

Influence of Material Use in Green Building Policies (A convenient truth)



Sylvain Labbé, Canada Wood
Geneva, October, 2010

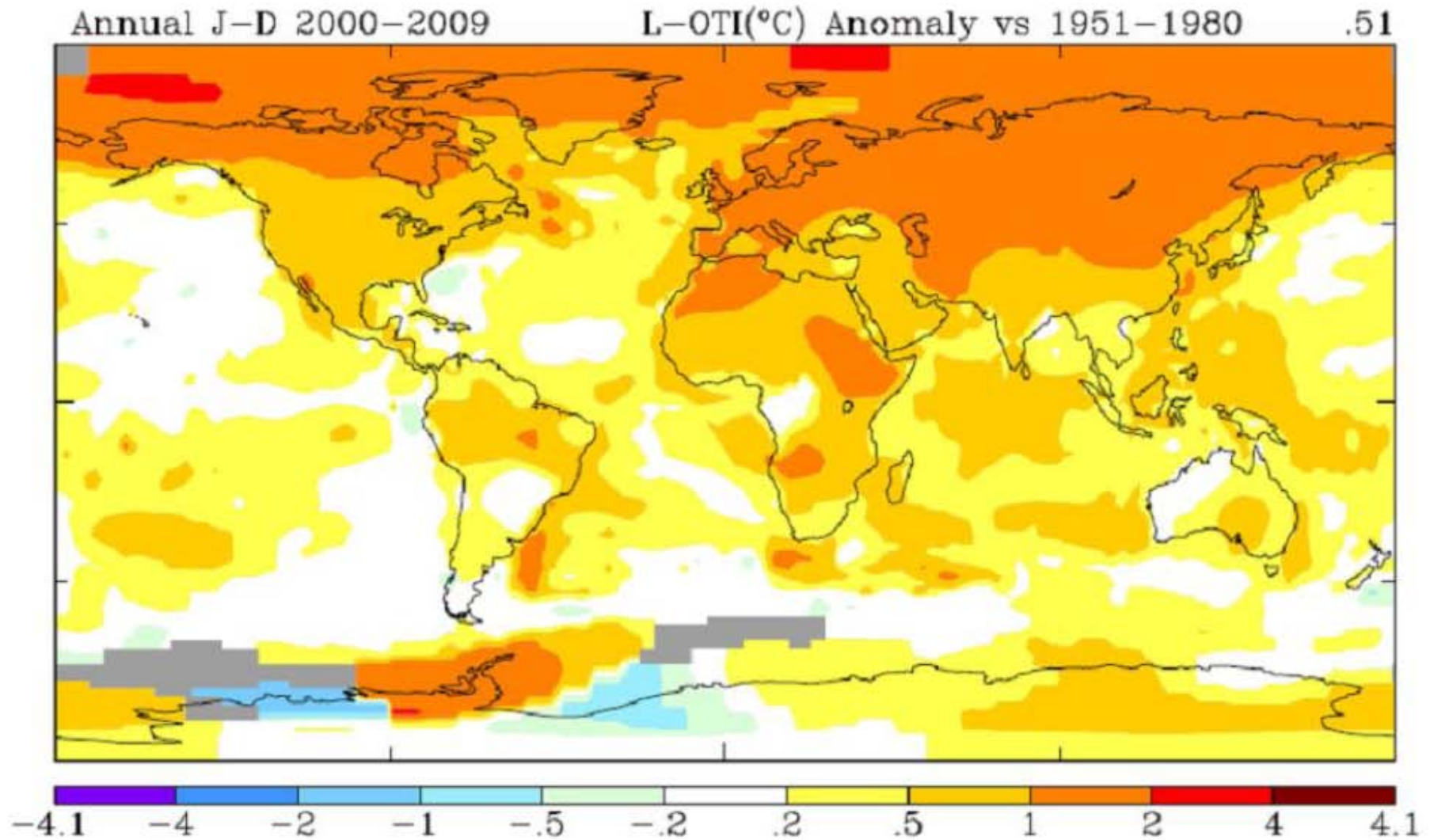
Canada Wood Group



Summary

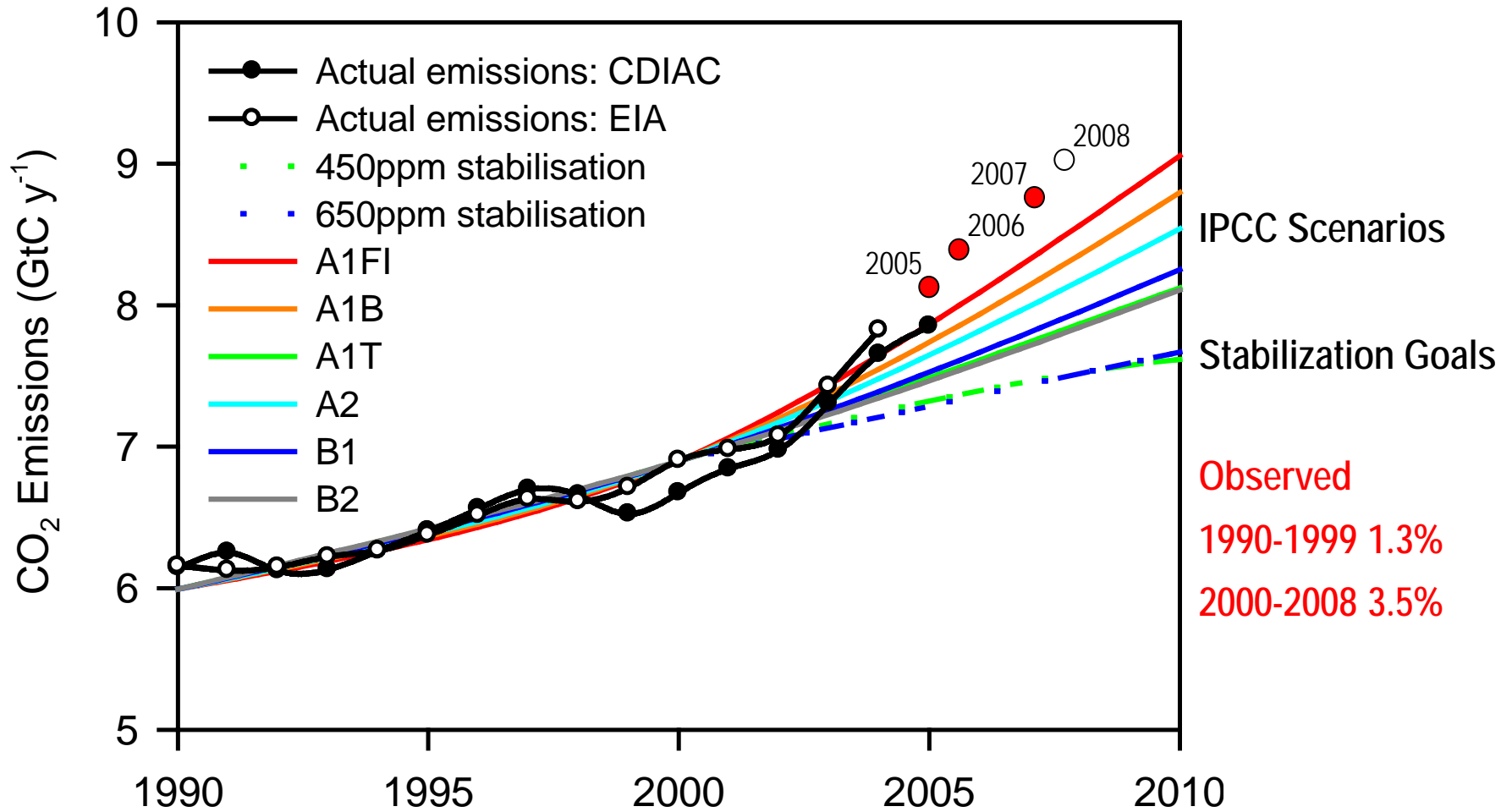
- Climate change: Update
- Role of forest and wood in mitigation
- Role of green building
- A global strategy

2000-2009: The warmest decade on record



Source: NASA GISS, 2010

2000
€



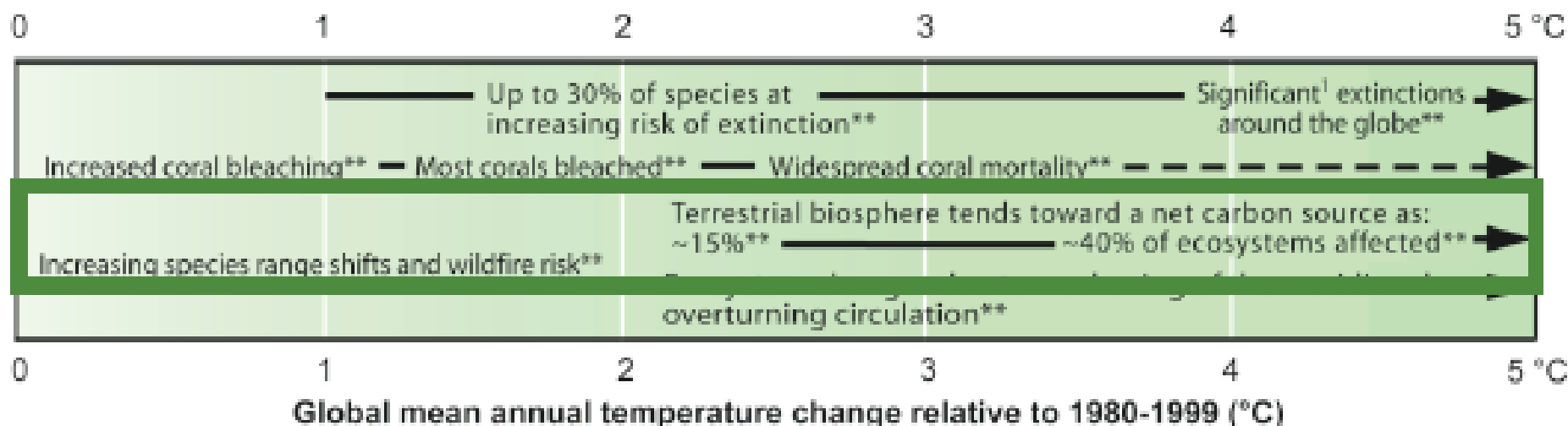
Raupach et al. 2007, PNAS; Global Carbon Project 2009 Update



Summary

Changes in Ecosystem Structures (includes in particular forests)

Global mean annual temperature change relative to 1980-1999 (°C)



¹ Significant is defined here as more than 40%.

The warmer, the more negative the impacts!

From Figure SPM.2

(IPCC, 2007c, Summary for Policy Makers by Working Group II AR4 IPCC)

Positive proof of global warming.

