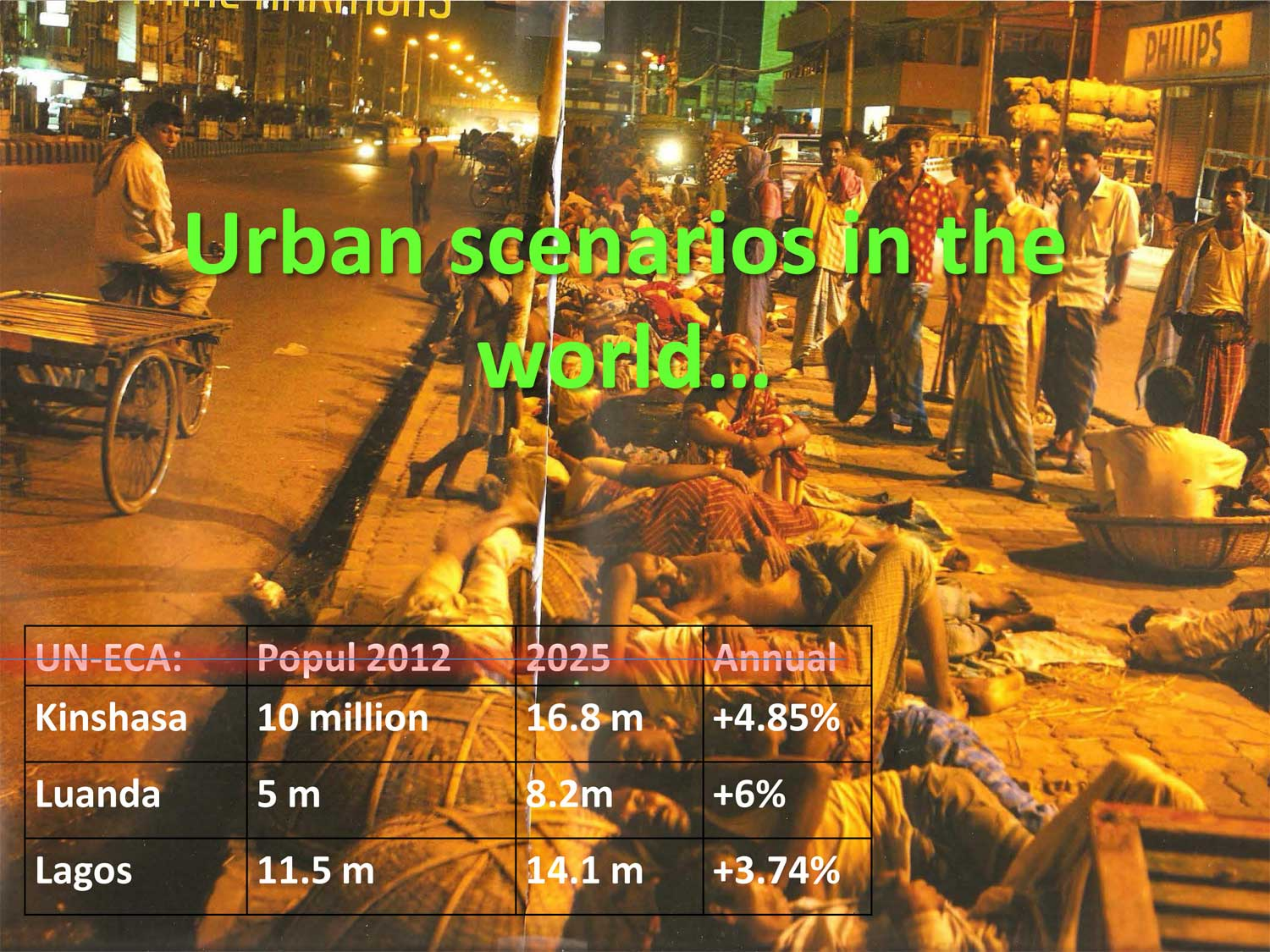


WBC, Antwerpen, April 15, 2012

Bamboo for Urban Density And Permanent Construction

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Urban scenarios in the world...

