Circularity processes in construction as a contribution to carbon neutrality

Os processos de circularidade na construção como contributo para a neutralidade carbónica

Clara Pimenta do Vale

Part 1
Contemporary condition | Condição actual

Part 2
Nothing New | Nada Novo

Part 3
Orange Grove House | Casa do Laranjal

Part 1
Contemporary condition | Condição actual

United Nations

Report of the World Commission on Environment and Development

Our Common Future

United Nations
1987

UN Documents: Gathering a Body of Global Agreements has been compiled by the *NGO Committee on Education* of the *Conference of NGOs* from United Nations web sites with the invaluable help of information & communications technology.

United Nations

Report of the World Commission on Environment and Development: Our Common Future

Transmitted to the General Assembly as an Annex to document A/42/427 - Development and International Co-operation: Environment

United Nations

7. In 1980, global energy consumption stood at around 10TW./2 (See Box 7-1.) if per capita use remained at the same levels as today, by 2025 a global population of 6.2 billion/3 would need about 14TW (over 4TW in developing and over 9TW in industrial countries) - an increase of 40 per cent over 1980. But if energy consumption per head became uniform worldwide at current industrial country levels, by 2025 that same global population would require about 55TW.

Table 7-1

Global Primary Energy Consumption Per Capita, 1984

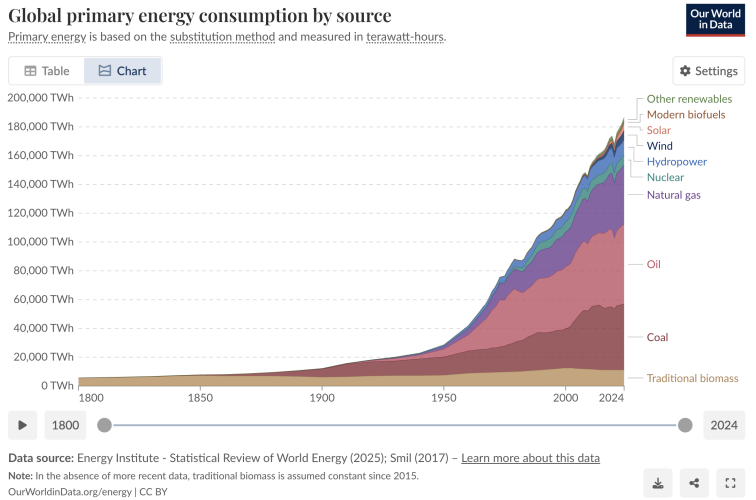
	GNP Per Capita (1984 dollars)	Energy Consumption (kW per capita*)	Mid-1984 Population (million)	Total Consumption (TW)
World Bank GNP Economy Category				
Low Income	260	0.41	2,390	0.99
Sub-Saharan Africa	210	0.08	258	0.02
Lower-middle	740	0.57	691	0.39
Upper-middle	1,950	1.76	497	0.87
Sub-Saharan Africa	660	0.25	148	0.04
High-Income Oil Exporters	11,250	5.17	19	0.10
Industrial Market Economies	11,430	7.01	733	5.14
East European Non-Market Economies		6.27	389	2.44
World		2.11**	4.718	9.94

*kW per capita is kW years/year per capita.

** Population-weighted average energy consumption (kW/capita) for first three main categories is 0.654 and for industrial market and East European categories is 6.76.

Source: Based on World Bank, World Development Report 1985 (New York: Oxford University Press, 1986).

World population in 2025:
8,231,613,070 people (estimated)

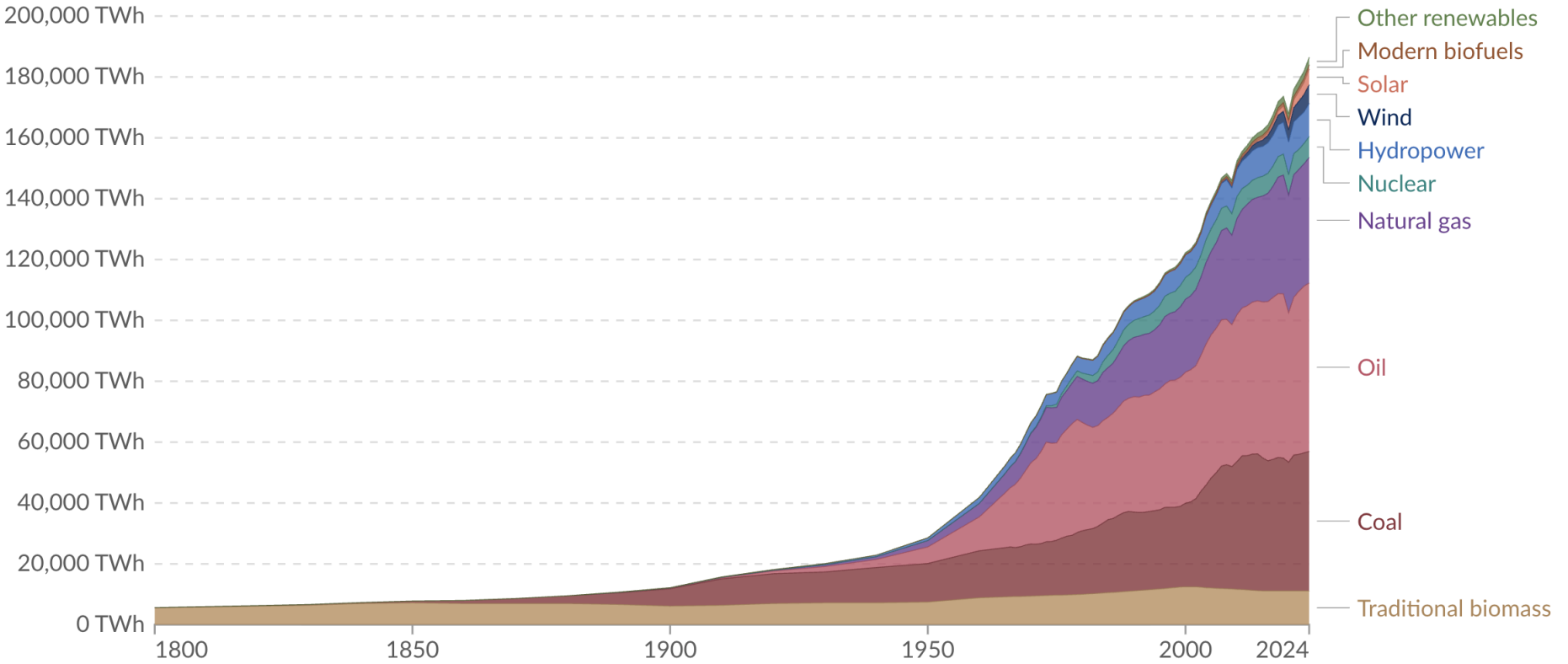


Global primary energy consumption by source

Primary energy is based on the substitution method and measured in terawatt-hours.

Our World in Data

Table | Chart | Settings



1800 — 2024

Data source: Energy Institute - Statistical Review of World Energy (2025); Smil (2017) – Learn more about this data

Note: In the absence of more recent data, traditional biomass is assumed constant since 2015.

OurWorldinData.org/energy | CC BY

Global primary energy consumption by source

Primary energy is based on the substitution method and measured in terawatt-hours.

Our World in Data

Table | Chart | Settings

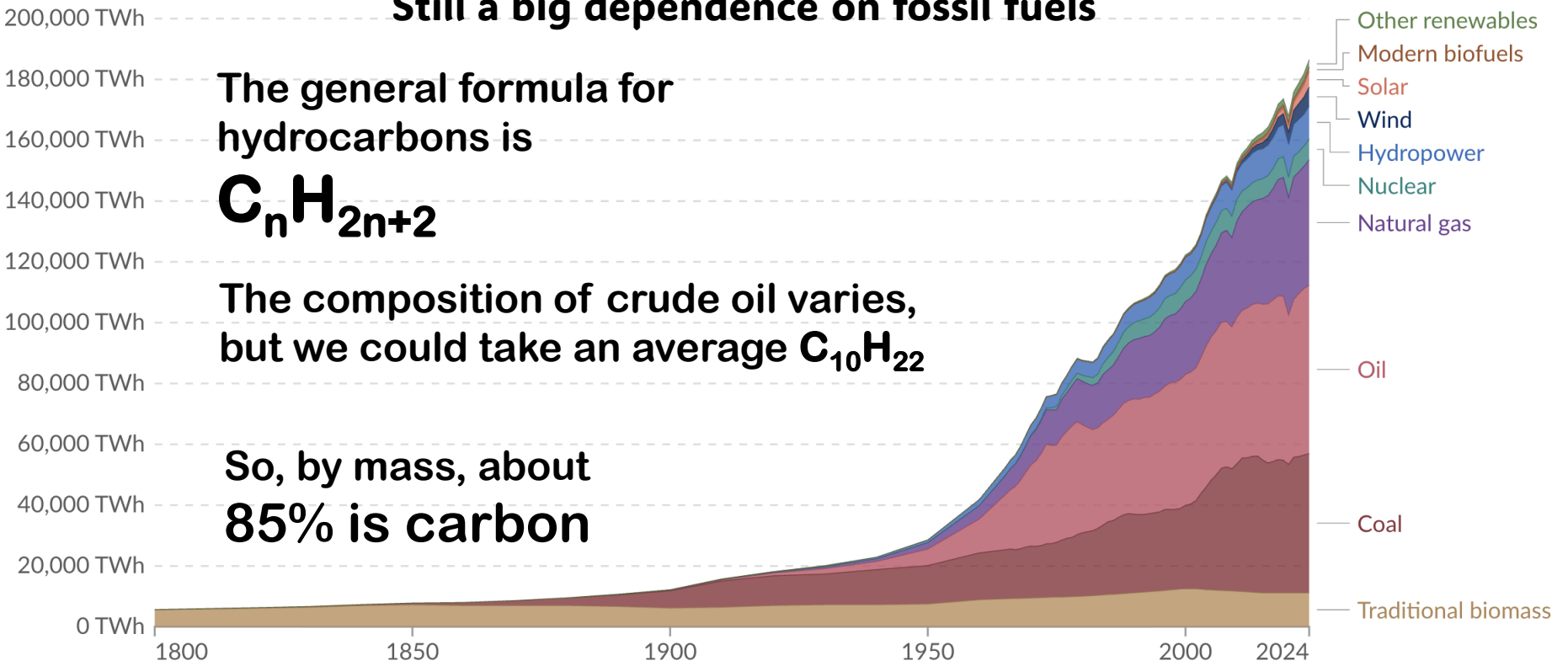
Still a big dependence on fossil fuels

The general formula for hydrocarbons is

$$C_nH_{2n+2}$$

The composition of crude oil varies, but we could take an average $C_{10}H_{22}$

So, by mass, about 85% is carbon



1800 — 2024

Data source: Energy Institute - Statistical Review of World Energy (2025); Smil (2017) – Learn more about this data

Note: In the absence of more recent data, traditional biomass is assumed constant since 2015.

OurWorldinData.org/energy | CC BY

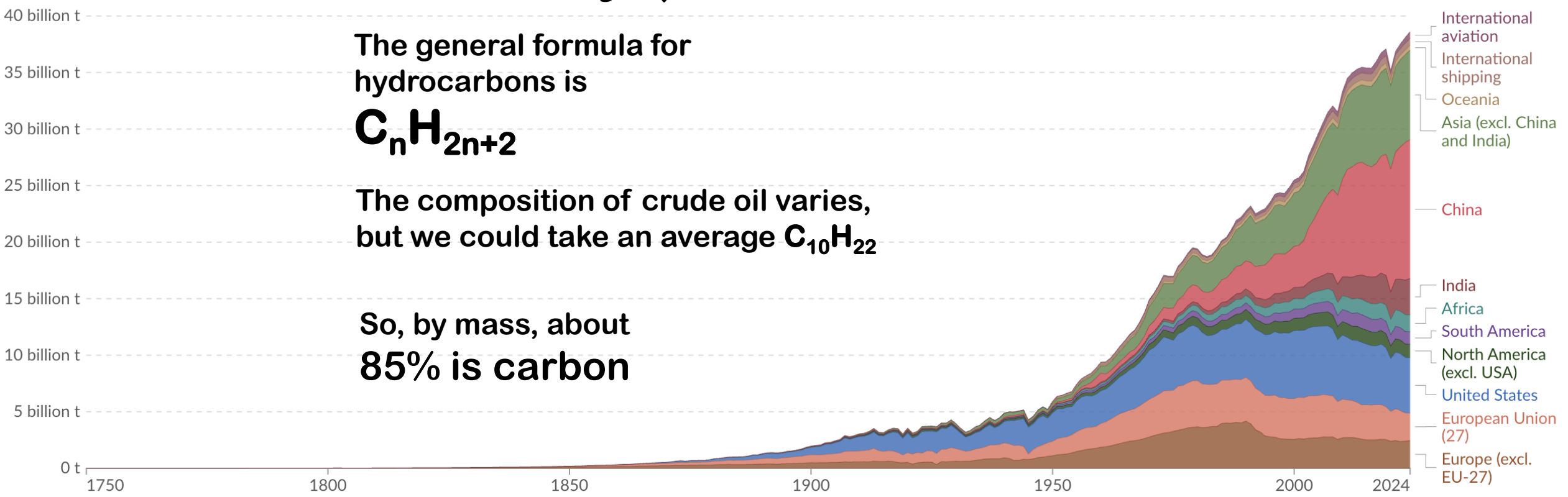
Annual CO_2 emissions by world region

Our World in Data

Emissions from fossil fuels and industry are included, but not land-use change emissions. International aviation and shipping are included as separate entities, as they are not included in any country's emissions.

Table | Chart

Settings



Play time-lapse 1750 2024

Data source: Global Carbon Budget (2025) – Learn more about this data

OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

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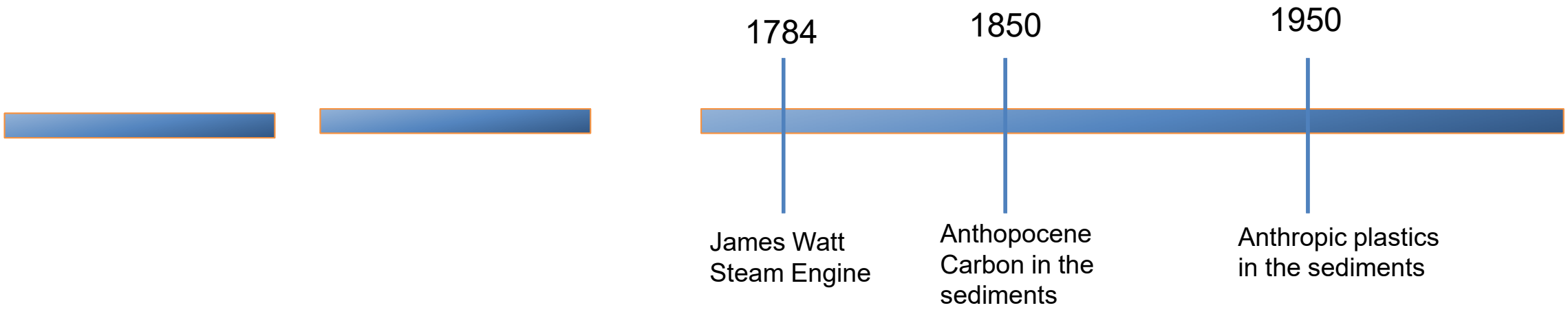
Anthropocene era



Extremos climatológicos Portugal

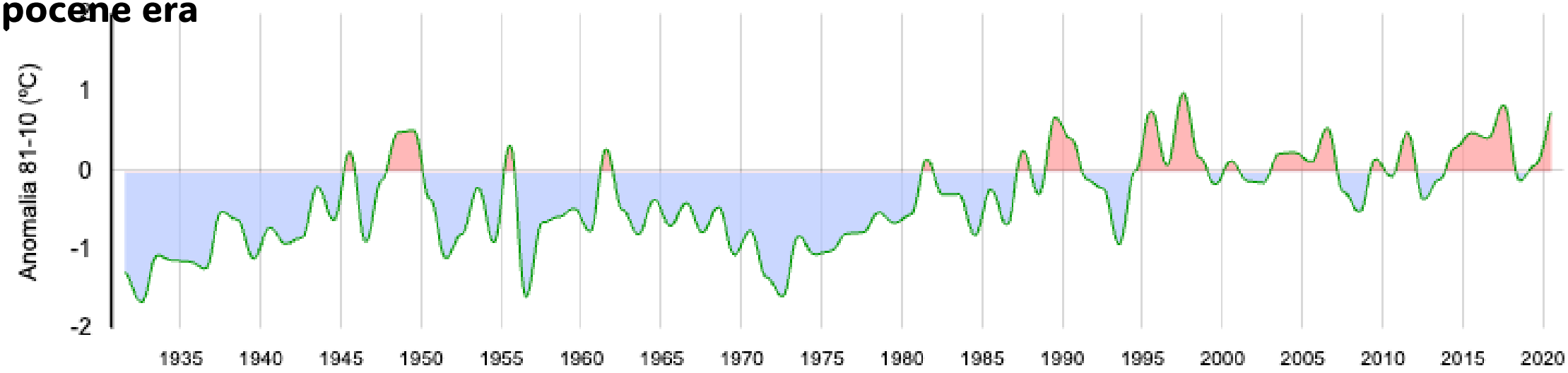
Portugal Continental

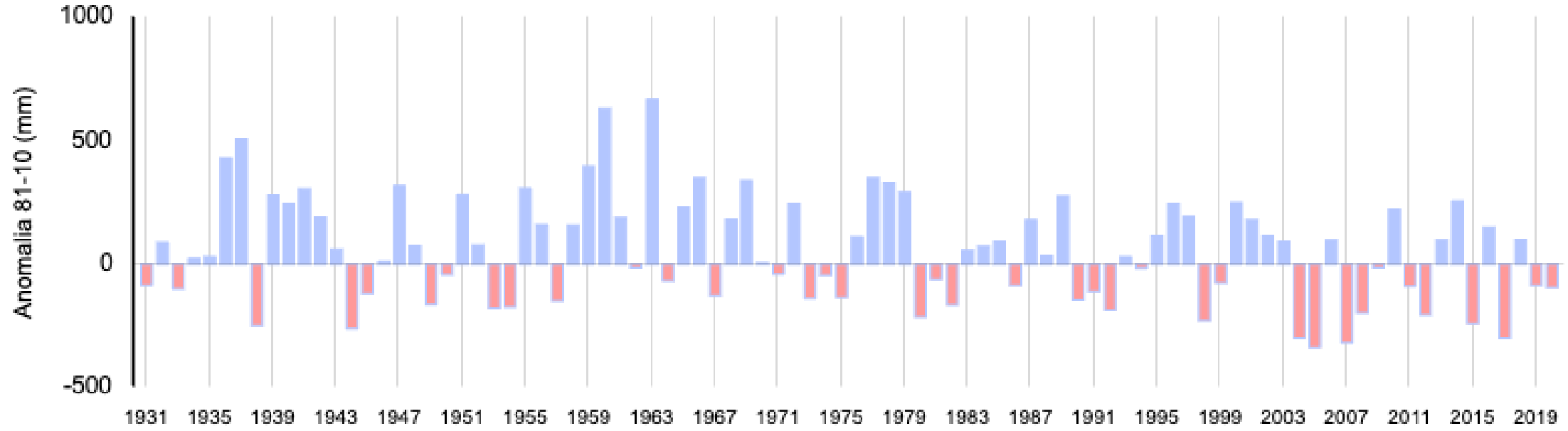
Variável	Valor	Local	Data
Maior valor da temperatura mínima do ar	+32,0 °C	Faro	26-07-2004
Menor valor da temperatura mínima do ar	-16,0 °C	Penhas da Saúde	05-02-1954 12-02-1956
Maior valor da temperatura máxima do ar	47,3 °C	Amareleja	01-08-2003
Menor valor da temperatura máxima do ar	-10,2 °C	Penhas da Saúde	04-02-1954
Maior valor da temperatura média do ar	38,2 °C	Faro	26-07-2004
Menor valor da temperatura média do ar	-11,8 °C	Penhas da Saúde	04-02-1954