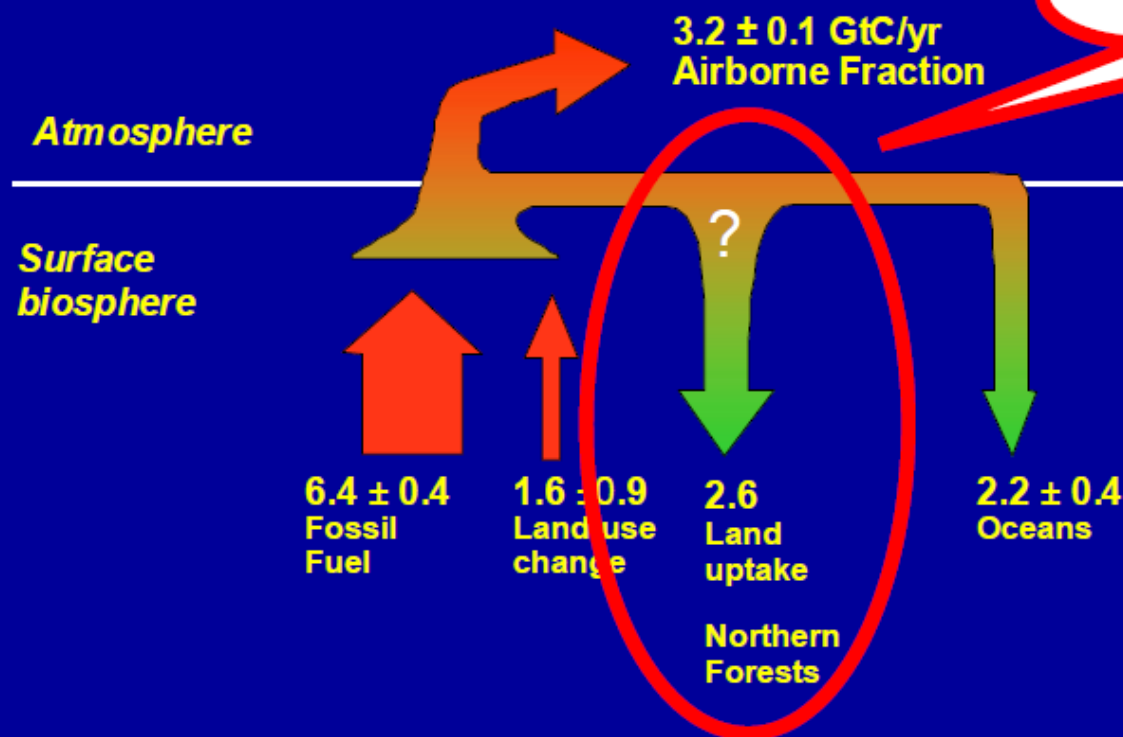


18th Century 1900 1950 1970 1980 1990 2006

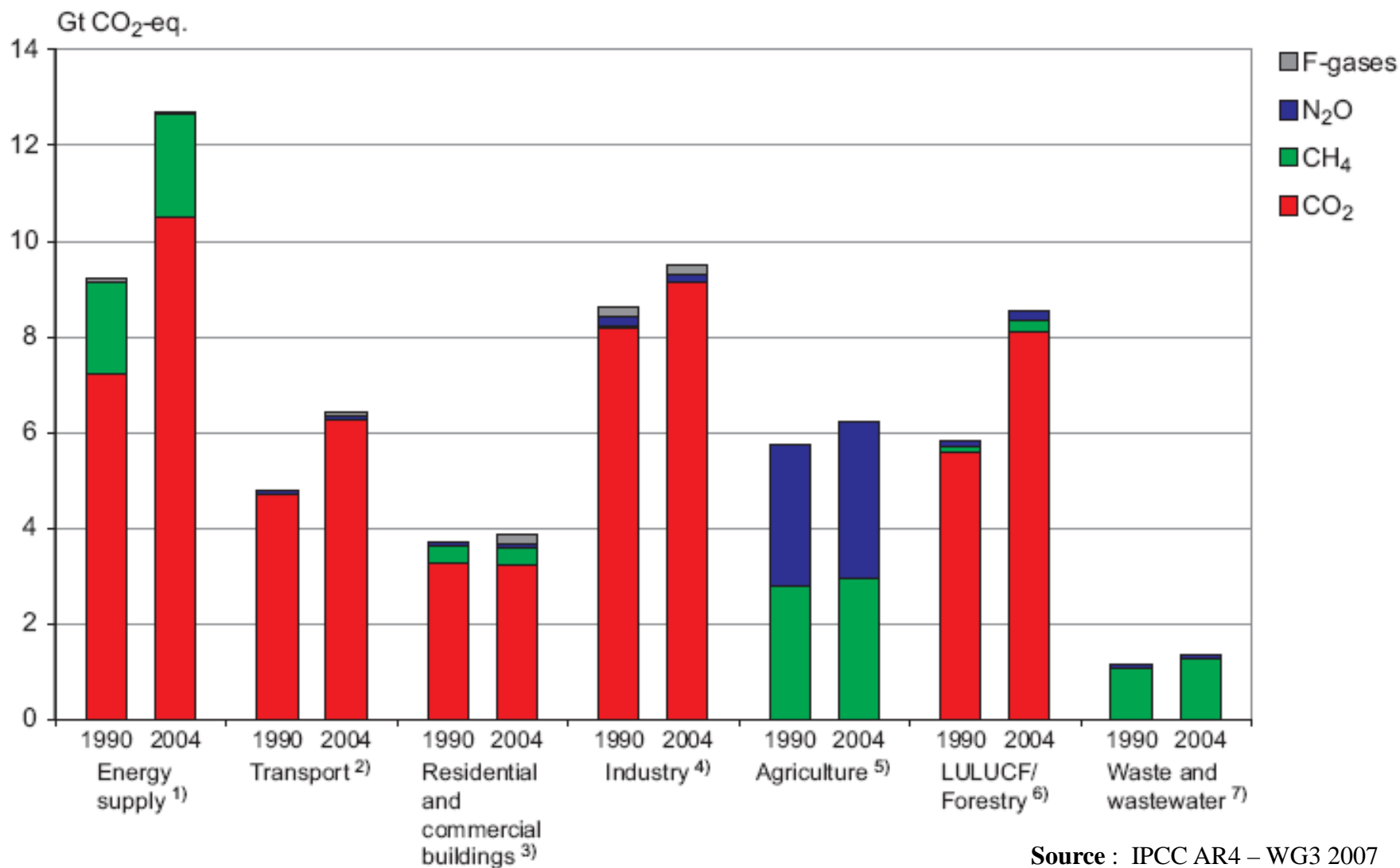
Human Perturbations to the Global C Cycle

Less than half of *human* emissions stay in the atmosphere:
8.0 up but only 3.2 remains

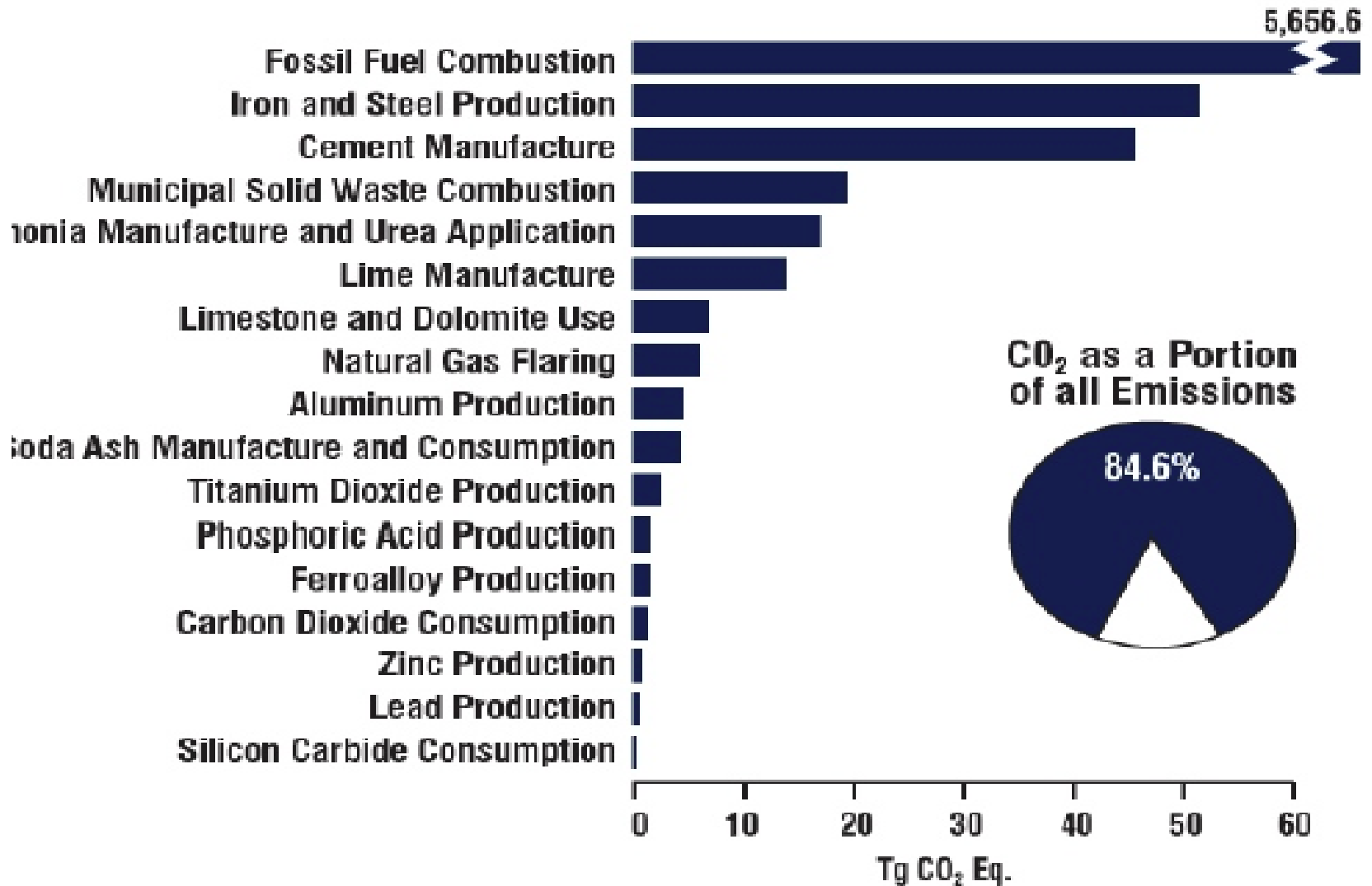
Forests will affect the future CO₂ concentration.



Sources of GHG per sectors - 2007

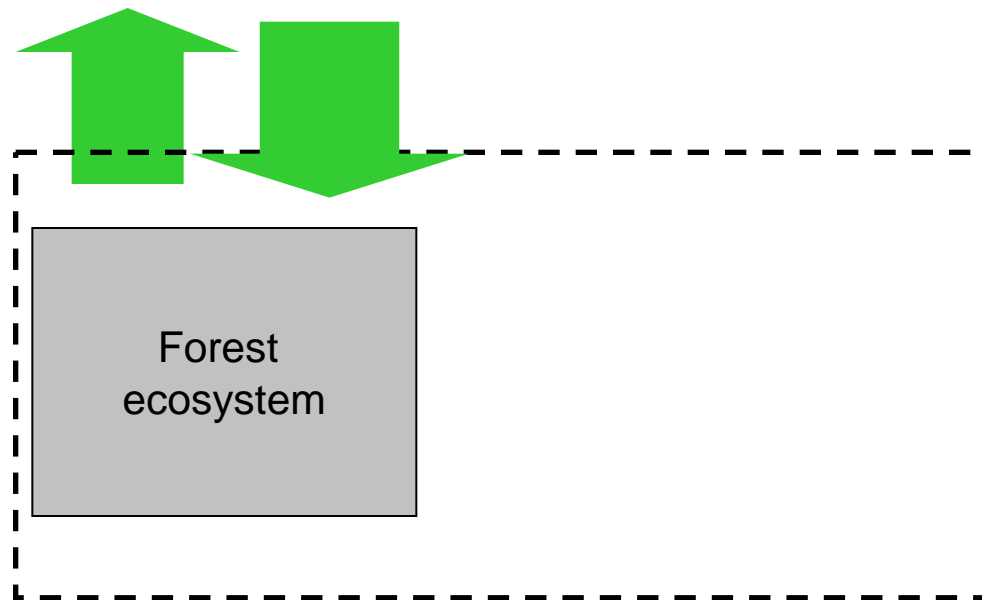


2004 Sources of CO₂



Carbon Account of the Forest Sector (IPCC)

