Asia Perspective

Challenges and Opportunities for Sustainable Community and Building Technologies

Sustainable Innovation Lab: Ichin Cheng

SILAB

Sustainable building design

- Minimize demand through the use of passive techniques suitable for the particular climate and daylighting
- Reduce embodied energy through the use of environment- friendly construction materials and techniques
- Meet the loads through efficient equipment for lighting
- Meet part of the load by renewable energy sources (e.g.. solar water heating, building photovoltaics)
- Minimize generation of waste and recycle waste
- Maximize water conservation

Sustainable habitat - zero energy in, zero waste out

Achieve Energy efficiency
Minimize demand (use of passive techniques)
Meet the loads by efficient equipment

Meet part of the load through renewable energy sources

Minimize generation of waste and recycle waste
Maximize water conservation

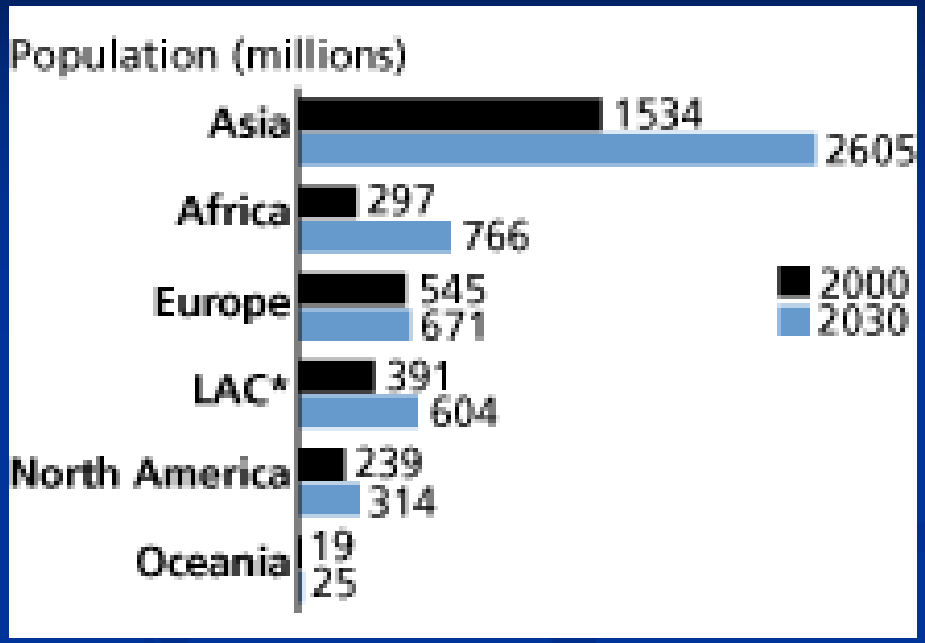
Reality in the Asia

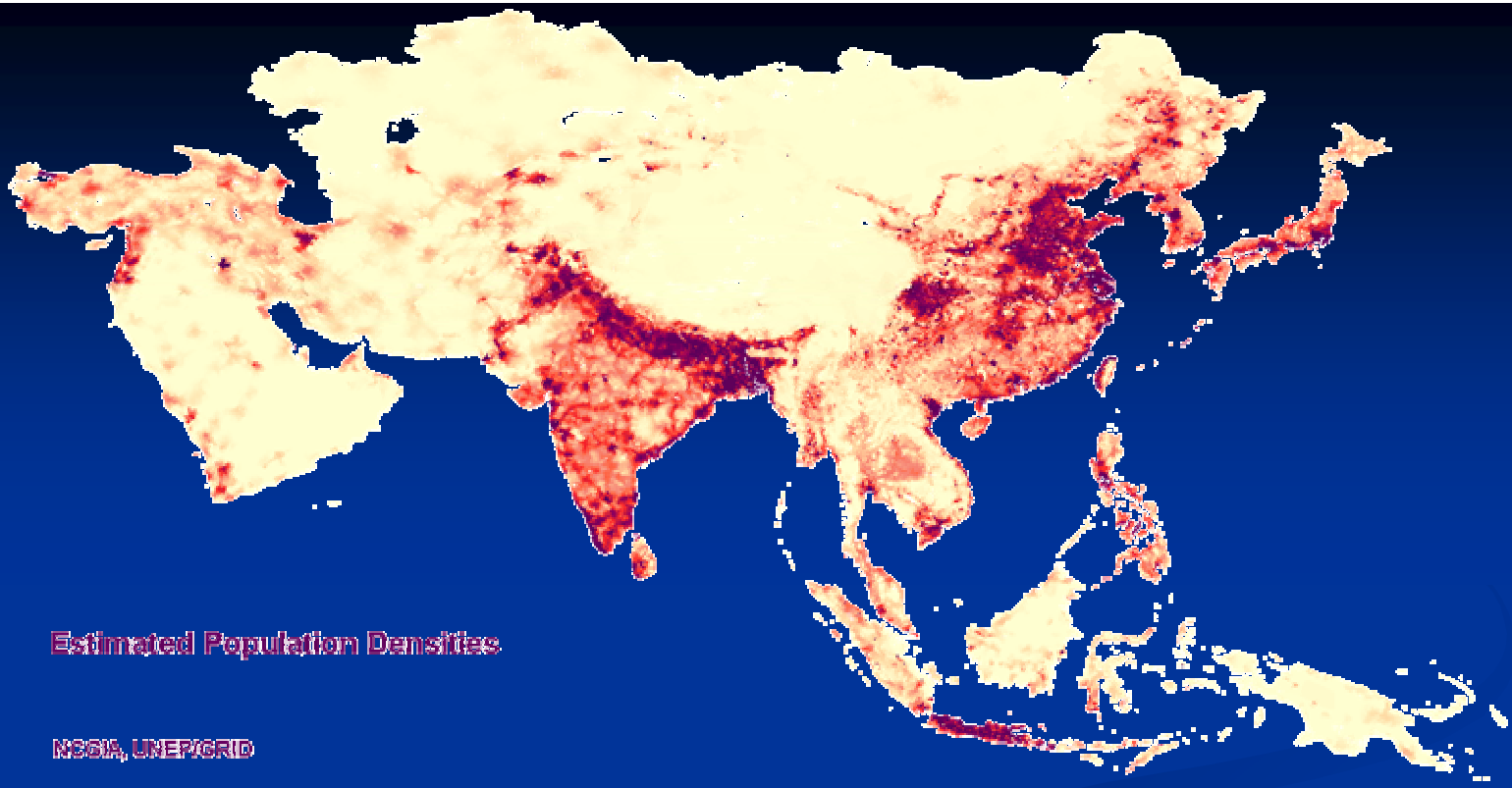
- South vs North
- Rich: Japan, Singapore, Hong Kong, Taiwan, South Korea, part of China; Poor: rest of Asia
- Focus on Great China, India, Japan, Taiwan

