

**IEA EBC**  
**ANNEX 57**  
**-EVALUATION OF EMBODIED ENERGY AND CARBON  
DIOXIDE EMISSIONS FOR BUILDING CONSTRUCTION-**

**SPECIAL SESSION**  
**SB13 GRAZ**

**25-28 SEPTEMBER 2013**

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# **Total energy consumed by building and Embodied CO<sub>2</sub> equivalent**

## 1. Operational Energy:

HVAC, Lighting, Outlet etc.

## 2. Embodied Energy:

‘Embedded’ in construction materials during  
all production processes

+ On site construction, demolition and final disposal

## 3. Embodied CO<sub>2</sub> equivalent:

CO<sub>2</sub> due to Embodied Energy consumption

+ GHGs other than CO<sub>2</sub>

## Standpoint of Annex 57

### 1. Operational energy and CO<sub>2</sub>:

Improved recently

### 2. Embodied energy and CO<sub>2</sub> :

Proportionally more significant

- ### 3. Annex 57 ⇒ Investigating methods for evaluating embodied energy and CO<sub>2</sub> emissions to develop guidelines:
- a. Practitioners' further understanding
  - b. Find better building design for buildings with less embodied energy and CO<sub>2</sub> emissions.

# Schedule and Subtasks

Subtask	Phase							
	Preparation		Working				Reporting	
	Year 1		Year 2		Year 3		Year 4	
	Jun-Nov	Dec-May	Jun-Nov	Dec-May	Jun-Nov	Dec-May	Jun-Nov	Dec-May
	2011-2012		2012-2013		2013-2014		2014-2015	
ST1 - Basics								
ST2 - Literature Survey								
ST3 - Evaluation Methods								
ST4 - Design & Construction Method								
ST5 - Dissemination								
Meeting Schedule	1-2 <sup>nd</sup> Meeting		3-4 <sup>th</sup> Meeting		5-6 <sup>th</sup> Meeting		7-8 <sup>th</sup> Meeting	
	Oct, Helsinki		Oct, Cambridge		Sept, Graz		Oct, 2014	
	May, Porto		April, Munich		April, 2014		May, 2015	

# **Sub Tasks**

## **ST1-Basics**

- [1] Activities related to EE/EC in the world
- [2] Demands related to EE/EC by various actors
- [3] Integration of EE/EC into decision making process

## **ST2-Literature Survey**

- [1] Definition of key concepts and technical terms
- [2] Characteristics of existing databases/tools
- [3] Current trends and future perspective