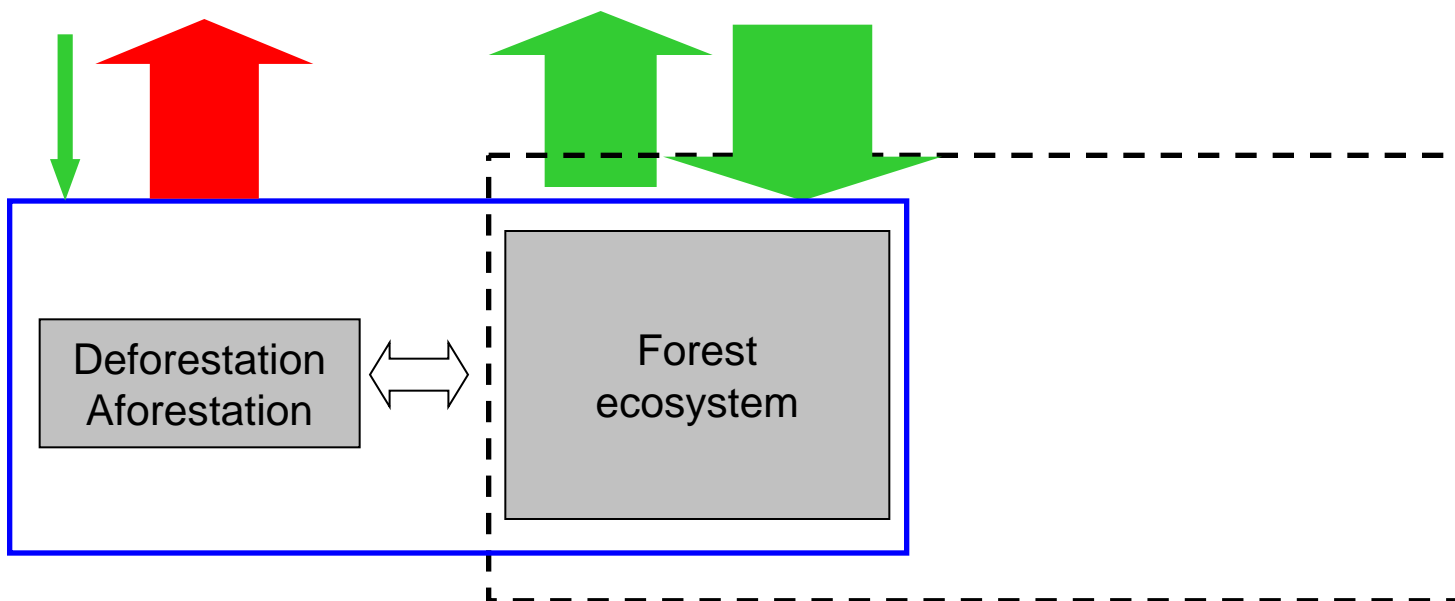
Forest Carbon Account
Carbon sink: photosynthesis,
Carbon source: harvest, biodegradation or
natural disasters



**Forest
sector**

Carbon Account of the Forest Sector (IPCC)

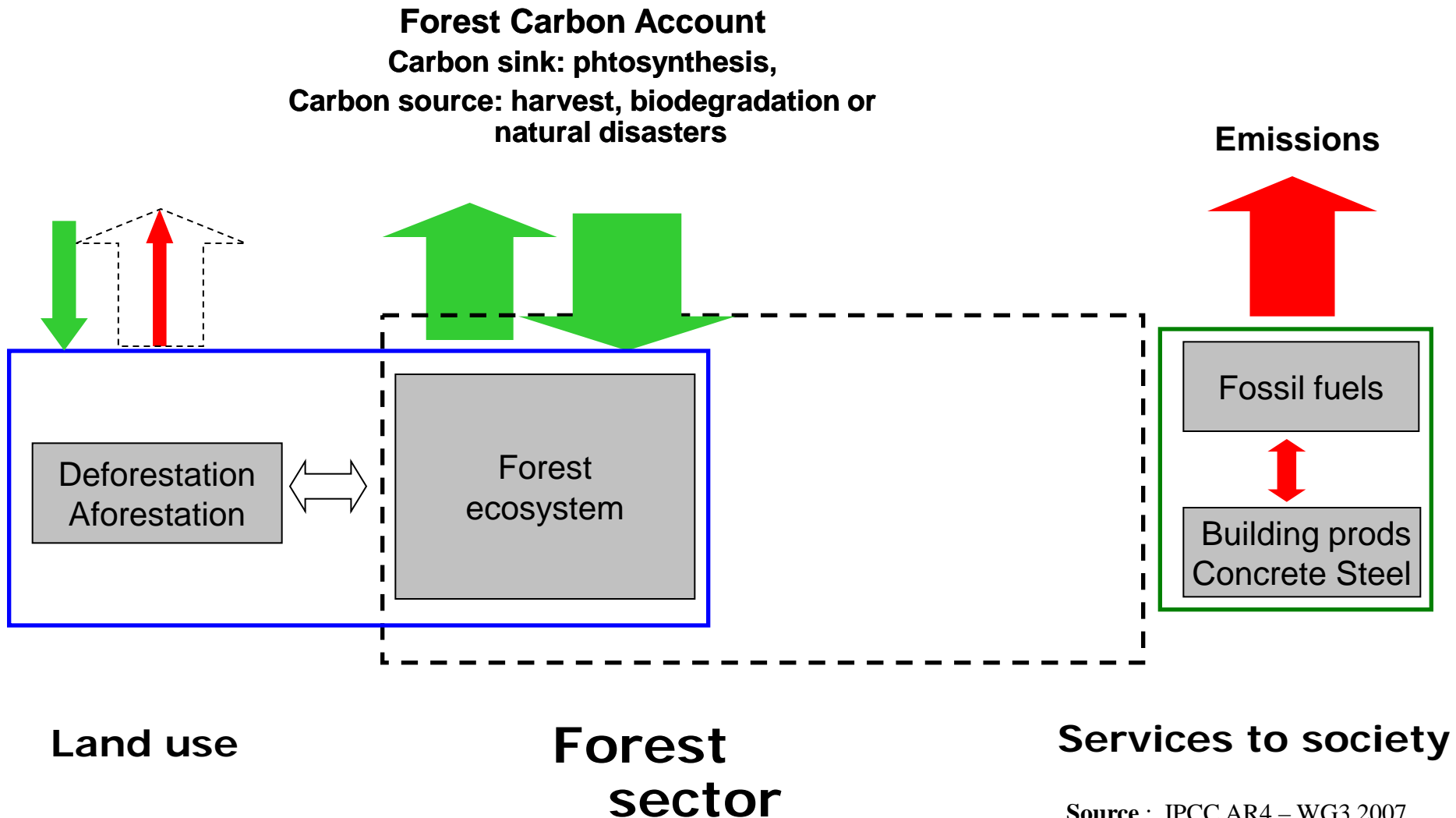
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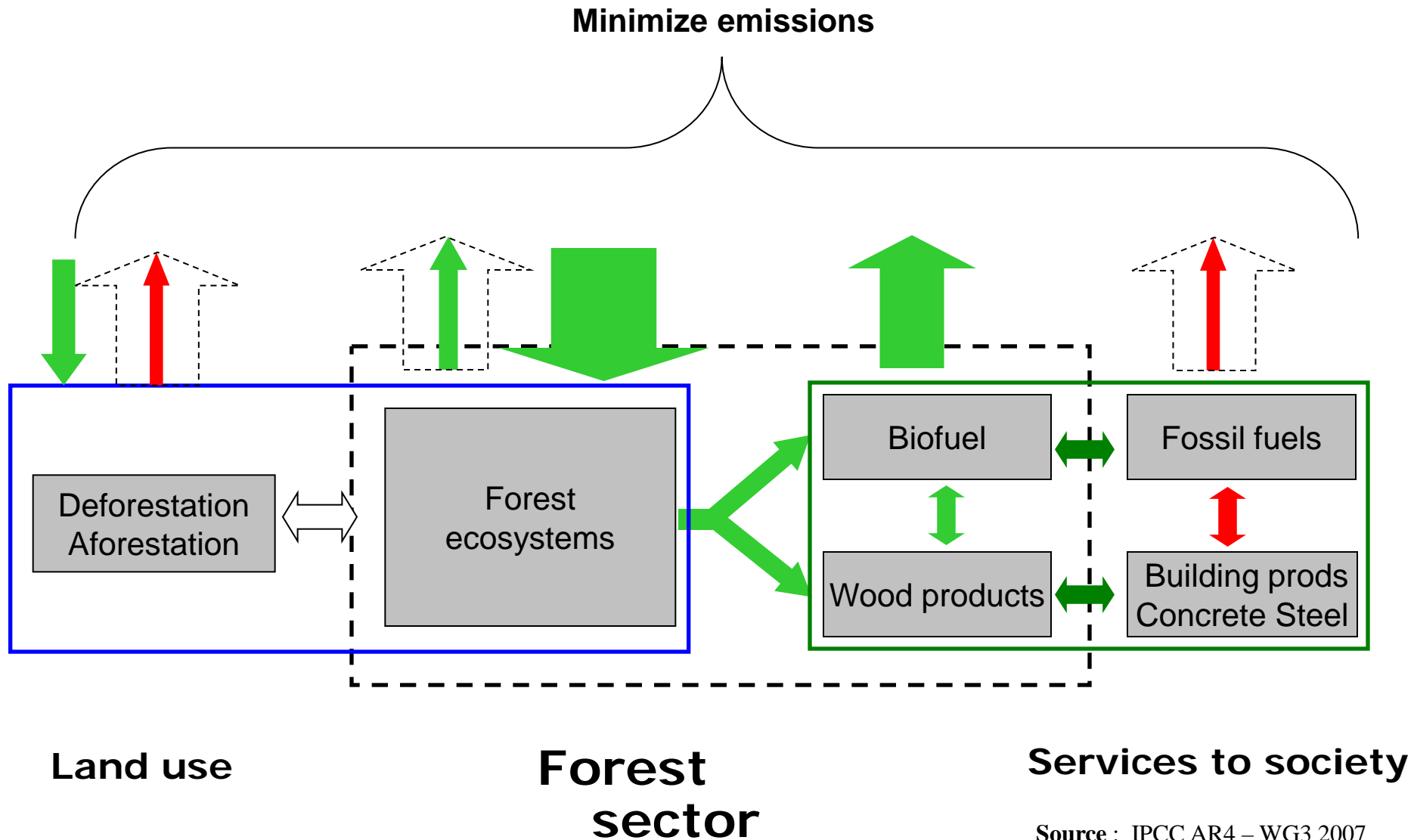
Land use

Forest
sector

Carbon Account of the Forest Sector (IPCC)



Carbon Account of the Forest Sector (IPCC)



Forest Carbon 101

- 50% of the dry weight of wood is carbon.
- 1 m³ of wood contains ~ 0.25 tons of carbon
- when burned releases ~ 1 ton of CO₂
- $C \times 3.7 = CO_2$
- C in 1 m³ of wood similar amount as in ~350 litres of gasoline.



