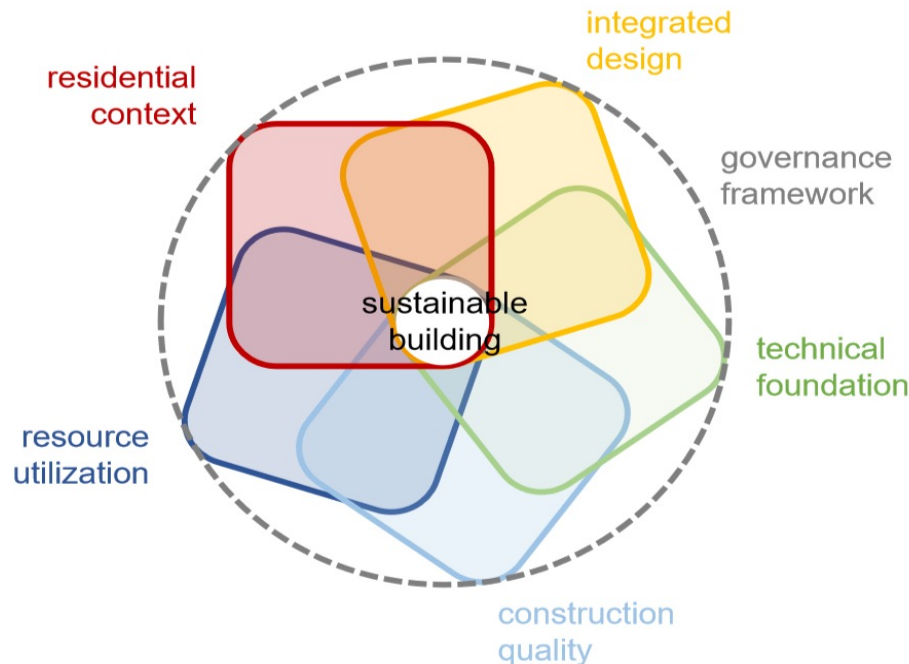


Climate-Adapted Material Research for the Socio-Economic Context of Vietnam (CAMaRSEC) - CLIENT II

Enabling Research and Development for Sustainable Buildings
in the socio-economic context of Vietnam



prepared by:

Dr Dirk Schwede, University of Stuttgart
Lavinia Ruf, University of Stuttgart

Embodied carbon in building – A case study from Vietnam

research consortium:



National University
of Civil Engineering
Hanoi, Vietnam



Ton Duc Thang
University
HCMC, Vietnam



Vietnamese Institut
for Building Materials
Hanoi, Vietnam

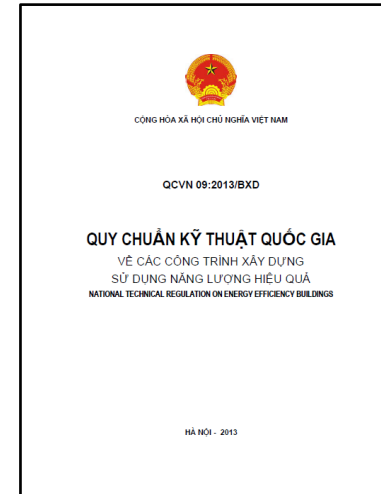


College of Urban Works
and Construction
Hanoi, Vietnam



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project duration

1.7.2019 – 30.6.2022

research consortium:



University of Stuttgart
Germany



Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG



Fraunhofer
IBP



BAU BILDUNG
SACHSEN



NETZSCH
TAURUS INSTRUMENTS



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CAMaRSEC

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International Finance
Corporation (IFC World Bank Group), Hanoi

