and work carried out in the UK by the Steel Construction Institute (Amato, 1996; HKUST *et al.*, 1999).

This research has progressed into the development of an internationally recognized methodology to undertake comparative assessments of the relative 'sustainability' of buildings and civil engineering projects. The methodology is specifically tailored to Hong Kong's Construction Industry, and the intention thereafter is to make it applicable to the broader South-East Asia Region. Construction and development of Hong Kong and the South China region are strongly driven by costs so, in this context, it is important life-cycle costing (LCC) is included in any assessment, together with life-cycle assessment (LCA). In the research, two of the three recognized environmental aspects of sustainability are measured: economics and environment. The third, the social impact, has been excluded because of a current lack of data, the difficulty in setting the scope of such a study, and setting recognized and appropriate 'yardsticks' within Hong Kong to measure social indicators. The intention is to focus on social indicators in future work.

The work demonstrates to key construction industry representatives and 'stake holders' the implementation of the methodology by undertaking a comparative assessment of archetypical residential towers in Hong Kong. The assessment was less to do with highlighting differences between the buildings, but more to demonstrate how the methodology can be used as:

- **A means to inform the debate on a macro-scale about how comparative construction methods and housing types might evolve in the light of LCA/LCC data**
- **A useful tool for client bodies to analyse their property portfolio, for design teams on projects, and for manufacturers on improving their products**

The study compared the environmental and cost performance of the following three 40-storey residential tower types:

- **A housing authority 'standard' harmony block (Figure 20.1)**
- **A private sector housing block (Figure 20.2)**
- **The Integer Concept Tower[1] (Figure 20.3)**

Regional background

Following the pattern of Hong Kong of some 20 years ago, China has a 'high-skilled–low-labour-cost' economy that is

Figure 20.1
A housing authority 'standard' harmony block.

driven both by internal external and demands from its relatively newfound ability to manufacture high-quality goods very competitively (Reuters, 2002). As a consequence, China has substantially higher-growth forecasts when compared with other regional centres, and is considered by some economic forecasters to become the future 'workshop of the world' (Peoples National Congress, 2001). Indeed, it is calculated that the Guangdong province (directly north of Hong Kong) alone produces 34% of the national industrial output (Ming Pao, 2002).

Over the last few years the majority of industrial production in Hong Kong has moved over the border to the special economic zone of Shenzhen, and beyond, where labour costs are much lower. In addition, a significant proportion of the property and industrial development in China is financed by Hong Kong capital (70% of total contracted amount of