### *ST-3 Evaluation methods for EE/EC*

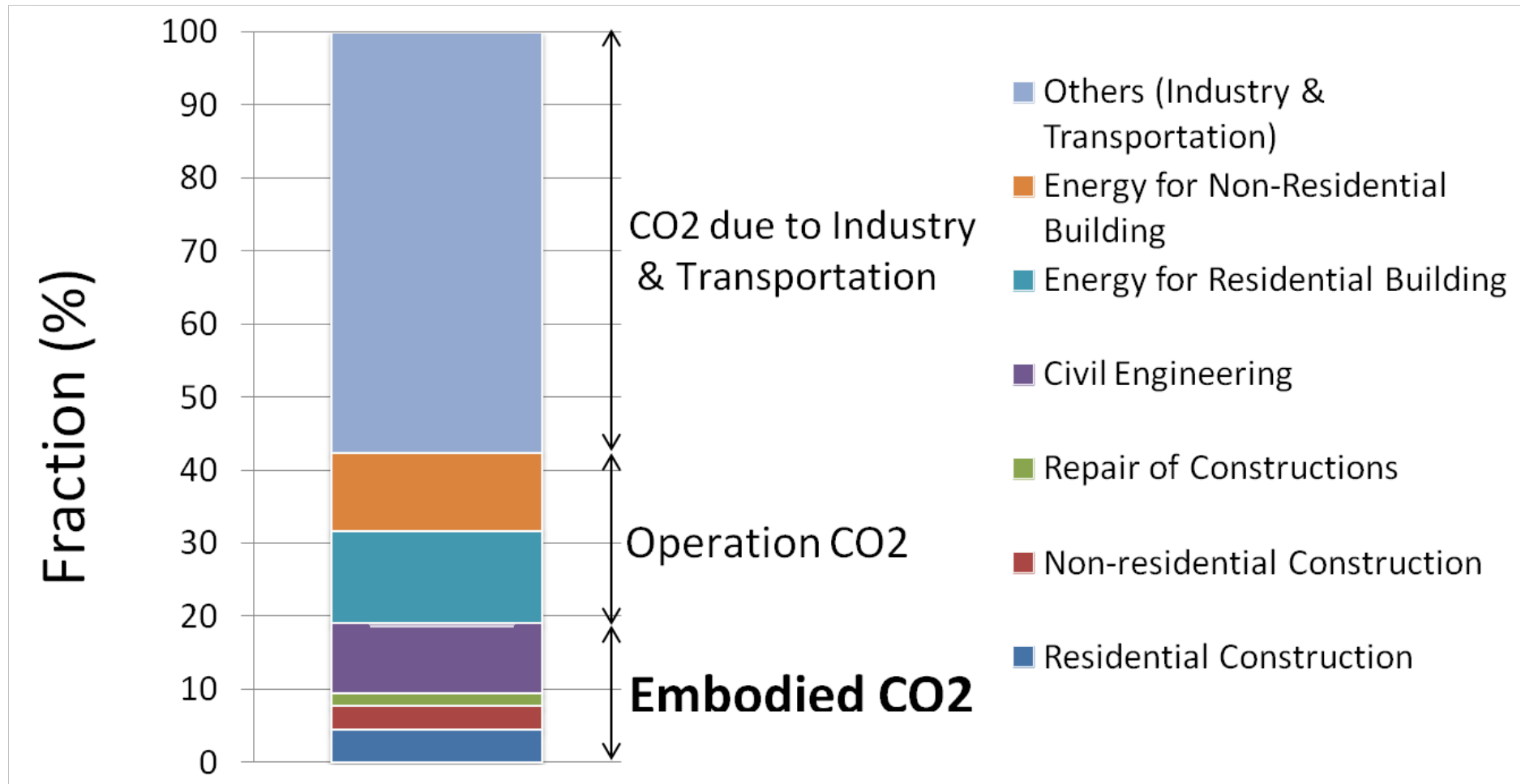
- [1] Methodology for databases of EE/EC and quantifying volumes of building materials
- [2] Characteristics of existing databases and tools