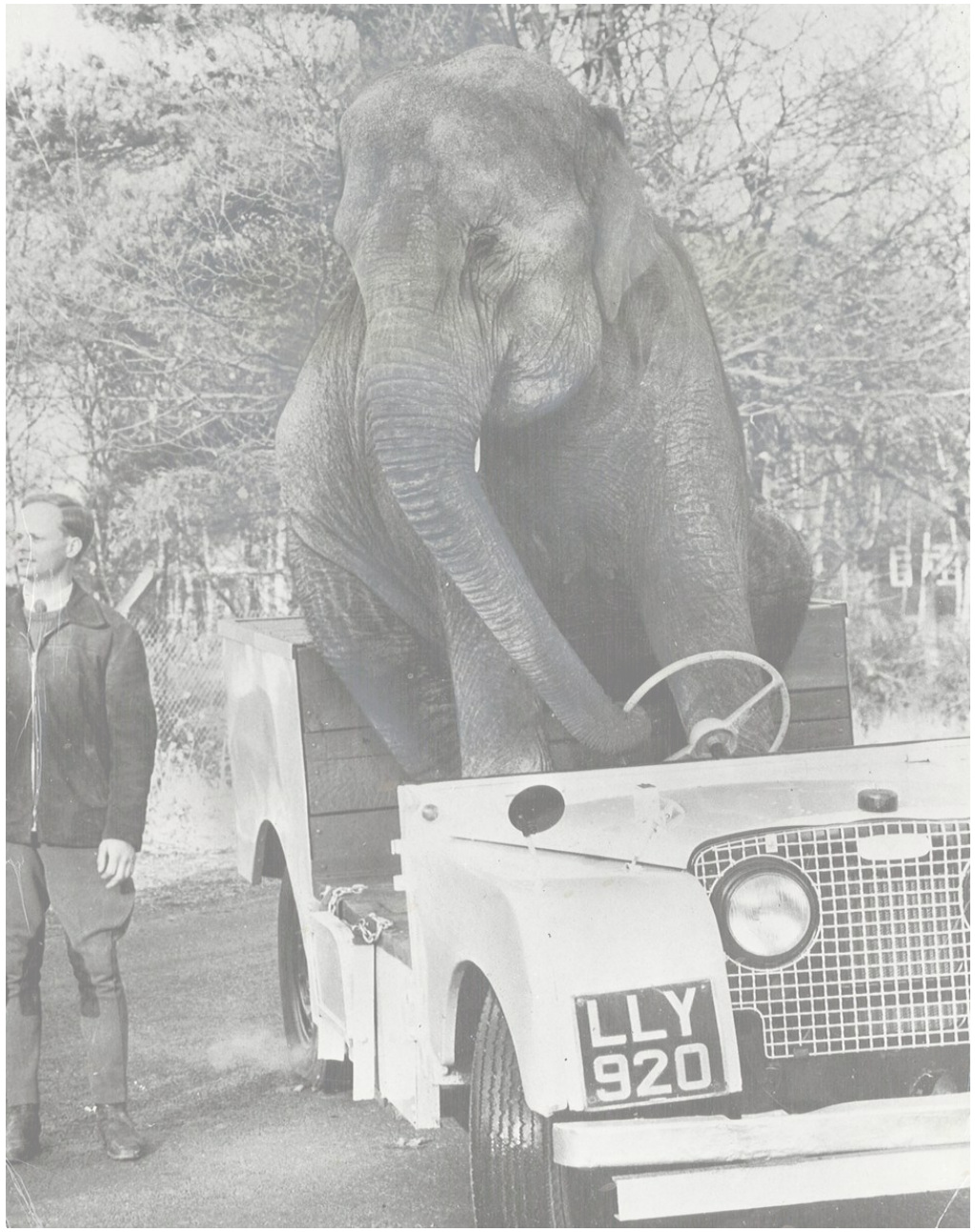
Lower temperature values
1954 1956

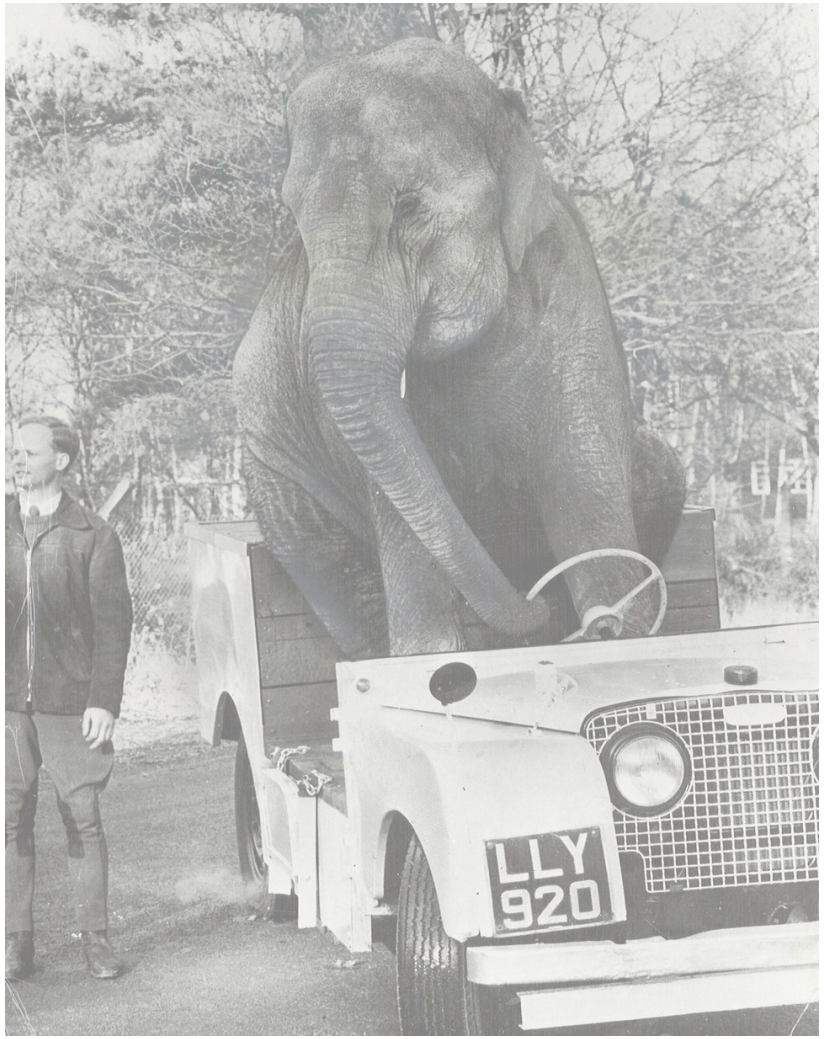
Higher temperature values
2003 2004

Anthropocene era






LLY
920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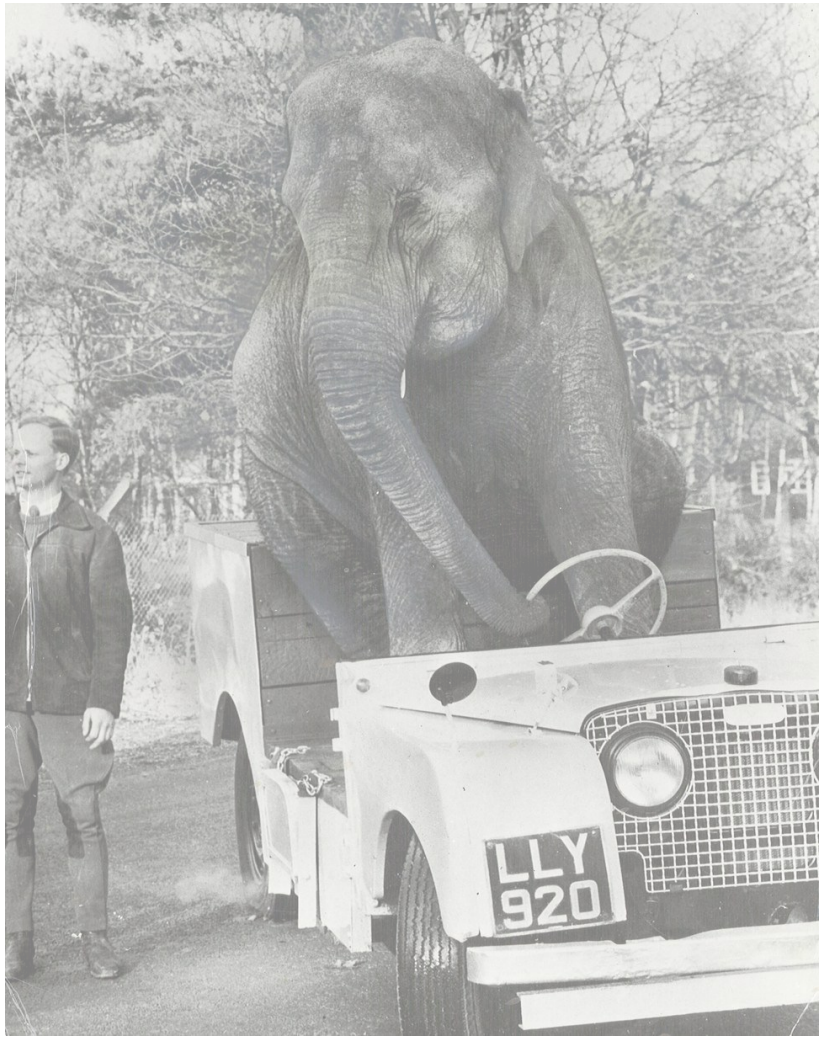
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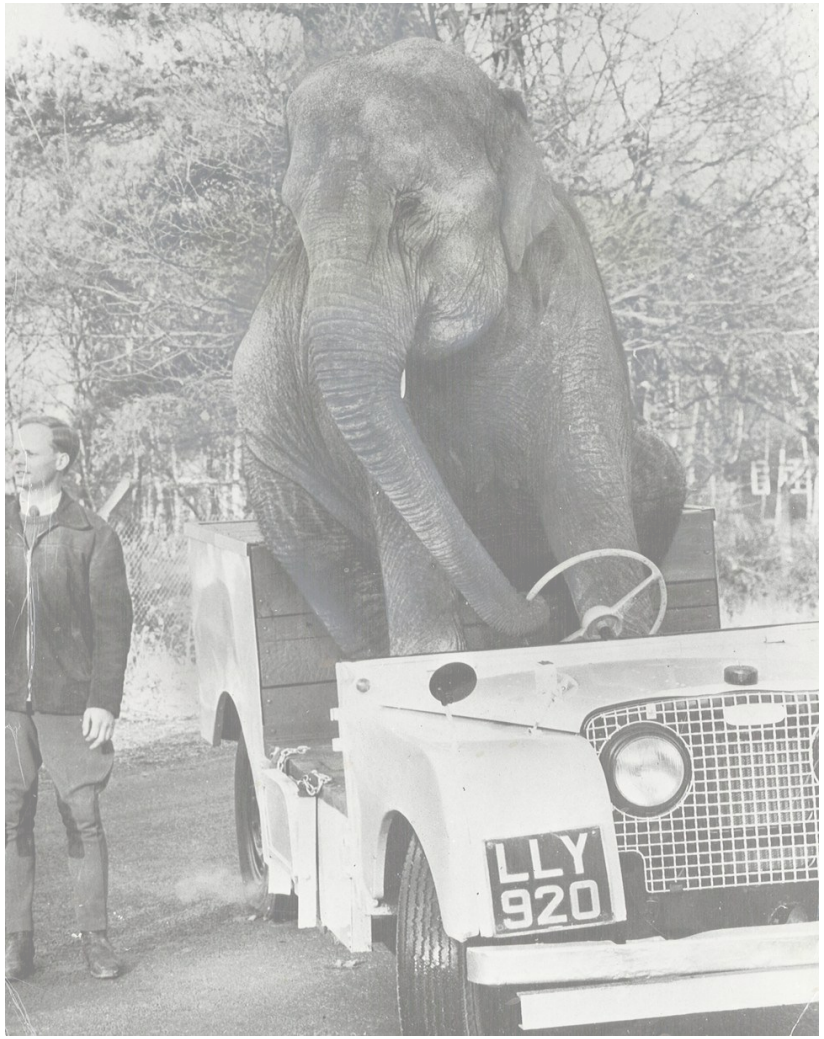
LLY
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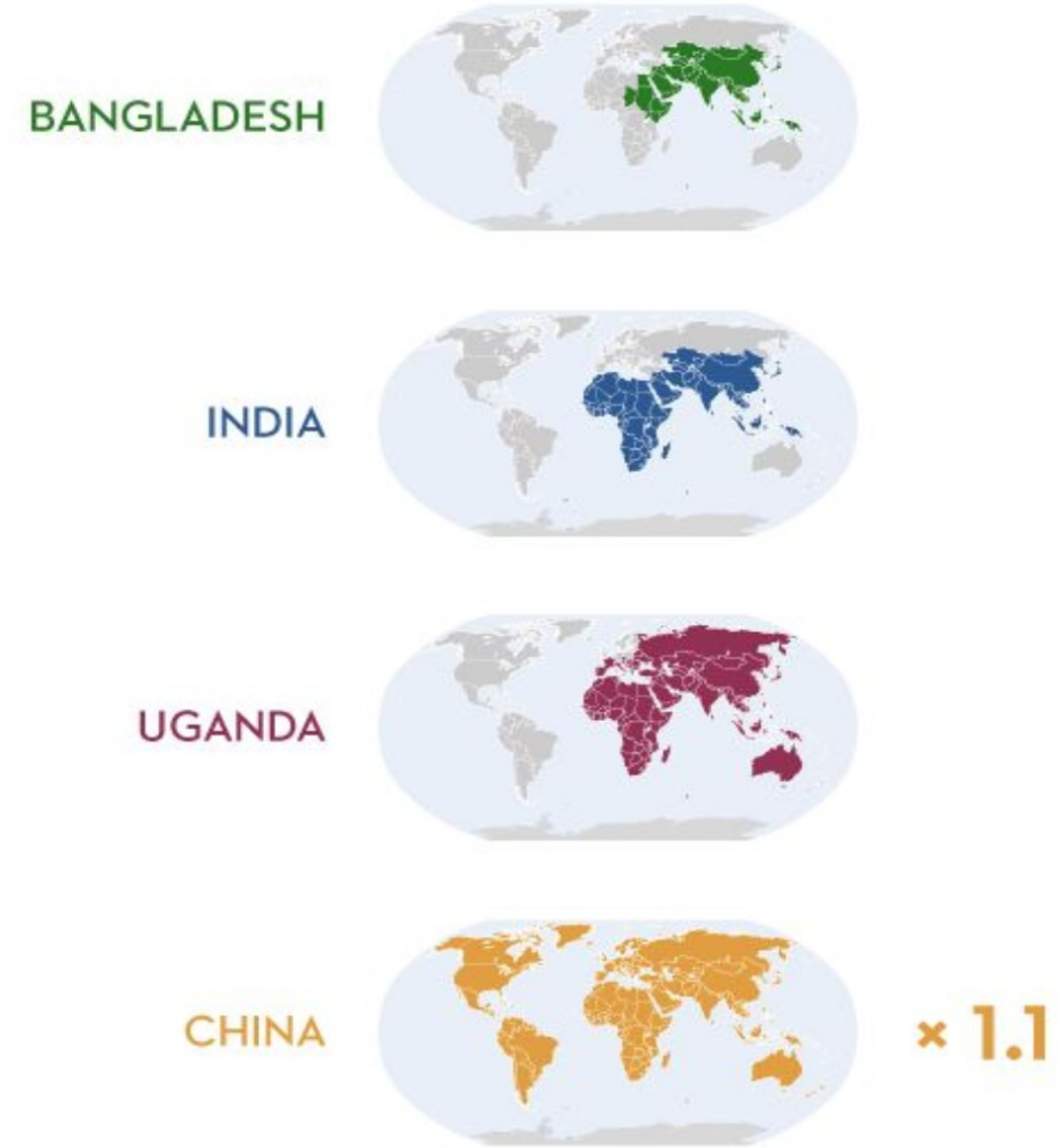
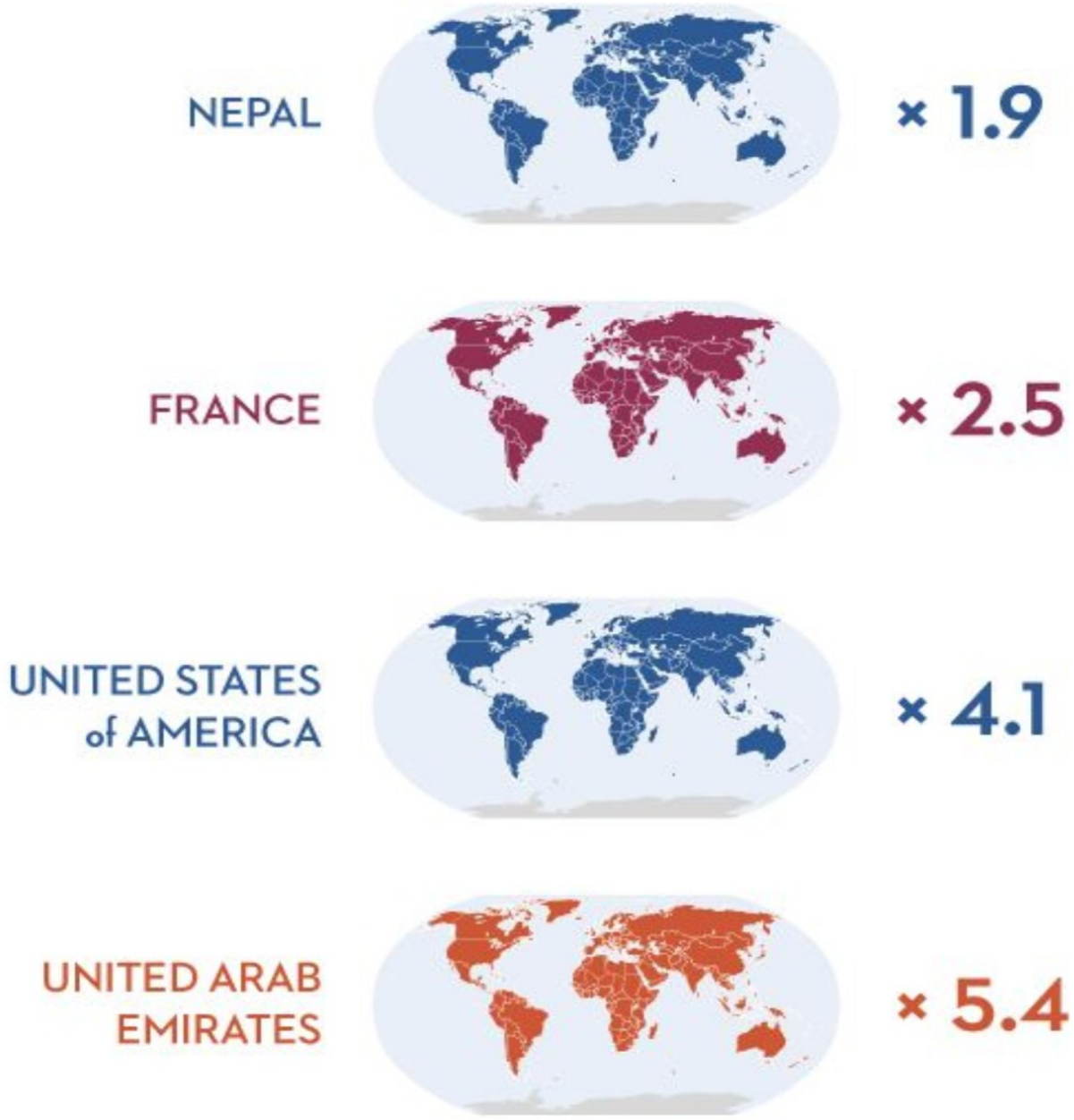
Global Footprint Network
Advancing the Science of Sustainability

