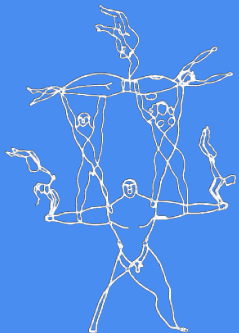


YAF | Turkey Timber in Construction Expo 2015 , 30.1.2015
„WOOD IS IN THE AIR“

Wood as a structural material for urban buildings

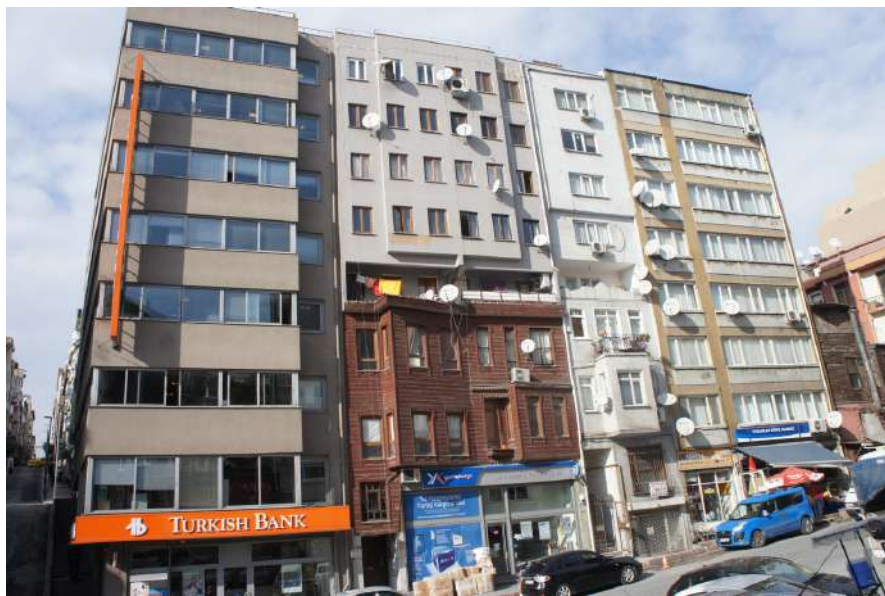
An option for Istanbul ?

Prof. DDI Wolfgang Winter



Vienna University of Technology
Structural Design and Timber Engineering
Department of Architectural Sciences






1. THE CHALLENGES FOR THE BUILDING SECTOR :

- URBANISATION
- ENERGY SUPPLY
- RESSOURCE SHORTAGE
- POLLUTION
- CLIMATIC CHANGE




2014



If we proceed this way with our resources...

2030



...we will need two planets to supply humanity by no later than 2030

More than 75 % of global energy consumption

Is accounted for by cities
OECD/International Energy Agency, World Energy Outlook, 2008



40%

- > Resource consumption
- > Energy consumption
- > CO2 – Emission
- > Amount of waste



Each building is a “prototype“

The problems:

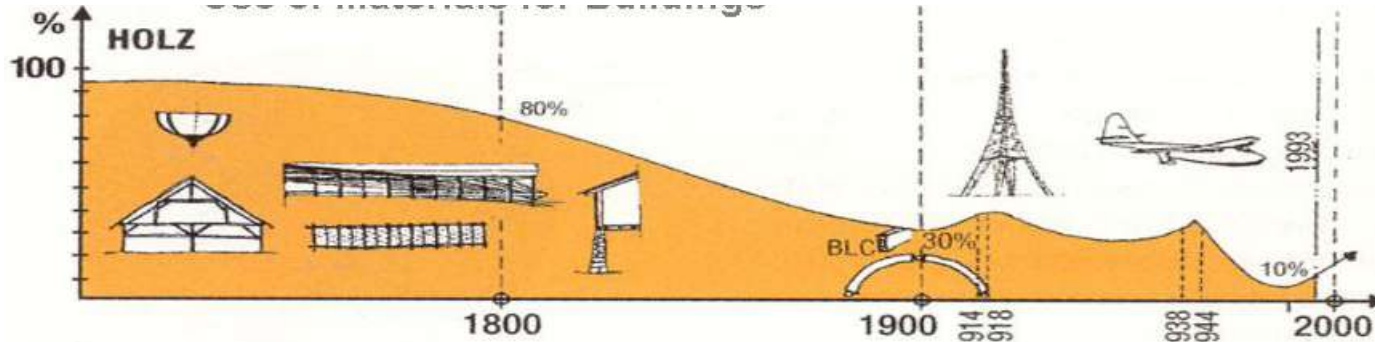
- > Chaotic procedures
- > High resource consumption
- > Inefficient way of construction