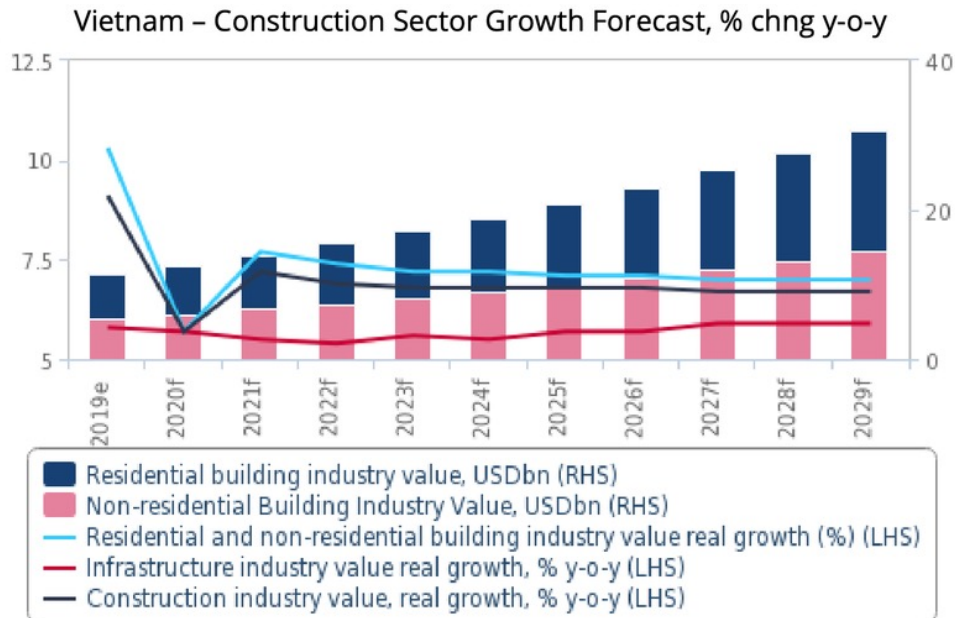


United National Development
Programm (UNDP), Hanoi



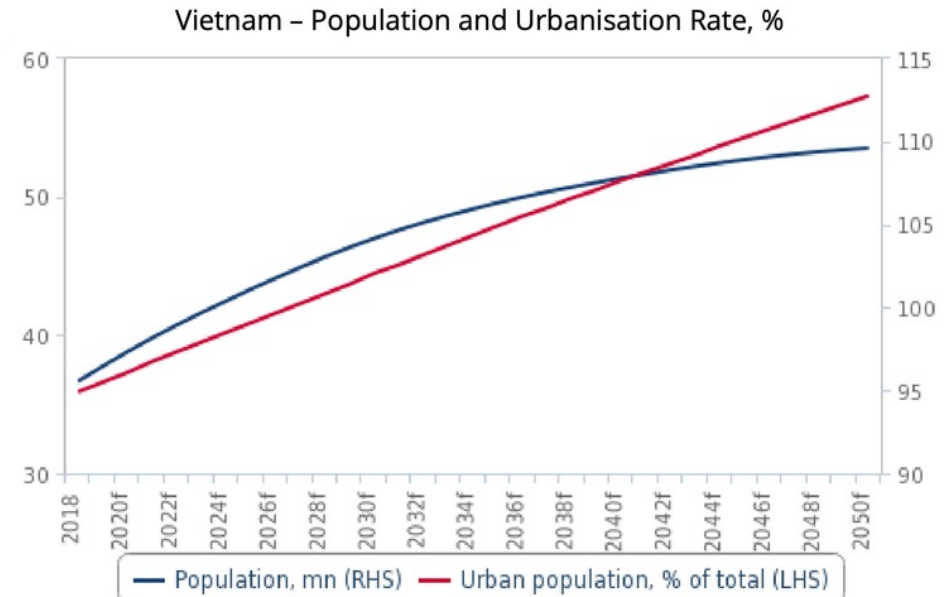
Vietnamese Ministry of
Construction (MoC), Hanoi

Expected developments in Vietnam



Source: Fitch Solutions, <http://m.hanoitimes.vn/vietnam-building-construction-sector-forecast-to-grow-over-7-over-next-decade-fitch-312049.html>