2015



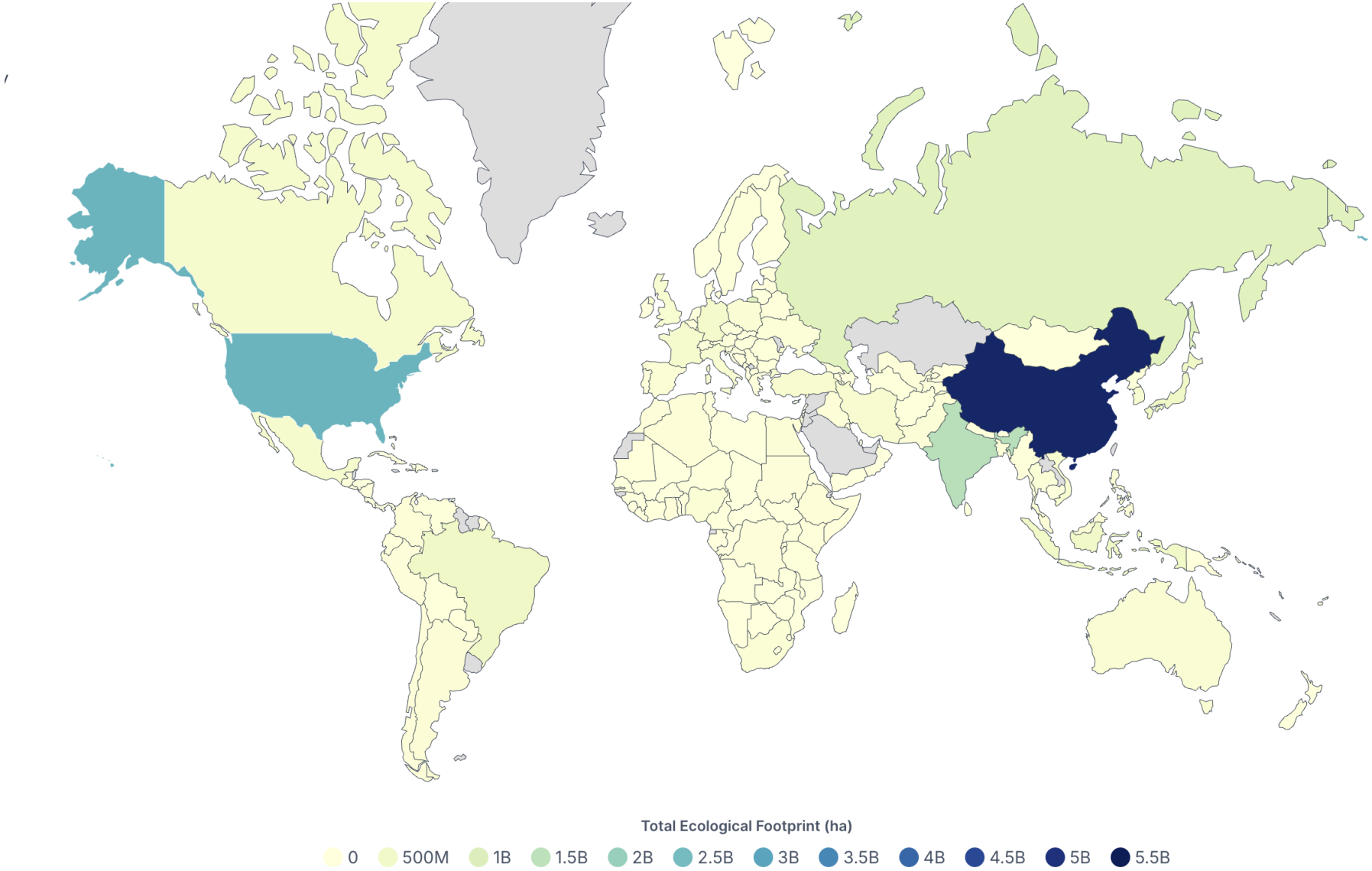
https://www.bbc.com/news/magazine-33133712

2015



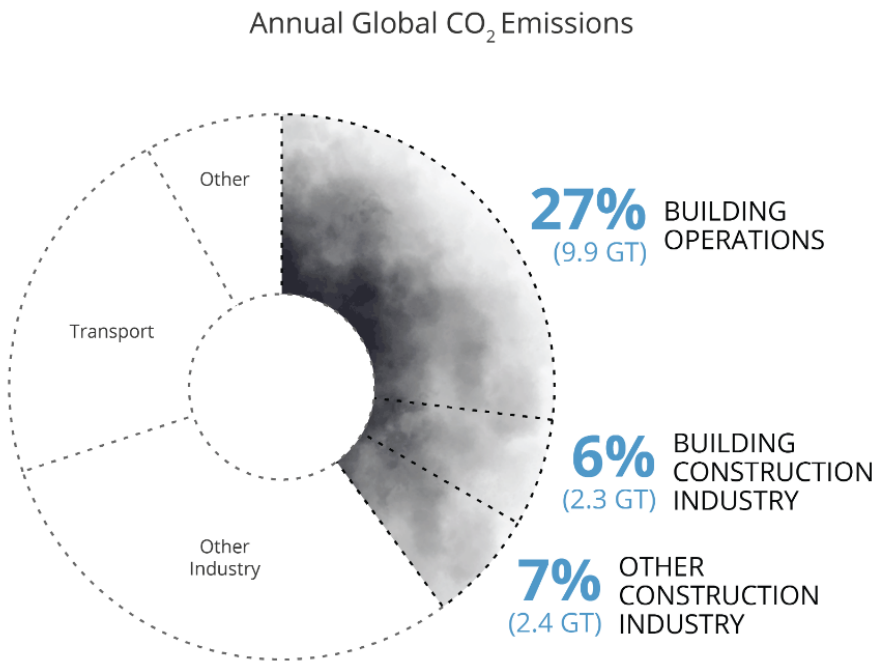
https://www.bbc.com/news/magazine-33133712

Ecological Footprint by Country 2025



https://worldpopulationreview.com/country-rankings/ecological-footprint-by-country

THE BUILT ENVIRONMENT



 Data Source: IEA (2022), Buildings, IEA, Paris

Building Construction Industry and Other Construction Industry represent emissions from concrete, steel, and aluminum for buildings and infrastructure respectively.

The built environment generates 40% of annual global CO2 emissions.

Of those total emissions, building operations are responsible for 27% annually, while building and infrastructure materials and construction (typically referred to as embodied carbon) are responsible for an additional 13% annually.