Cree – The Natural Change in Urban Architecture – invented by Rhomberg

PAST | USE OF WOOD IN EUROPE'S BUILDING ACTIVITIES

Marketshare of timber construction



until 1800:

natural materials, stone, clay, timber

19.th century:

resource shortage by energy use (steel production)

forest laws limiting consumption of wood

steel replaces timber

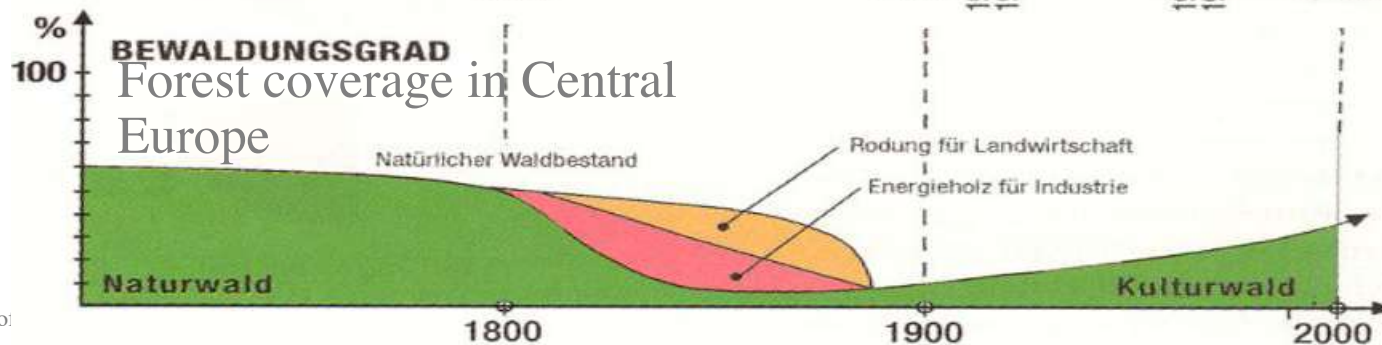
since 1900:

reinforced concrete

today:

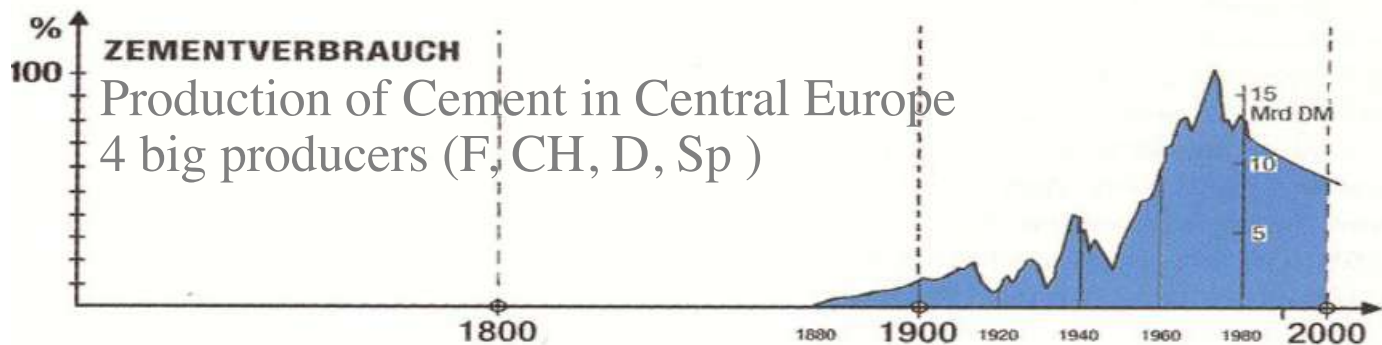
forests are recovered, in Europe 30-50% of annual growth not used