Challenge 1 : population/density

China plus India
= 40% population

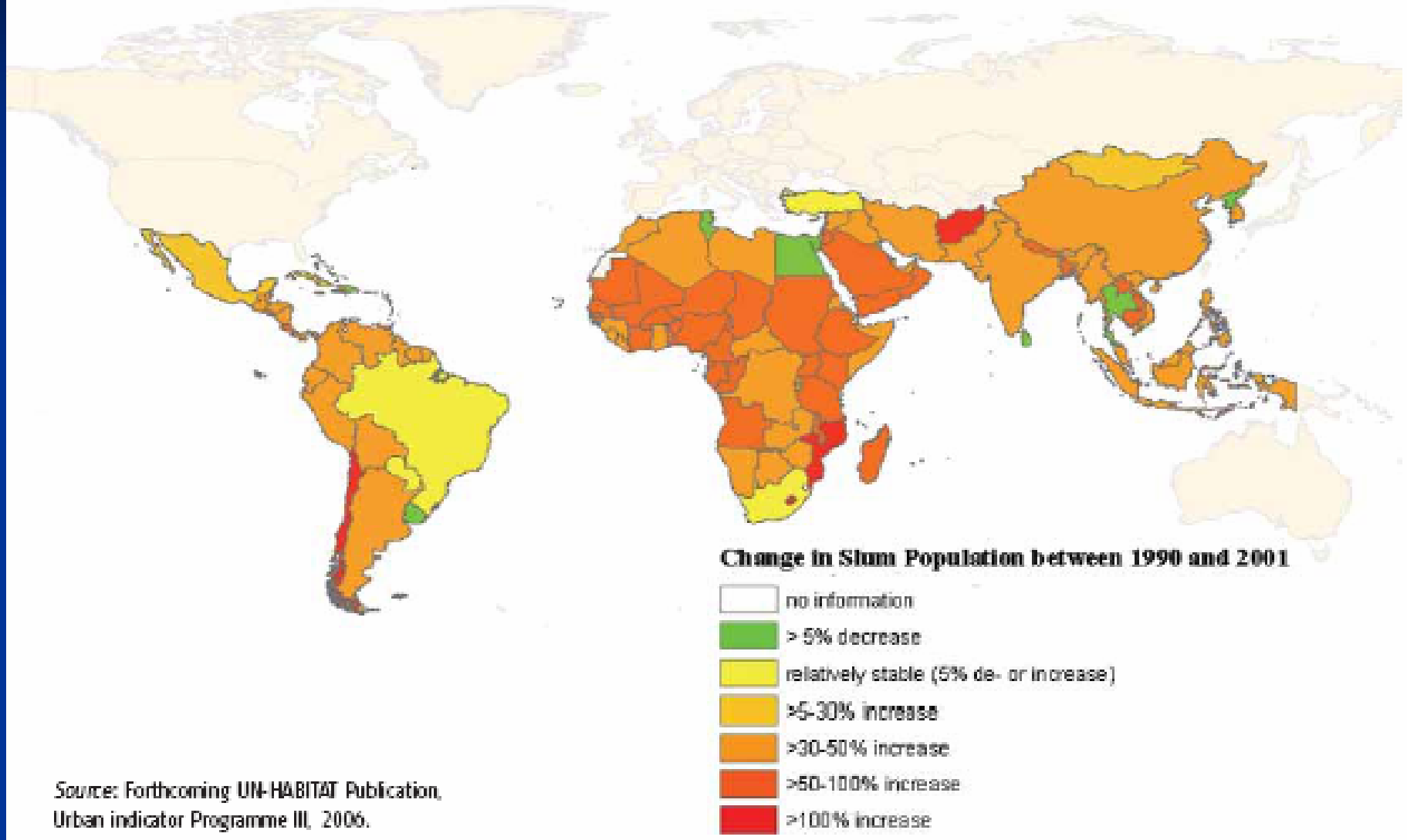
Continue to grow





•India already has 35 cities with populations over 1 million, and that number is projected to reach 70 by 2026.
Greater Delhi and Mumbai have populations of 30 million each—a combined total that equals that of the United Kingdom.
In China, 45 cities already have more than a million residents.

