, Howard had arrived at the solution that society could spend its way out of a recession."

It was the famous diagrams of concentric new towns though, which stirred planners' and architects' imaginations, and even these, Hall argues, were mostly misunderstood. The full diagram of Howard's polycentric "Social City" as originally published in the first edition of his work, *Tomorrow: A Peaceful Path to Real Reform*, shows six towns with a population of 32,000 each grouped in circular formation around a Central City of 58,000, all linked together by "inter-municipal" canals, railways and roads across open countryside (see Figure 1). As Howard envisaged it, the whole arrangement of compact new towns and urban core was capable of housing a quarter of a million persons at medium densities. However, the image of the Garden City that imprinted itself upon professional minds was that of an altogether more modest proposal, as pictured in abstracted segments of the plan published in the second and better known title, *Garden Cities of Tomorrow* (see Figure 2). The complete diagram of the polycentric city was generally ignored and was never reproduced again until recently. Howard himself only realized fragments of his scheme at Letchworth and Welwyn Garden Cities near London, the scale and character of which resemble villages more than cities (Fishman 1982).

Presented as a two-dimensional diagram and interpreted ever since by others in its more limited variations as "dormitory" suburbs and semi-autonomous new towns (Choay 1969; Galantay 1975; Hall 1996), the concept of the Garden City was subsequently stripped of Howard's social agenda and developed exclusively as a physical plan. Outdated by the automobile, the networks of railways and canals that were such an important feature of Howard's strategy, suffered the same fate. In their place, Frank Lloyd Wright's own seductive vision of an ultra-low density city criss-crossed by freeways (Fishman 1982; Sergeant 1976), fast became reality, fueled in the post-war years by seemingly endless supplies of cheap land and gasoline. Rejecting low-density models and substituting the communal home for the individual house, Le Corbusier interpreted Howard's vision in his own way, creating a series of projects for a "vertical garden city" comprised of tall buildings set in parkland (Besset 1987). However, Le Corbusier's contrary interpretation failed to stem the general drift towards lower and lower urban densities. What now remains of Howard's legacy has devolved into countless automobile-dependant, repetitive garden suburbs around the world, the growth and maintenance of which are stretching the planet's natural resources to breaking point. ✐

Only Singapore bears any resemblance to the polycentric city Howard planned. With its "constellation" of high-density new towns all linked to the main city by a circular metro system, the city-state combines elements of both Howard's and Le Corbusier's visions together in a rare, infrastructure led urban strategy (Liu 1998), that is now the envy of planners around the world.

End of the Great Australian Dream

Nowhere are the negative aspects of Howard's misunderstood legacy more apparent than in the dispersed, low-density settlement patterns of Australia's cities. Inspired by their own vast landscape, like their fellow immigrants in North America, Australians developed an early passion for the wide-open suburban lifestyle and the individual freedom private automobiles afforded (Forster 1999). Even without the additional and potentially catastrophic effects of climate change, the limitations of a way of life built entirely around finite sources of fossil fuel were already becoming apparent, just as they are now belatedly obvious to most if not all planners in the USA and other parts of the world (Jenks & Burgess 2000; Dodson & Sipe 2008; Duany et al 2000; Newman & Kenworthy 1999).

However, extended droughts, shrinking areas of productive farmland, raging bushfires, fragile, low-lying coastlines and bleached coral reefs have brought home to Australians the particular vulnerability of their continent to global warming (Flannery 1994, 2005; Spratt & Sutton 2008). In many respects, Australia stands in the front line of climate change, for reasons largely of its own making. According to US Department of Energy figures for 2006–07, Australia has the highest per capita rate of carbon dioxide emissions in the world at 20.58 tons per year, overtaking even the US at 19.78 tons (Wilkinson 2009). As the world's largest exporter of coal – much of it to feed China's exponential growth – the Australian economy is also inextricably linked to the basic causes of global warming and continues to resist any significant change (Manning 2009). In his account of the collapse of previous civilizations and the analogous dangers facing the world