Forest coverage in Central Europe



Pro:

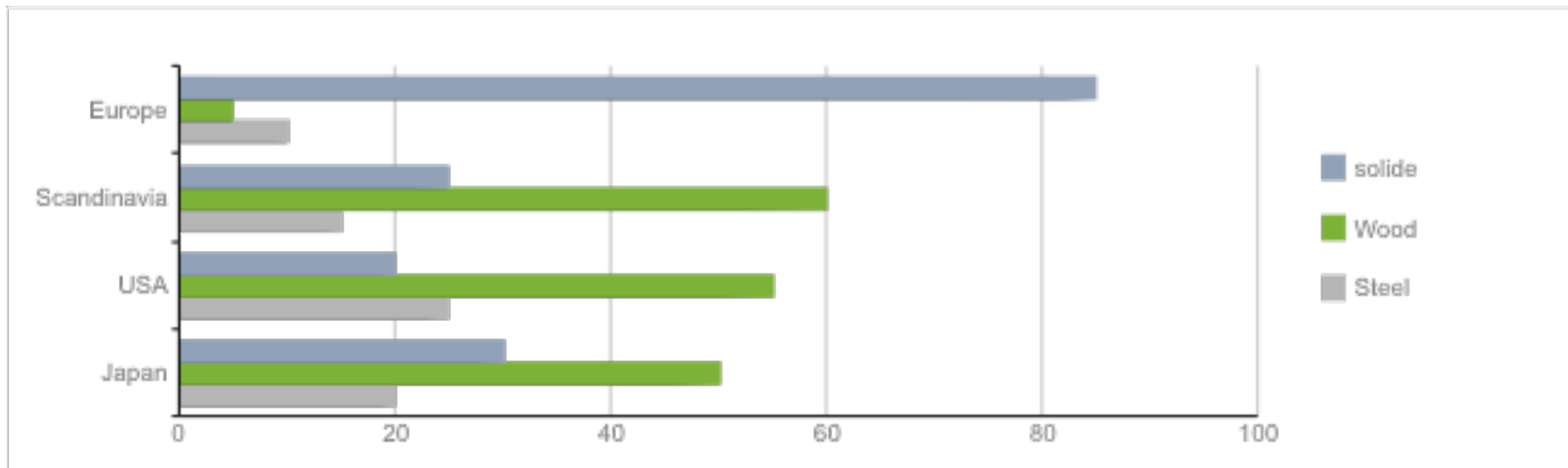
Production of Cement in Central Europe
4 big producers (F, CH, D, Sp)



T | Europe has enough wood in the replanted forests, but the cement production is very efficient and cost effective

PRESENCE | USE OF MATERIALS TODAY

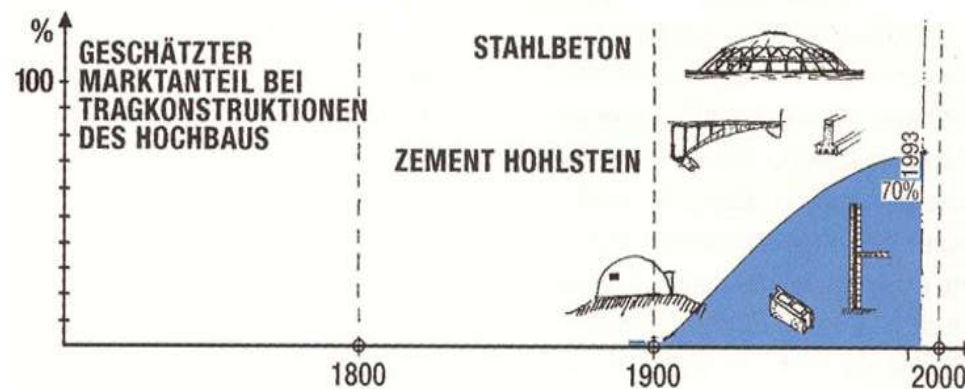
EUROPE DOMINATED BY CEMENT
 US AND JAPAN MORE WOOD BUT MAINLY 1-2 STOREYS



Sawn timber 200 €/m³
 Gluelam 400 €/m³
 Floor panel
 5m span 25 cm thick: 100 €/m²