Construction sector rises by an annual average of above 7% in line with expect

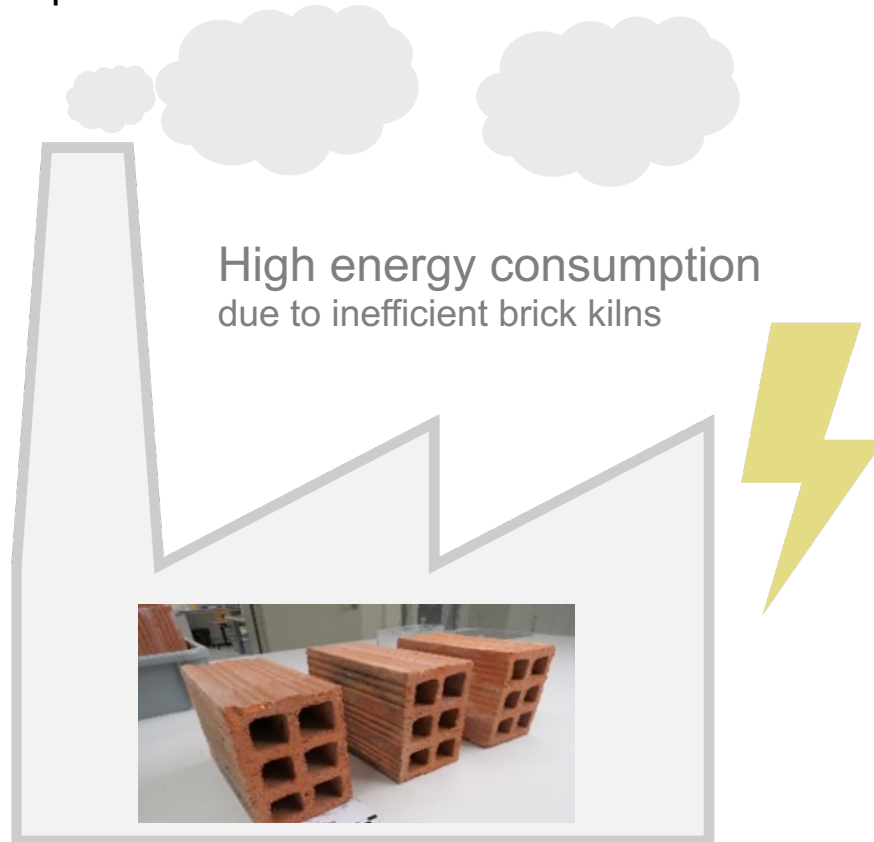


e/f = Fitch Solutions estimate/forecast. Source: National Sources, Fitch Solutions

Rising income level leads to greater demand for higher-end housing in urban areas

Effects of fired clay brick

- 87 % of the building bricks used in Vietnam are fired clay bricks
- More than 10.000 traditional brick kilns are still in operation



Air emissions
due to emissions from clay brick production



<https://e.vnexpress.net/news/news/hanoi-air-quality-climbs-to-dangerously-high-levels-4011031.html>



<http://dtinews.vn/en/news/017/24930/clay-mining-destroys-tea-in-vietnam-highlands-town.html>

WP2.4 Life cycle assessment of materials

WP3.3 Concept for Labelling and Assessment of Building Materials

Product and Material Labelling Environmental Product declaration

- Information on the environmental impact of individual building materials/ products
- support planners in the targeted selection of sustainable products
- serve as the basis for building certifications
- independent audit
- advantage over inaccurate generic data: that they correspond to actual production data of a manufacturer or group of manufacturers