Map 3.2: Change in slum population in developing countries, 1990–2001



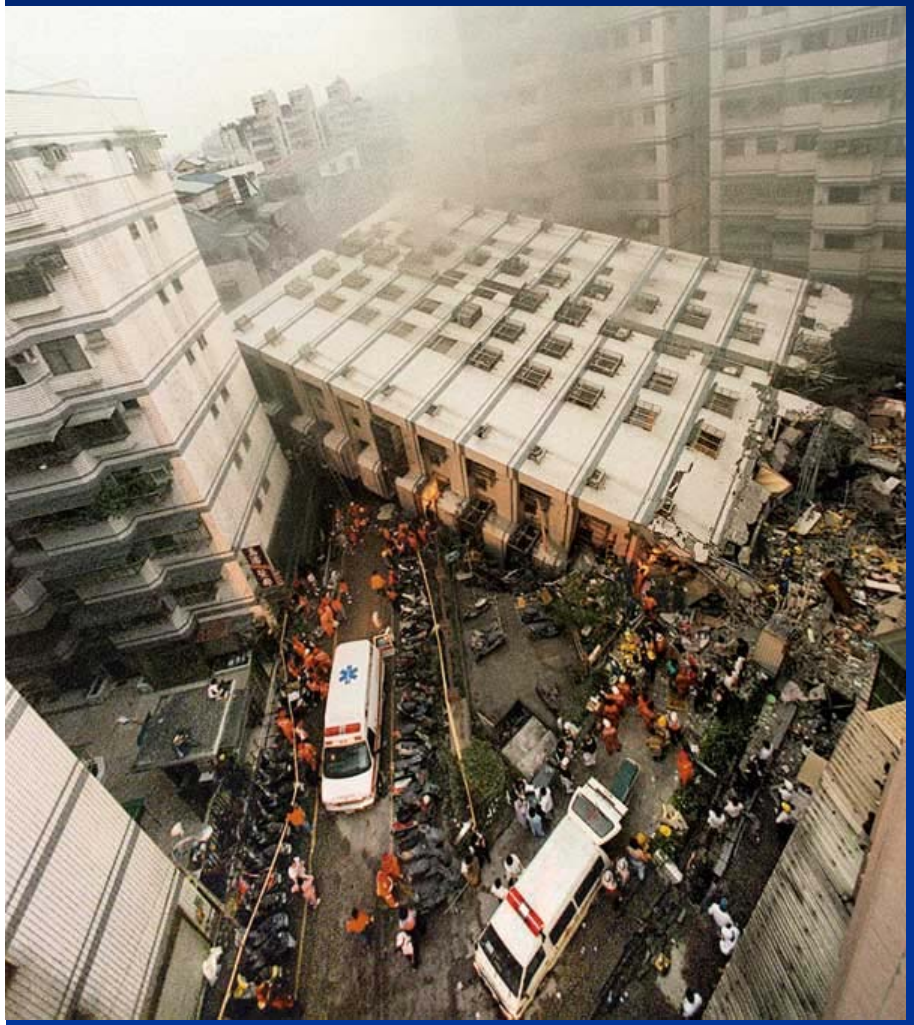
Source: Forthcoming UN-HABITAT Publication, Urban indicator Programme III, 2006.

Uneven development

Water intake = sewage system

INDIA
Woman pumping water in a slum Delhi, India, Asia ,WHO

Challenge2 : Nature and knowledge



- nature disaster : challenge of building code / climate change impact
- Most of the advanced green building knowledge and experts are developed in the EU or north America for cold/ dry climate
- A big part of the Asia is in tropic/ sub- tropic area (hot /humid)
-

Challenge 3 : resource and economy

- China's economy growth rate 9.5%
- In 2005, China used 26 percent of the world's crude steel, 32 percent of the rice, 37 percent of the cotton, and 47 percent of the cement. (all No1 in the World)

Nature disaster plus manmade disaster

- 20 cities worldwide with the most polluted air, 16 are in China. Some 200 Chinese cities are estimated by the State Environmental Protection Administration to fall short of World Health Organization standards for the airborne particulates that are responsible for many respiratory diseases.
- China's air is also filled with sulfur dioxide, which has given it someof the world's worst acid rain. An estimated 30 percent of China's cropland is suffering from acidification, and the resulting damage
- to farms, forests, and human health is projected at $13 billion.

- Air pollution is a major environmental issue, particularly in Asian cities, and related diseases kill more than half a million people each year.

Ecological Footprints of China, India, Europe, Japan, and the United States, 2002

	Total Footprint million global hectares	Footprint per Person global hectares
China	2,049	1.6
India	784	0.8
Europe	2,164	4.7
Japan	544	4.8
United States	2,810	9.7

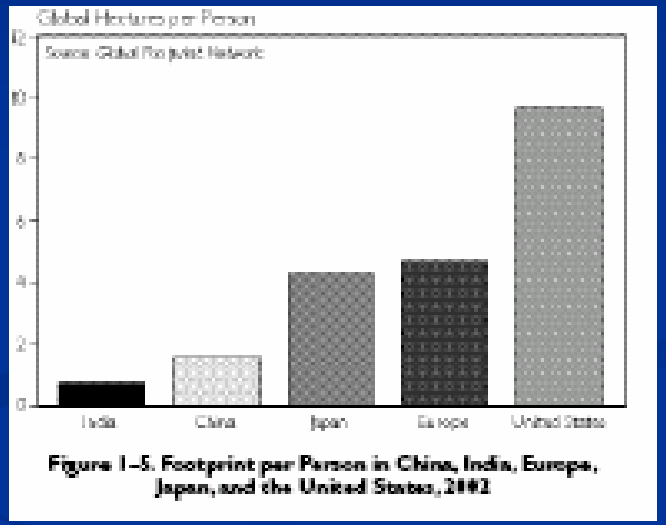


Figure 1–5. Footprint per Person in China, India, Europe, Japan, and the United States, 2002