Concrete 50 – 100 €/m³
 Steel 1% (1€/kg) 80 €/m³
 Formwork 50 – 500 €/m³
 Total floor 200-400 €/m³
Total floor 20 cm 40-80 €/m²

Total colums 350 - 700 €/m³



TIMBERSTRUCTURES CONFERENCE 2015

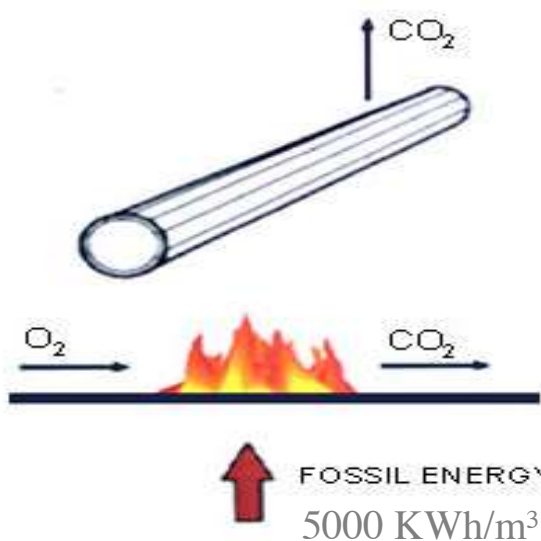
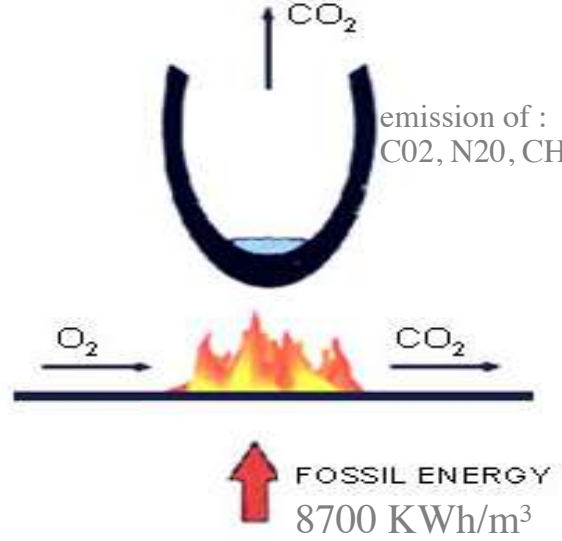
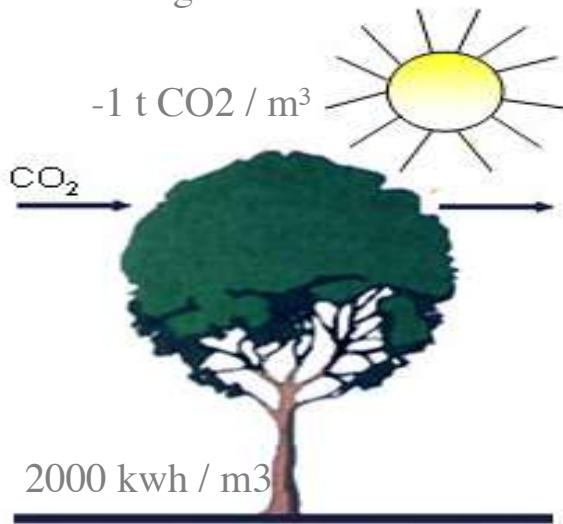
Prof. Dr. D. D. I. W. O. I.