<https://ibu-epd.com/epd-programm/>

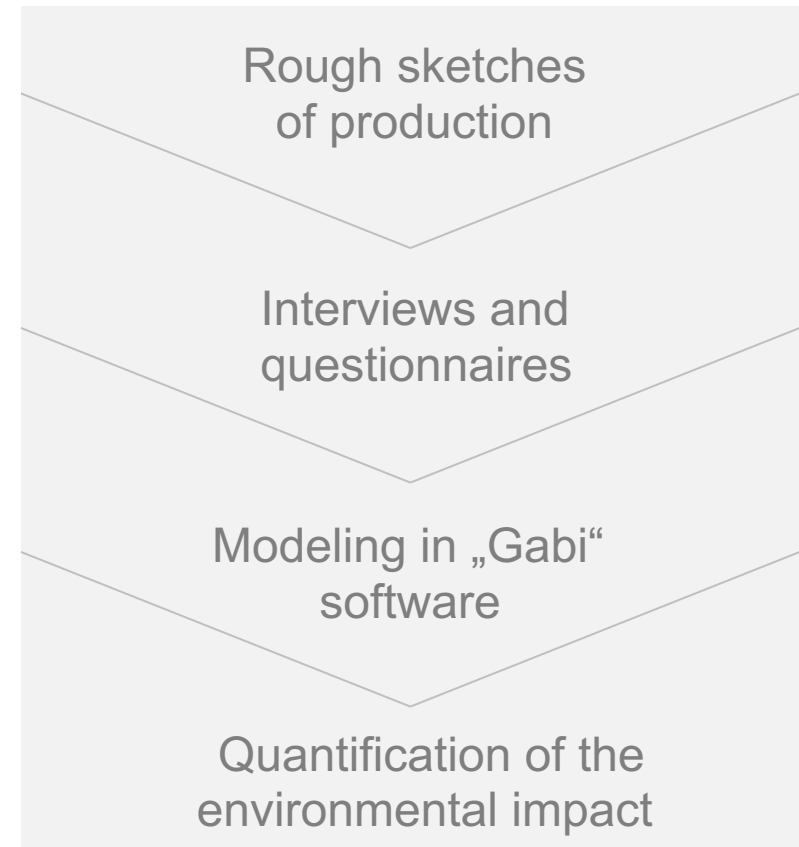
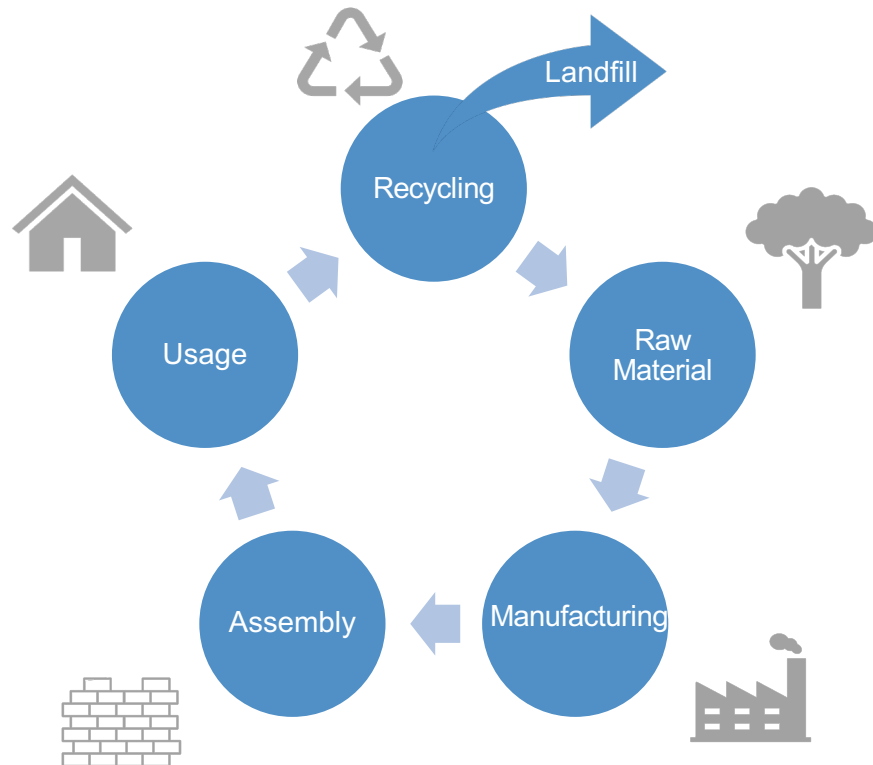
Material Label