### *ST-4 Design and construction methods for buildings with low EE/EC*

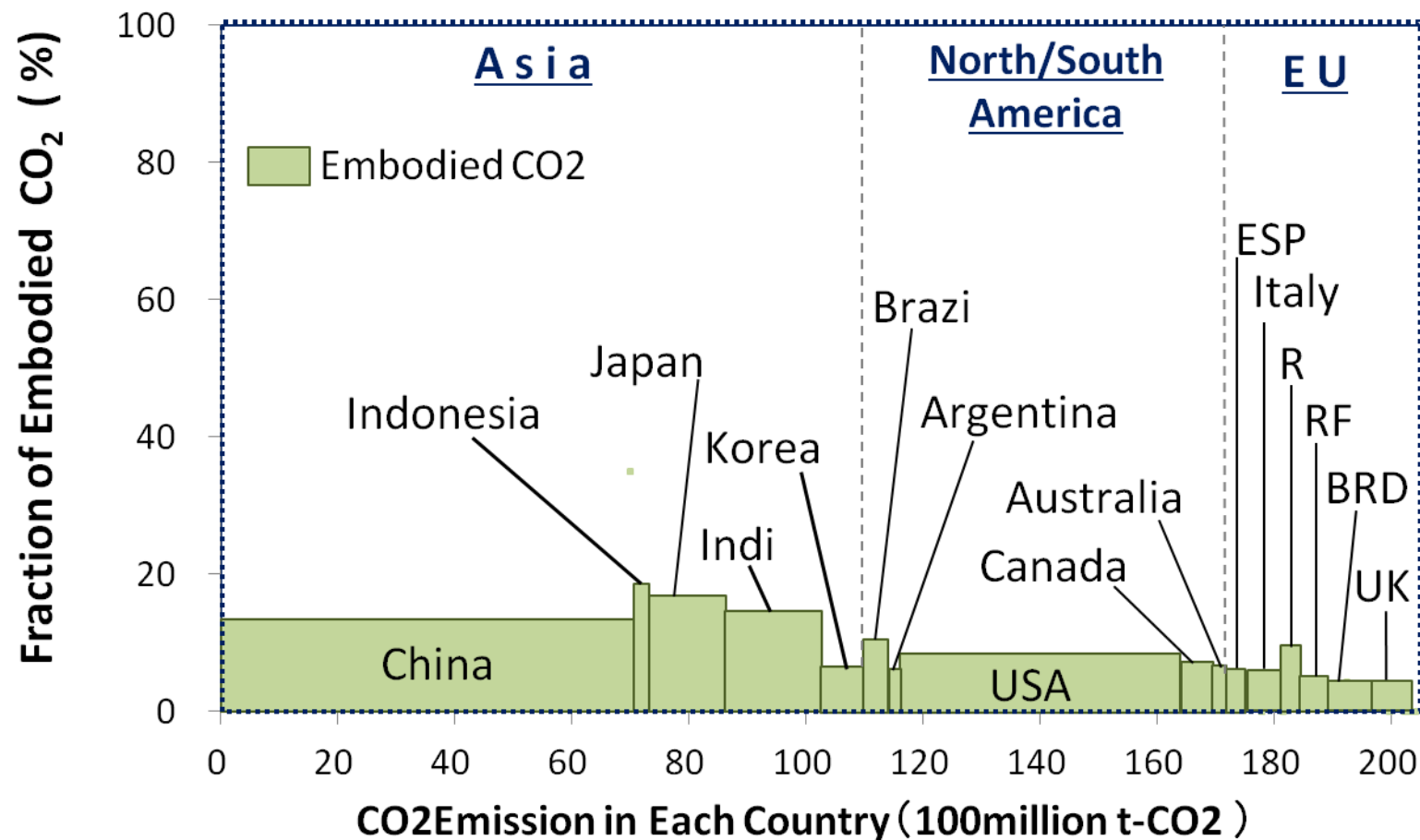
- [1] Options for design and construction to reduce EE/EC
- [2] Use of recycled or reused materials and components
- [3] Life of building and its prolongation
- [4] Consideration of GHGs other than CO<sub>2</sub>
- [5] Case studies and best practices (ZEB etc.)