The Global Environmmental Impact of Buildings

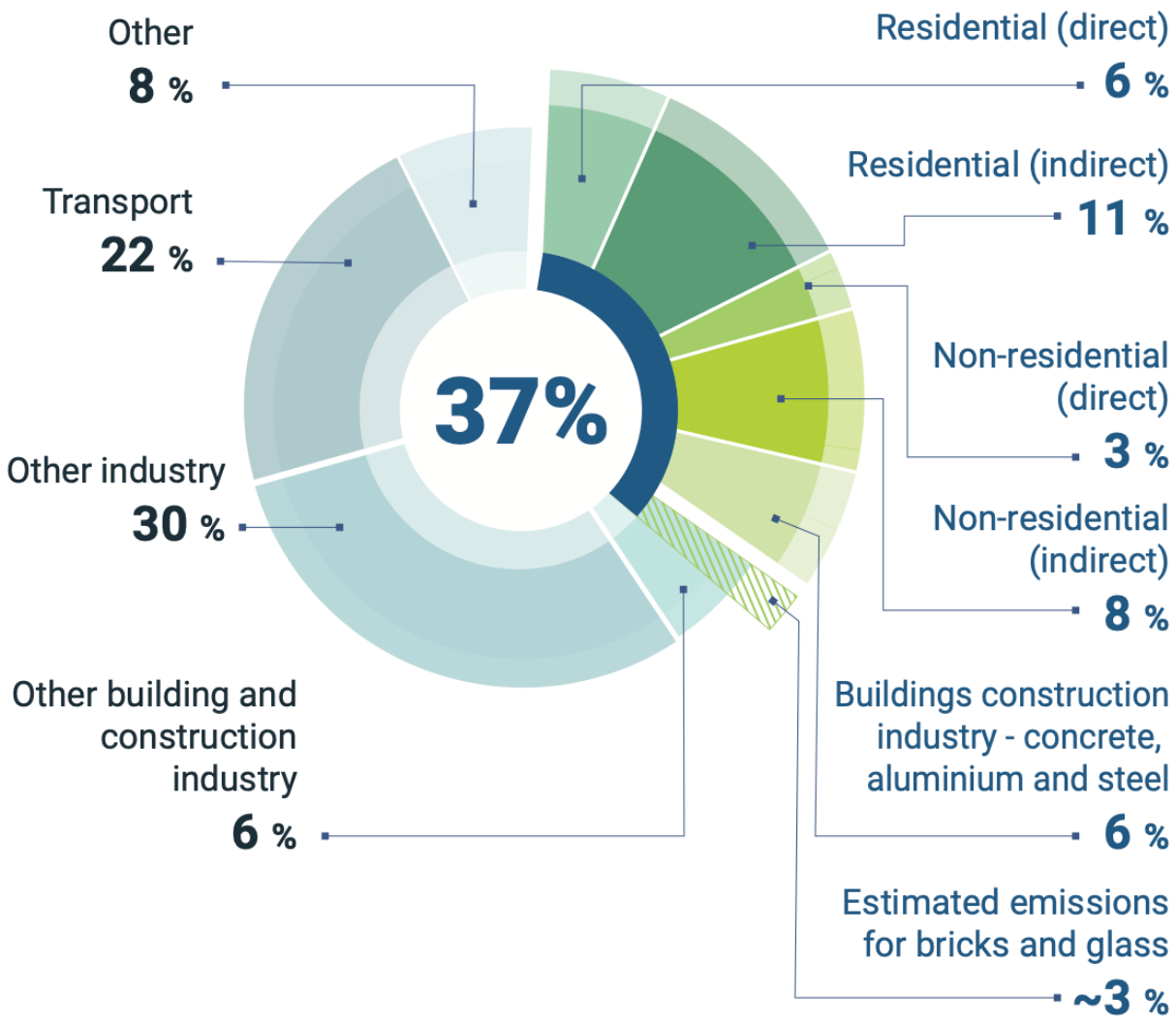
20%
OF ALL WATER CONSUMPTION

25-40%
OF ALL ENERGY USE

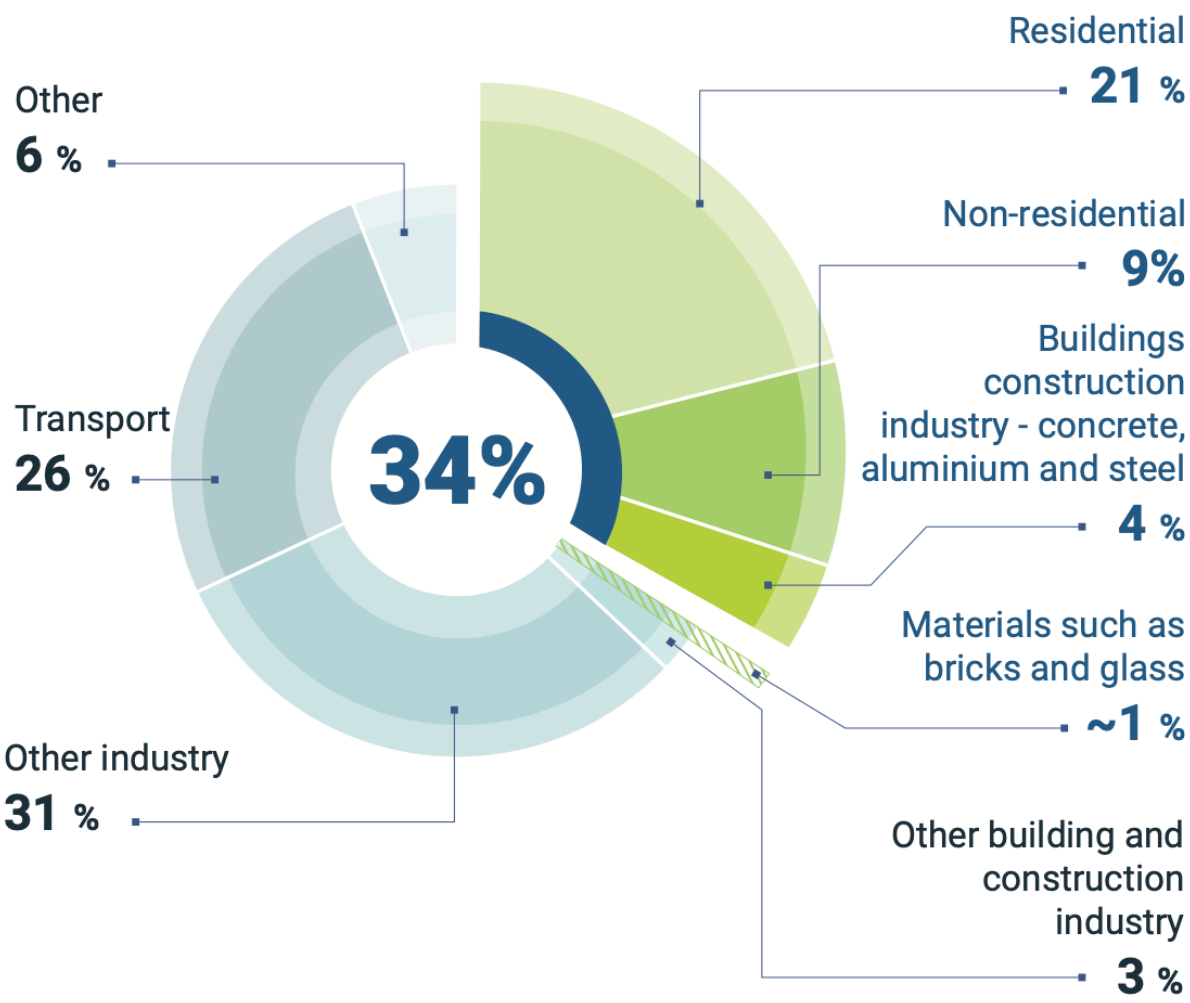
30-40%
OF GREENHOUSE GAS EMISSIONS

30-40%
OF SOLID WASTE GENERATION

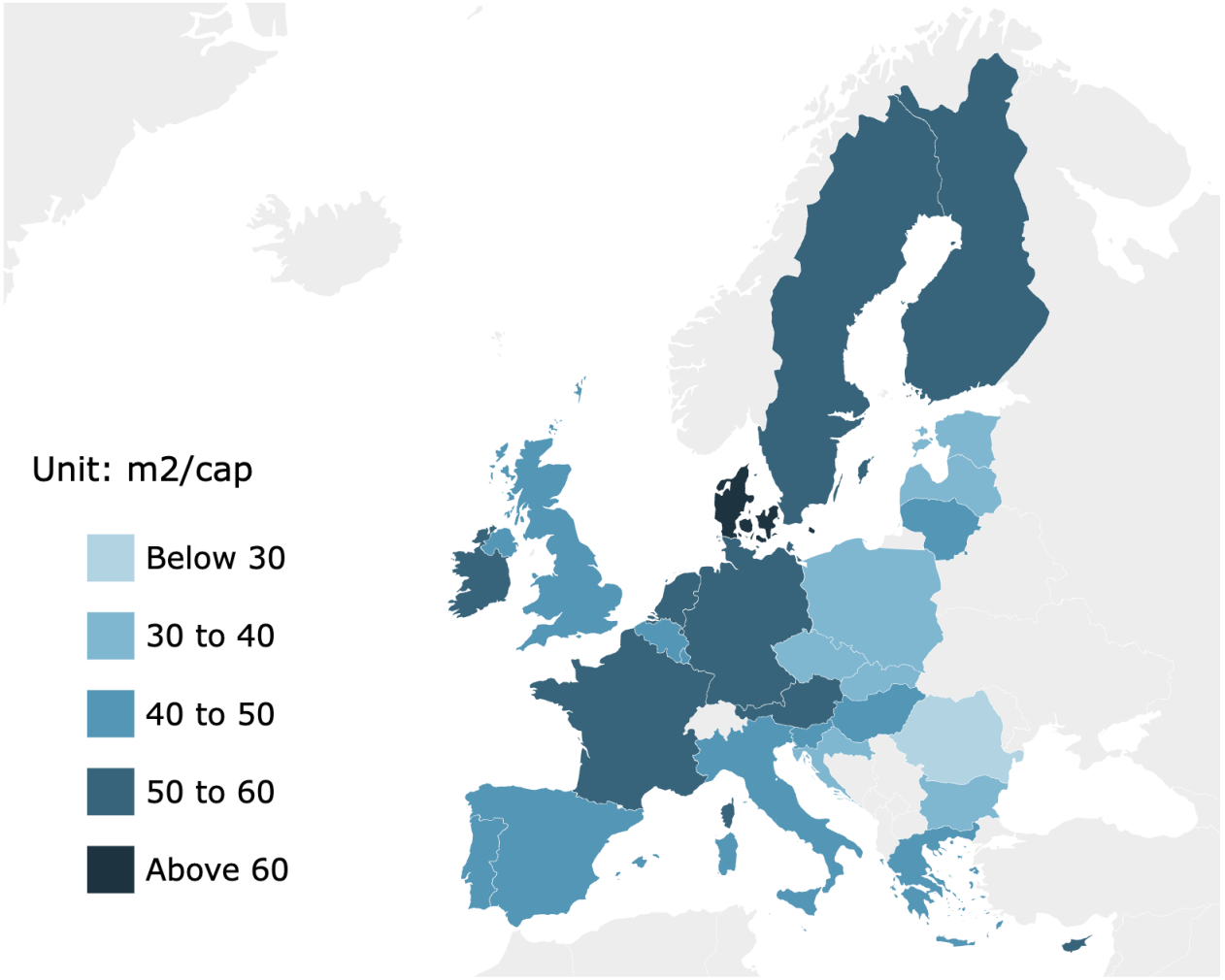
Global share of buildings and construction operational and process CO2 emissions, 2021

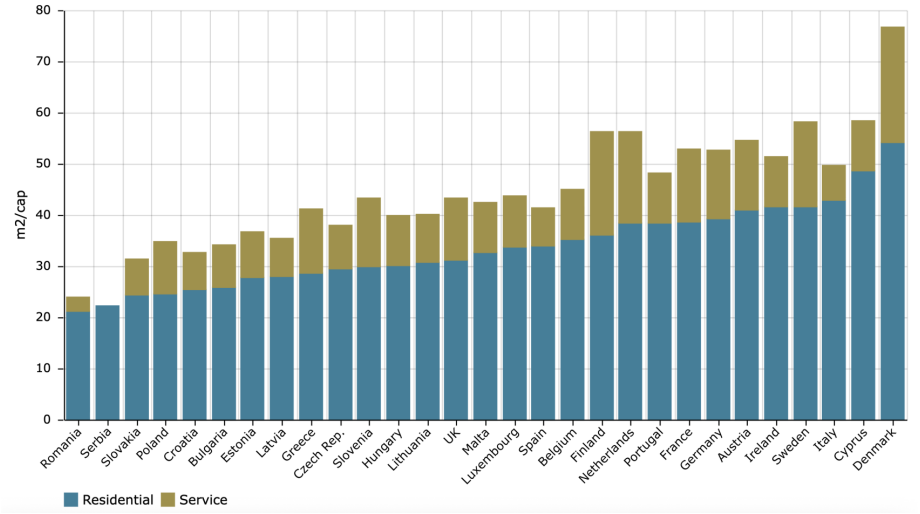


Global share of buildings and construction final energy demand, 2021

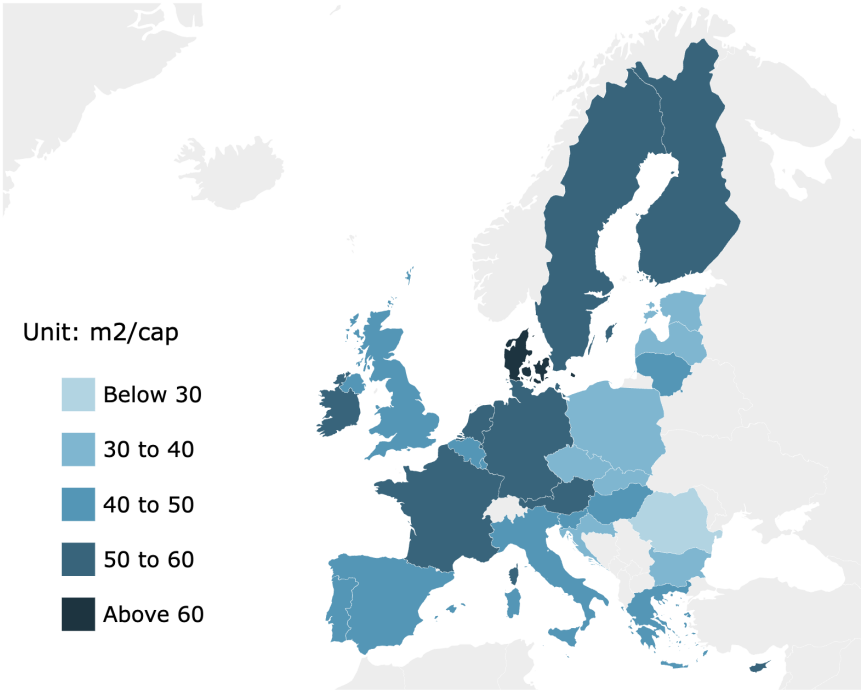


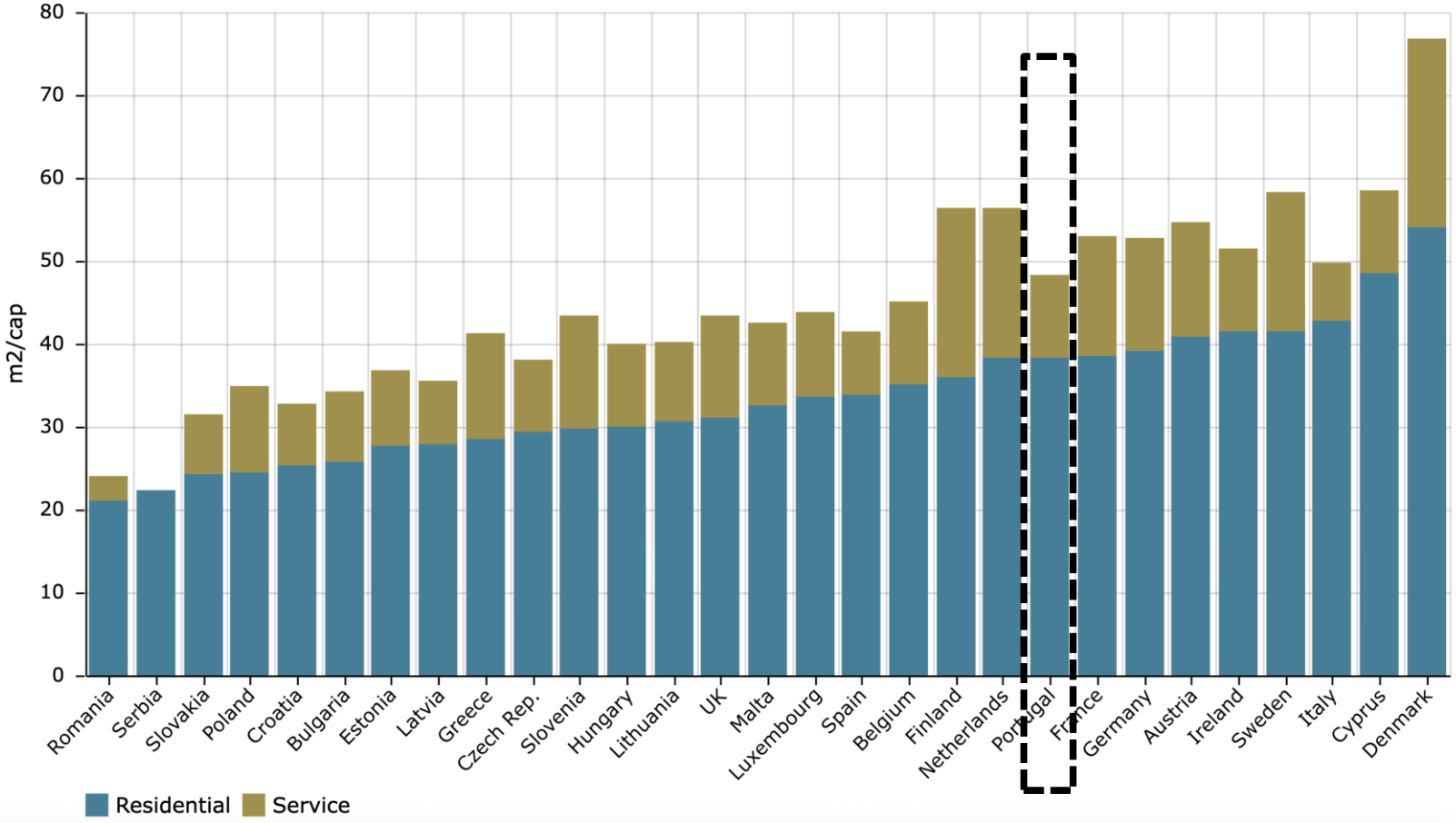
Average floor area per capita



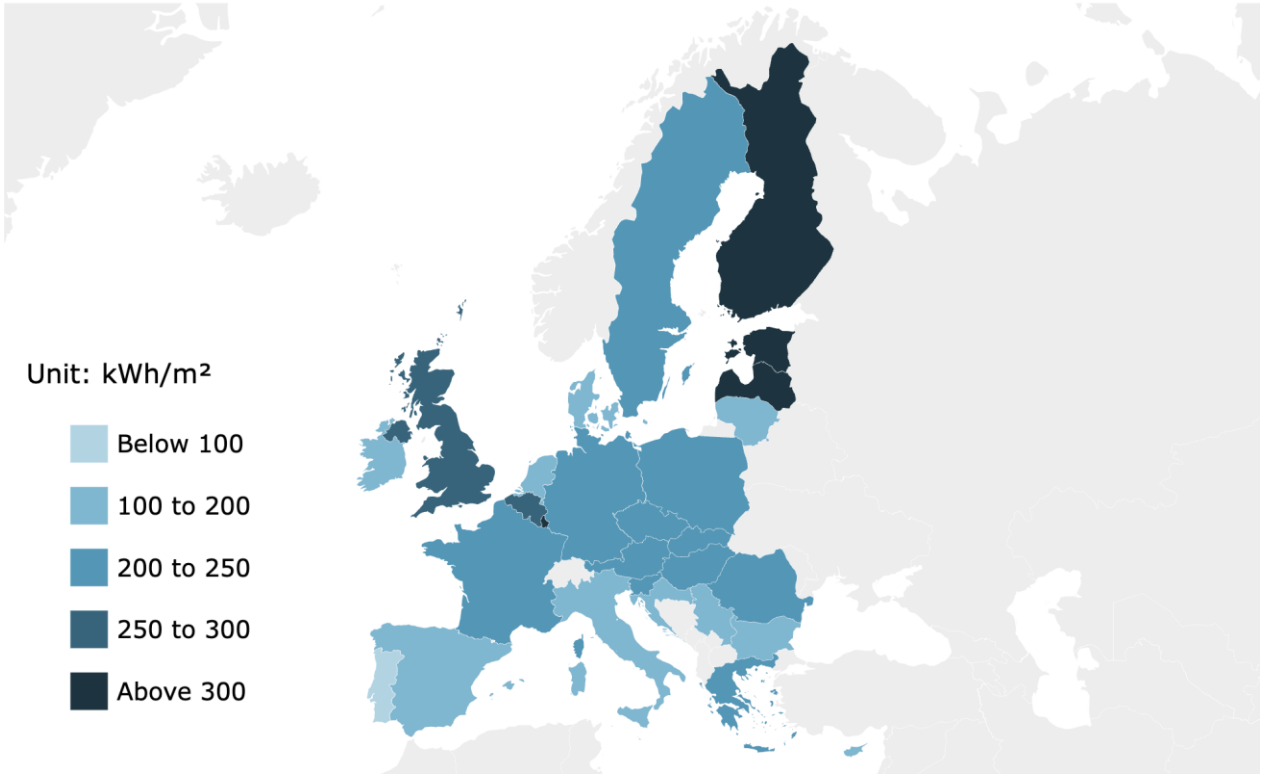


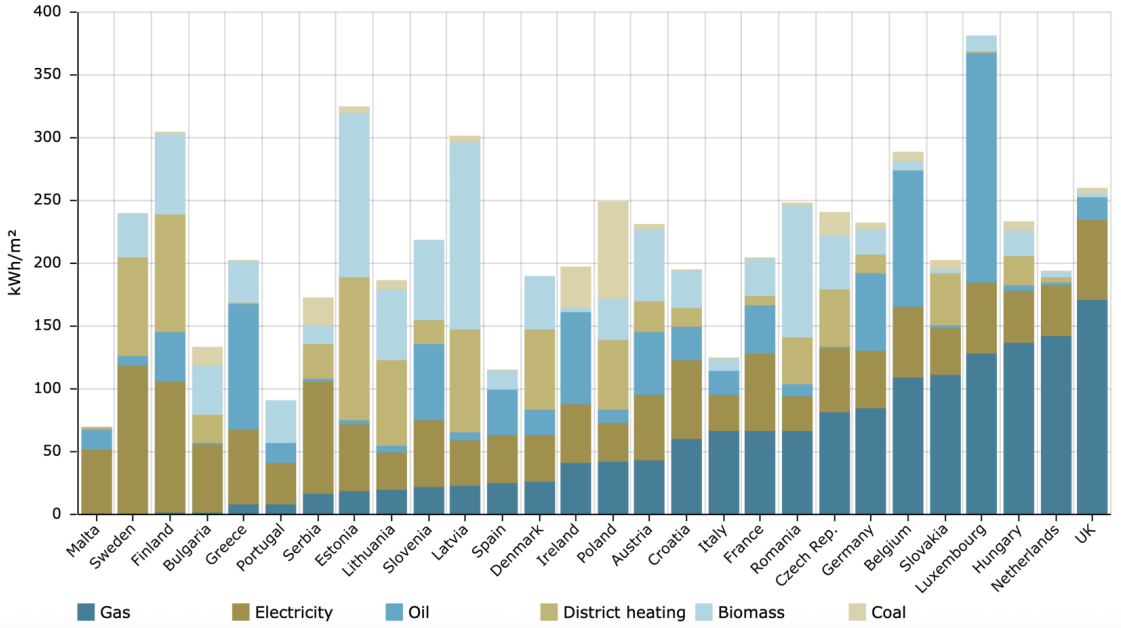
Average floor area per capita





Total unit consumption per m2 in residential (at normal climate)