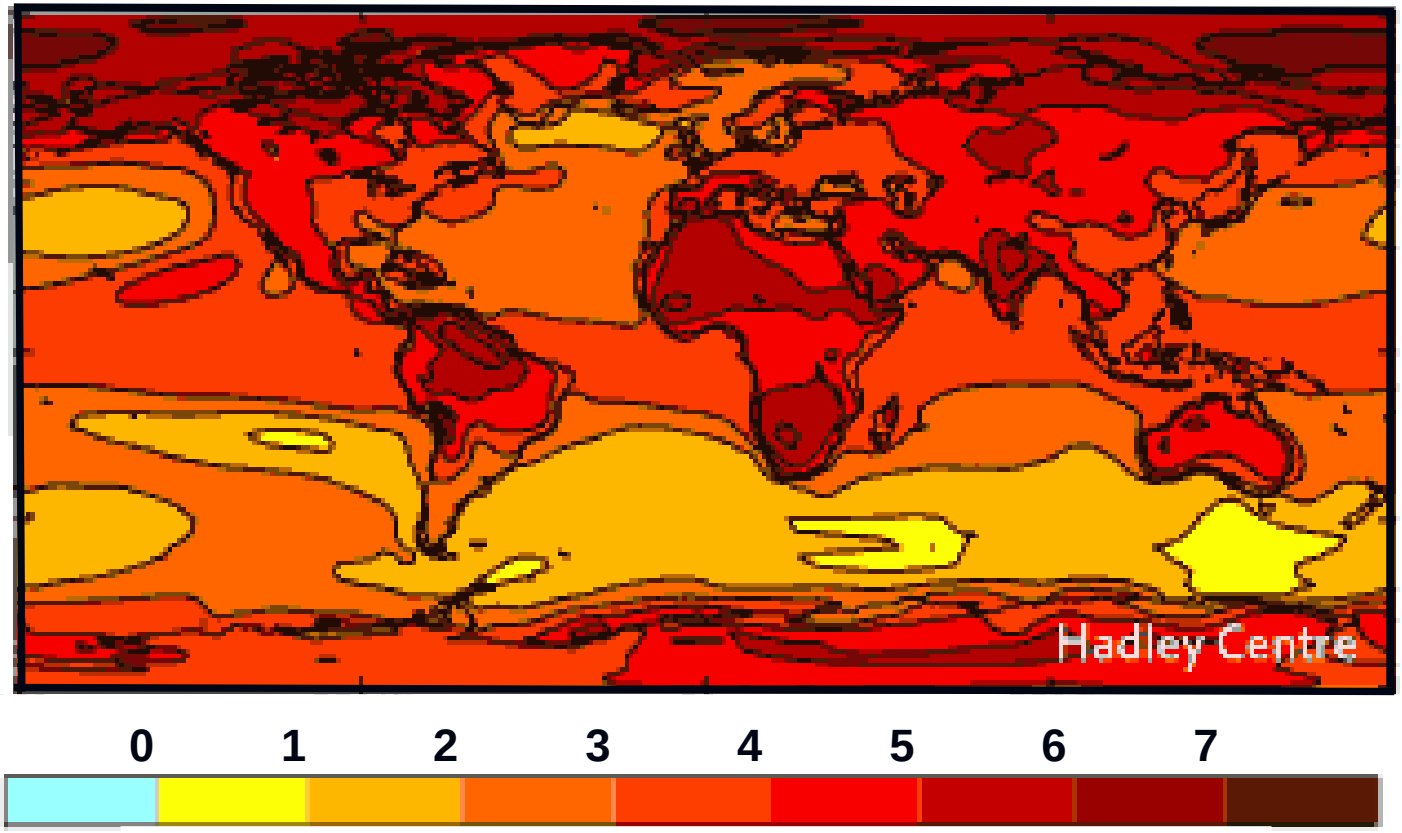
- Global hectares are the area of biologically productive space (land or water with significant photosynthetic activity and biomass accumulation) with world-average productivity.

Threat and Opportunity

Quick , big, grow fast , the center of global economy and environment

- According to official figures, approximately two-billion-square-meters of floor area are constructed annually in China, accounting for half of that around the world.
  China's each year energy use add whole UK energy use
- **China to pass US greenhouse gas levels by 2010**

Global warming and climate change will accelerate

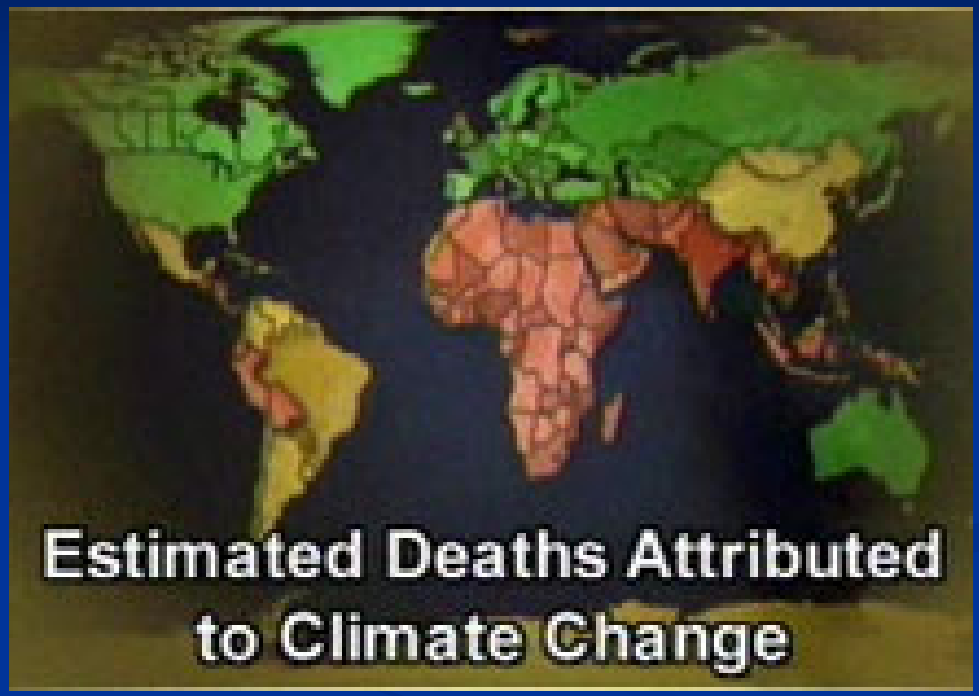


Predicted 2080 Temperature rise (°C)