### *ST-5 Dissemination*

## Profile of CO<sub>2</sub> emission in Japan by IO analysis (2005)



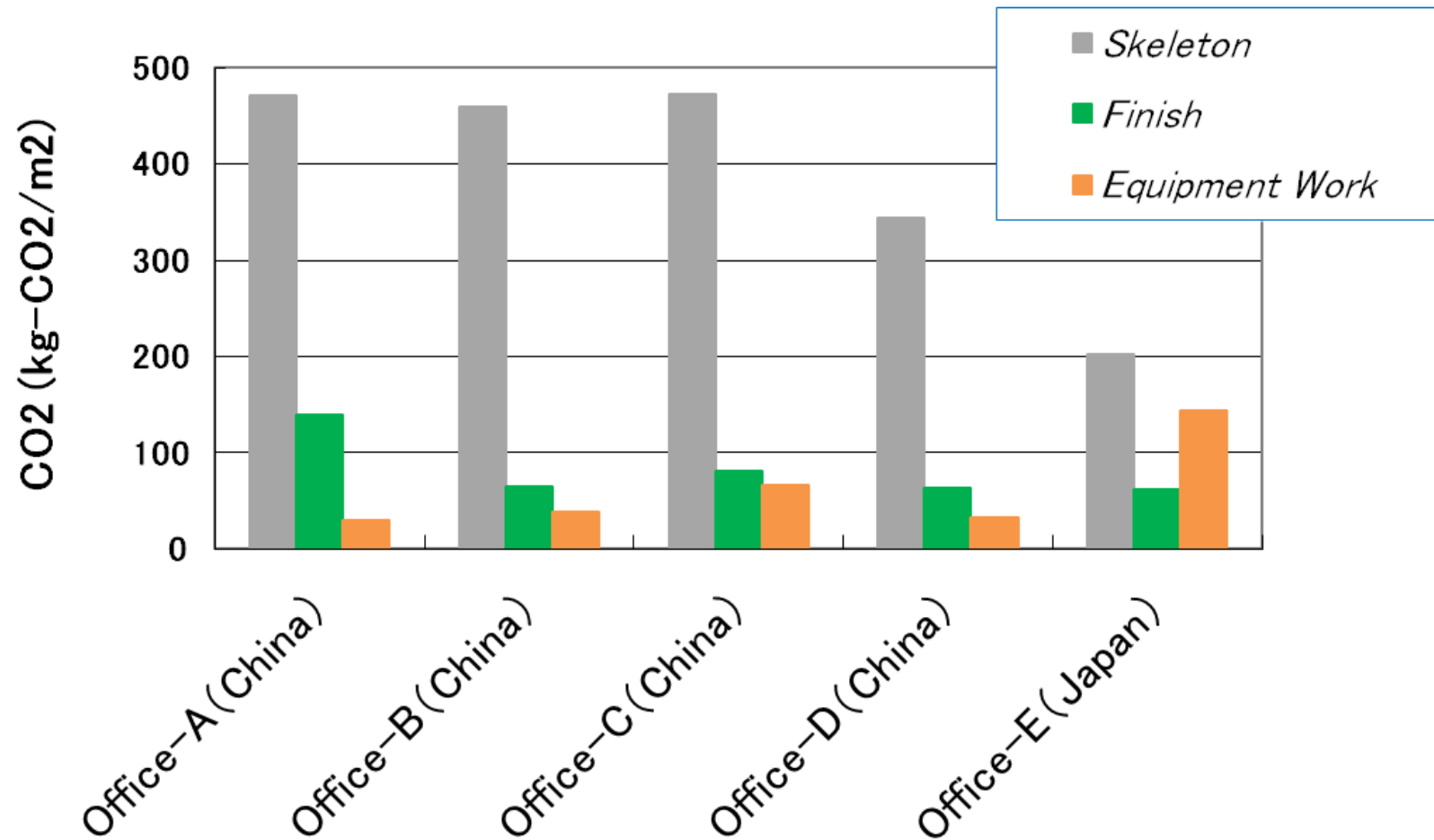
The CO<sub>2</sub> emission of each chosen country (horizontal axis) and the fraction of embodied CO<sub>2</sub> (vertical axis) RP: Poland RF: France BRD: Germany