Concrete 101

- The process of reducing limestone to lime in a cement kiln requires temperatures in the order of 1400°C
- The chemical reduction of limestone looks like:

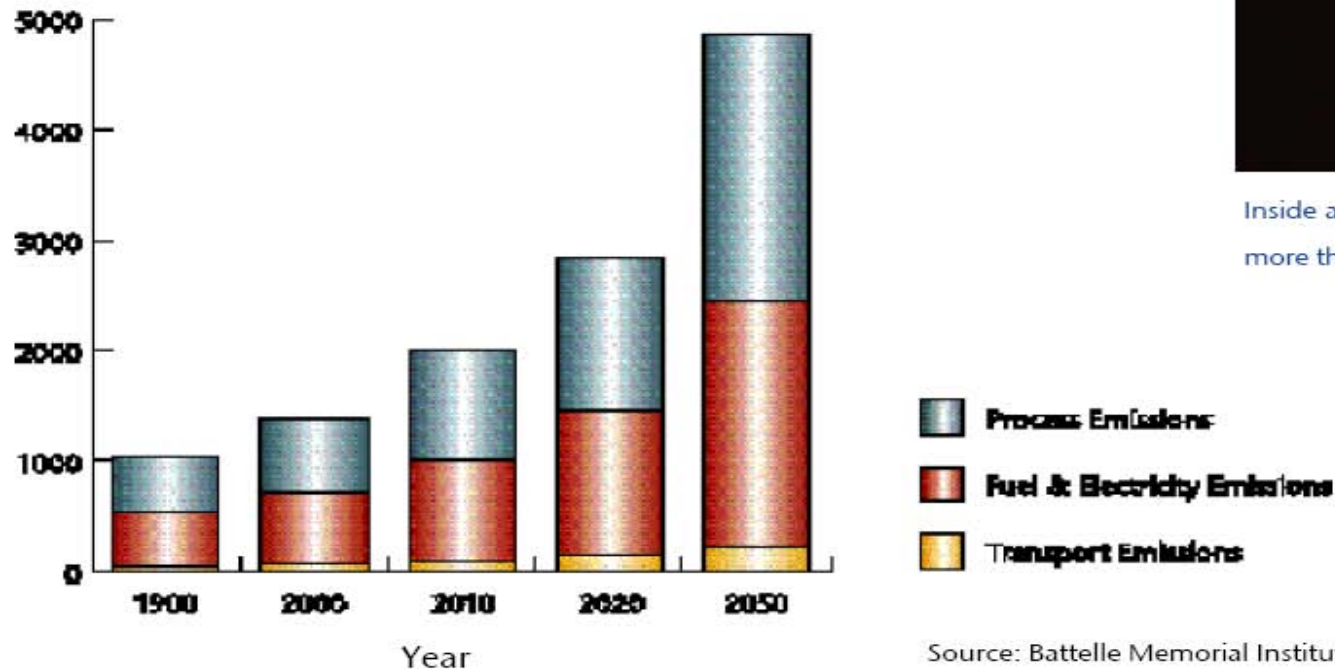


Source : Bowyer et al. 2008

Substitution of concrete

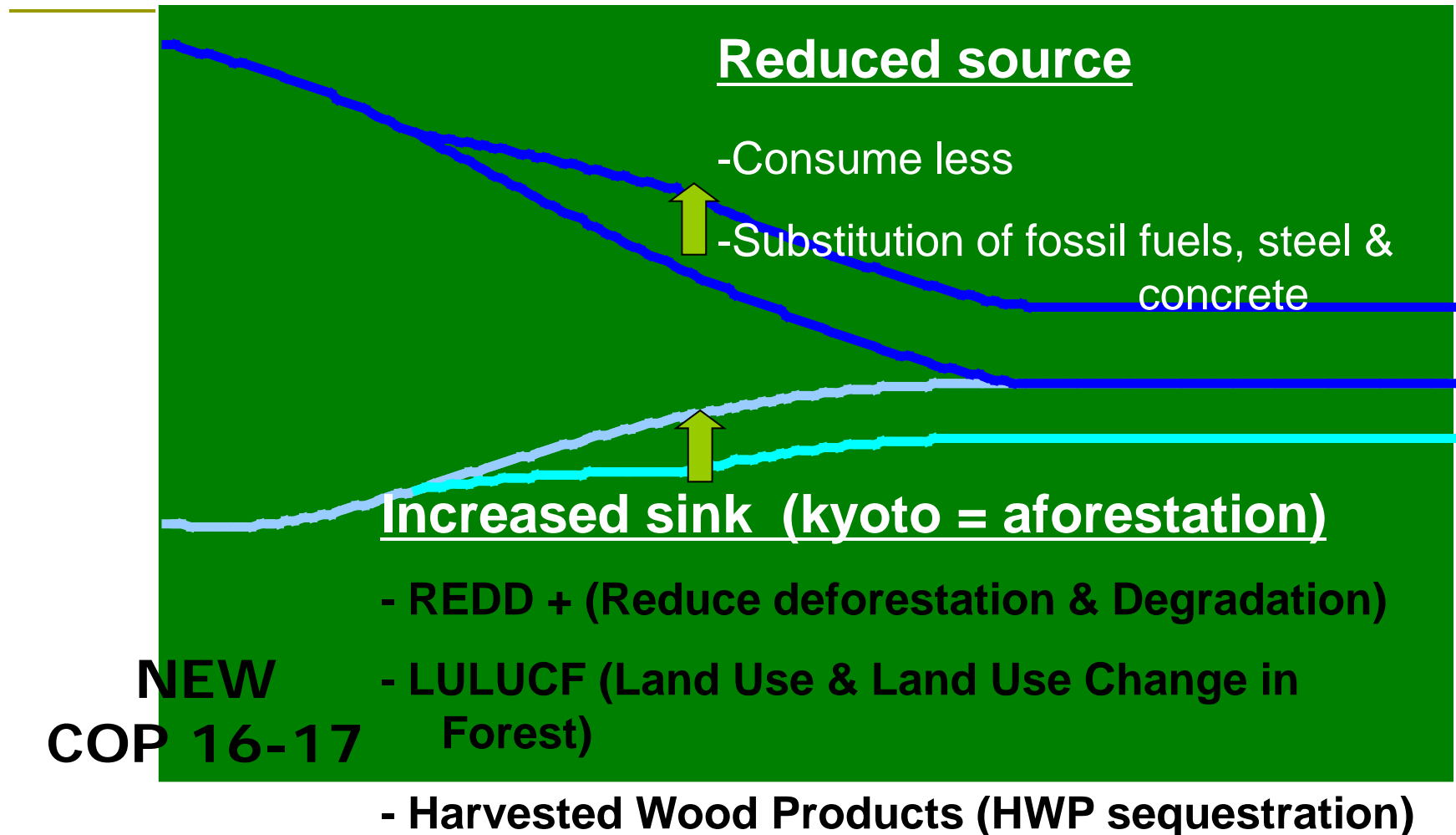
Projected CO₂ emissions from the global cement industry through 2050
(assuming no change in current practices)

Millions of metric tonnes



Inside a cement kiln, where temperatures reach more than 1400°C (2550°F).

Kyoto protocol basics for mitigation achieved by increasing sinks or reducing sources



Accounting of Harvested Wood Products

- Default assumption of the 1996 IPCC reporting guidelines is that amount of wood added to stocks of HWP from this year's harvest merely replaces C lost through decay and burning of C harvested in prior years.
- HWP C stocks are assumed constant
- Because inputs are assumed = outputs, the simplified assumption is that all material transferred from forest through harvest is immediately emitted to the atmosphere.
- But data indicate that HWP in use and in landfills are increasing (e.g. Apps et al. 1999).

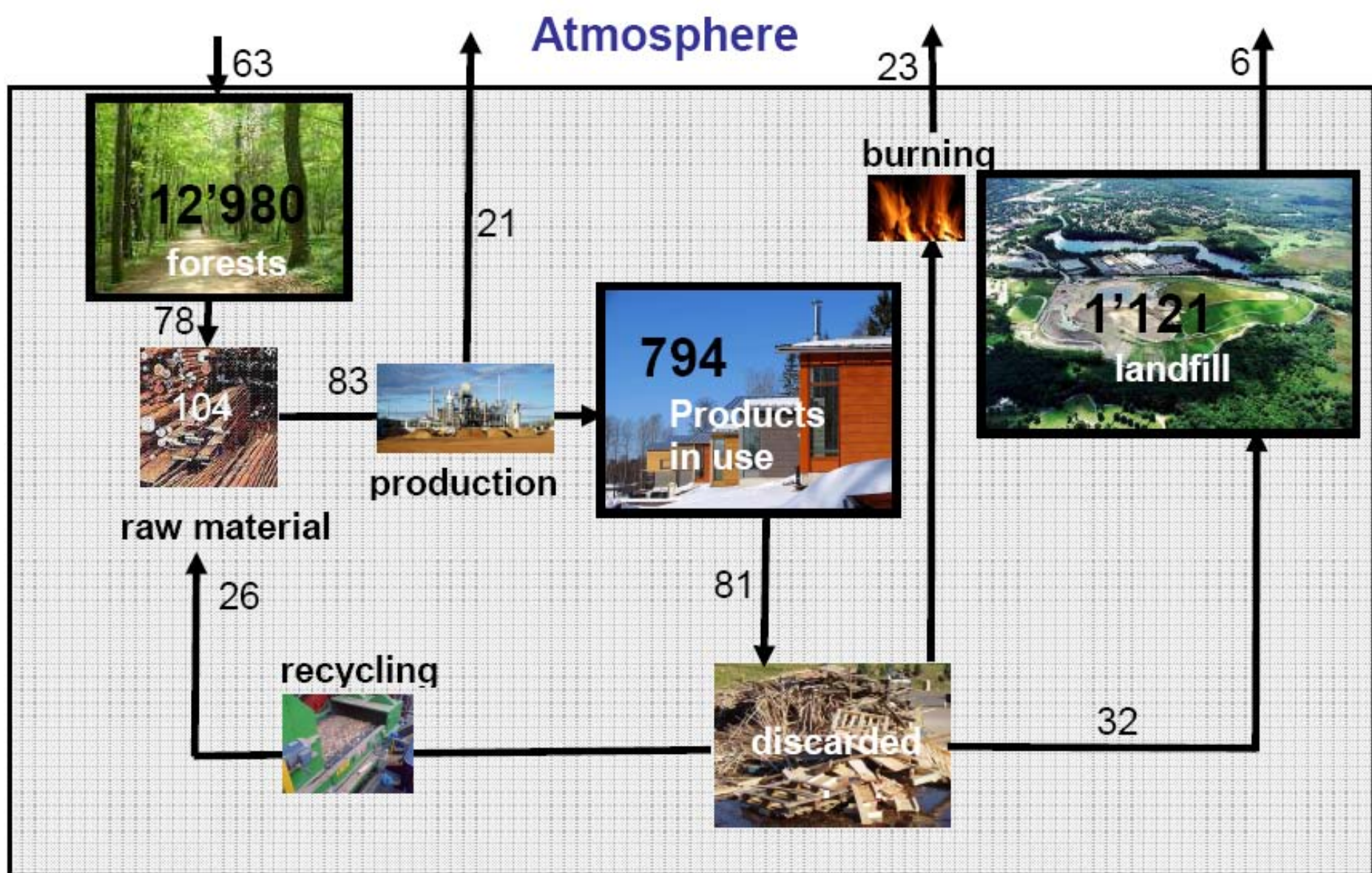
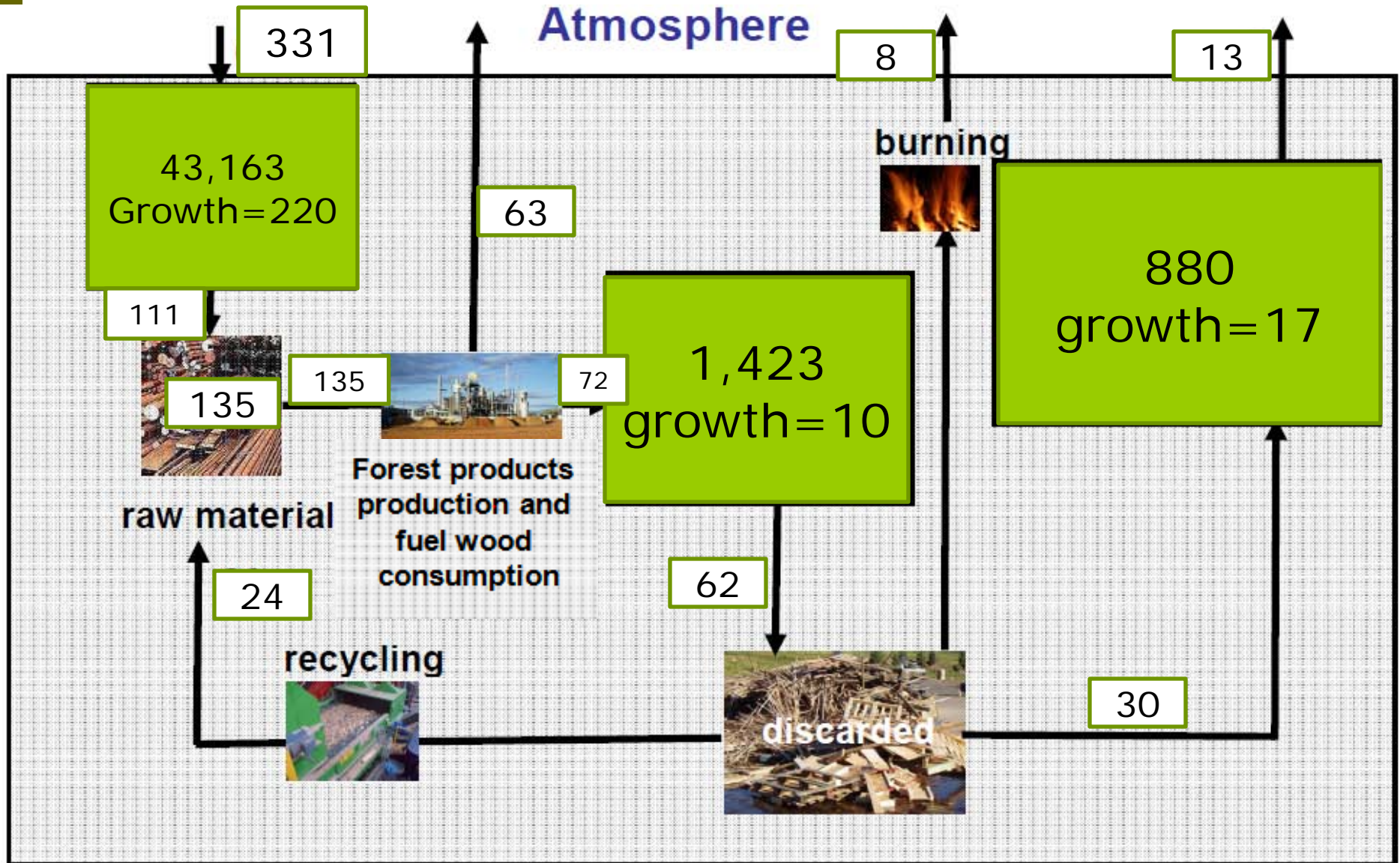


Figure 1. Carbon fluxes and stocks in wood products for Europe in 2000. Fluxes are indicated as arrows, stocks with boxes. The units are in teragrams (10^{12}) of carbon per year (Eggers, 2002)².