Poor suffer more

- *Rich countries produce most of the world's greenhouse gases, but it is the health of people in poor countries that suffers the most from global warming*

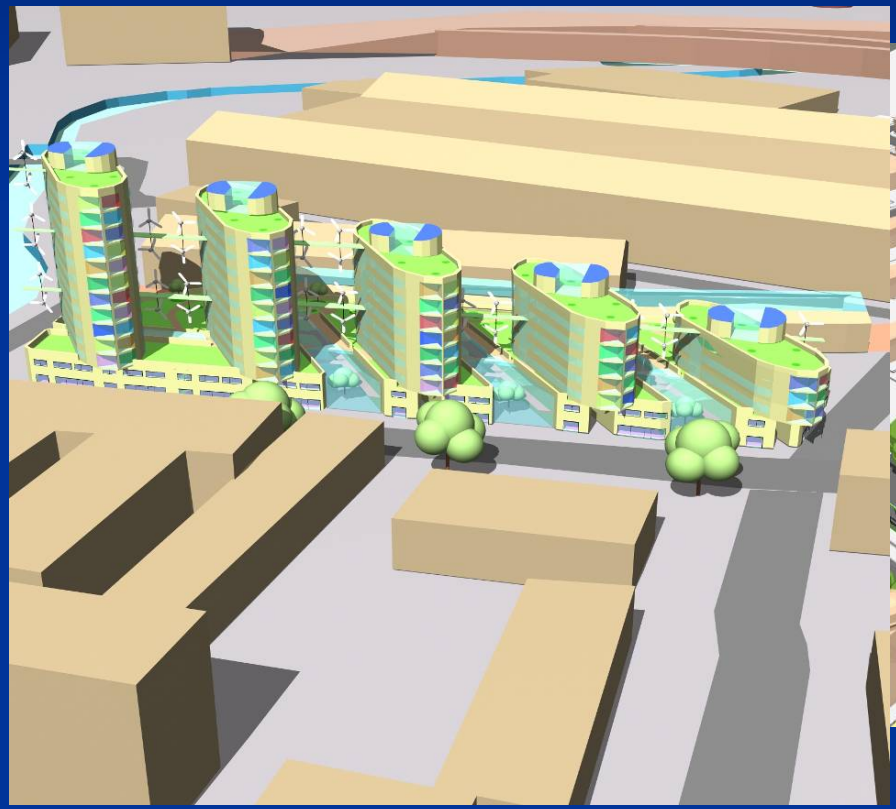
  Nature, Dec 2005



- *Countries shown in red get the most climate-related diseases, and in green, the least.*

- Natural ventilation Vs. air pollution
- Clean water, sewage system vs total water management
- Slum vs sustainable community solution
- Affordable housing Vs. rich people's show room
- Integration of solar thermal energy in buildings:
  - for sanitary hot water production
  - for heating support ---cooling system

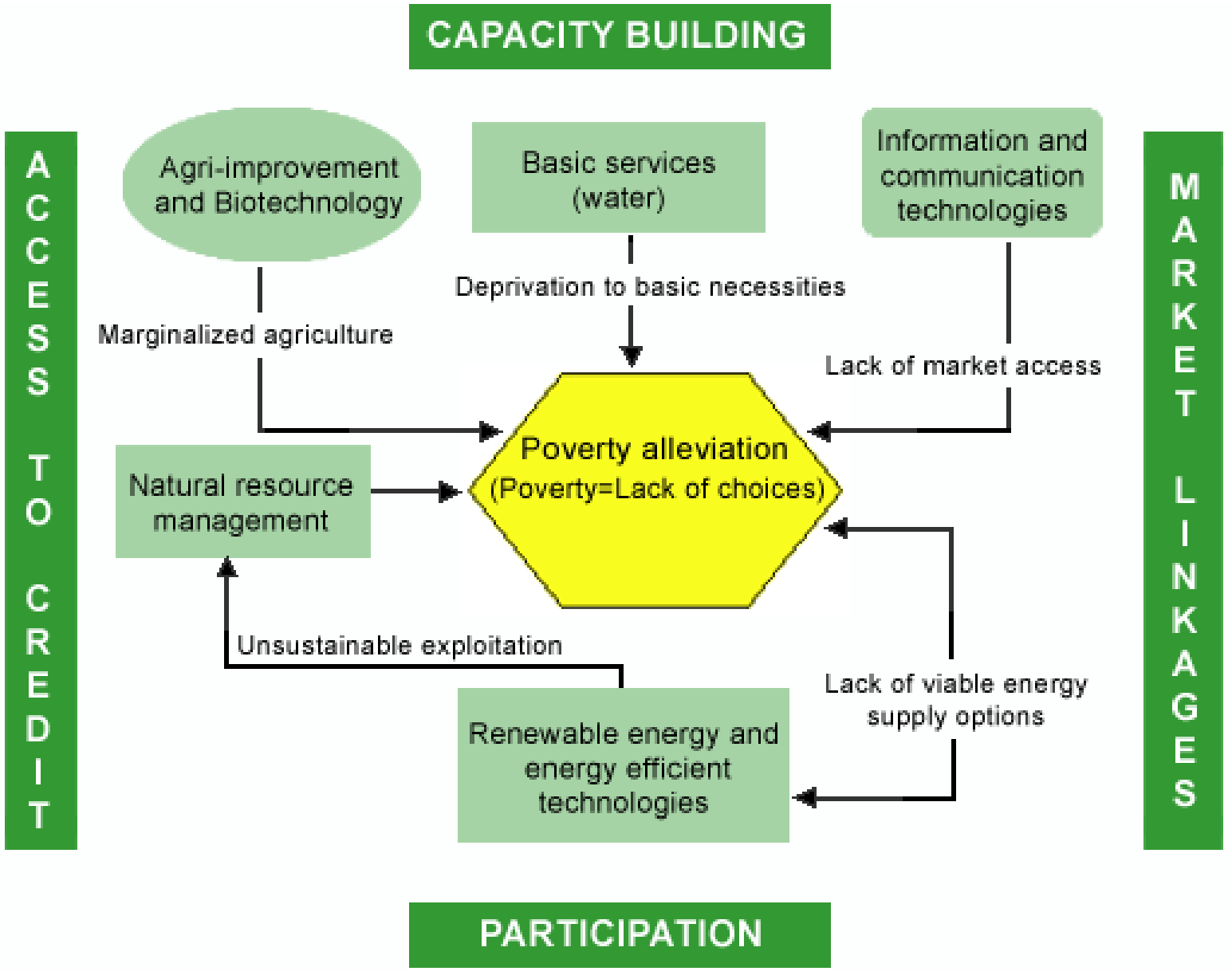
Looking for…..