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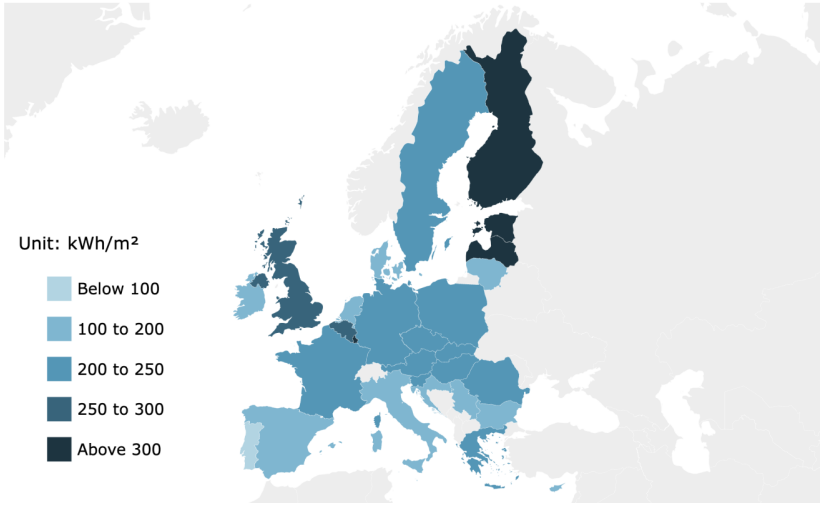
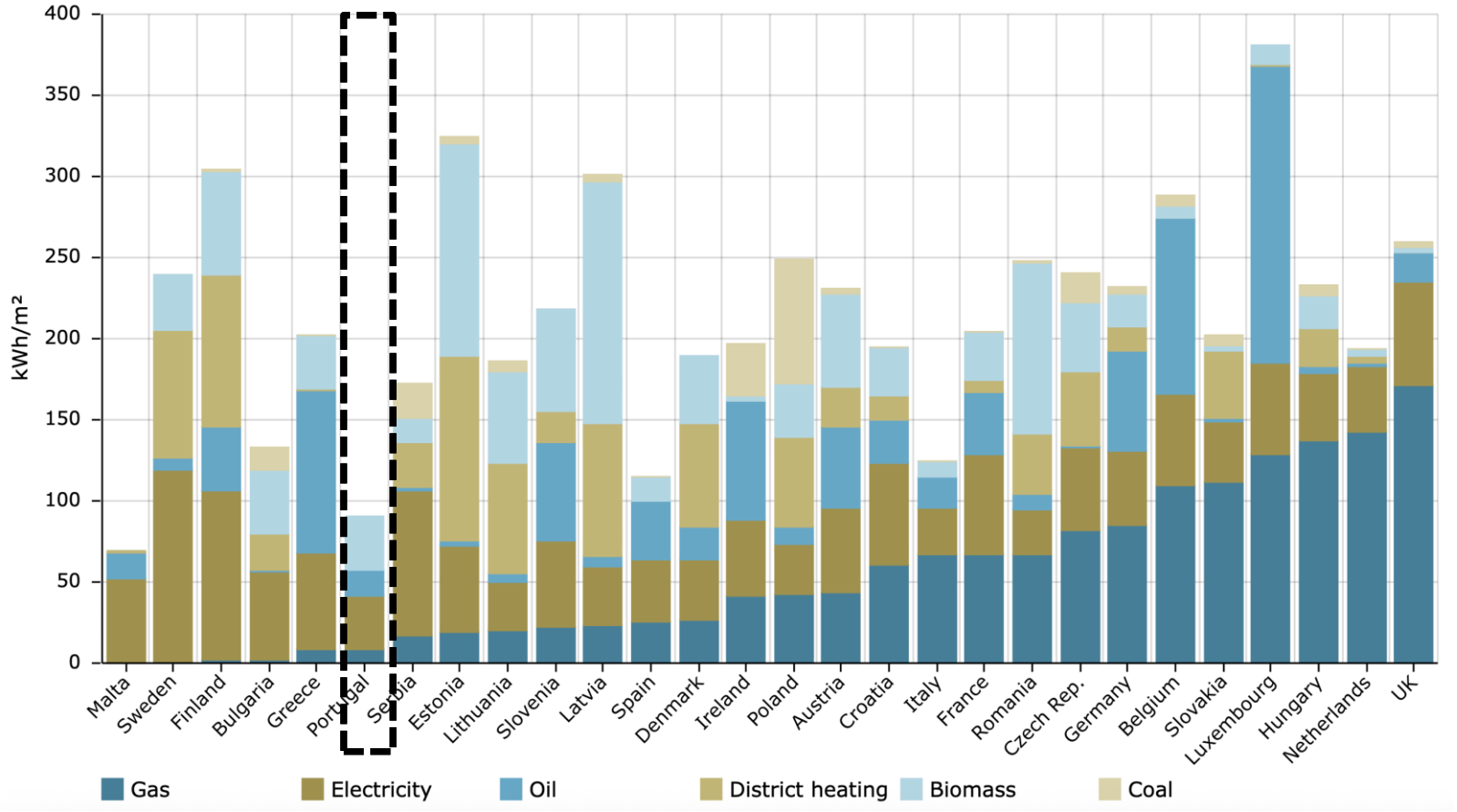
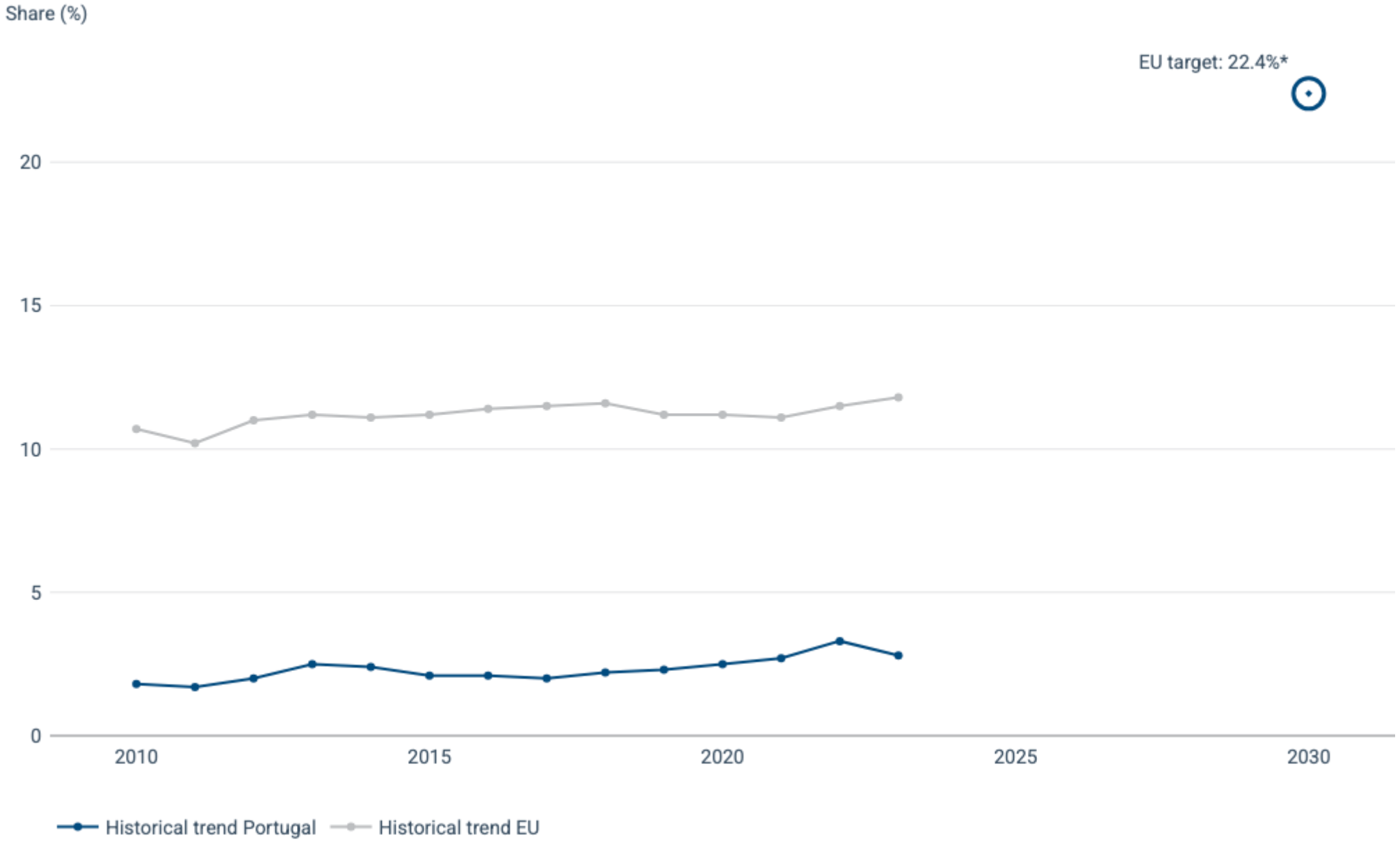




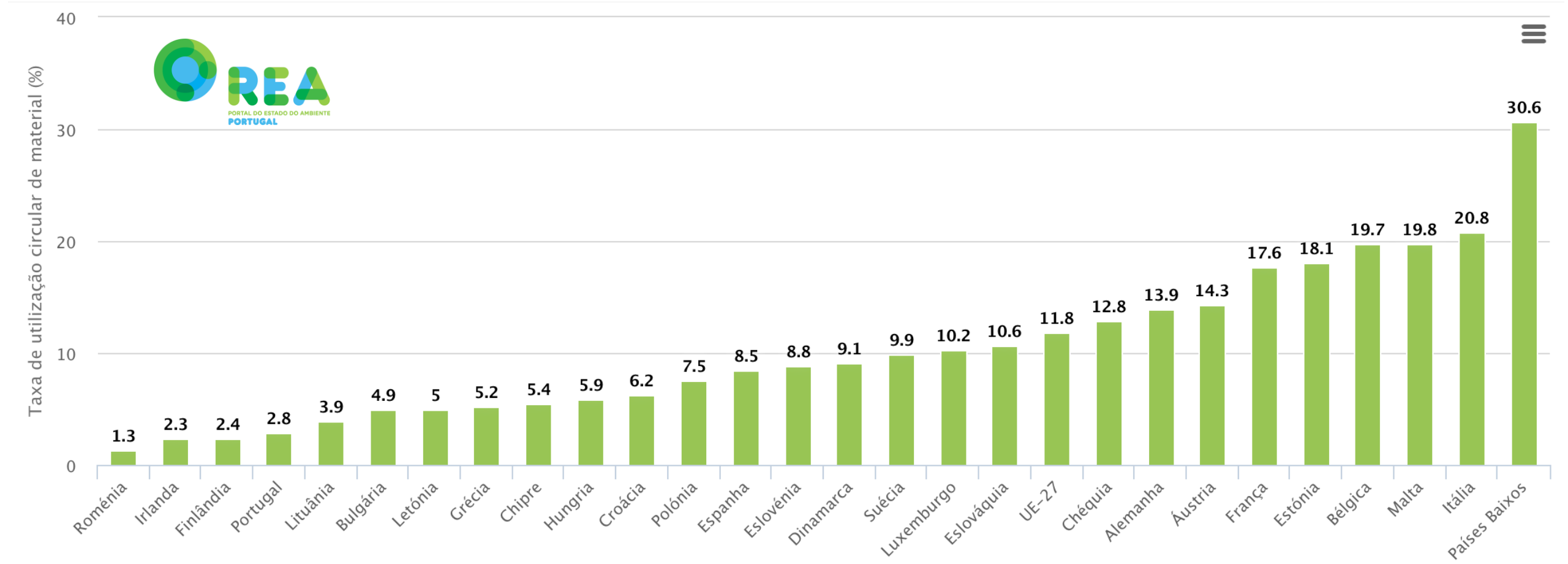
Building impact on CO2 Emission and Resources