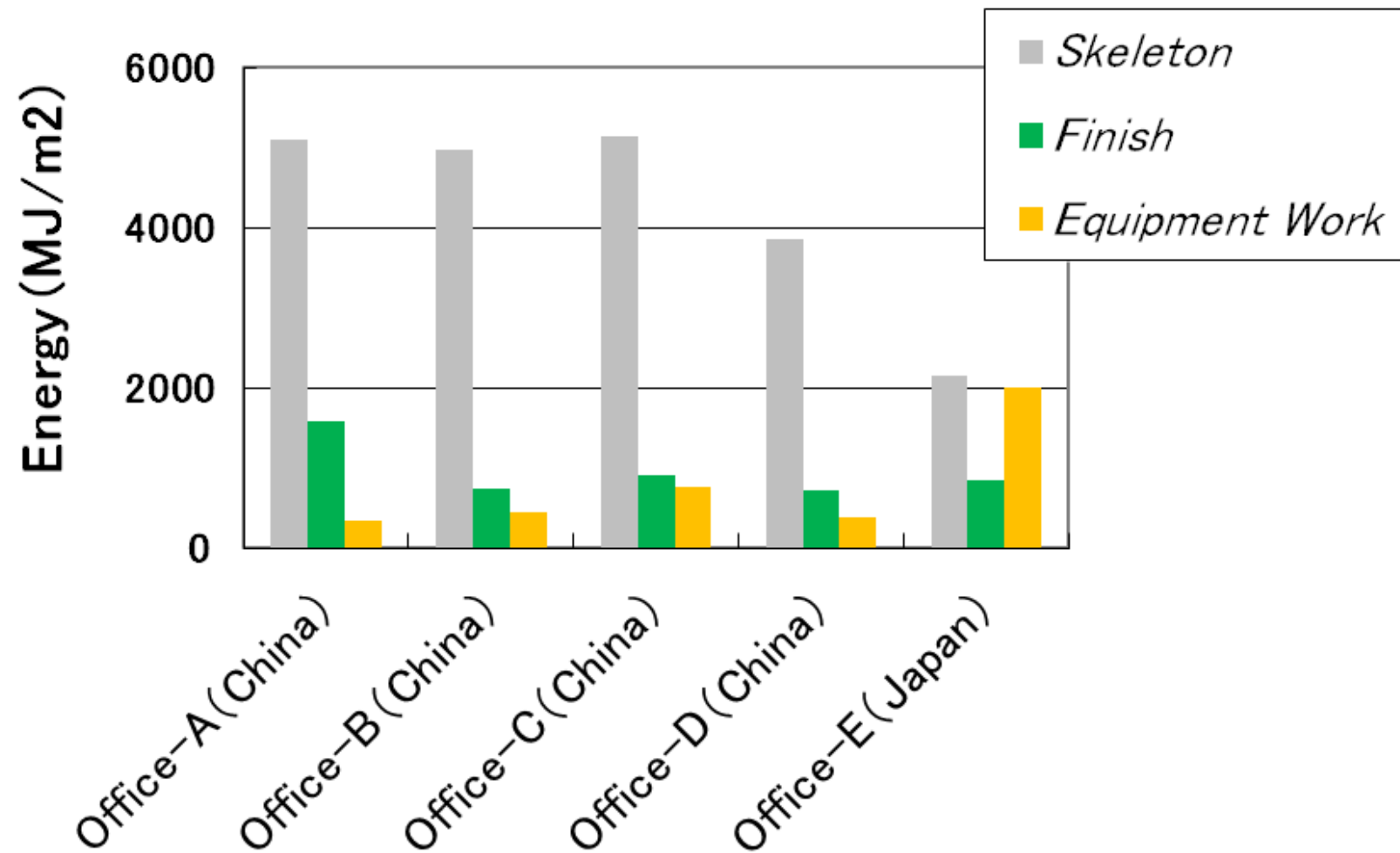
CO<sub>2</sub> Emission of 23 Countries in This Figure : 204 x100million t-CO<sub>2</sub>  
Whole World CO<sub>2</sub> Emission: 287x100 Million t-CO<sub>2</sub>