today, Jared Diamond (2005) devotes a whole chapter to Australia and the history of environmental degradation that has brought the country to its present precarious state. For all its great size, the area of habitable and productive land in Australia is relatively limited. Close to 60% of the entire population of 22 million lives in just five major cities situated on or close to the coastline where the first settlements were established. Likewise, the richest soils are mostly confined to a few areas, the largest of which is the Murray-Darling Basin in the state of Victoria, from where most of Australia's farm produce originates. Even that is now in danger of literally drying up. The once impressive Murray River is now occasionally reduced to a mere trickle – the combined result of years of drought and over-use of the river's waters to irrigate the increasingly dry land. Plans for increasing water-intensive coal mining operations in the region can only add to the problem (Sheehan 2009). According to Diamond, much the same is happening to Australia's other natural resources:

"Australia has been and still is 'mining' its renewable resources as if they were mined materials. That is, they are being overexploited at rates faster than their renewable rates, with the result that they are declining. At present rates, Australia's forests and fisheries will disappear long before its coal and iron reserves, which is ironic in view of the fact that the former are renewable but the latter aren't."

Paradoxically, while the population is concentrated in a small number of large cities, those same cities also have the lowest densities of any in the urbanized world, the growing extent of which is steadily gobbling up precious farming land and forests (Dodson & Sipe 2008). Irrespective of the environmental costs, the popularity of living in the bush on the urban

Figure 3a. Rouse Hill Town Centre, 2008, by Allen Jack + Cottier. Aerial photo. © GPT Group and Lend Lease.

fringes is sustained by a steady stream of enticing images in both the popular and professional media of architect designed houses shrouded by tall eucalyptus trees. Deceptively blending with the natural surroundings, the pollution from the endless automobile traffic needed to ferry families between scattered homes, schools, shopping malls and distant workplaces, together with the expensive infrastructure needed to support the low densities, are effectively discounted (Abel 2005).

However, for all its popularity, the Great Australian Dream of homes in the countryside is also now under direct threat from the most severe effects of climate change. As with the forest fires which have regularly plagued the dispersed inhabitants of California, bush fires have long been regarded by Australians as an undesirable but tolerably infrequent price to pay for the benefits of living close to nature as well as the city. Rising temperatures and parched lands have changed all that. Far worse than any previous conflagration, the "unstoppable" fires that swept through Victoria in February of last year devastated whole communities in their wake. The deadly fires marked a turning point, not only in the high toll in human life and property (173 died in one day, most of them in their own homes), but also in the public perception of the present and future dangers such fires present. Similar in intensity and speed to the recent so-called "mega-fires" which also devastated large areas

Figure 3b. Rouse Hill Town Centre. Town square. © Brett Boardman

of California, "Black Saturday", as the disaster is known, called into question the very idea of living in the bush. "Life or lifestyle, warns fire chief" was a typical headline in the following days (Stewart & Bita 2009). Sadly, whatever measures like "fuel reduction" or "controlled burning" may be taken in the future to prevent the reoccurrence of these events, so long as the same worsening climatic conditions prevail and people continue to live in the bush, it seems likely there will be more Black Saturdays to come (Abel 2009a; Wallace 2009).

Constrained Urban Framework

Not all the news from Australia's cities is bad. Motivated by population pressures and environmental concerns, most local planning authorities are now implementing strategies of urban consolidation and densification (McManus 2005). Both Melbourne and Perth have built extensive light rail systems while Sydney recently completed the town center for Rouse Hill (see Figures 3a and 3b), a model compact new town in the northwestern suburbs (Harding 2008). Last year, for the first time, the number of new apartments built in Sydney also exceeded the number of new, detached houses; many of them built within the inner suburbs around existing mass transit systems, where future growth will be concentrated (NSW Government 2005). The city's forward looking mayor, Clover Moore, also recently announced the installation of a trigeneration power plant in the Town Hall, the

