

Tall Trends

Tall Building Trend One: An Increase in Height



Incremental height changes in the World's Tallest Buildings (as of April 2013)

Tall Building Trend Two: An Increase in Number



Tall Building Trend Three: A Change in Location





Tallest Buildings by Location (as of January 2013)

Tall Building Trend Four: A Change in Function



Tallest Buildings by Function (as of January 2013)

Tall Building Trend Five: A Change in Material



 Tallest Buildings by Structural Material (as of January 2013)

Tall Building Trend Six: A Change in Title / Motivation

Pre-2000



Chrysler



Sears



Transamerica



Petronas

Post-2000



Taipei 101



Burj Dubai



Shanghai Tower

Tall Building Trend Seven: A Change in Aesthetics



4 Times Square

Bahrain World Trade Center

Al Bahar Towers

Pearl River Tower

Drivers / Influencing factors

Tall Building Driver One: Land Prices & Return on Investment



Tall Building Driver Two: Global Icons



Tall Building Driver Three: Population Growth

Old	Stone Age	New Stone Ag Commences	ge	New Stone	e Age	Bronze	e Age	Iron Age			Middle Ages	Modern Times	
7 BILLION				-				·				·	
6 BILLION													
5 BILLION													
				1900 ≈	• 1.7 E	Billion							
4 BILLION				2013 ≈	• 7.0 E	Billion							
				2025 ≈	* 8.0 E	Billion							
3 BILLION													
2 BILLION													
1 BILLION													
•												~~	
	800	0 7000	6000	5000	4000	3000	2000	1000	B.C.	A.D.	1000	200)0

Tall Building Driver Four: Urbanization



Source: United Nations Population Fund (UNFPA) Graphic: Paul Scruton

Transport and Urban Density



Source: Newman, Peter and Jeffrey Kenworthy, Urban Design to Reduce Automobile Dependence, Opolis: An International Journal of Suburban and Metropolitan Studies: Vol. 2: No. 1, Article 3. http://repositories.cdlib.org/cssd/opolis/vol2/iss1/art3, (2006)

Tall Building Driver Five: Changing Social Demographics



The U.K.

Factors:

- longer life expectancy
- smaller household size
 (single person households,
 divorce rate, children outside
 marriage, etc)

Results:

a government demand of 2.6
million new homes by 2020
An annual requirement of

189,000 new homes

Tall Building Driver Six: Population Shifts

Greatest Domestic In- and Out-Migration Metro Areas, 2011-2012

Circles are sized by number of migrants to or from each metro area. Red indicates out-migration; blue indicates in-migration.



USA Pop. Growth / Immigration

- 0.9% per annum (world average
- = 1.09%)
- 0.9% x 3.2 million people =
 280,000 urban growth annually
- Not equal across cities. Rust belt to Sun-belt, etc.

Source: Brookings Institution

Tall Building Driver Seven: Energy, Sustainability & Climate Change



Tall Buildings and Place: The Shortfall of Tall?



Shortfall 1: The Commercial Design Approach

1958. Seagram Building, New York, Mies van der Rohe & Philip Johnson



Tall building-scape, Jakarta



Tall building-scape, Seoul



Shortfall 2: The Iconic -Sculptural Design Approach

2007. RAK Financial City, Ras Al Khaimah, UAE, Rakeen

The Extreme Iconic-Sculptural Design Approach: A Tall Building Menagerie?



New Paradigms in High Rise Design: A New Vernacular for the Skyscraper?

10 Design Principles

Design Principle 1: Tall Buildings should relate to the **physical** characteristics of place.



2004. "Building As Frame" Annette Ward University of Nottingham



Design Principle 2: Tall Buildings should relate to the **environmental** characteristics of place (Light, Wind, Air, Sun, Rain)



Light 2003. "The Sun Splice" Thomas Pickford University of Nottingham







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Wind 2007. "Wind Farm" Adam Chambers & Alex Dale-Jones University of Nottingham



Harnessing Wind in Tall Buildings? $P = 0.5 \ pV^3 T$ where P = Turbine Wind Power, p = air density, V = Wind Velocity,



Bahrain World Trade Center, 2008 Strata, London 2010 Pearl River Tower, Guangzhou, 2013





Water 2007. "The Chicago Aquifer" Steve Henry & Hannah Cho, Illinois Institute of Technology










Design Principle 3: Tall Buildings should relate to the **cultural** characteristics of place.





2009. "Swadeshi Tower (Textile Tower)," Mumbai Nishant Modi & Hiren Patel Illinois Institute of Technology



- Integrate a dhobi ghat system within the high-rise to wash and dry the clothes of surrounding towers and neighborhood.
- 2) Revive an existing textile market culture at the base of the site.
- 3) Integrate a clothes drying system within the skin of the tower.
- 4) Incorporate the terrace as not only an outdoor balcony,

but a semi-outdoor space with tubs for clothes washing

5) Provide an open space at top of tower for kite flying.



Design Principle 4: Tall Buildings should Vary with height

– in form, texture, scale (and program) – not be just
vertical extrusions of an efficient floor plan



2003. "SkyBox version 1" Eva Young, University of Nottingham



Burj Khalifa, Dubai, 2010 SOM

+6 degrees in external air temperature at top of tower, compared to bottom

The environment changes with height too!