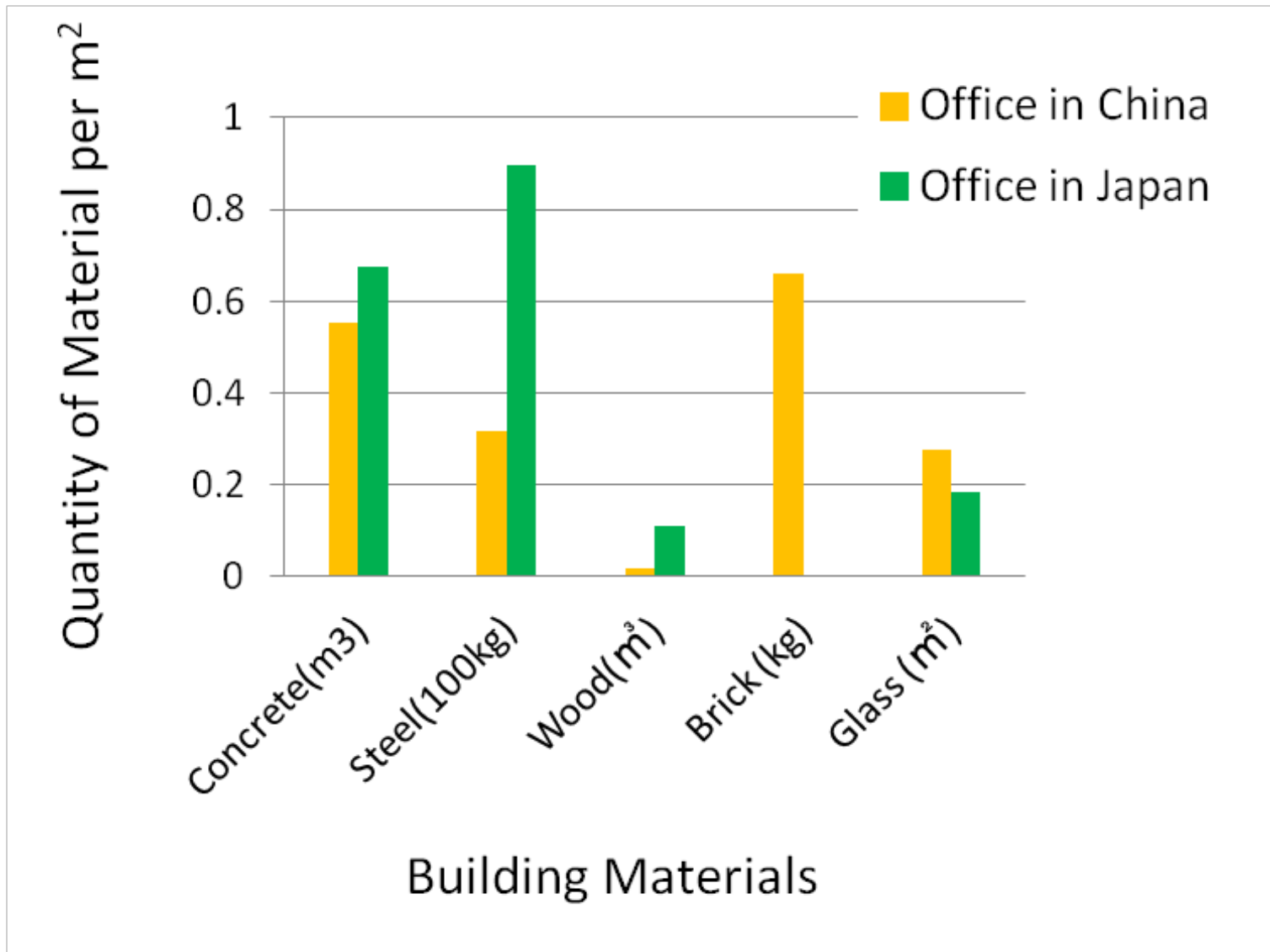
Embodied CO<sub>2</sub> per m<sup>2</sup> of the floor area  
(China and Japan)