first of many localized or "distributed power" plants to supply surrounding buildings planned under the Sustainable Sydney 2030 strategy. While the popular image of Australian architecture abroad remains dominated by single-family dwellings, such as those designed by Glenn Murcutt and other award-winning architects, a growing number of leading firms are now creating innovative designs across a broad spectrum of building types, using cutting edge technologies of production. The late Harry Seidler was also one of the first major architects in Australia to recognize the need to increase urban densities, leaving an impressive legacy of tall buildings on the skyline of Australia's cities, as well as residential architecture of every scale (Blake 1973; Frampton and Drew 1992; Abel 2003a).

For the most part, however, architecture and urban design in Australia, as in all market economies, continues to evolve within a conventional and highly constrained urban framework mostly shaped by commercial imperatives. While, following recent advances in digital tools of design (Kolarevic 2003; Leach 2002, 2004), there has been an outpouring of new forms and structures of every kind, the basic spatial and land use pattern of separate blocks and buildings of varying size and densities has hardly changed. At the same time, architects and urban designers have been compelled to accept increasingly circumscribed roles and limitations on their ability to influence the shape and quality of urban life as the public realm has shrunk in the face of growing private interests (Cuthbert 2006; Madanipour 2003; Zukin 1996). For all its compact and pedestrian friendly virtues, Rouse Hill, for example,

unlike the earlier new towns of Europe, is a wholly privately owned and managed development – including the "public" open spaces within the town center – while the promised new railway line connecting it with the city network has yet to be built by the state government, typically desperate for public funds.

Innovations in High-rise Architecture

Urban densification is generally best implemented with a wide range of building types and heights, from low to high-rise, depending on location. Mixed-use tall buildings are also increasingly favored over office towers, especially if built close to mass transit hubs, maximizing activity at those junctions and creating vibrant urban centers. Other innovations in high-rise architecture around the world epitomize the problems and shortcomings in the way designers approach the city, as well as their achievements. Generous sky gardens and soaring atria have become a common feature of office towers since SOM (see Figure 4), Norman Foster and Ken Yeang led the way. Raising the ground plane and opening up interiors with semi-public spaces, they transformed the spatial character of the tower type (Abel 1997). ✍
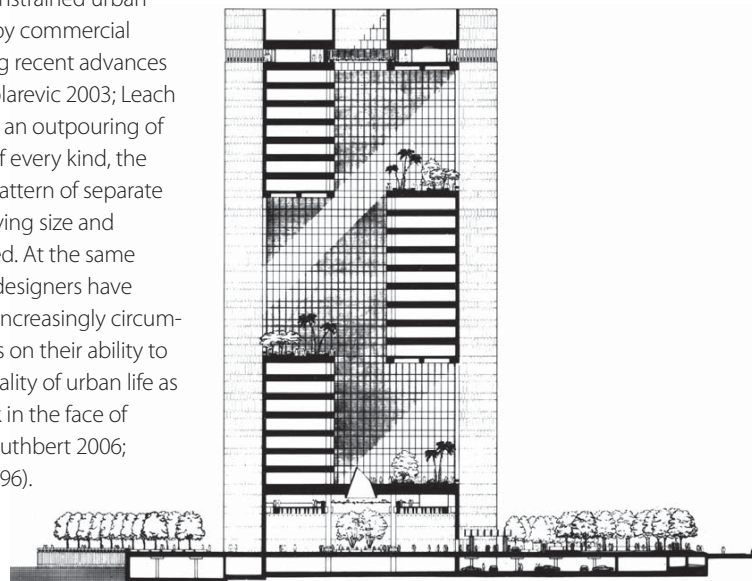

Figure 4. National Commercial Bank, Jeddah, 1989, by Skidmore, Owings and Merrill LLP. Section. © Aga Khan Award for Architecture