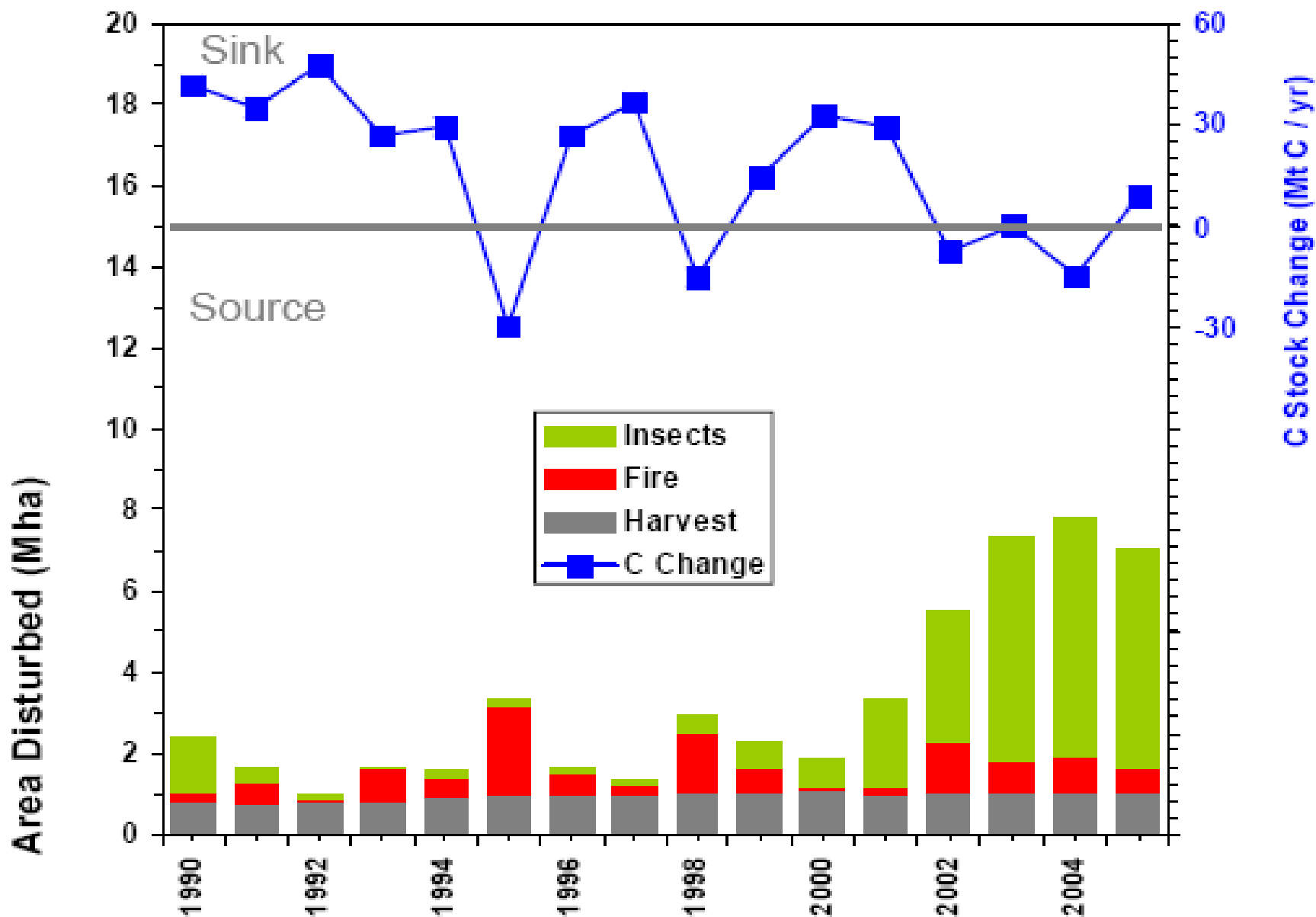
Approximate values for the US

Data from USFS, FAO, AF&PA and other sources

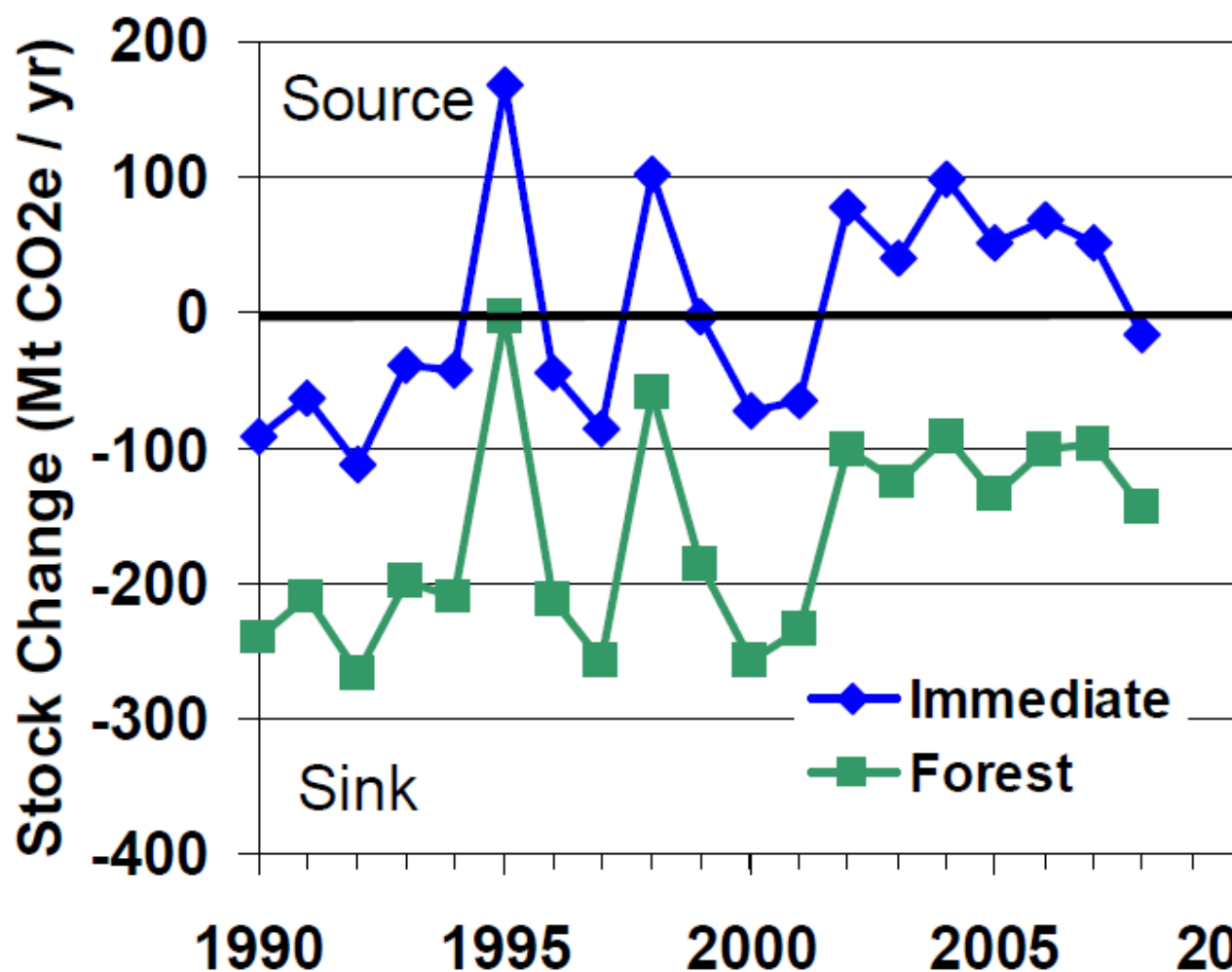


Carbon balance in the Canada managed forest

Increasing importance of fire and insects



GHG Fluxes with and without immediate emissions of harvested carbon



Cumulative Sink:
With immediate emissions:
24 Mt CO₂e

Forest only
3125 Mt CO₂e

Exported to HWP
3149 Mt CO₂e

Remaining in HWP
20-25%

Impact of UNFCCC reporting guidelines

- Default assumption of immediate emissions captures neither the timing nor the location of actual emissions.
- In Canada (1990 – 2008) ~3,150 Mt CO₂e are reported as emitted – but 20-25% of this remains stored in HWP.
- Many of the emissions occur outside Canada.
- Same issue for all (net) wood exporting countries.
- International convention to not report C stocks retained in HWP creates public misunderstanding of forest management contribution to C cycle.
- This convention also creates no incentives to improve HWP management for climate mitigation.

Can the Building Sector contribute to a Climate Change Mitigation Portfolio?

- Sustainably managed forests provide renewable resources
→ make best use of wood, carbon and energy
- Wood use in buildings can lead to long-term carbon storage
→ design and build for long-term retention of C in wood
- Use wood to substitute steel, concrete, and other materials that are emissions-intensive to produce to reduce emissions
→ where possible chose wood-based building materials
→ recognise differences in embodied energy and emissions
- Good management of wood waste & post consumer material
→ avoid disposal in landfills (CH₄) and
→ recover energy contained in wood waste

Main Building Materials Contribution to GHG Emissions

Net Carbon Emissions in Producing a Ton of: ^{1/} ^{2/}

Material	Net Carbon Emissions (kg C/metric ton)
Softwood lumber	33
Recycled steel (100% from scrap)	220
Concrete	265
Concrete block ^{3/}	291
Steel (virgin)	694

^{1/} Values are based on life cycle assessment and include gathering and processing of raw materials, primary and secondary processing, and transportation.

^{2/} Source: USEPA (2006).

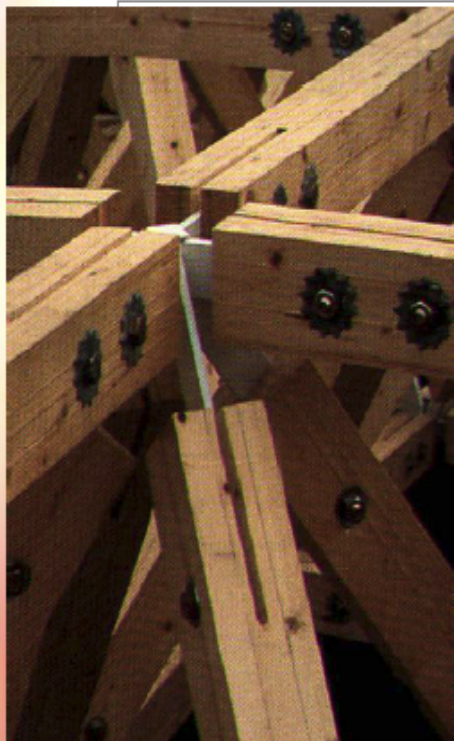
^{3/} Based on the EPA concrete value and information about energy requirements in block-making.