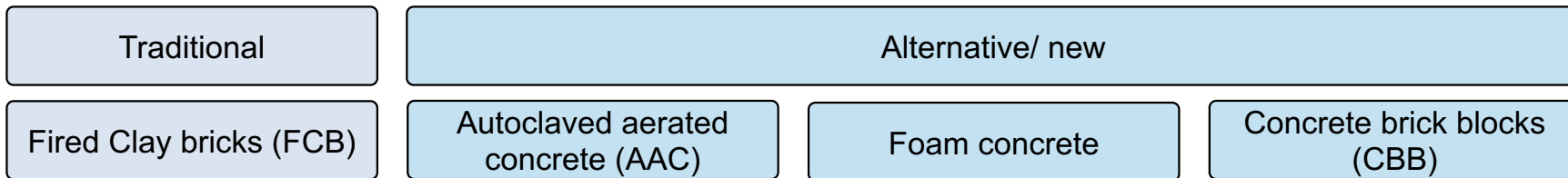
Autoclaved aerated
concrete bricks (AAC)

thermal properties	
hygrothermal properties	
resources	
embedded carbon	
recycling	

Life Cycle Assessment (DIN EN ISO 14040)



Considered Building Materials groups



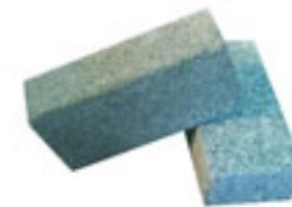
Source: IBP



Source: IBP



Source: IBP




Source: Luu Xa Cement Company


Fired clay brick (FCB) *Gạch đất sét nung*



Bilingual questionnaires for manufacturers



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Nghiên cứu vật liệu thích ứng với khí hậu
trong bối cảnh kinh tế-xã hội của Việt Nam
Thúc đẩy nghiên cứu và Phát triển các công
trình thân thiện môi trường trong bối cảnh kinh
tế-xã hội của Việt Nam

**CAMaRSEC - Đề tài nghiên cứu khoa
học hợp tác giữa Đức và Việt Nam**

**Questionnaire for the LCA (Life Cycle Assessment) study within the scope
of the "CAMaRSEC"- project (Phiếu điều tra cho nghiên cứu đánh giá trên vòng
đời sản phẩm – Life Cycle Assessment - trong khuôn khổ dự án "CAMaRSEC")**

Contact data and Company (Thông tin liên hệ)

Company name: (Đơn vị) _____

Surname: (Họ) _____

First name: (Tên) _____


City / district / postal code: _____

Thành phố/ huyện/ mã bưu điện _____

Street: (Tên đường) _____

Telephone: (Điện thoại) _____

Email: _____



CAMaRSEC

Produced building material (Loại vật liệu sản xuất)

Product (e.g. AAC): _____
Tên sản phẩm (ví dụ AAC) _____

Type (massive or hollow): _____
Chủng loại (đặc hoặc có lỗ) _____

Weight per product [kg]: _____
Khối lượng mỗi viên [kg] _____

Dimensions of a product
(height x width x depth) [cm]: _____
Kích thước: (Cao x rộng x dày) [cm] _____

Thermal conductivity [W/(mK)] _____
Hệ số dẫn nhiệt [W/(mK)] (hoặc
thông số khác về khả năng cách nhiệt
mà bạn biết) _____

Annual produced quantity
[kg or m³ or piece number]: _____
Công suất hàng năm
[kg hoặc m³ hoặc số viên] _____

Annual Power consumption [kWh]. _____
Năng lượng tiêu thụ hàng năm [kWh] _____

Vui lòng ghi chú nguồn của con số (năng lượng tiêu thụ) cung cấp, ví dụ dựa vào hoá đơn tiền điện;
hoặc ước tính từ hoá đơn tiền điện sau khi trừ đi phần điện tiêu thụ cho các công đoạn/các khu vực
khác; hoặc ước tính dựa vào kinh nghiệm và dựa theo công suất các máy sử dụng...

Distance to customers
(Average kilometers of all
customers): _____
Khoảng cách từ nhà máy đến
khách hàng (số km trung bình)
Vui lòng điền khoảng cách trung bình từ nhà máy sản xuất đến các công trình xây dựng sử dụng vật
liệu của quý công ty. Ví dụ, nhà máy đặt tại Bình Dương, các công trình phục vụ chủ yếu là ở Bình
Dương hay ở TPHCM... từ đó suy ra số km trung bình tương ứng.