Figure 5. Riverside Development, Brisbane, 1986, by Harry Seidler. Aerial photo. © Harry Seidler Associates

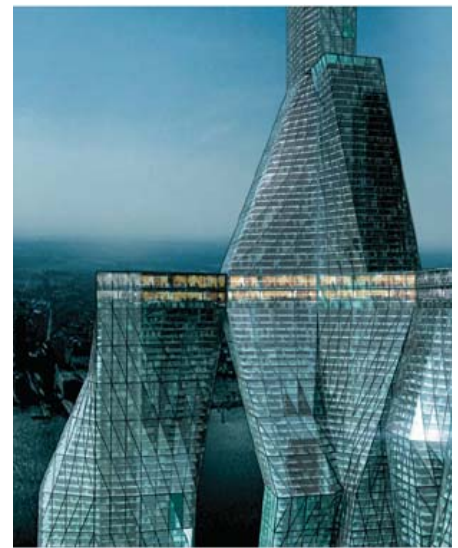Figure 6. Edge Spire, Gurgaon, India, 2008, by Ken Yeang. Rendering. © Ken Yeang

Figure 7. World Trade Center Competition entry, 2002, by United Architects. Rendering. © United Architects

Contrary to the stereotypical pictures presented by their critics, both Foster and Seidler also succeeded in extending and enhancing the public realm in high-rise architecture as well as in their civic buildings (see Figure 5), creating popular plazas and "urban rooms" around the base of their office towers, as well as in their upper levels (Abel 2006a, 2009b). Introducing a whole vocabulary for greening skyscrapers, Yeang also argued for "vertical urban design", taking the debate to yet another level (Yeang 2002).

Inventive as these designs are, which often feature linked sky gardens in a spiral or zig-zag formation, as in both Foster's and Yeang's work (see Figure 6), they remain tightly constrained by the vertical dimension and by their limited plot sizes and regulatory envelopes. Echoing the science fiction fantasies of the early twentieth century and the megastructure projects by Archigram and other avant-garde designers in the 1960s, a new tower type emerged at the turn of the millennium in which two or more structures are linked together at their upper levels by bridges and other spatial elements (Wood 2003, Abel 2003b). The first and most familiar of these – the twin Petronas Towers in Kuala Lumpur by Cesar Pelli – are linked by a simple bridge, providing communication and alternative escape routes between the two structures. The more daring designs, like United Architects'

entry for the World Trade Center competition (see Figure 7), and Steven Holl's Linked Hybrid building in Beijing (see Figure 8), join several tall buildings together with multifunctional public "skyways". The CCTV building in Beijing by OMA and Arup (see Figure 9) also melds both horizontal and vertical elements into one spatial and structural continuum (OMA 2008). Lastly, the Museum Plaza in Louisiana by REX features a raised slab of space housing a complete museum of art supported by several slim towers, arranged much like the seat and legs of a chair (see Figures 10a & 10b).

All of these projects, none of which was conceivable without the new digital technologies of production, give new meaning to the horizontal dimension in high-rise architecture. However, for all their innovations, the vision they offer of new urban forms and spaces is at best a partial one. They appear primarily as giant sculptured objects in their urban surroundings, while the external spaces between the different elements of the composition have little or no definition or character of their own. Similarly, attempts to revive the Corbusian idea of a vertical garden

Figure 8. Linked Hybrid building, Beijing, 2009, by Steven Holl. © Shu He

Figure 9. CCTV Building, Beijing, 2009, by Office of Metropolitan Architecture. © OMA

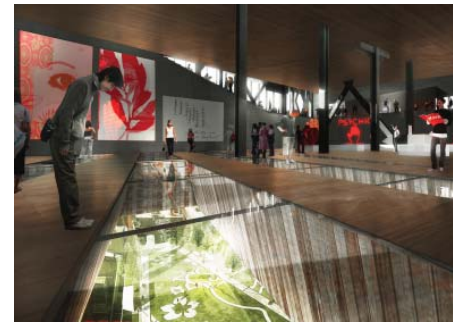Figure 10a. Museum Plaza, Louisiana, by REX. Montage. © REX

Figure 10b. Museum Plaza. Interior of Museum. Rendering. © REX

city, like Mori's project for Tokyo (Mori 2009), repeat the same tired formula of separate towers set in open parks. The idea of a genuine three-dimensional urban topology, that might create elevated spaces of equivalent character and variety to those found in any great city at street level, remains a compelling but elusive prospect.