Auroville, India

- A flagship community of the eco-village movement
- Since 1970, one million of trees have been planted; appropriate technology, Solar PV, solar cooker are now used by over 2000 people

- Appropriate technologies and renewable energy systems
- Sustainable agriculture and community-based food systems
- Habitat restoration and stewardship•
- Group facilitation, consensus decision making, community organizing
- Mindfulness practices such as meditation and yoga
- Ecological design, green building, and community development
- Social Responsibility, environmental education and activism
- Cross-cultural awareness
- Holistic health, nutrition, and alternative medicine
- Program and institutional development



INSTEP approach in the India

Innovation in Asia

- Building products
- Electrical engineering and information technology
- Green Building System
- From eco- home to intelligent home; integrated eco-life with eco-city infrastructure

China, Beijing, CCTV

Japan: Sanyo

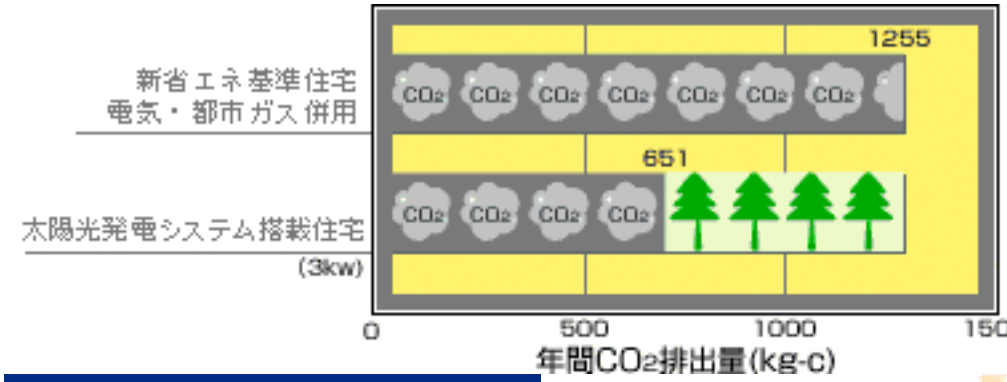
Japan: innovation
Taiwan: manufacture
China: market

from a standing start (within 3 years Taiwan) now supplies 70% the world's solar PV.