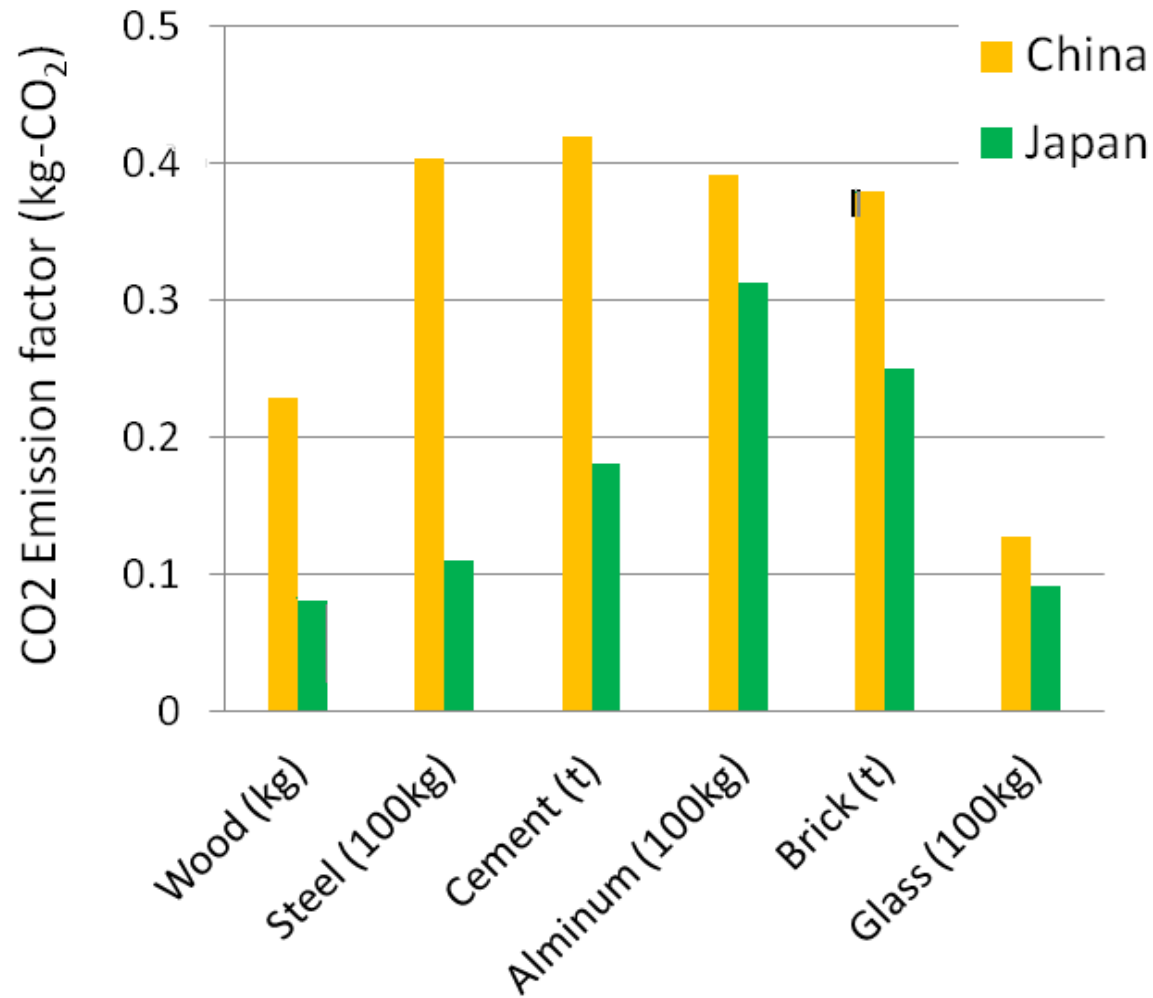
Embodied Energy per m<sup>2</sup> of the floor area  
(China and Japan)



*Quantity of Building Materials per m<sup>2</sup> of the floor area*  
*(China and Japan)*