Building Materials Carbon Footprint (Including HWP Carbon sCquestration)

Material	Carbon emissions (Kg of C per ton)
Wood	-460
Glass	630
Virgin steel	1 090
Aluminium	2 400
Plastic	2 810

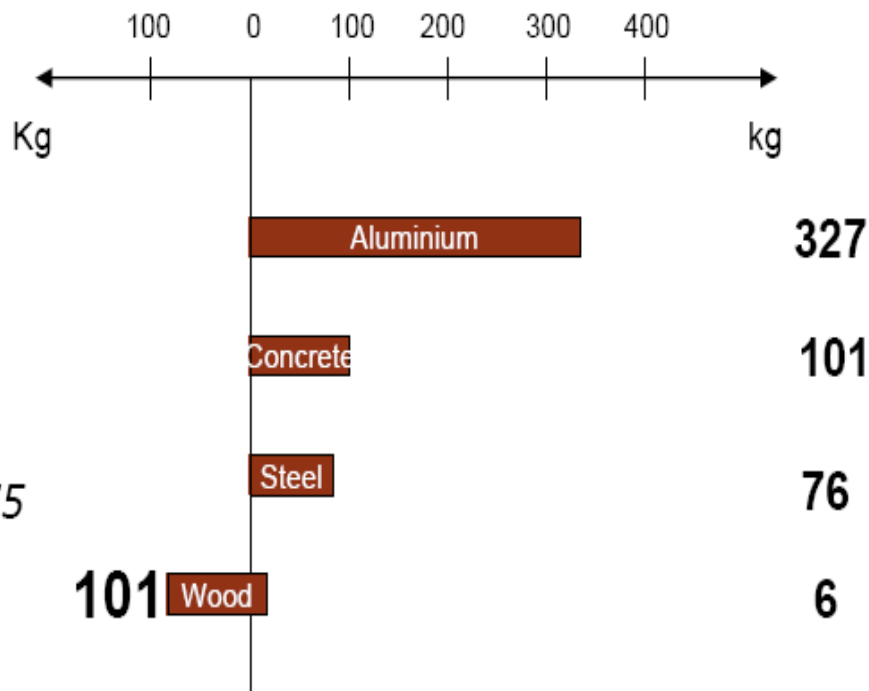
Source: Taylor et Van Langenberg (2003).

Construction Materials Compared on the Basis of CO₂ Emissions



Comparison of the CO₂ emissions linked to the design of a beam made of Aluminium, Steel, Concrete and Solid Wood

Absorbed Emitted CO₂



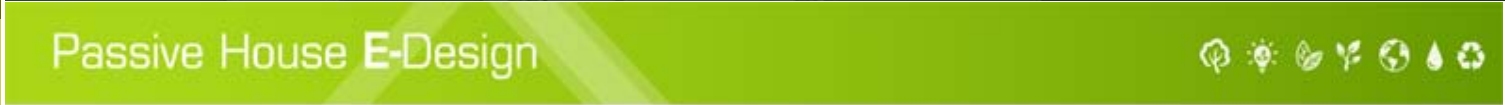
Beam designed for :
Permanent load of = 75
kg/m
Exploitation load of =
300 kg/m
Span = 7.5 m

101 Wood

Role of Green Building

Who are the Players

in Green Building Policies?



UNEP SBCI
Sustainable Buildings
& Climate Initiative



Sustainable Building
common metrics for key issues



WORLD GREEN BUILDING COUNCIL

CASBEE 建築環境総合性能評価システム
Comprehensive Assessment System for Built Environment Efficiency



Global Trend of Green Building Movement



Green building assessment systems vary from country to country in accordance with local environmental and socioeconomic conditions.

Mission Statement

UNEP-SBCI works to promote sustainable building policies and practices worldwide.

Stated Goals of the Initiative:

- 1. Provide a common platform for stakeholders**
 - 2. Establish baselines**
 - 3. Develop tools and strategies**
 - 4. Demonstrate through pilot projects**
- 



Founding Members (2006)

- Agence de l'Environnement et de Maîtrise de l'Energie (ADEME), France
- Arcelor-Mittal Company, Luxembourg
- Broad Air-Conditioning, China
- Fasken Martineau (previously: Gravel, Leclerc & Associates), France
- Hydro Aluminium, Switzerland
- International Federation of Consulting Engineers (FIDIC), The Netherlands
- Lafarge, France
- Plastedil SA, Switzerland
- Sinotech Engineering Consultants Ltd, Taiwan
- SKANSKA, Sweden
- World Steel Association, Belgium

2009-2010 Membership



UNEP SBCI
Sustainable Buildings
& Climate Initiative

EXPO 2010 SHANGHAI CHINA
Global Partner of Expo 2010 Shanghai China
中国2010年上海世博会全球合作伙伴

BROAD 远大

FIDIC

HYDRO

LAFARGE

Lend Lease

U.S. GREEN BUILDING COUNCIL USGBC

ADEME
French Environment & Energy Management Agency

ArcelorMittal

BLUE

Green tech Malaysia

Canada Wood Produits de bois canadien

Bayer MaterialScience

Building and Construction Authority

CSTB le futur en construction

EHS

emvs

ITC Limited

招商地產 Home is where the heart is

cidb development through partnership

CEMEX

NRDC THE EARTH'S BEST DEFENSE

BQDRI
معهد بروقة والديار القطرية للبحوث
BARWA & QATARI DIAR RESEARCH INSTITUTE

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PREFEITURA DE SÃO PAULO SECRETARIA DO VERDE E DO MEIO AMBIENTE

PROPERTY COUNCIL of Australia

REAL pac
Real Property Association of Canada
Association des biens immobiliers du Canada

RESNET
Setting the Standards for Quality

Resilience

SAINT-GOBAIN

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Sustainable Building Alliance
common metrics for key issues