https://www.materialepyramiden.dk/

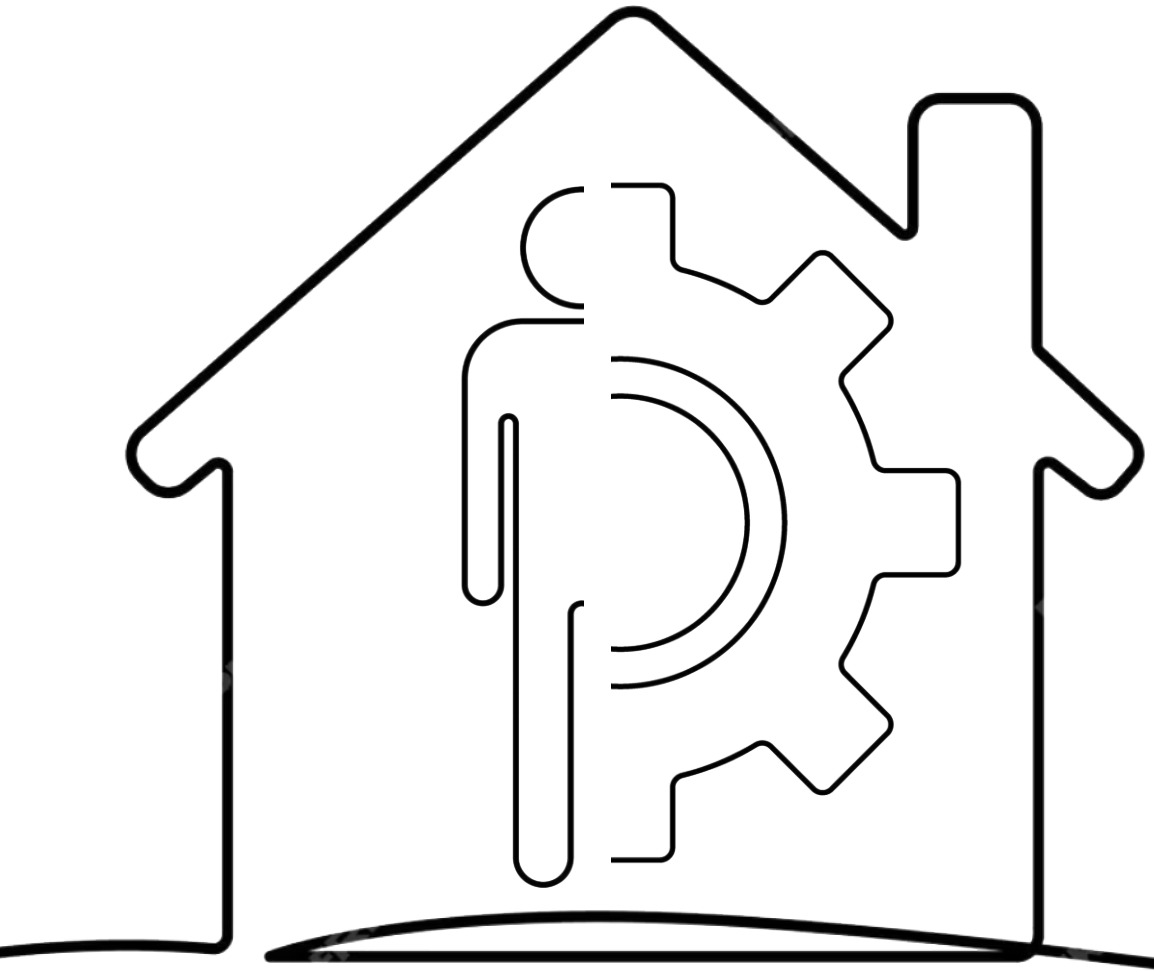
Circular material use rate



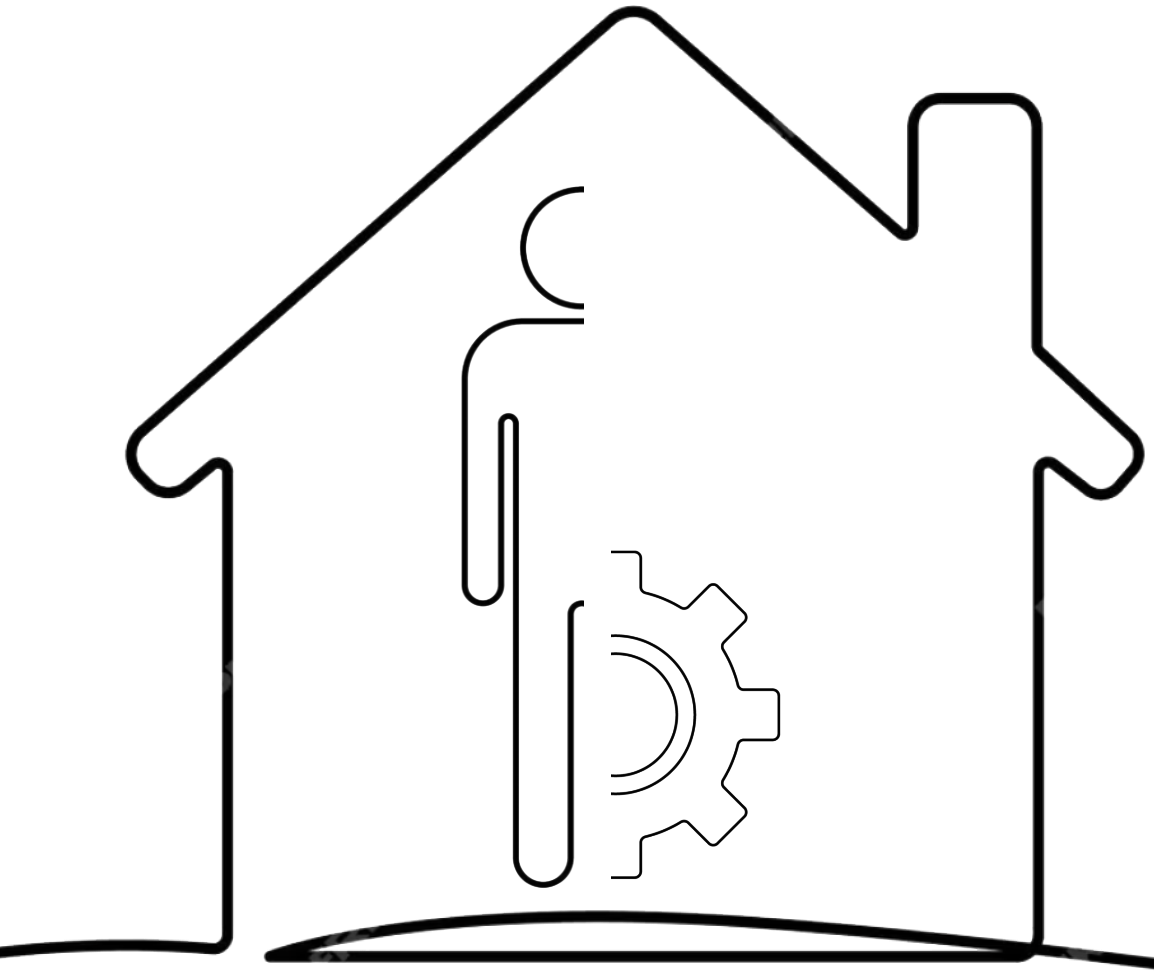
Circular material use rate



https://rea.apambiente.pt



Embodied carbon
vs.
operational carbon



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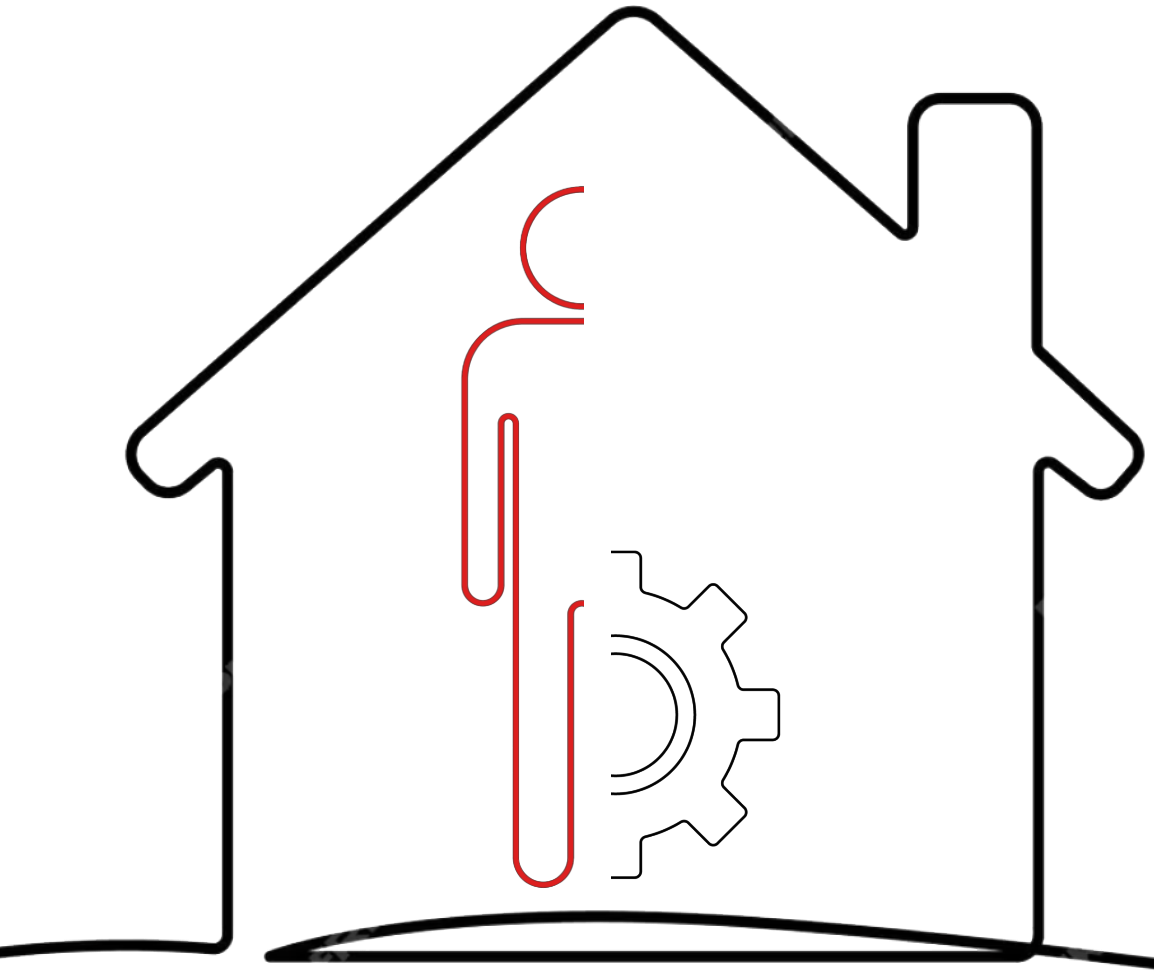

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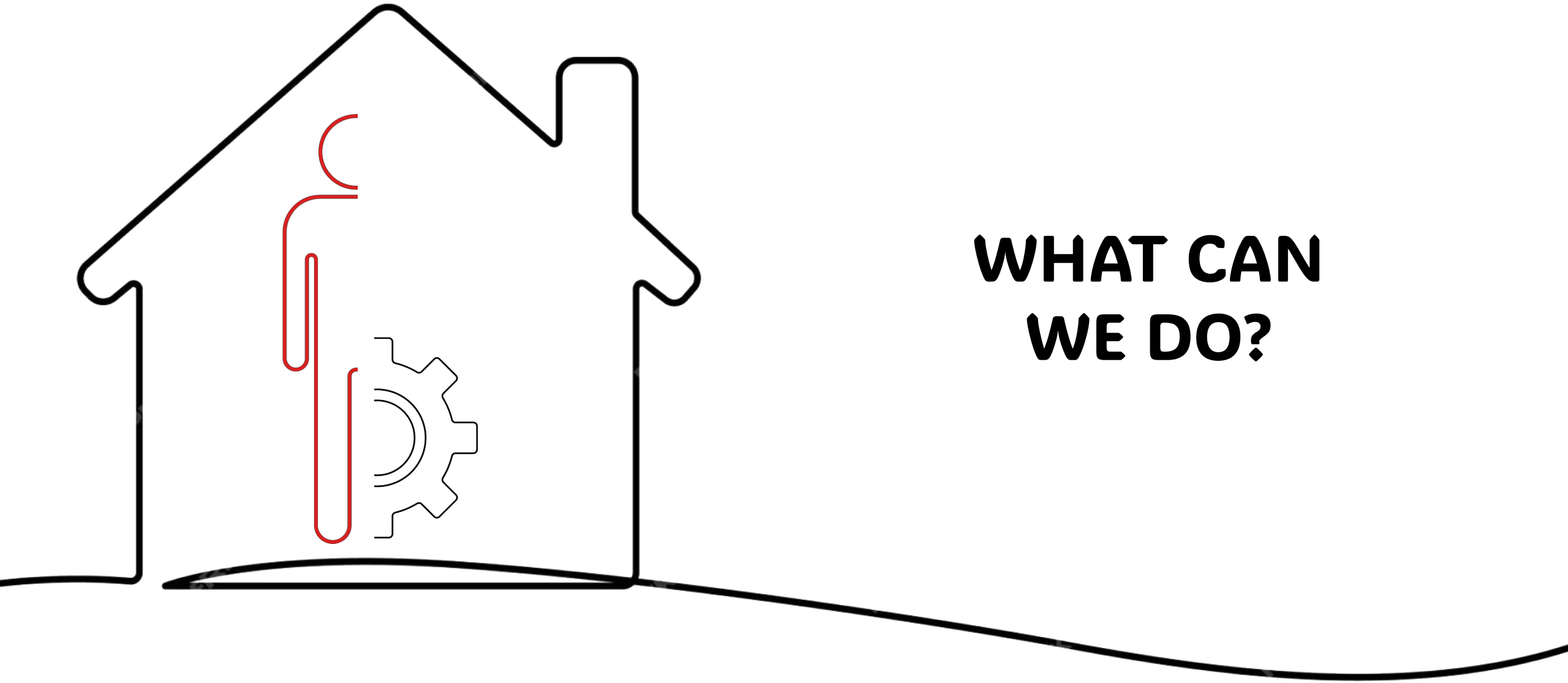
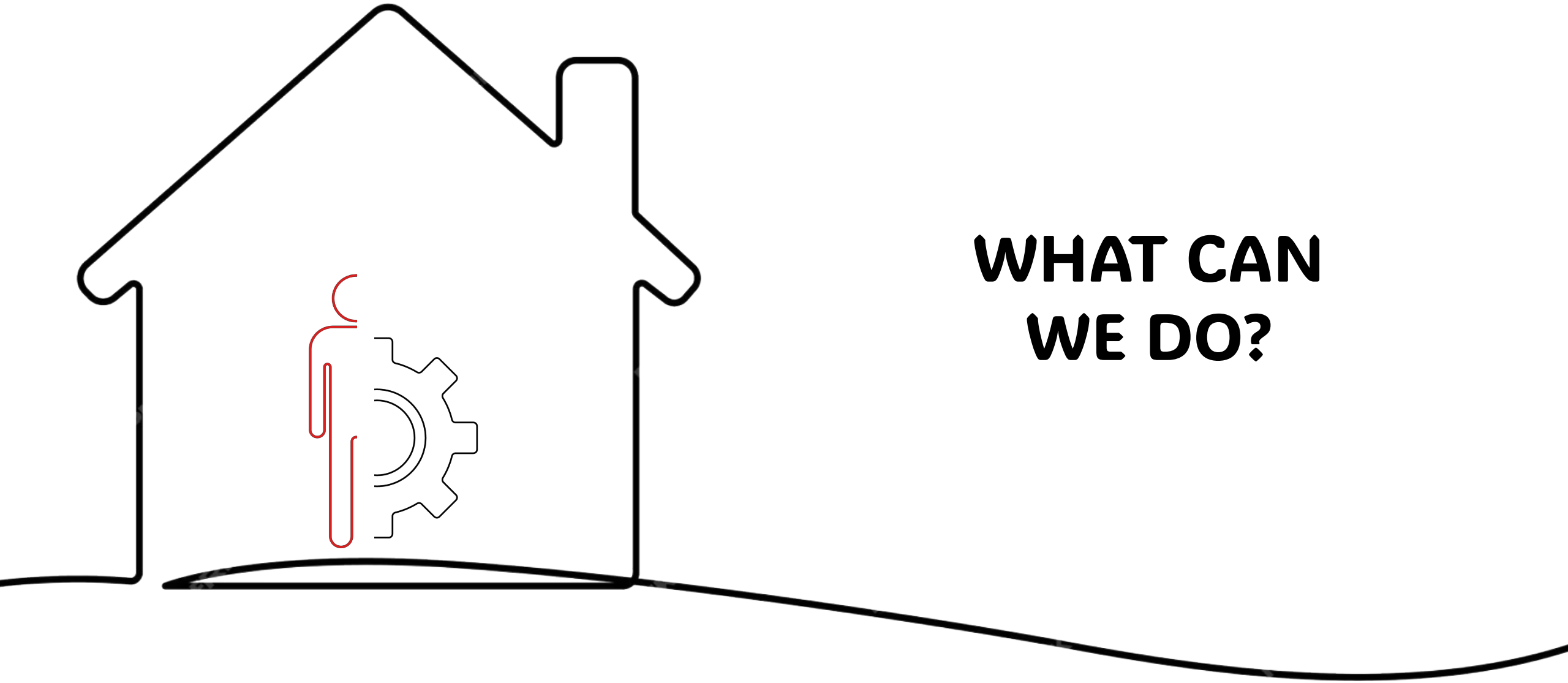


WHAT CAN WE DO?



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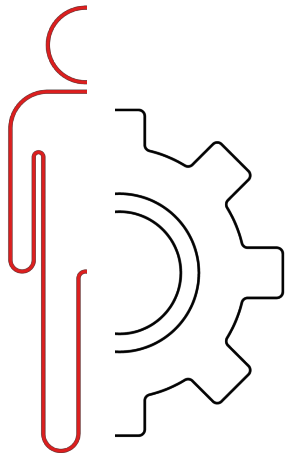
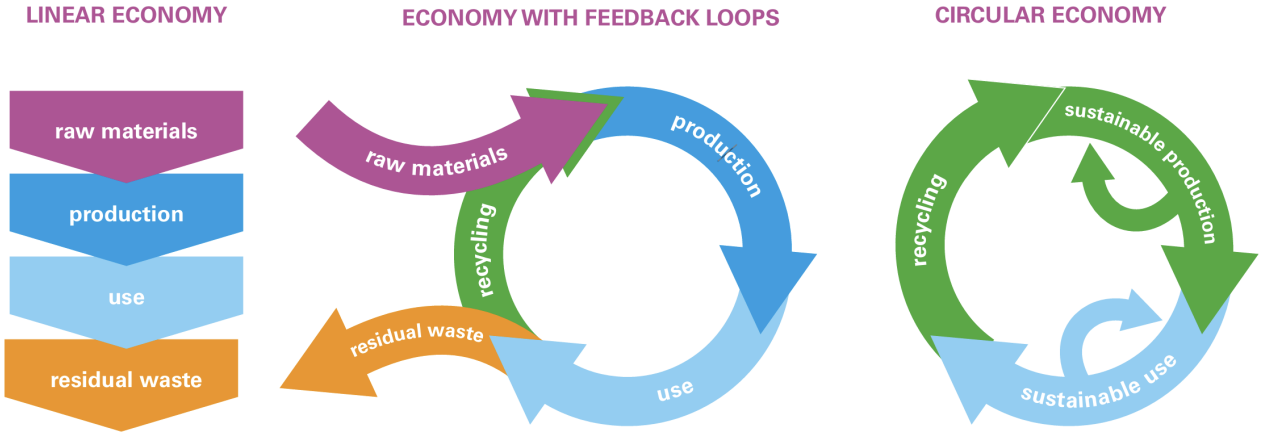
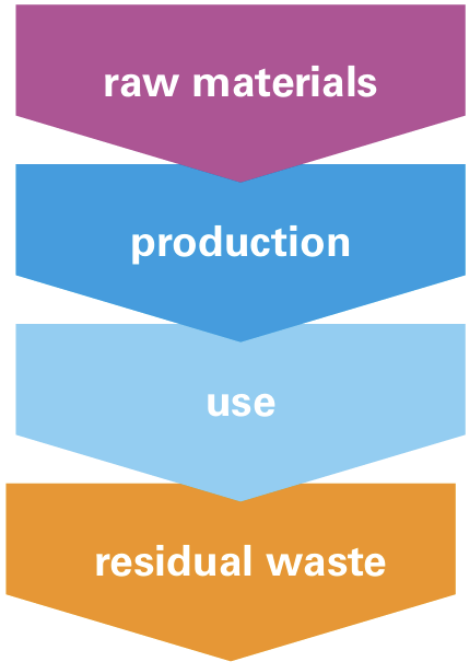
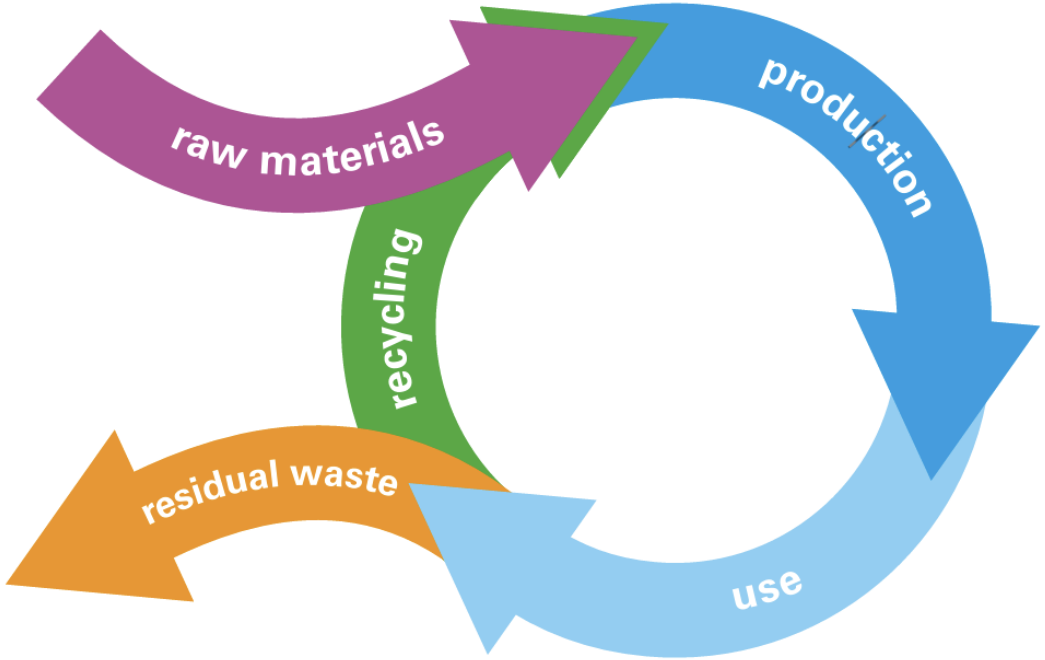