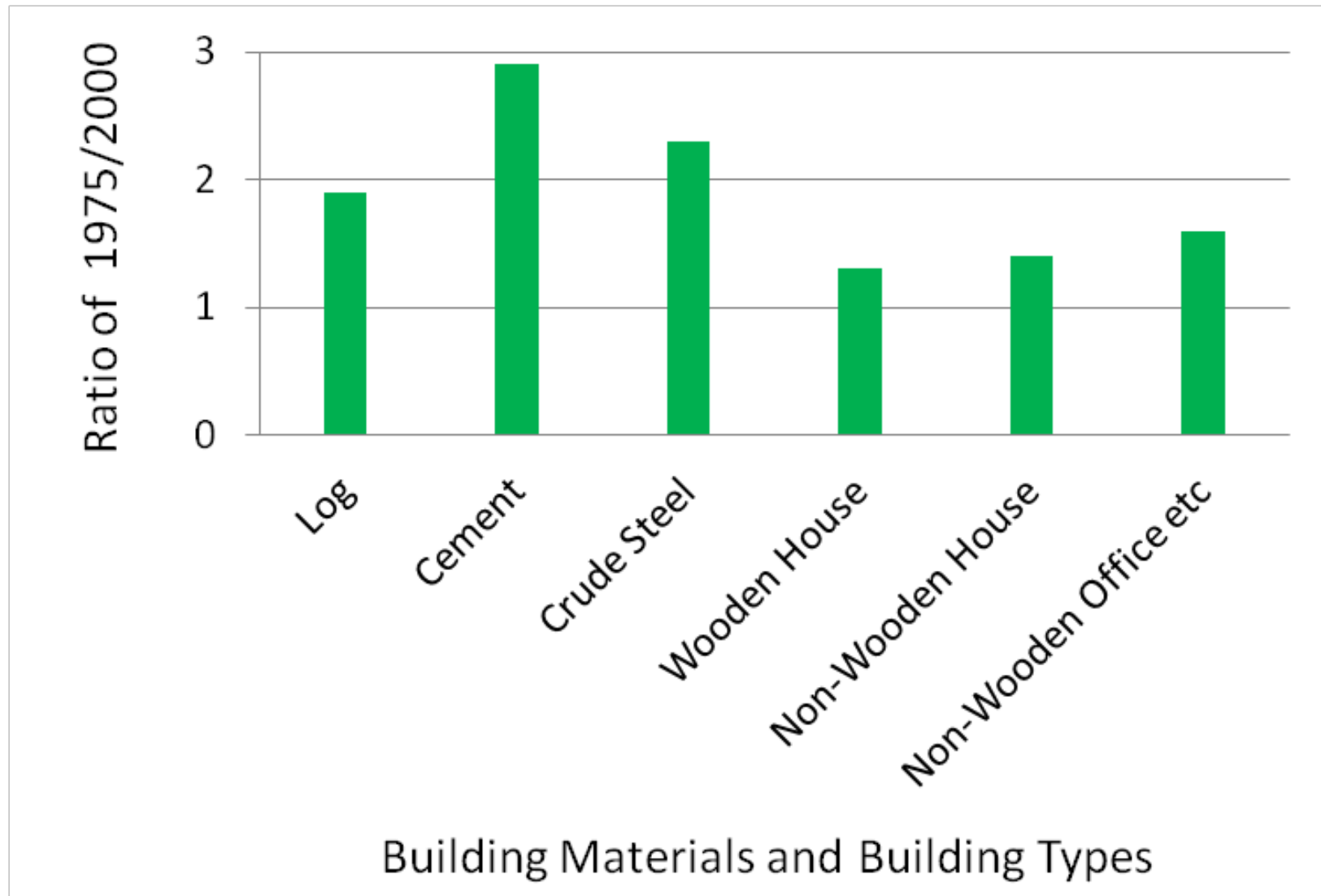


## CO2 Emission Factors of Building Materials (China and Japan)



Building Materials and the Units

*Ratio of CO2 Emission Factors of Building Materials and Buildings  
between 1975 and 2000 in Japan*



*Thank you for your attention*