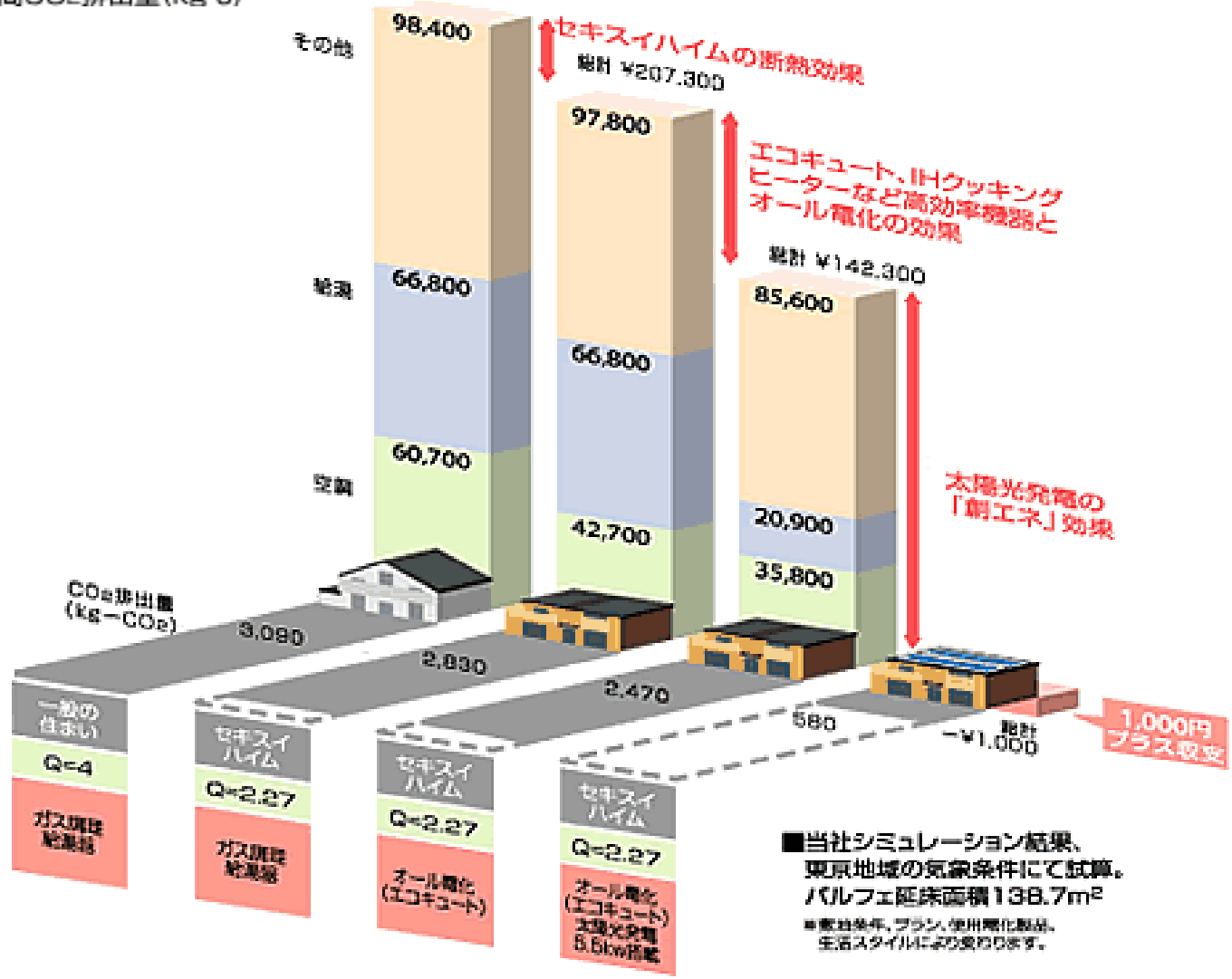
Zero-utility-cost houses

Sekisui chemical co,Ltd

- Utility cost from 226,000 yen down to 1,000 yen a year (less than 0.5%)
- Co2 3090kg to 580 kg (6%)
- System pay back time:
- 13 years(2.6 million yen)
- 太陽光発電装置＆オール電化設備


新省エネ基準住宅
電気・都市ガス併用
太陽光発電システム搭載住宅
(3kw)
1255
651
CO2
0
500
1000
1500
年間CO2排出量(kg-c)


SILAB


¥225,800
その他
98,400
給湯
66,800
空調
60,700
総計 ¥207,300
セキスイハイムの断熱効果
97,800
66,800
42,700
エコキュート、IHクッキングヒーターなど高効率機器とオール電化の効果
総計 ¥142,300
85,600
20,900
35,800
太陽光発電の「創エネ」効果
CO2排出量 (kg-CO2)
3,080
2,830
2,470
580
総計 −¥1,000
1,000円プラス収支
一般の住まい
Q=4
ガス併用給湯器
セキスイハイム
Q=2.27
ガス併用給湯器
セキスイハイム
Q=2.27
オール電化(エコキュート)
セキスイハイム
Q=2.27
オール電化(エコキュート)
太陽光発電8.6kw搭載
■当社シミュレーション結果、
東京地域の気象条件にて試算。
パルフェ延床面積138.7m²
※家族条件、プラン、使用電化製品、生活スタイルにより変わります。

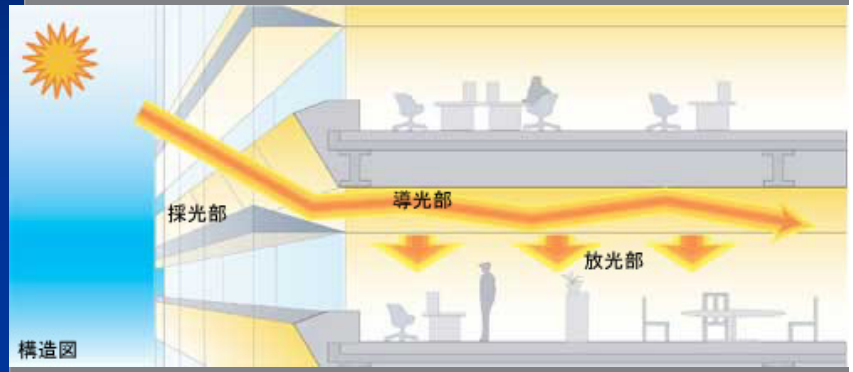
Reuse of Used houses System

「再築システムの家」再使用部材	
鉄骨構造体	再使用（再防錆処理）
屋根材	新規
外壁	再使用（再塗装）
開口部	再使用（サッシ部再塗装）
基礎	新規
内装仕上げ材	新規
内装下地	再使用
住宅設備	新規（キッチン・浴室・洗面・トイレ）

※物件ごとに異なる場合がありますので、営業担当にご確認ください。

- Start 2 years
- Used house will be disassembled and returned to the plant inspected, repaired and rebuilt into new models
- Increased of component reuse rate more than 85% by weight of the building body

The Daylighting System using mirror ducts

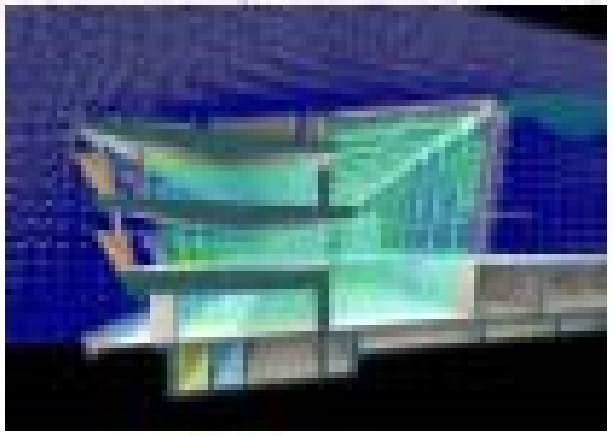


- Bring daylight into indoors
- --simple structure/ high energy- use efficiency. Maintenance-free