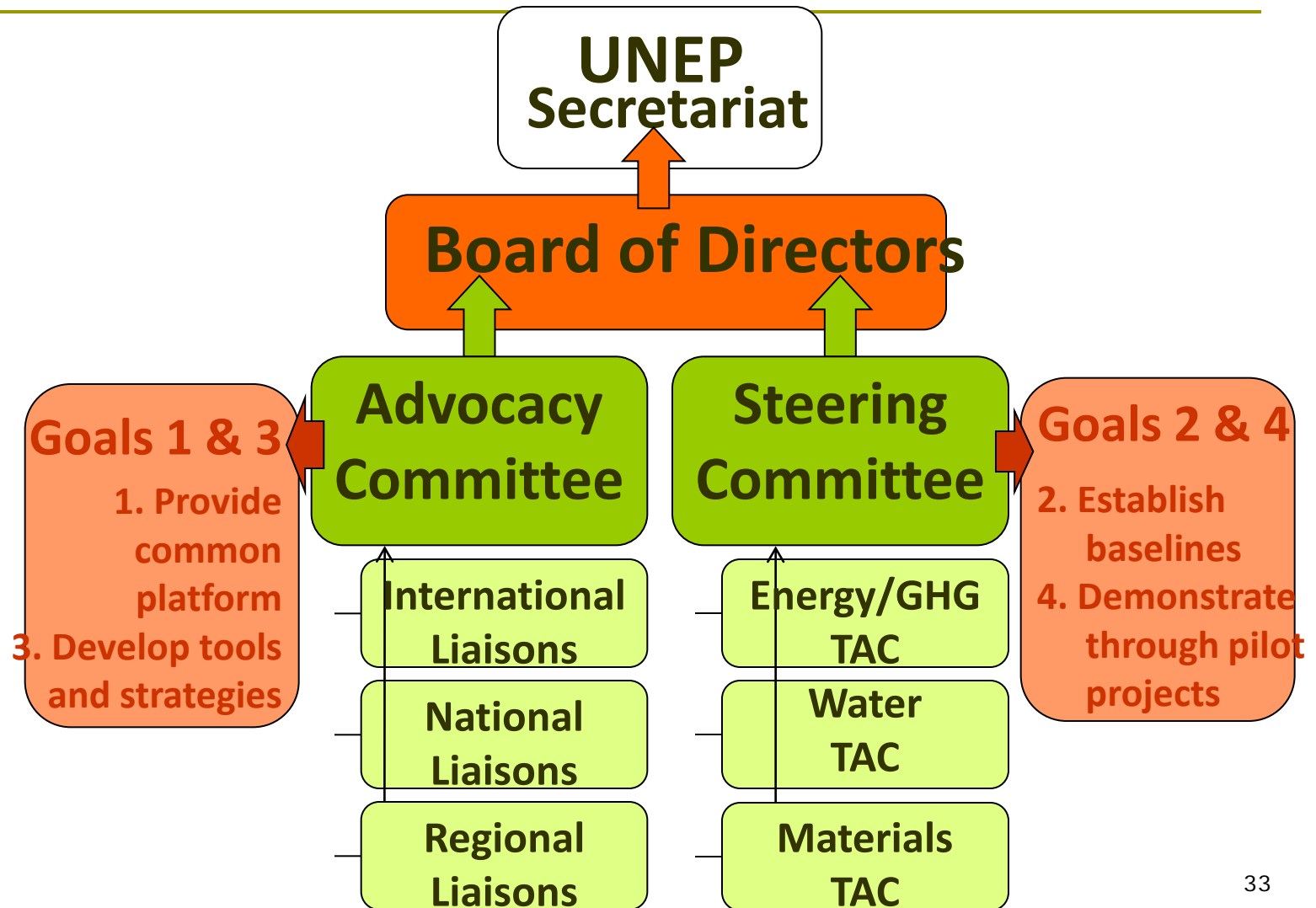
worldsteel ASSOCIATION

WORLD GREEN BUILDING COUNCIL

UNEP-SBCI Structure



UNEP SBCI
Sustainable Buildings
& Climate Initiative





United Nations Environment Programme

برنامج الأمم المتحدة للبيئة • 联合国环境规划署

PROGRAMME DES NATIONS UNIES POUR L'ENVIRONNEMENT • PROGRAMA DE LAS NACIONES UNIDAS PARA EL MEDIO AMBIENTE

ПРОГРАММА ОРГАНИЗАЦИИ ОБЪЕДИНЕННЫХ НАЦИЙ ПО ОКРУЖАЮЩЕЙ СРЕДЕ

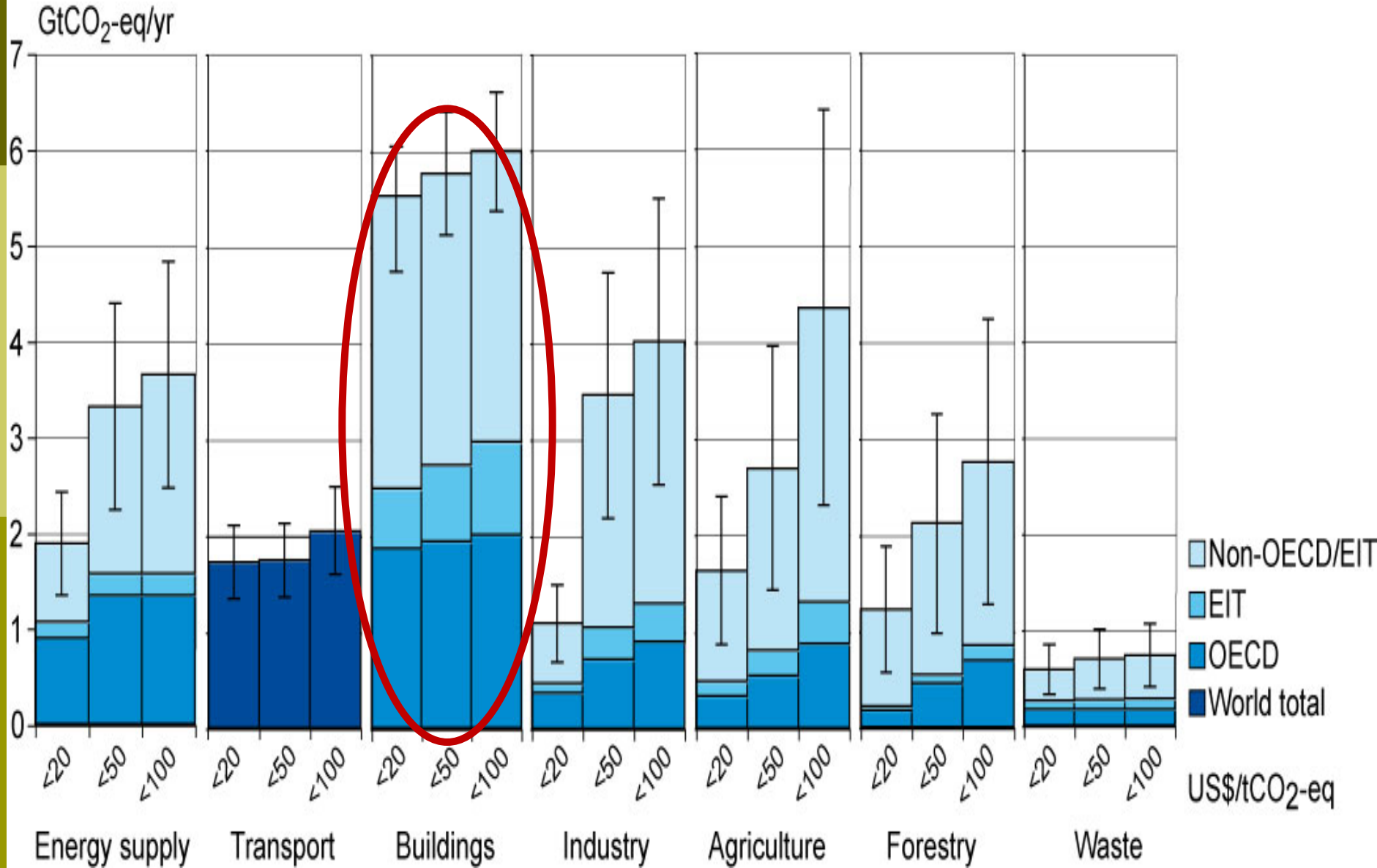
Submission of the United Nations Environment Programme (UNEP) Sustainable Building Initiative (SBCI) to the Ad Hoc Working Group on Long-Term Cooperative Action under the Convention (AWG-LCA)

24 April 2009

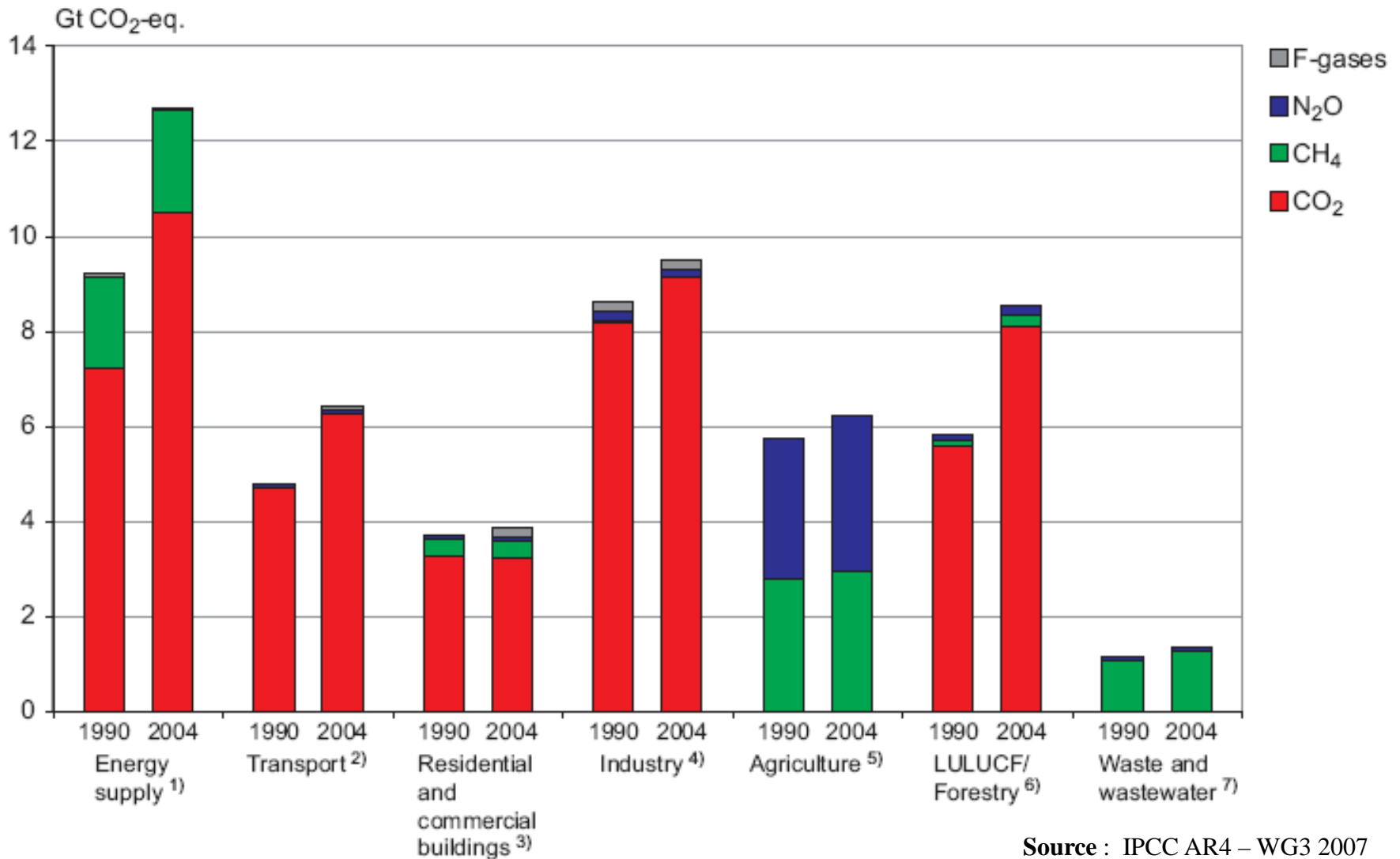
UNEP SBCI proposes that emission reduction in buildings is recognized as an appropriate area for NAMA and that the development of frameworks required to monitor, report and verify such actions are included in a post-2012 Agreement.

A registry of nationally appropriate mitigation action by all developing countries should be established, supported and enabled by developed countries through the provision of the means of implementation (technology, financing and capacity-building) to developing countries in a measurable, reportable and verifiable manner in order to develop policy packages that promote emission reductions in buildings under NAMAs. These policy packages will require the development of indicators and metrics to report on emissions from buildings and to establish national baselines to enable reporting of achieved emission reductions.

IPCC Assessment of Emission Reduction Potential in Different Sectors Depending on the Carbon Market Price (<\$20, <\$50, <\$100)



Sources of GHG per sectors





Objective 2: Frame a Common Language *for performance assessment of energy efficient & low carbon buildings, as a basis for consistent global reporting of building related greenhouse gas emissions.*

- A. The Sustainable Buildings Index
- B. Steering Committee and Technical Advisory Committees

Steering Committee Members



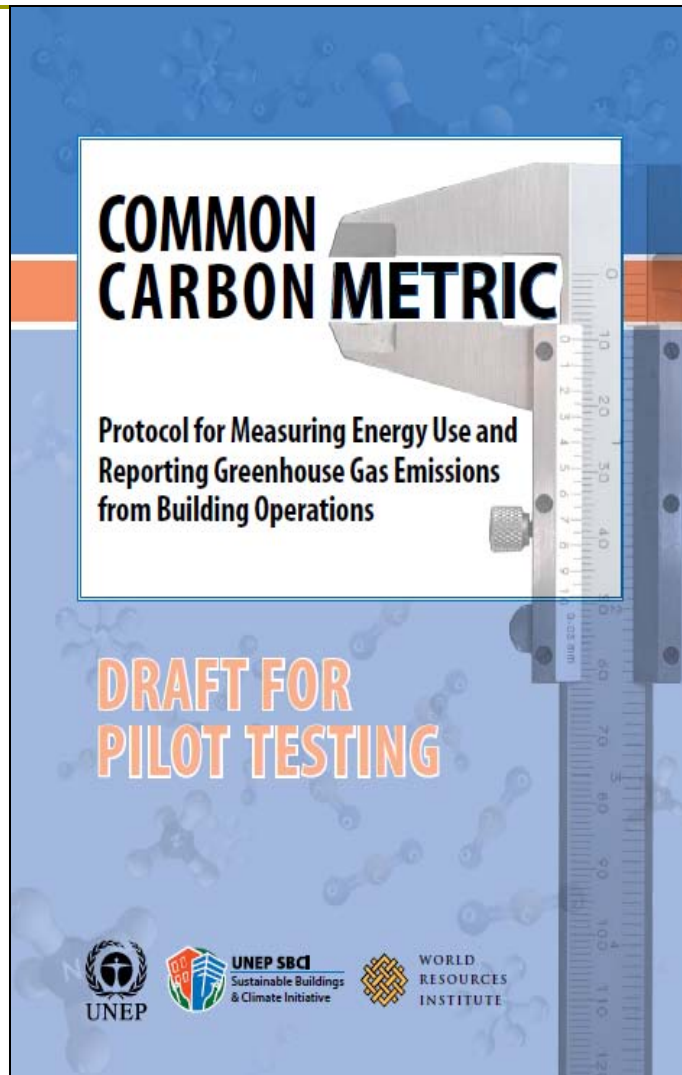
UNEP SBCI
Sustainable Buildings
& Climate Initiative

UNEP/SBCI Sustainable Buildings (SB) Index Steering Committee (SC)

Sustainable Building Alliance	Ana Cunha	Board member	Partner- Sponsor of the committee
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Ten seats are available for the 2010 Steering Committee. The committee is formed with the following ten nominees.