Raw materials and their transport (please tick, multiple choice is possible):
Nguyên liệu và hình thức vận chuyển (vui lòng đánh dấu, có thể chọn cả hai)

Raw materials procurement: (Phương thức mua nguyên liệu đầu vào)

☐ Purchasing (mua từ nơi khác)

☐ Own mining (tự khai thác)

Modeling in „Gabi“ software



process

LZ> [Plan] -- DB-Plan *

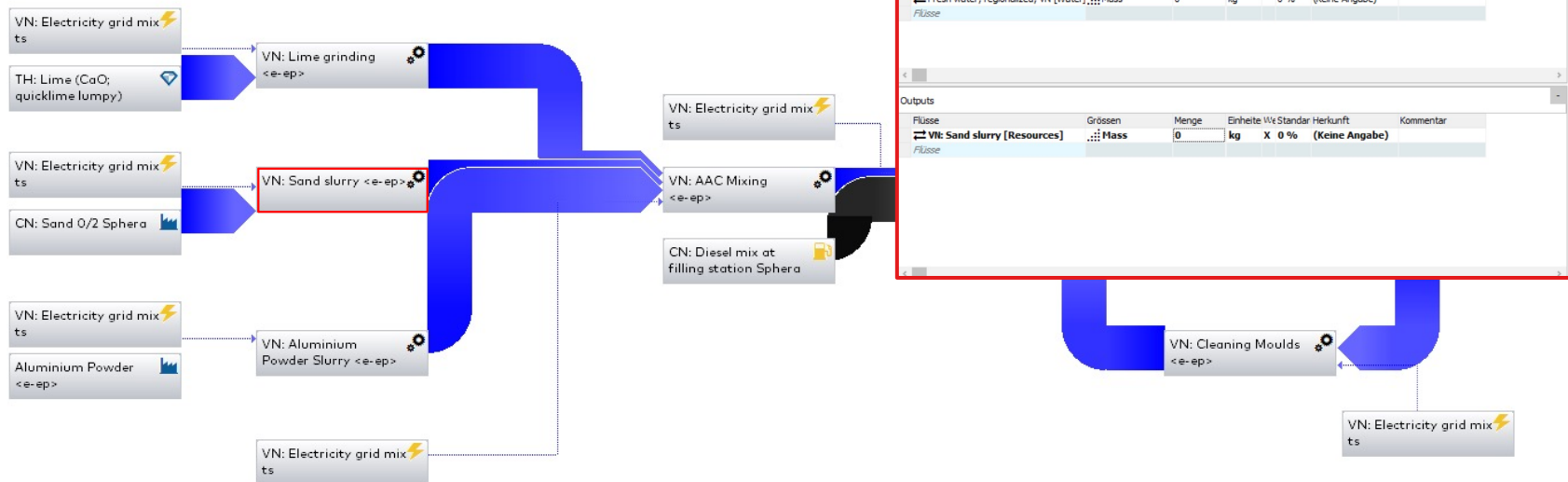
ife



1 Stage of AAC

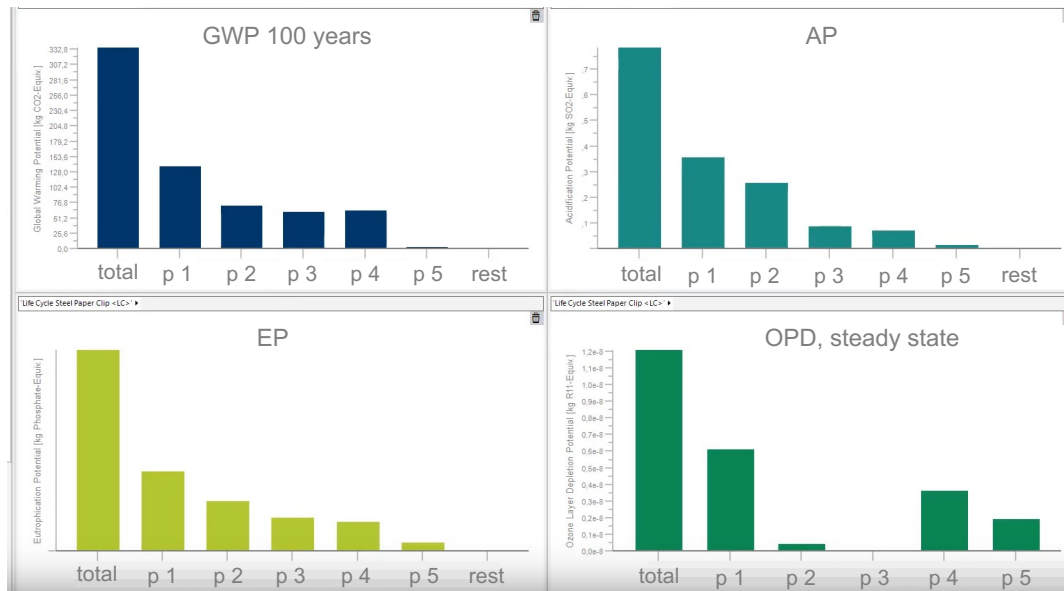
Production Stage of AAC

GaBi Prozess-Plan: Mass [kg]