COMPARISON OF BUILDING MATERIALS | SUSTAINABILITY



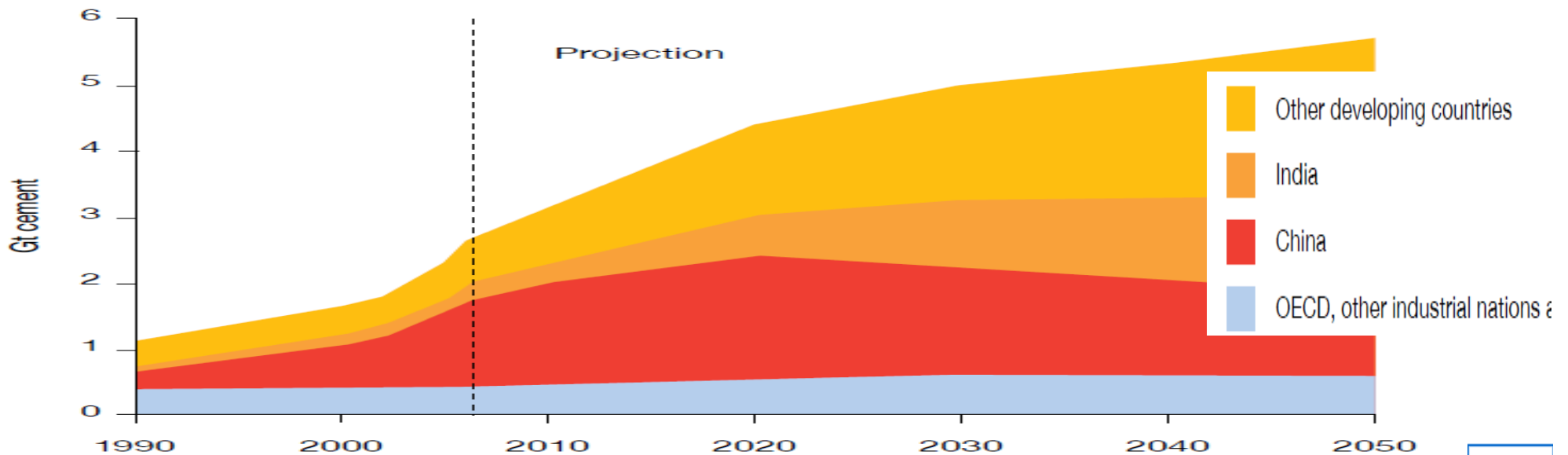
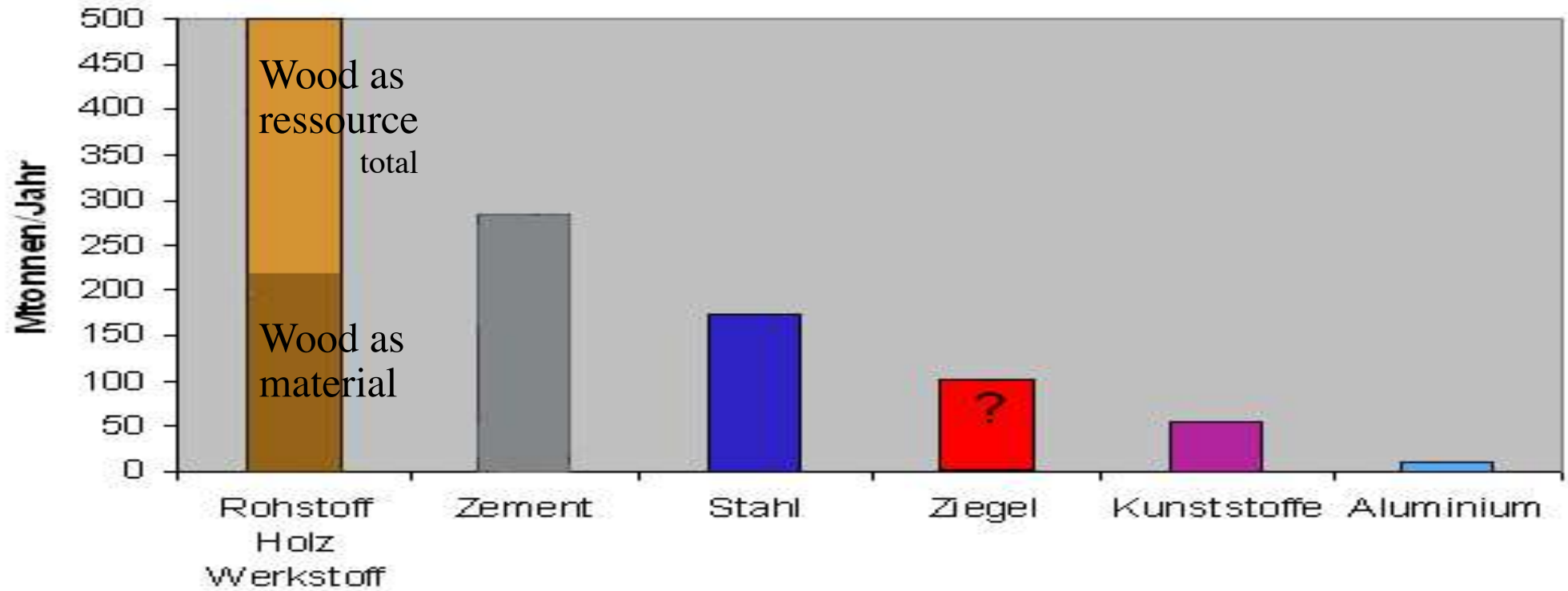
T I M B E R S T R U C T U R E S C O N F E R E N C E 2 0 1 5