The Vertical Architecture STudio

Though Howard's original vision may have been distorted beyond all recognition, the scope of his social agenda and commitment to safeguarding the landscape by concentrating urban growth around mass transportation systems, are, if anything, more relevant today than they were in Howard's own age. Having accepted diminished professional roles and visions for decades in the face of rapacious economic and social forces, it may be time for architects and other designers to readjust their priorities and to broaden their horizons once again. Understandably, architects have abandoned the flawed urban visions of the past century to focus on the new technologies of production and other more immediate issues. However, having now finally mastered the "how" of production in the digital age, designers need to refocus on the "what'" and to re-imagine the shape of the modern city to meet the urgent challenges of this century.

With this goal in mind, the Vertical Architecture STudio © (VAST) was conceived by the author as a focus for research in new forms of high-rise architecture and urban design. Beginning in 1994 as a studio project (see Figure 11) at the University of Nottingham, UK, VAST was created in its present itinerant form

in 2006 at the Faculty of Architecture, University of Sydney (USYD). It has since been offered at architecture schools at the University of Lincoln Nebraska (UNL) and the University of New South Wales (UNSW), also in Sydney, where it is presently in the graduate program. In line with current strategies, all of the projects carried out so far within the VAST program have been located on large central urban sites adjacent to or close by railways and other mass transit systems, the size of which demand appropriate large-scale solutions. In all cases, plans for high-density redevelopment on the same sites already exist and may, as in the first project in Sydney, even be under construction at the time, affording valuable sources of information and benchmarks for the students' work without inhibiting their own approaches. Given the complexity of the designs and the fact that most students have little or no prior experience of this scale, teamwork is mandatory for all projects.

Overriding any differences in their location, all VAST programs are rooted in a common set of principles for designing a prototypical Vertical Garden City, as summarized at the end of this essay, based upon a new urban topology. Beyond these principles, generic solutions, structural logic and energy saving features (the Sydney projects have enjoyed the enthusiastic support of engineers from Arup's office in the city) are favored over idiosyncratic form making, though this has not excluded non-orthogonal geometries, or iconic forms. Crucially, depending on the scope offered by site and program, students are encouraged to treat both horizontal and vertical spatial dimensions as having potentially equal significance above ground level. ✏
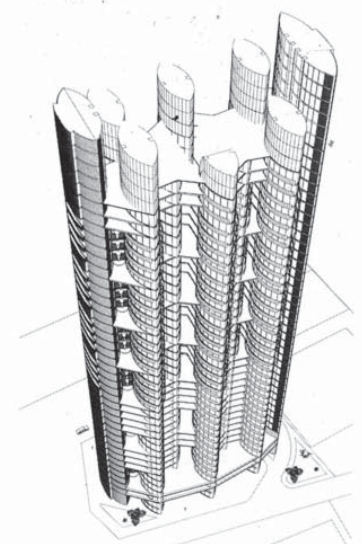

Figure 11. Project for a Tropical Tower, 1994, by Miller, University of Nottingham. Aerial view. © Abel/University of Nottingham

...down cycle

"A correction might give opportunities. I think it's healthy for the city's real estate market to have a down cycle."

Jonathan Bowles, director of the Center for an Urban Future, referring to the opportunities that investors and businesses could find buying and leasing in Manhattan as a result of lower costs during the current recession. From "Commercial Real Estate Slumps in New York", The New York Times, January 8, 2010