UN-ECA:	Popul 2012	2025	Annual
Kinshasa	10 million	16.8 m	+4.85%
Luanda	5 m	8.2m	+6%
Lagos	11.5 m	14.1 m	+3.74%

Urbanization is accelerating with climate change and aggravated rural conditions.

Conventional bungalow style housing, squatter settlements and other *one level* development create unprecedented *urban sprawl* and mega-cities without the necessary infrastructure

Terra Nova

66 km

Image © 2010 DigitalGlobe
© 2010 Europa Technologies

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33 L 315544.83 m E 9023180.82 m S elev 74 m



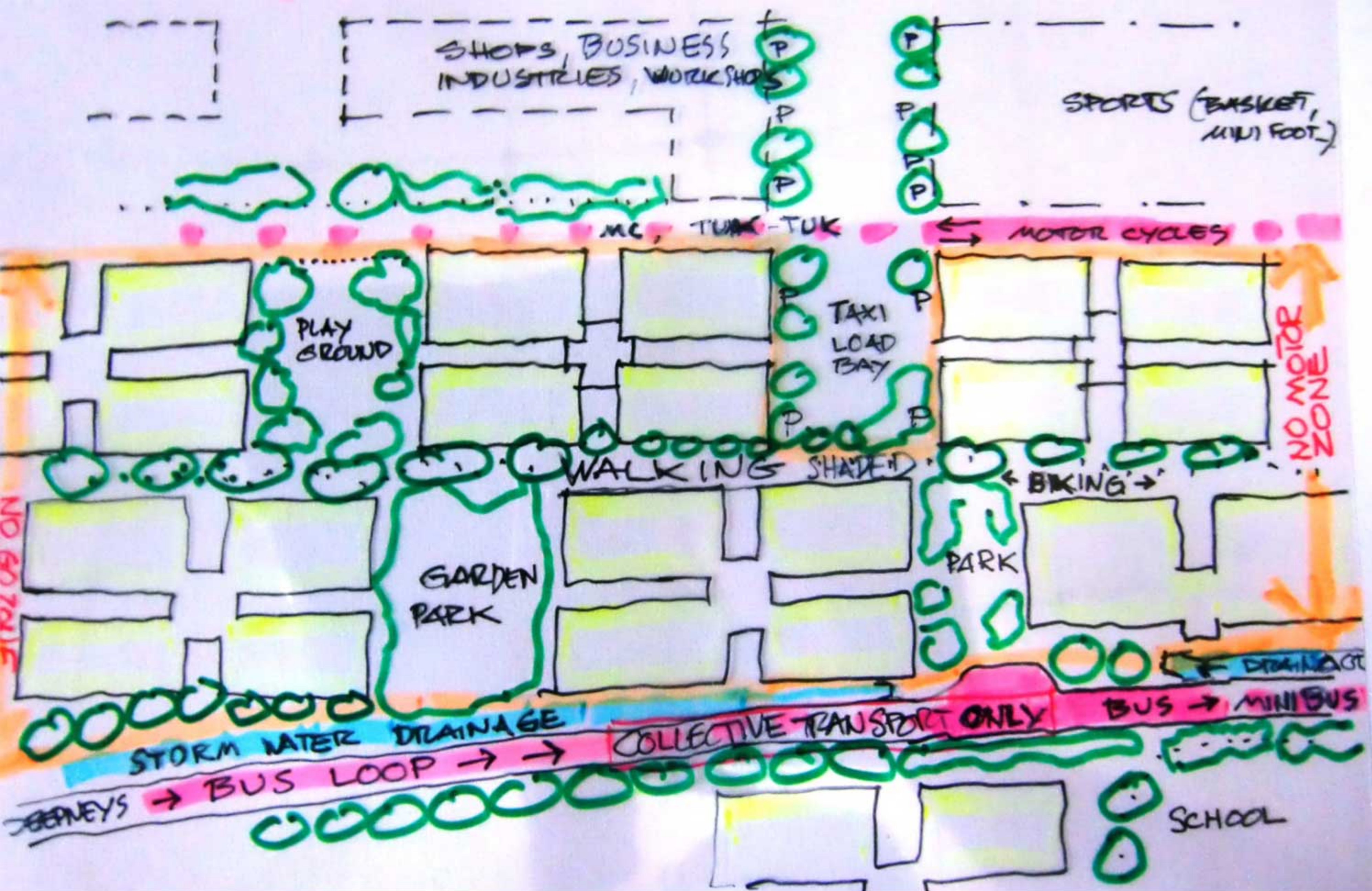
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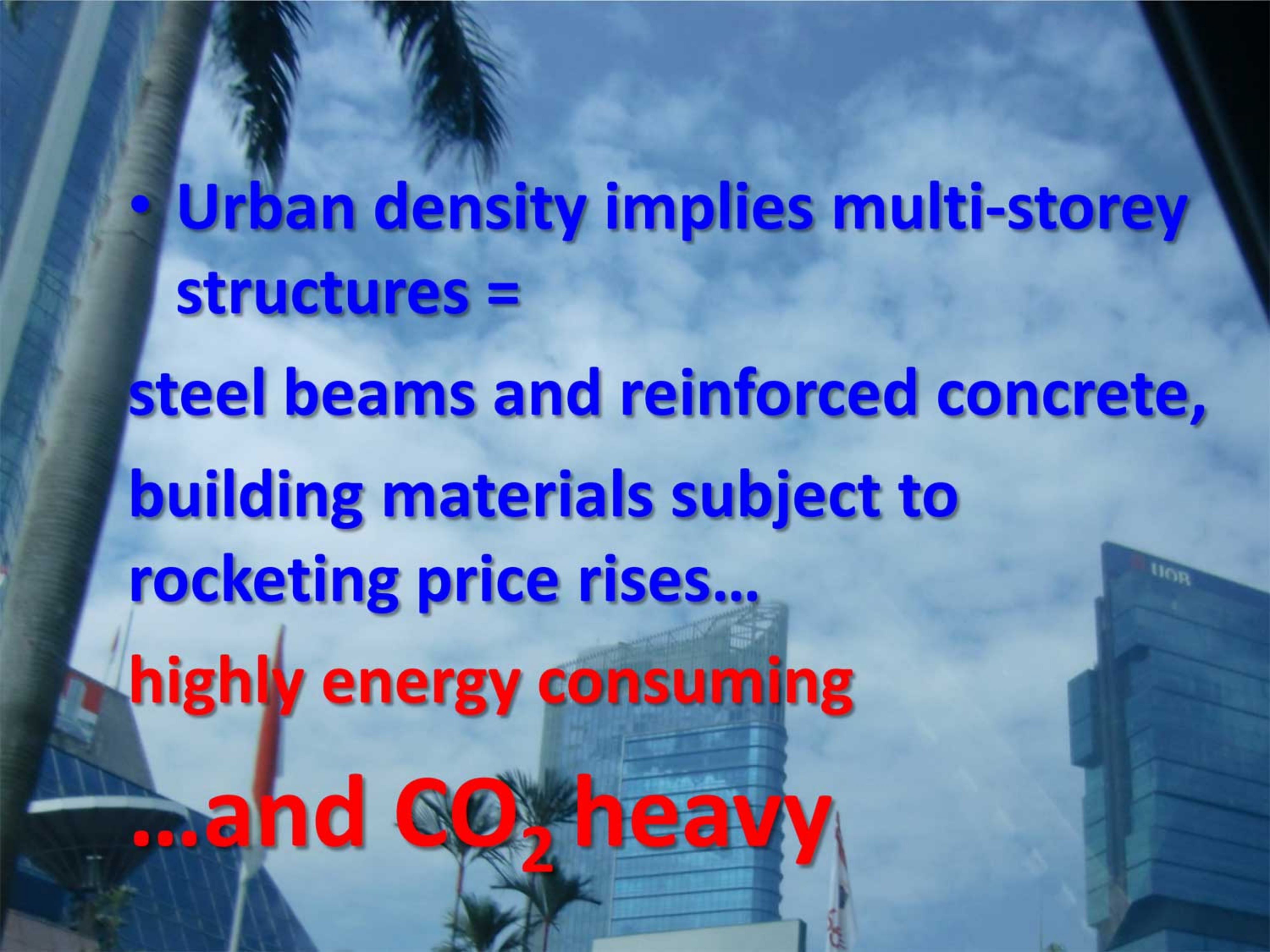
- **Cost of urban land increases dramatically >>>**
- **Construction on steep hills, swamps ...
>>landslides, unhealthy environment**