P r o f . D D I W o l f

CEMENT	STEEL	WOOD
<p>2400 kg / m³</p> <p>+ 33 t CO₂ / m³</p> 	<p>7800 kg / m³</p> <p>+ 20 t CO₂ / m³</p> 	<p>400 kg / m³</p> <p>SOLAR ENERGY</p> <p>-1 t CO₂ / m³</p>  <p>2000 kwh / m³</p> <p>180 KWh/m³</p>

Timber : Less weight Less fossile energy Less CO2 emission

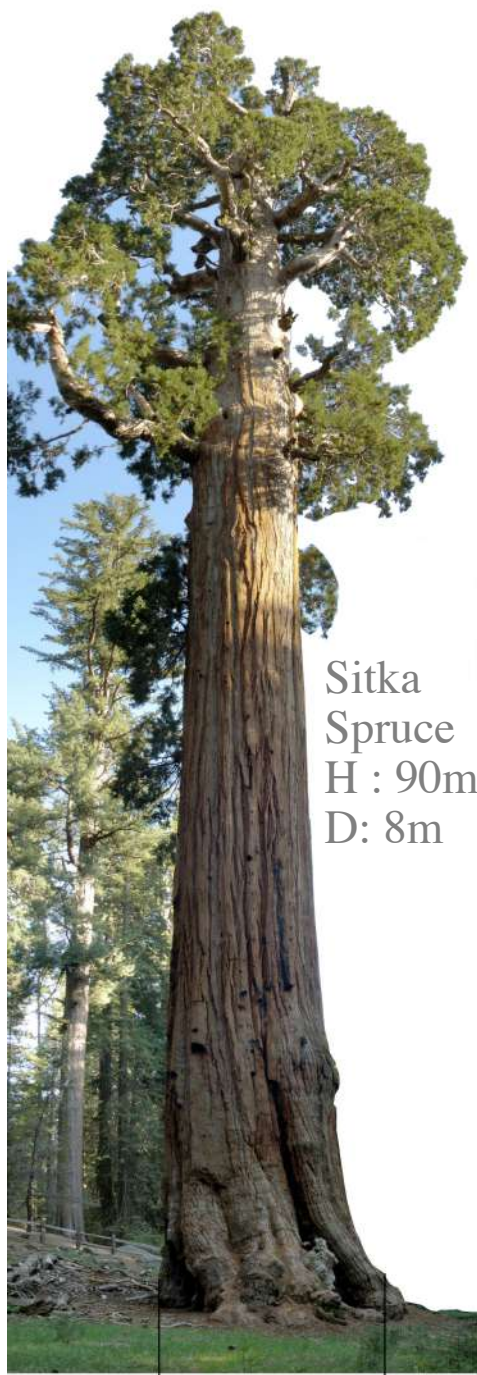
World production of materials :
 cement responsible for 5 – 8 % of the global CO 2 Emission