Design Principle 5: Accommodate **new and multiple functions** – bringing all aspects of the city into the sky



2006. "Vertical Farm" Paul Foster & Darran Oxley University of Nottingham

2006. "Vertical Farm" Paul Foster & Darran Oxley, University of Nottingham











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The last few years consumers have shown increasing disastrufaction with food quality, safety, cost, choice and inequality in food distribution. Questions have been raised concerning food being transported unnecessary miles within, to and out of the UK. The UK is a net importer of food, the trade gap rising from £5.8 billion in 1994 to £7.9 billion in 1994 and is becoming more reliant on oversess producers.

Between 1978 and 1998 the amount of food transported on UK roads increased by 20% and the distance travelled increased by 30%. A tonne of food travelled an average distance of 123 km compared to 82 km in 1978. Food accounts for the largets amount of freight above any other single commodity and 34 per cent of the increase in goods travelled is made up of food.

Transport is all forms is a major consumer of energy in 1996, some 34 per cent of all UK energy consumption was used by transport, contributing significantly to pollutant emissions. Food travelling greater distances requires more packaging to retain quality and nutritorial values drop during greater storage and transportation. In addition longer distance transportation can result in greater use of agri-chemicals to protect erops in storage and transit, which stay on the product.

A reduction in Food Miles will not only provide an environmental benefit, but will shorten the link between producers and comumers and increase the level of anderstanding between buyer and seller. Farmers markets are examples of this, where only locally produced food of high quality and festimes are sold.

Year	All foods	Indigenous foods (that could be grown in UK)
1993	73.4%	B5.3%
1994	73.0%	BS.8%
1995	73.5%	86,5%
1996	69.8%	83.1%
1997	68.7%	82.0%
1998	68.1%	82.3%

Average Quantity Year Distance (km 1978 287 82 1983 264 89 1988 302 100 1993 300 119 1998 346 123

UK Self sufficiency relative to total consumption.

Food quantity and distribution on UK roads.

Sources from SUSTAIN Report Food melles – Still on the road to much Antenno alers BUSIAN Beams Course from Science A number to highlic of antenna Conference of the State of the Science A number of the UC Conference - The Mailting Ingeneration Conference - The Mailting Ingeneration Conference - The Mailting Ingeneration Conference - A number of the Science A number Science - An enging of Leaders from the Science Science - Antenness of Leaders - Antenness Conference - Antenness of Leaders - Antenness Science - Antenness of Leaders - Antenness Science - Antenness of Leaders - Antenness of Leaders - Antenness Science - Antenness - Science - Antenness of Leaders - Antenness Science - Antenness - Antenness - Antenness - Antenness - Science - Antenness - An







Design Principle 6: Tall Buildings should provide significant communal, open, recreational space



Commerzbank Frankfurt,

Germany

Commerzbank Frankfurt, Germany



View of high-level sky garden

Inward facing office

Design Principle 8: Tall Buildings should introduce more facade opacity (and variation / texture) in skin/envelope





1984. National Commercial Bank, Jeddah. SOM Architects









O14, Dubai, 2009 Reiser + Umemoto



Design Principle 9: Embrace **organic vegetation** as an essential part of the material palette



Design Principle 10: Introduce physical, circulatory and programmatic connections – **skybridges**



"City in the Sky / Skybridges" Harijinder Singh, University of Nottingham



1908 - The Cosmopolis of the Future. Harry Petit. From King's Views of New York



1927 - Metropolis. Erich Kettelhut. Still from Fritz Lang's film



1997 - The Fifth Element. Luc Besson. Still from film













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2009. Linked Hybrid, Beijing, China. Steven Holl Architects



2010. Marina Bay Sands Singapore Moshe Safdie Architects





2009. The Pinnacle @ Duxton Singapore ARC Studio





1998 - Petronas Towers, Kuala Lumpur. Cesar Pelli



Cross Cultures

Differing Cultural Attitudes towards Fire Safety





Urban Enrichment – Hong Kong









What is needed?..... A new regulatory, political & financial model for urban development.....

The horizontal 2-dimensional planning model flipped vertical into 3- Dimensions......



Source: Pomeroy, J. (2009) "The Skycourt – A comparison of Four Case Studies," *CTBUH Journal,* Issue I, p. 35.
A new Vernacular for the Skyscraper, for Cities?

Future Tall Buildings should.....

- 1. Relate to the **physical** characteristics of place
- 2. Relate to the **environmental** characteristics of place
- 3. Relate to the **cultural** characteristics of place
- 4. Vary with height in form, texture, scale (and program) not be just vertical extrusions of an efficient floor plan
- 5. Accommodate **new and multiple functions** bringing all aspects of the city into the sky
- 6. Provide significant communal, open, recreational space
- 7. Maximize layers of usage on all systems and materials
- 8. Introduce more facade opacity (and variation / texture) in skin/envelope
- 9. Embrace organic vegetation as an essential part of the material palette
- 10. Introduce physical, circulatory and programmatic connections **skybridges**

What is needed?...... A new regulatory, political / financial model for developing vertical cities

The Future of Sustainable Cities?





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