- **Transport systems and infrastructure networks, totally insufficient today, will further deteriorate**





Urban density offering service facilities, public transport, green spaces, waste recycling, biogas etc

- 
- **Urban density implies multi-storey structures = steel beams and reinforced concrete, building materials subject to rocketing price rises... highly energy consuming ...and CO₂ heavy**

A photograph of a construction site. In the foreground, several large, light-brown bamboo poles are stacked vertically. To the left, a wooden frame made of bamboo and planks is visible, with two reddish-brown tiles resting on it. In the background, a person wearing blue jeans and a red shirt is standing on a grassy area. The scene is outdoors with green grass and some wooden debris scattered around.

**Innovative architecture with
renewable materials is needed**

**One possible option for multi-
storey is design based on fast
growing bamboo**

Most issues associated with bamboo (insects, fungi, connections...) are resolved today, as seen in Colombia,....



...or in Brazil... advanced, expressive architecture...

Eco-cultural center, Pardinho, SP, Brazil

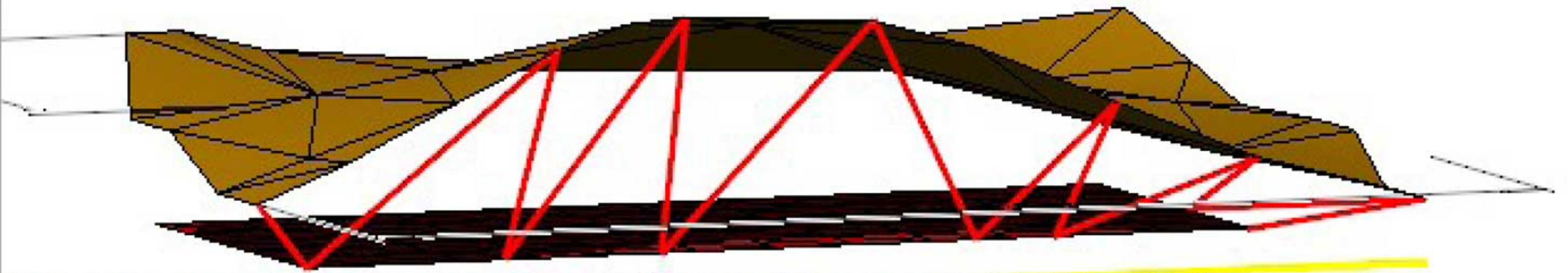
Architect: Leiko Motomura



...excellent space frame structures ...



Architect: Leiko Motomura, São Paulo



Space frames of any shape can be designed with parametric CAD; individual bamboo elements may have different lengths and tagged with ID for production and assembly on construction site.





Multi storey?

Bamboo pole 15 x 200 cm sustaining *11 ton* load at
Structural
Engineering Lab,
Gadjah Mada Univ,
Yogyakarta,
Indonesia



**Bamboo
components
replacing reinforced
concrete and steel**





**Combined with a few key
components, bamboo
provides earth quake safe
connections**

**Prefab construction in
small workshops allows
for quality control and
adequate assembly on
site.**



**Weather protective exterior skin
of ferro-cement on a bamboo
honeycomb structure.
Excellent bracing effect and
impact strength**