**“WOOD IS IN THE AIR”
YES, BUT IS IT AS WELL TRUE
FOR URBAN AREAS AND
BIGGER BUILDINGS?**

2.1 ARE THERE TECHNICAL AND ECONOMICAL LIMITS





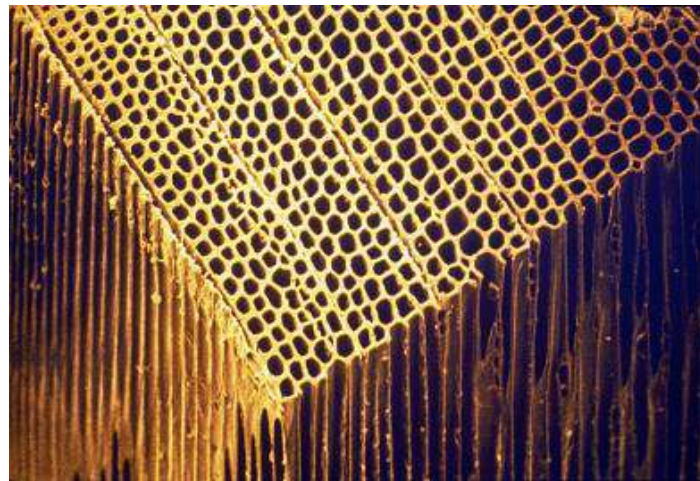
Sitka Spruce
H : 90m
D: 8m

8,8 mts

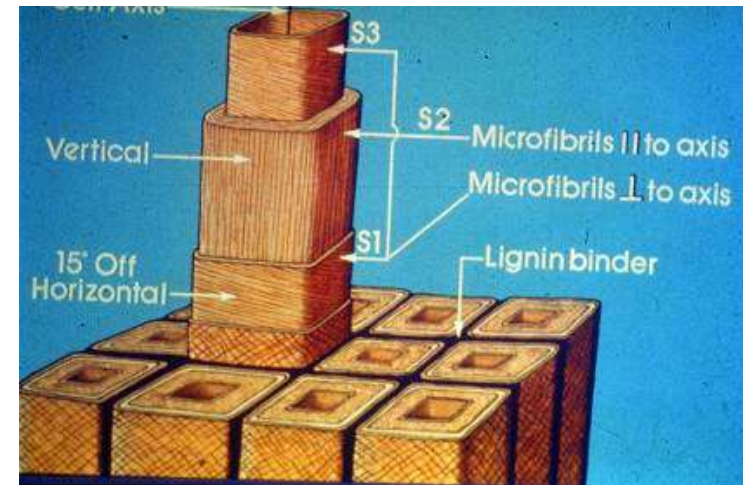
Croissance des forets cultivées 5
– 25 m3/ha

81

		Bois C24	Acier Fe 225	Beton B 30
30°				
29°				
28°	Contraintes admissibles compression	kg/cm2	100	1600
27°	Contraintes admissibles traction		80	1600
26°				2
25°	Poids propre	kg/m3	350	7800
24°				2400
23°	Rupture sous poids propre	m	8000	250
22°				4000
21°	Isolation thermique	W/m x K	0,1	50
20°				2,1
19°	Allongement thermique (Delta T 50 C)	mm / m	0,2	0,6
18°				0,5
17°	Masse thermique	KWh/m3 x K	0,406	
16°				0,5
15°				
14°				
13°				
12°				
11°				
10°				
09°				
08°				
07°				
06°				
05°				
04°				
03°				
02°				
01°				



Volume d'air 70 % (epicea)



Parois :50% fibres de (1500kg/m3)