Es werden die Namen der Basis-Prozesse angezeigt.



Results – Environmental impact

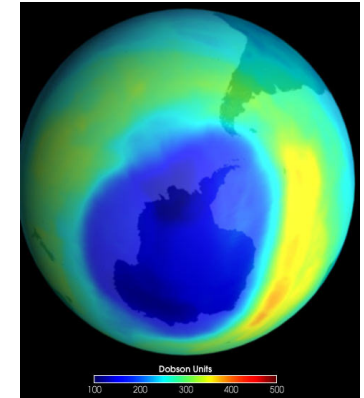
Output from “Gabi” for individual process steps
and the entire manufacturing process



total: all processes
p1...pn: individual processes (e.g. Lime grinding,
sand slurry,...)



Global Warming
Potential (GWP)



Ozone Depletion
Potential (ODP)



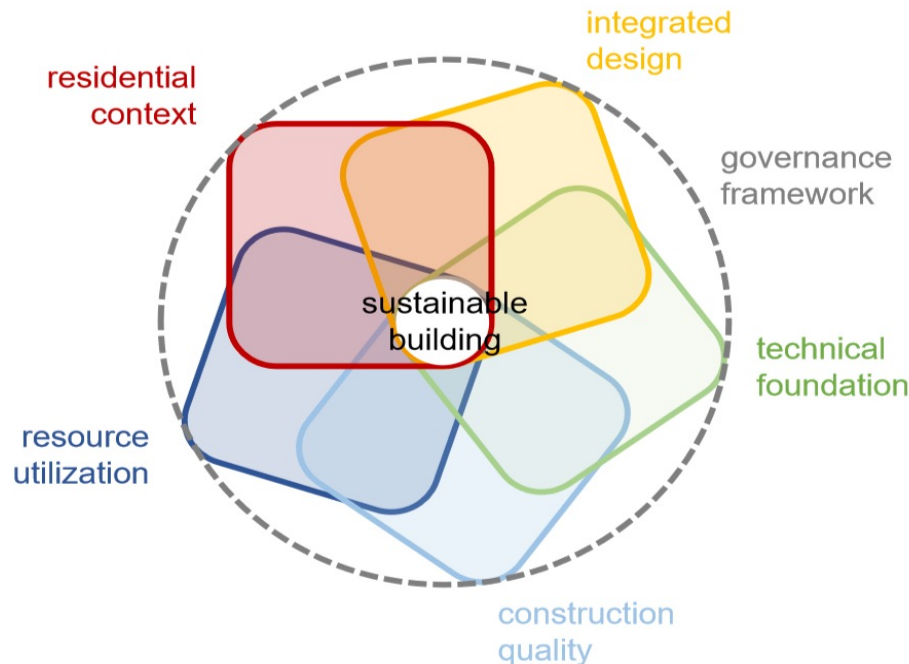
Photochemical
Ozone Creation
Potential (POCP)



Acidification
Potential (AP)

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