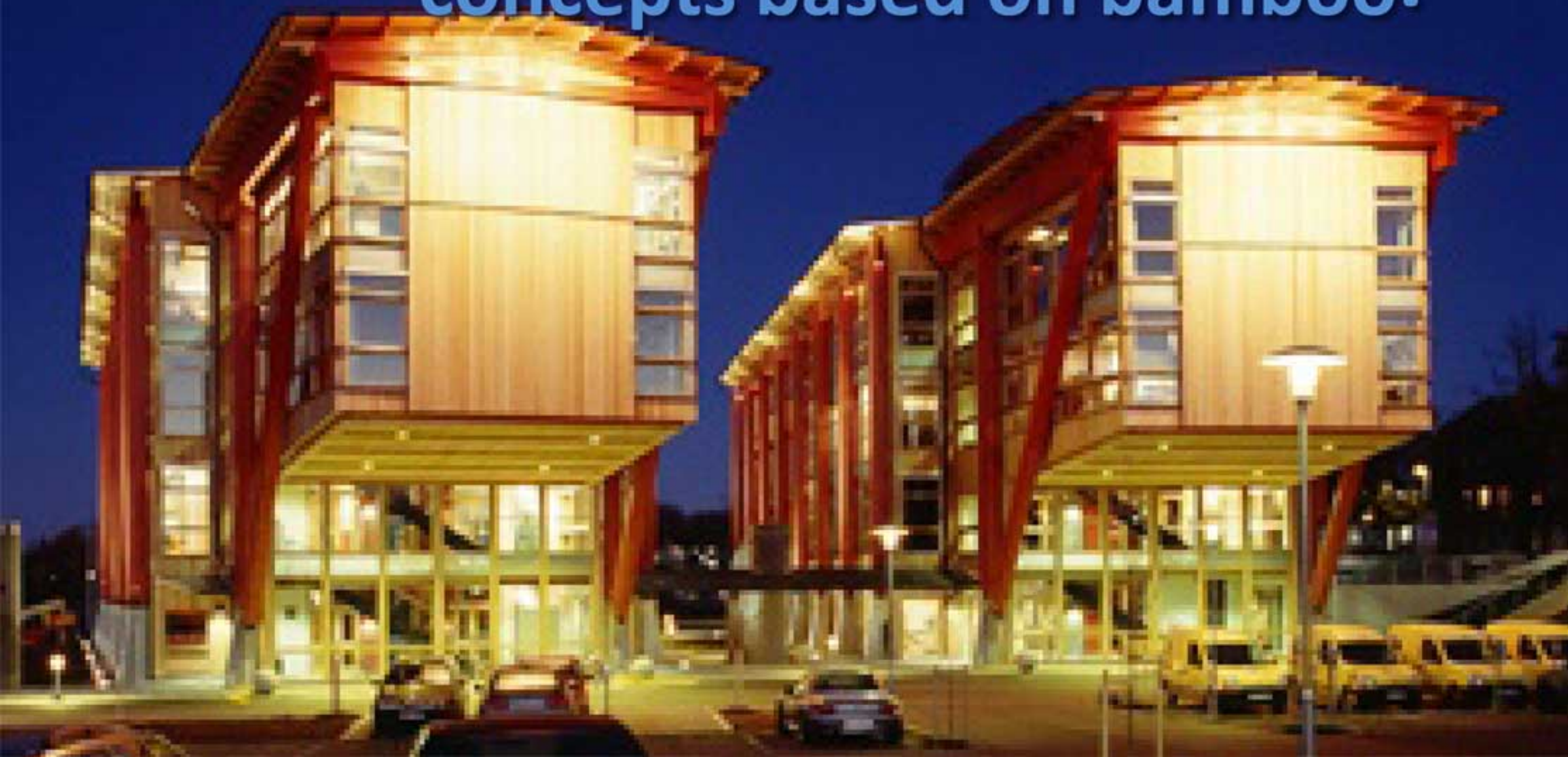




Urban style = flush, planar walls,
floor tiles, modern bath rooms,
AC thermal insulation...
all of it is possible to combine
with bamboo loadbearing
structures



In Sweden multistory structures in wood are now becoming competitive and could inspire to similar concepts based on bamboo.





**Multi story, urban density
housing in bamboo is
entirely feasible with new
design concepts**

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