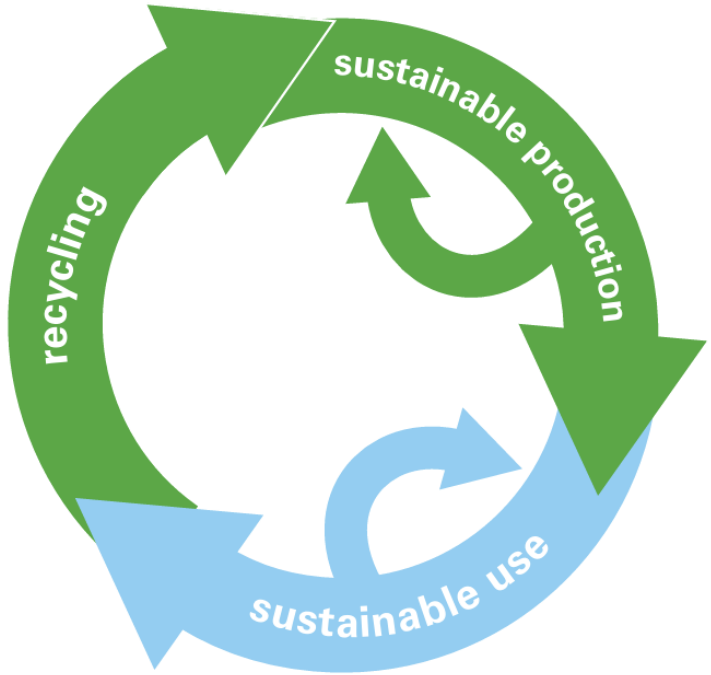
LINEAR ECONOMY

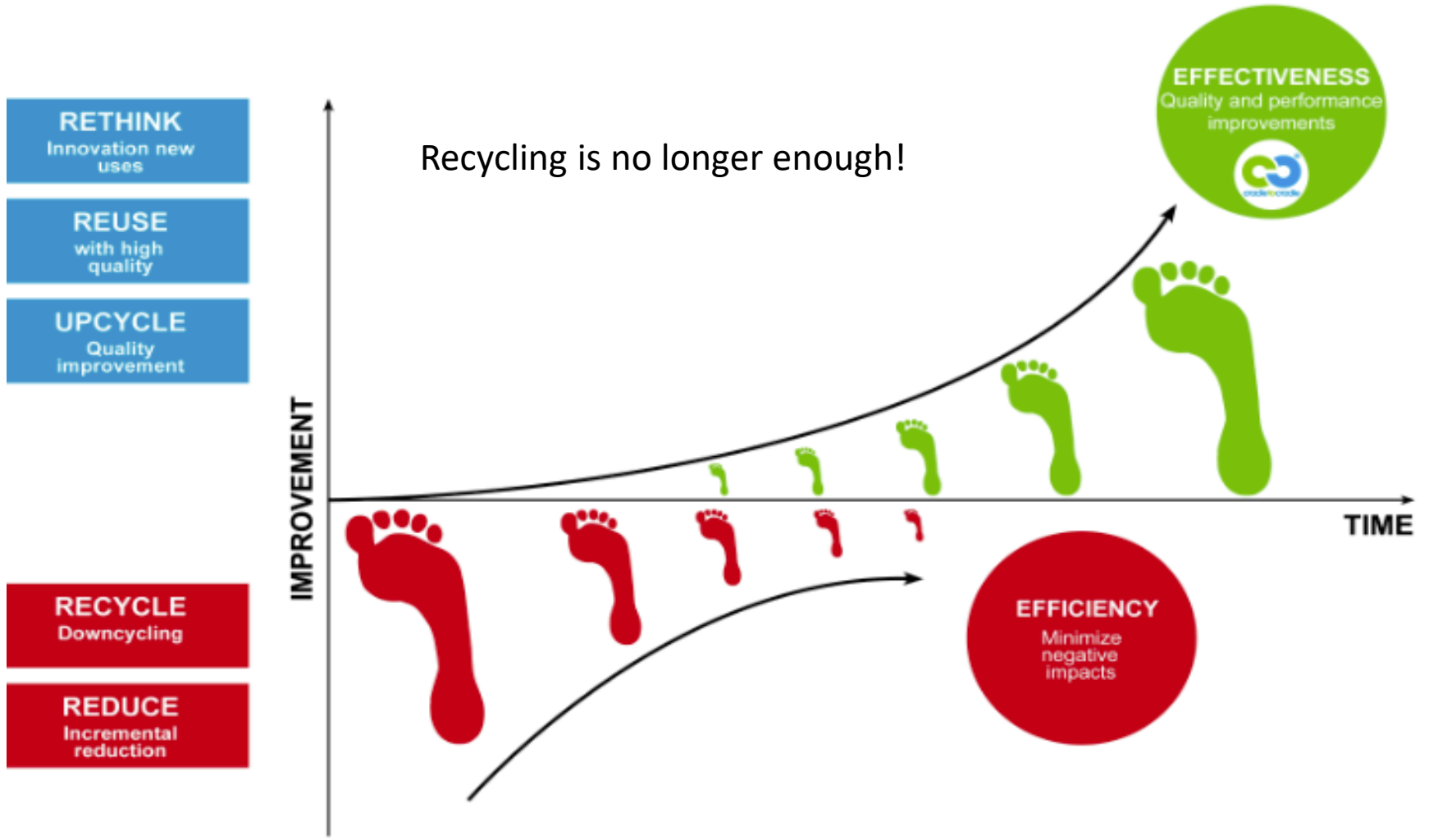


ECONOMY WITH FEEDBACK LOOPS



CIRCULAR ECONOMY

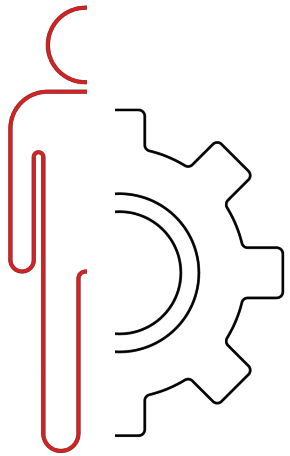




Recycling is no longer enough!

From efficiency to effectiveness!

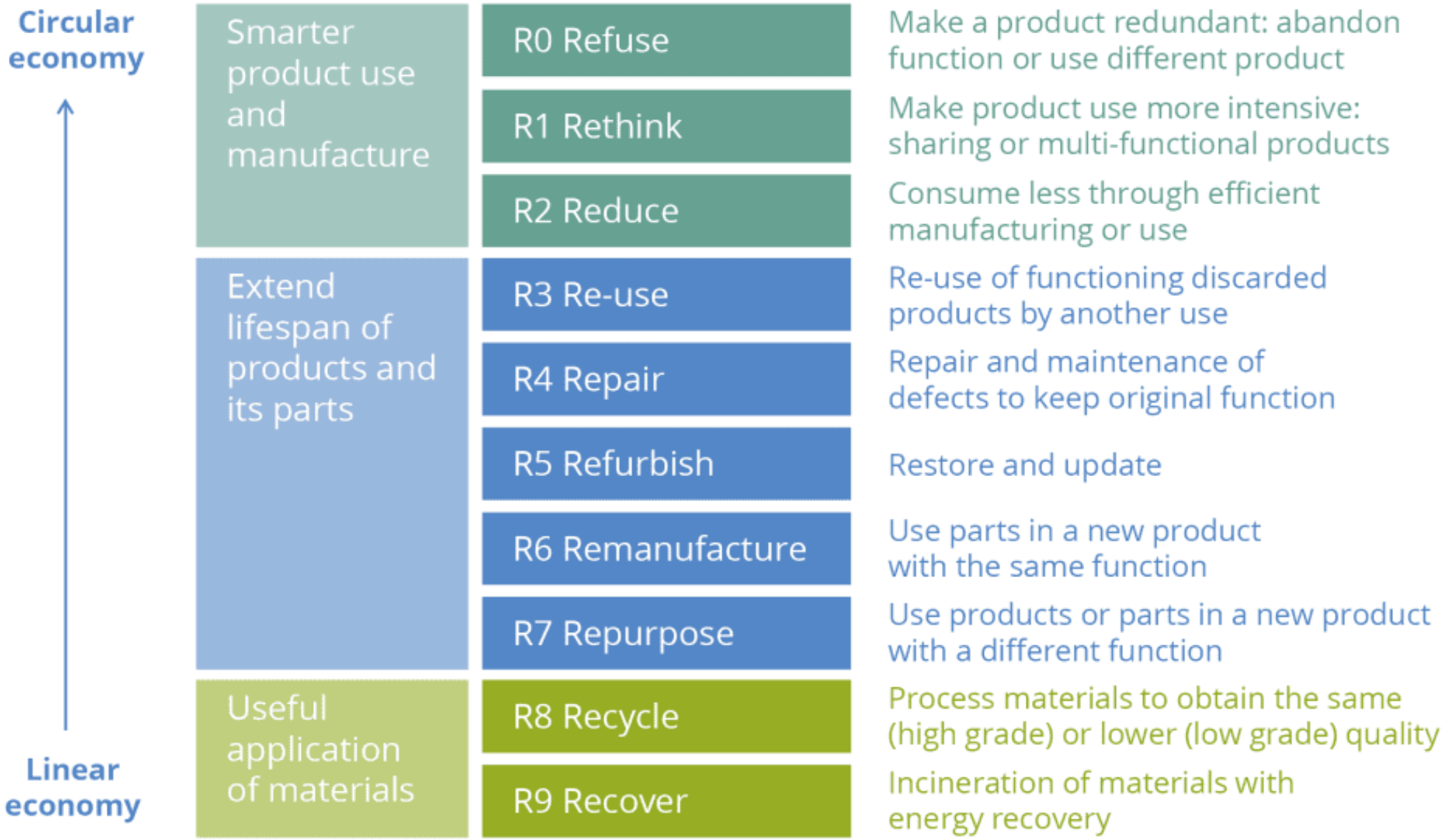
WHAT CAN WE DO?



Circular economy

Linear economy

Smarter product use and manufacture	R0 Refuse	Make a product redundant: abandon function or use different product
	R1 Rethink	Make product use more intensive: sharing or multi-functional products
	R2 Reduce	Consume less through efficient manufacturing or use
Extend lifespan of products and its parts	R3 Re-use	Re-use of functioning discarded products by another use
	R4 Repair	Repair and maintenance of defects to keep original function
	R5 Refurbish	Restore and update
	R6 Remanufacture	Use parts in a new product with the same function
	R7 Repurpose	Use products or parts in a new product with a different function
Useful application of materials	R8 Recycle	Process materials to obtain the same (high grade) or lower (low grade) quality
	R9 Recover	Incineration of materials with energy recovery


Circular economy
Linear economy
Smarter product use and manufacture
Extend lifespan of products and its parts
Useful application of materials
R0 Refuse
R1 Rethink
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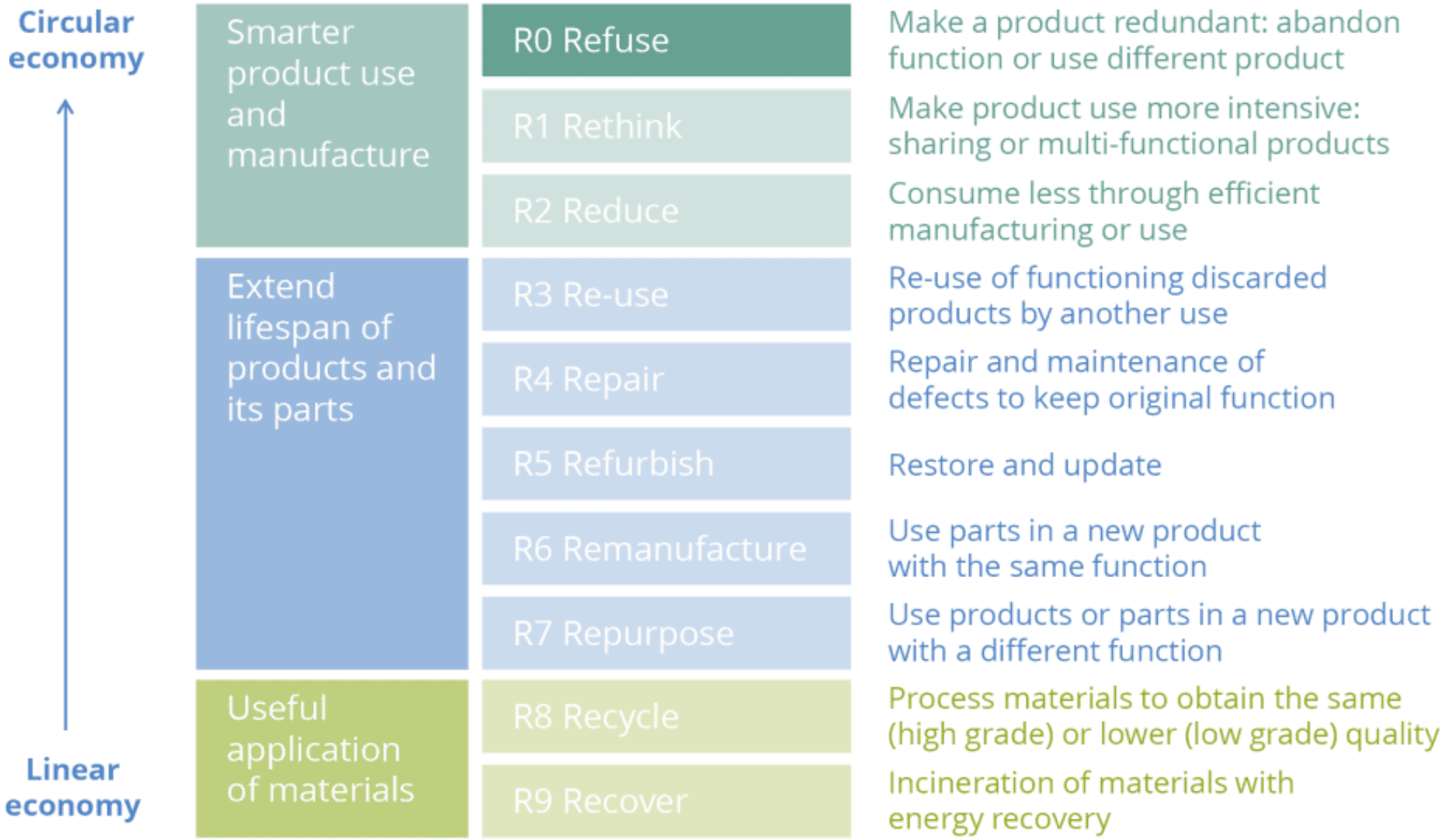
Incineration of materials with energy recovery

