

Sustainable City - Housing

Sustainable City

- Rapid Urbanization --> huge consumers of resource & producer of waste ==> HUGE environmental impact
- Sustainable City: city designed to have minimal environmental impact.
 - Creates smallest possible ecological footprints, waste and pollution



Urban Ecological Footprint

- Urban ecological footprint : land area required to sustain a population of any size.
 - Encompass water & energy use, use of land for infrastructure, land for waste assimilation, agricultural land, forest land and other resources required for people to live daily lives.
 - 1.7 hectares of biologically productive area needed per capita for basic living (Earth Council)



Sustainable Strategies

- Reducing Pollution
 - Environmental programs such as Hoy no circula (day without a car) in Mexico City
- Integrated Transport & Land Use
 - Curitiba (TOMAS & MAHO)
- Recycling
 - 70% of household separating recyclable rubbish in Curitiba, Brazil.
 - Food and bus fares exchanged for garbage in squatter settlement of Curitiba, Brazil
- **Sustainable Housing**
 - Case Study 1: Aurora, Victoria (Australia)
 - Case Study 2: CODE for Sustainable Homes (UK)



HOUSING

Housing: social sustainability indicator

Case Study 1 : Aurora Residential Development - Australia

- Aurora: Melbourne's newest sustainable community in Epping North (Victoria suburb) launched in 2009
 - **8,000 homes with population of 25,000 estimated to live in Aurora**
 - Victorian resident (other than Aurora residents) on average has 4 times the ecological footprint of that available per person worldwide.
- Aurora's Ecological Footprint Assessment
 - **Participants in Planning: VicUrban, EPA Victoria, Global Footprint Network, Centre for Design at RMIT**
 - Compared to Footprint of conventional 5-star development
 - **Total Ecological Footprint of an Aurora resident : 7.03 global hectares**
 - Saving 9% on from the conventional 5-star greenfield resident's footprint in Victoria
 - But still 3.5 times the bio-capacity available per person (1.7 hectares)

- How?

- Public transport & walking encouraged (20% of Aurora's land parkland)
- Planned to extend electrified railway
- Housing at least 6 stars (solar-heating of water, insulation of buildings)
- Streets designed for optimal capturing of solar power
- 'Rain Water for Hot Water' system
- Third Pipe -wastewater from households recycled to be used in toilets, gardens, etc.

- Outcomes

- **52%** Reduction of Ecological Footprint from the housing of conventional 5-star Victorian.
- **If replicated globally --> substantial amount of ecological deficit eliminated**
- 11% reduction in the mobility footprint at Aurora due to pedestrian and bike friendly design
- **Strategies to use towards 'one planet living' created!**

Housing Ecological Footprint
Aurora versus Conventional Development*



Aurora's Master Plan



Discovery Pavilion and Display Village

Cur Whitelight Avenue & Harvest Home Road
Epping North
Melway Ref 181 H3



Case Study 2: CODE for Sustainable Homes (CSH) - UK

- What is Code for Sustainable Homes?

CSH is voluntary **national standard to improve overall sustainability** of new homes by setting a single framework within which the home building industry can design and construct homes to **higher environmental standards**. So there is an environmental **assessment method** evaluating the running cost and environmental impact of new houses of England which must be informed to the government to be certified. There are **9 categories** to rate the houses into **6 star stages**, 1 Star being the entry level house while Star house would be a exemplar development house.

- When was it established?

Introduced in April **2007**. Since May 2008, all new homes of the location under the rule are obliged to have sustainability certificate

- Where & Who follows?

England, Wales, Northern Ireland imposed the standards on the **residents/homebuyers of the land**

- What are the reactions?

CSH is welcomed by people as the program helps reducing carbon emissions of housing. But also criticized for the way the funding for all the changes for greener house must be paid for by the developer.

Also, designing higher level Code houses requires holistic approach to design in the early stages. Design detailing for Code can be time consuming, labor intensive and thus expensive.



9 Categories to assess the Houses

- Energy and CO₂ Emissions
- Water
- Materials
- Surface Water Run-off
- Waste
- Pollution
- Health and Wellbeing
- Management
- Ecology

How can it benefit the environment?

- low lighting energy will use less power
- the houses are built with high insulation, keeps the house warmer or cooler depending on the season
- reuse water (water butts installed in houses)
- sets new goals for home building, not only in the UK but all over the world
- relatively cheap housing

Photovoltaic panels



Level 3 Housing

- low energy lighting
- water butts to collect rainwater
- heat recovery system
- photovoltaic panels
- The build cost excluding land costs and fees was around £900 per square metre.
- The sales value of the properties that have so far been put on the market range from -£124,950 (three-bedroom link property) to £149,950 (three-bedroom semi detached house).
- occupants are pleased with the houses



Level 6 Housing

- low air permeability
- thermal mass construction (underfloor heating via biomass boiler, photovoltaic panels)
- £985/m² for the Code Level 3 unit and £1423/m² for the Code Level 6 unit
- from £305,950 for the Code Level 1 unit to £339,950 for the Code Level 6 unit



Biomass boiler supplying the Code Level 5 and 6 homes