ORGANIZATION	NAME	POSITION/TITLE	SEAT
Council for Built Environment, South Africa	Nana Mhlongo	Manager Research and Policy	Research Institution
Canada Wood	Robert Beauregard	Dean, Faculty of Forestry, Laval University	Not-for-Profit
Construction Industry and Development Board (CIDB)	Rodney Milford	Programme manager	Not-for-profit
Jordan Green Building Council	Abdullah Bdeir	Vice Chairman	Not-for-Profit
Hydro Building Systems	Werner Jäger	Head of Research and Development	Private sector
Residential Energy Services Network (RESNET)	Steven Baden	Executive Director	Private Sector
Bayer MaterialScience	Manfred Rink	Senior Vice President	Product Manufacturers
Lafarge	Constant van Aerschot	Director	Product Manufacturers
Brazilian Sustainable Building Council (CBCS)	Eduardo Trani	Chief in Cabinet - São Paulo State Housing Secretariat	Local Government
Building and Construction Authority Singapore	Kian Seng Ang	Director (Research)	National Government



Measuring Energy Use & Reporting GHG Emissions from Building Operations

Energy

kWh/m²/yr

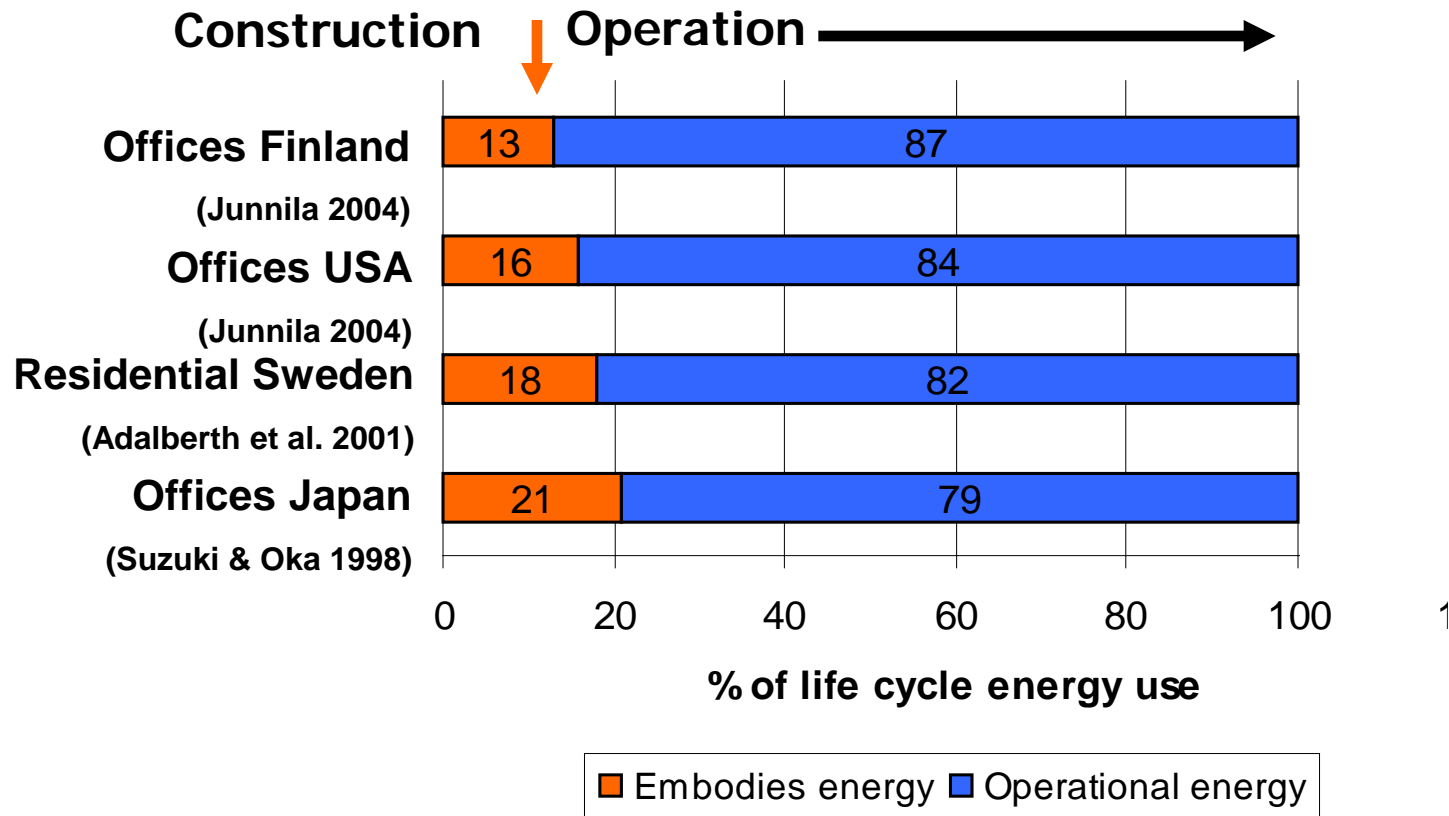
Emissions (*equivalent (e)*)

kgCO₂e/m²/yr

In collaboration with:
World Resources Institute (WRI)

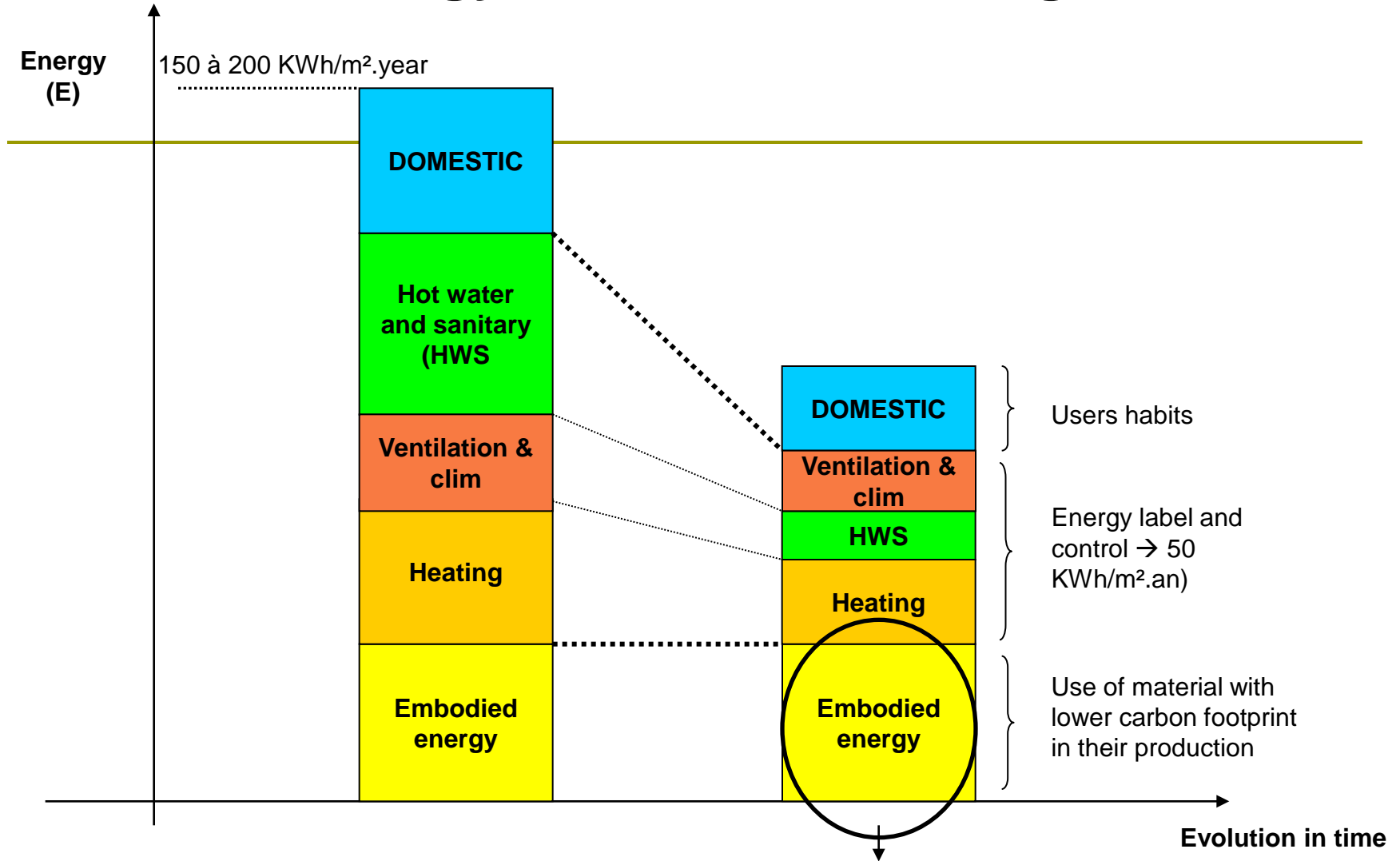
The Common Carbon Metric

Operation of Buildings = about 80% of energy GHG



50% of total energy can be reduced at net zero cost with commercially available technologies

Embodied energy in a Green Building time frame



More efficient is the building , more important is the embodied energy in the life cycle scheme
Plus' embodied energy is accounted during the first year

- Scientific evidence continues to increase and support the IPCC conclusions that:

A sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber, fibre or energy from the forest, will generate the largest sustained mitigation benefit (IPCC AR4, Nabuurs et al. 2007).

WE NEED A GLOBAL STRATEGY

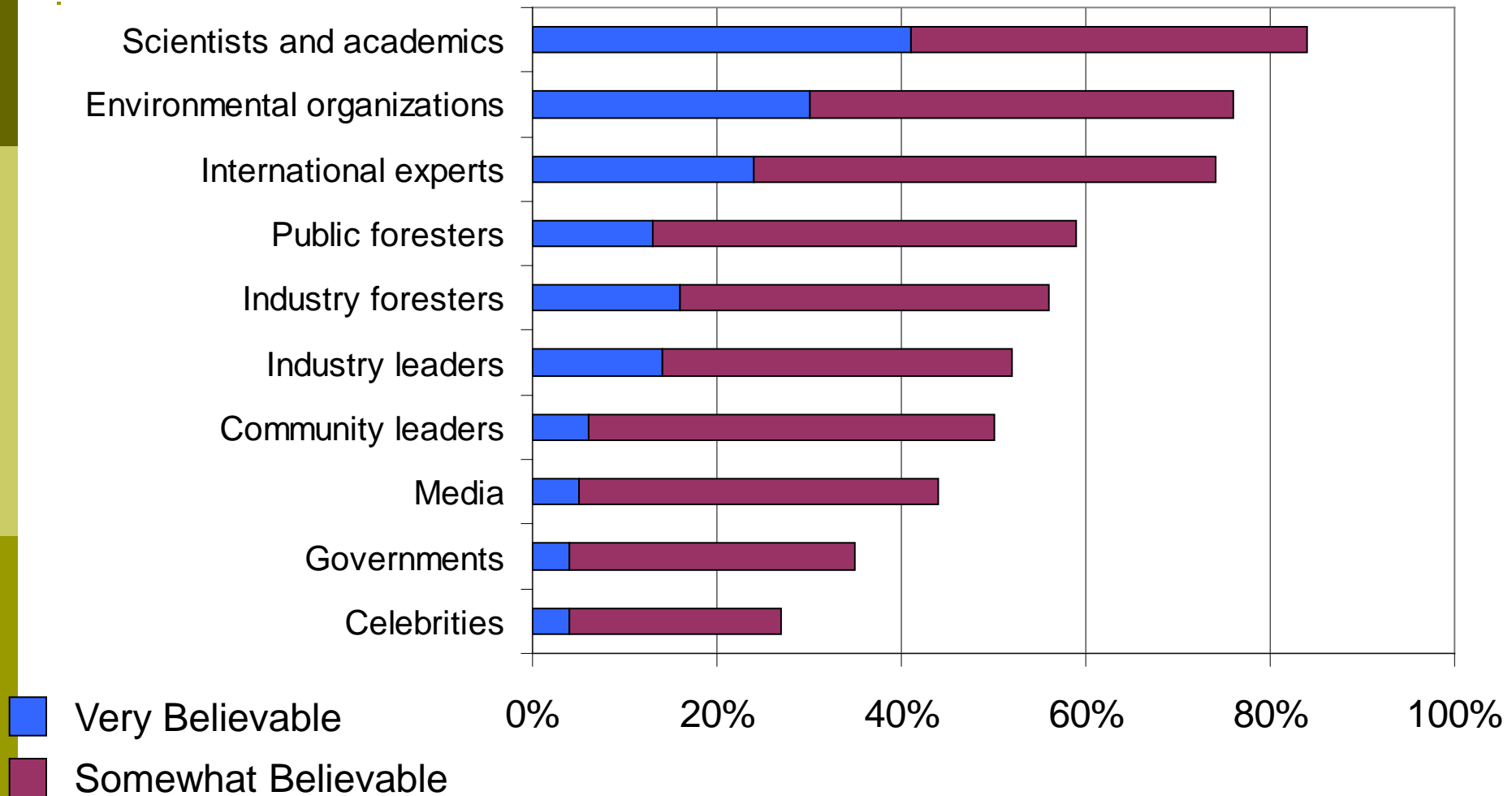
(9 Action Plans)



Metric

	FORÊT	BOIS	CONSTRUCTION
INTERNATIONAL	FI	BI	CI
NATIONAL	FN	BN	CN
RÉGIONAL	FR	BR	CR

Who is credible in speaking about forests wood and climate change?



Source: IPSOS REID, 2007

Next step: Social responsibility How much for this furniture ?

Quel prix pour ce meuble ?

Non au commerce des armes et des matières premières avec les pays qui violent les droits humains. Amnesty International

www.amnesty.org/fr