- Japan: Materialhouse co

IGES Research Building

- Natural ventilation
- Day lighting
- Photovoltaic power
- Solar heat collector
- Use of underground heat



- Shading and daylighting by the light shelf


攝影：簡照玲 www.archinfo.com.tw

Matsushita Electric Works, Ltd.

eco- home plus intelligent home Japan--Taiwan

- **Developing toilets with new functions**
  At MEW, our latest toilets analyze health signs when the user sits down on the seat. By using designs that efficiently incorporate all the toilet's functional components, we are developing advanced, compact products that meet requirements set out in the Housing Performance Indicator System.

From eco- intelligent home to eco-intelligent city

- South Koren, U-City
- U-city is intended to give its residents not only a more convenient lifestyle but also more secure, environmental and humane way of life.
- This will be achieved by integrating the latest IT infrastructures and information services into urban space.

- ARUP
- **China: Shanghai Dongtan Eco City**
- 8,400 hectares vs London 1000 units

New green building industry model: green building system—home compliance to end user

Matsushita Electric Works, Ltd.

- **WPB (Wood Plastic Boards)**
  This durable, ultra-thin building material used in home renovation is formed from a mix of recycled plastic and wood flooring.

Air condition counts half of the electiric use

- Taiwan: Nutec
- High E.E.R Air-ondition
- reduce 40% energy use,
- counter heat island phenomenon

water

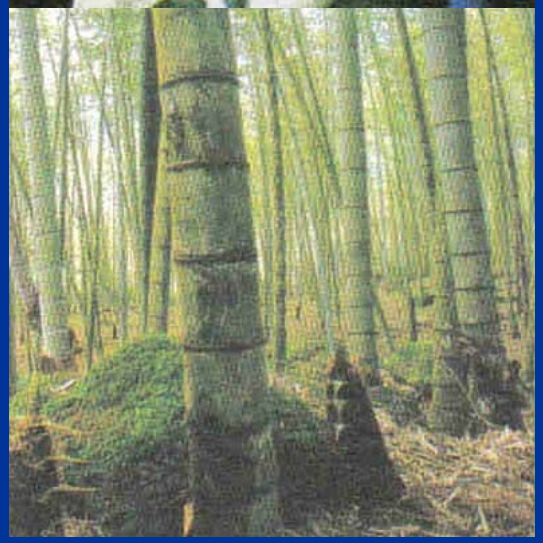
- Rain water , storm water management
- white water and grey water system, grey water recycling wetland

Information

- efficiency ratings for refrigerators in Thailand, which gave consumers information on average energy consumption and savings on electricity, resulted in total savings of 1 992 GWh of energy and avoided 1.5 million tonnes of CO2 emissions during 1995–2004 (EGAT 2000

New and Natural Building Material

M.V.C. – Shaping The Future



Bamboo, a symbol of Chinese culture and art, is one such material. With the help of modern technology, we are now able to harness the technique in turning this fast growing plant into useful products.

Bamboo floor, bamboo furniture, air con Bed

New Sustainable Material

KENAF

BEAUTIFUL FIBER

…Fast growing plant that can attain a height of 12 to 14 feet in 4-5 months.

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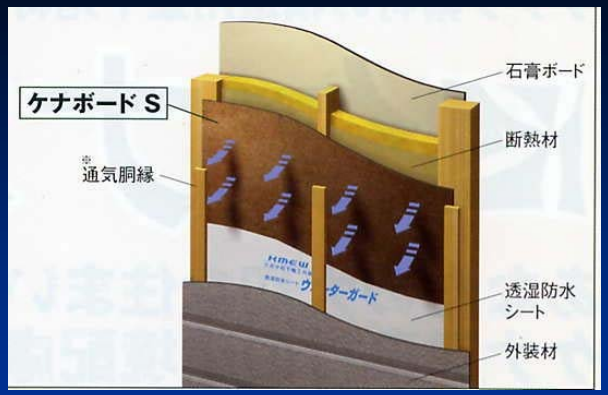

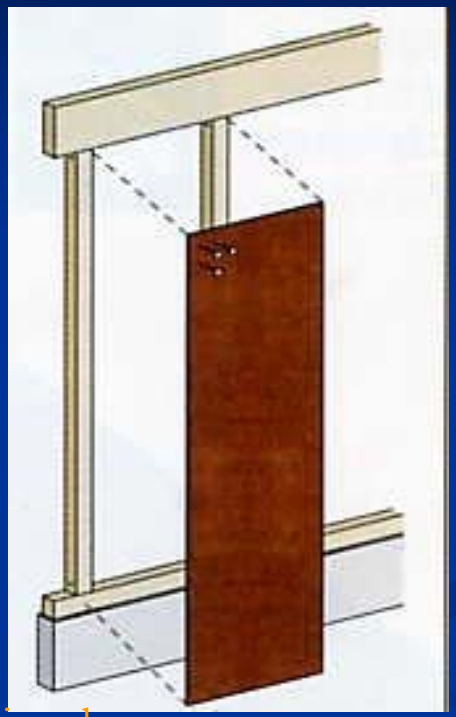

CONSTRUCTIONS

Essentially, kenaf is a traditional, third world plant that is being introduced as a renewable source of industrial fiber

SILAB
Innovation for the Future

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