1 + 9R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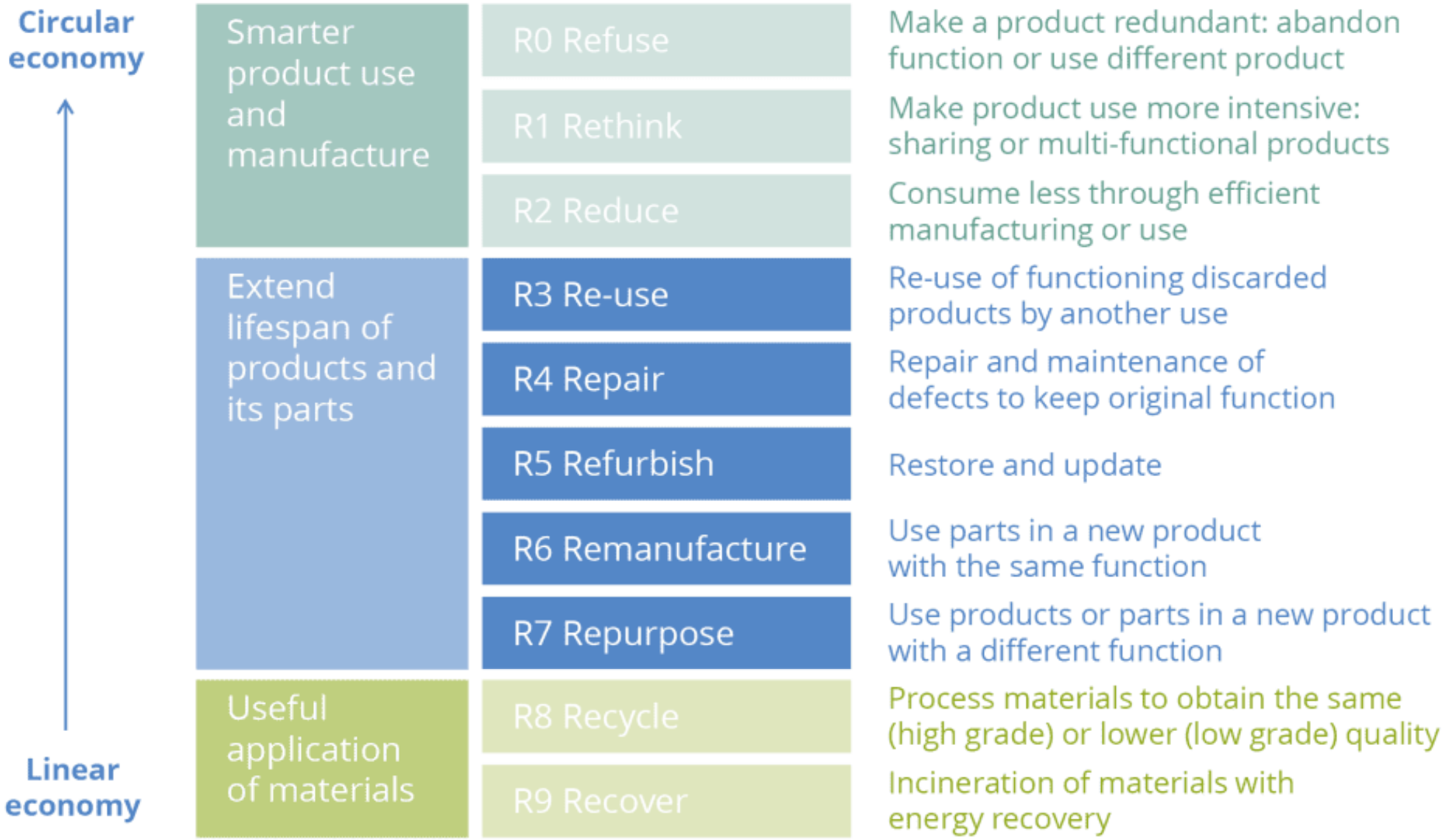
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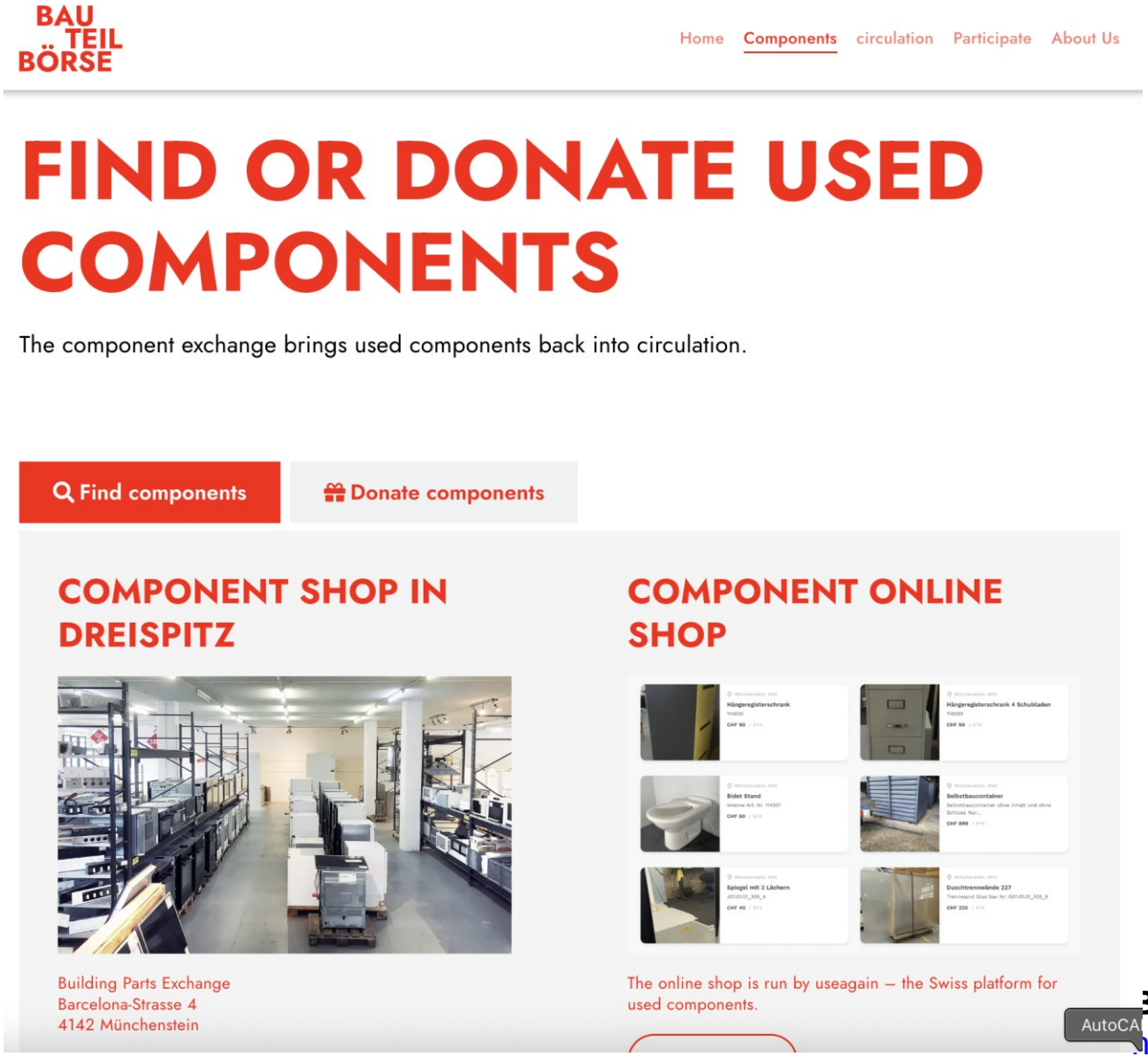
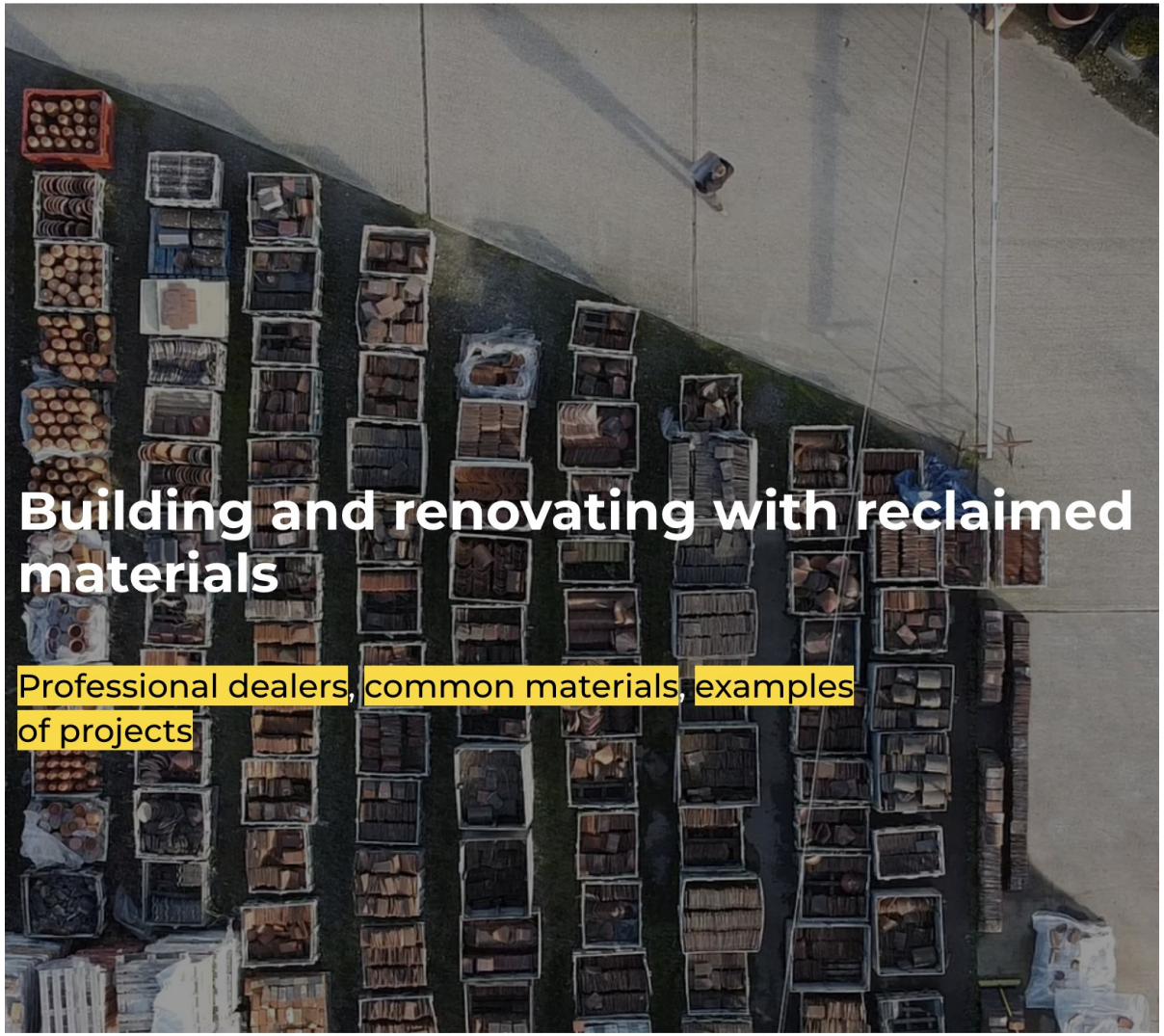


Bauteil boerse
https://bauteilboerse-basel.ch/bauteile/



Opalis
https://opalis.eu/en

BAMB Buildings as material Banks
https://www.bamb2020.eu/

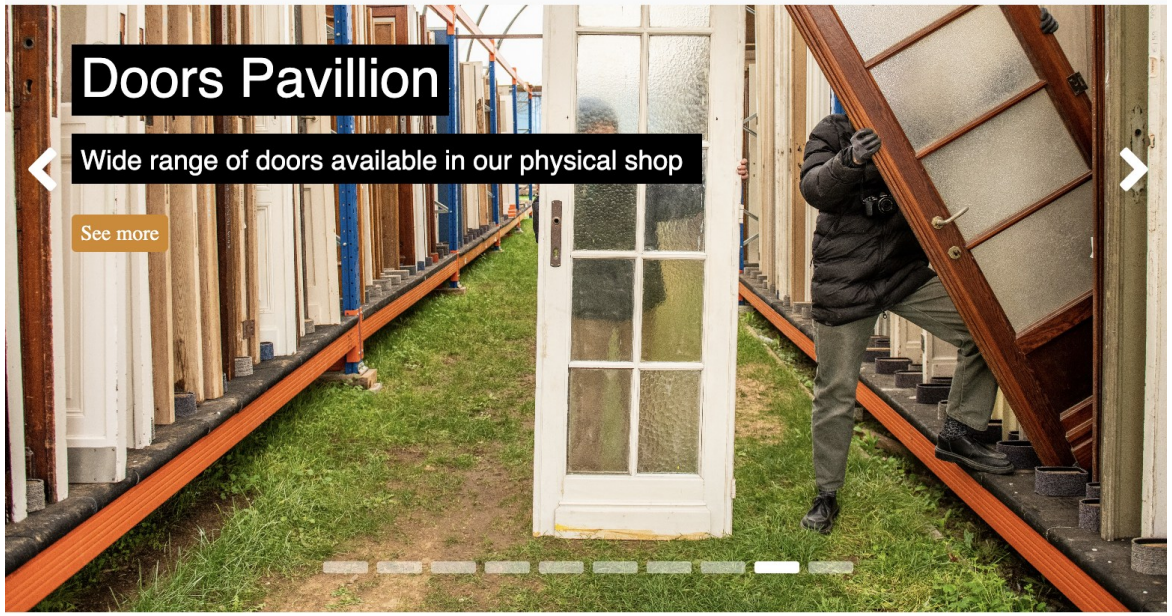
Rotor is a cooperative design practice that investigates the organisation of the material environment.

News 26.03.2025

Eight years later...

Project — Exhibition, Research 2024-2025

Entangled Matter

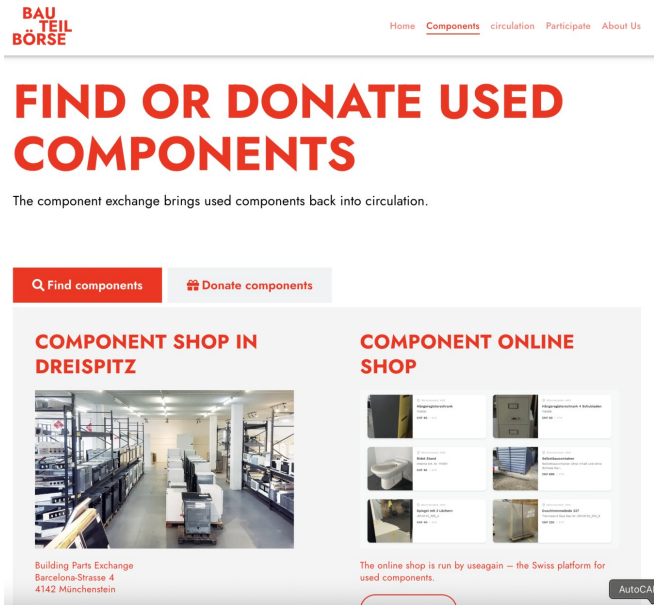


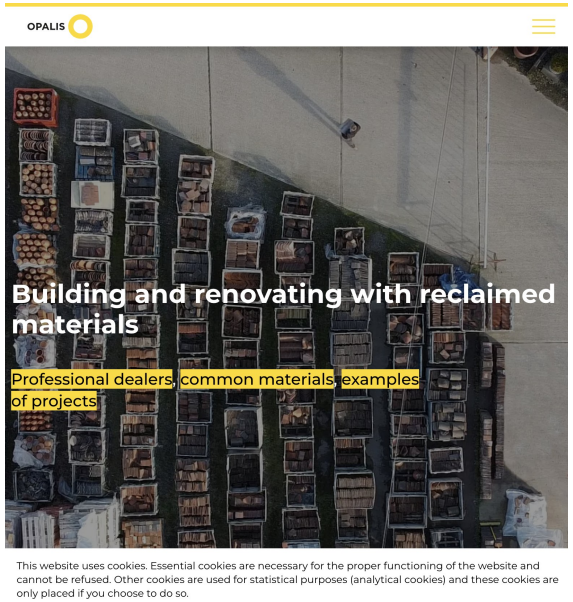
Rotor Deconstruction

We are a cooperative that organizes the reuse of construction materials.

We dismantle, process and trade salvaged building components.

Rotor https://www.rotordb.org/en
Rotor desconstruction https://rotordc.com/





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Bauteil boerse https://bauteilboerse-basel.ch/bauteile/
Opalis https://opalis.eu/en
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Rotor https://www.rotordb.org/en
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News 26.03.2025
Eight years later...

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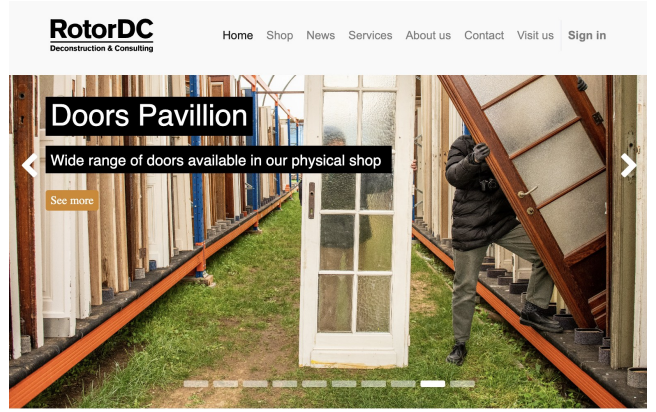


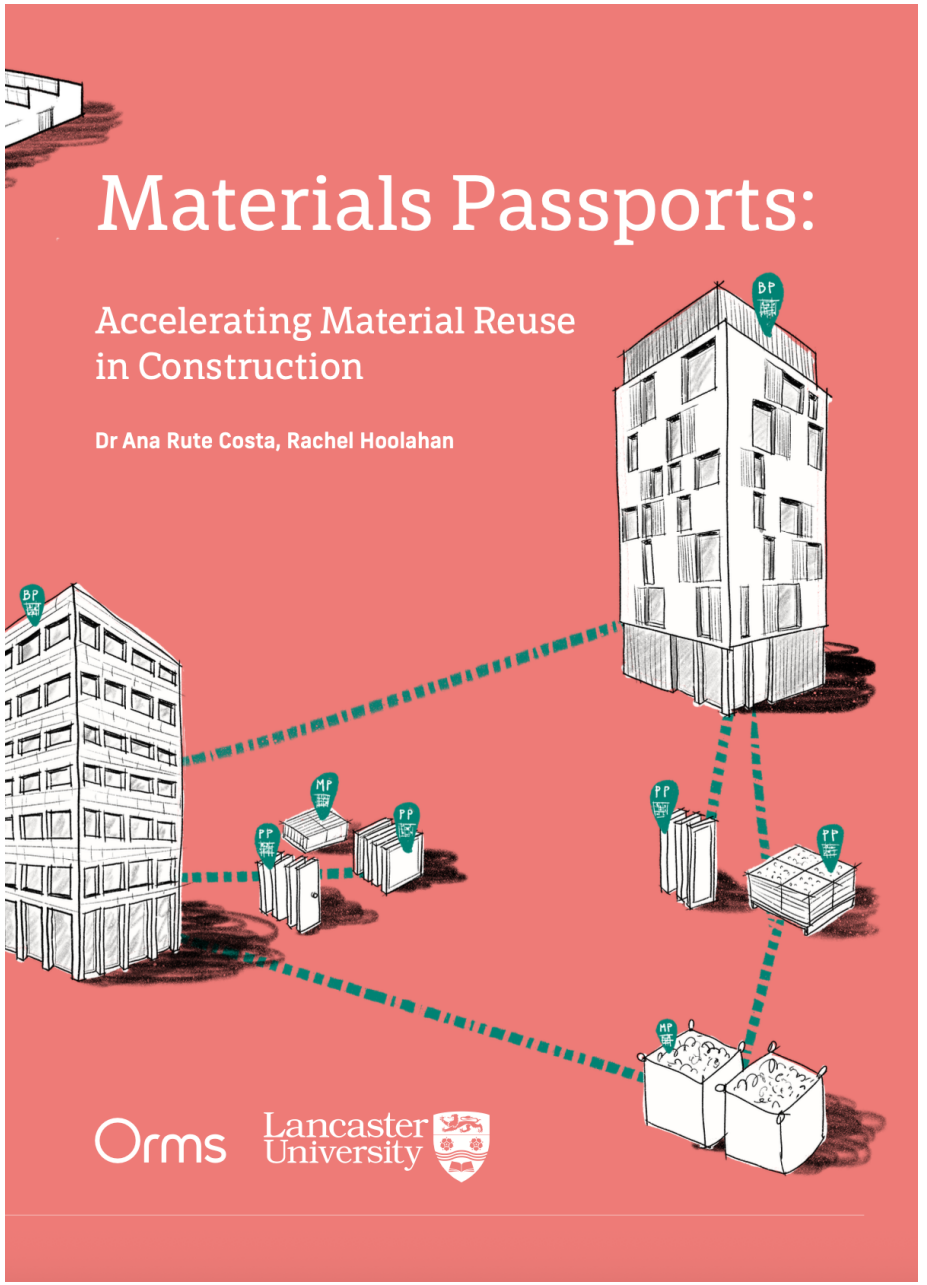
Rotor Deconstruction

We are a cooperative that organizes the reuse of construction materials.

We dismantle, process and trade salvaged building components.

MATERIALS PASSPORTS - BEST PRACTICE

Matthias Heinrich, Werner Lang



Catálogo

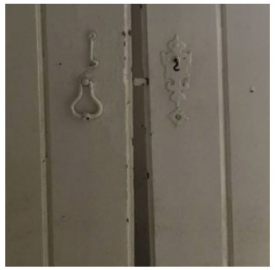
A mostrar 1–16 de 51 resultados

Ordenar por mais novos

Procurar produtos...

Portas de madeira maciça e vidro

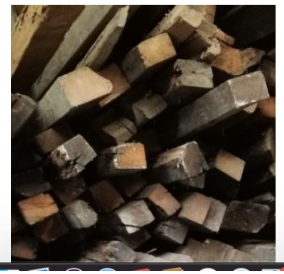
Porta branca – Edifício 1735 [Indisponível]

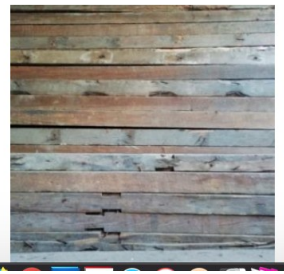


Portas brancas – Edifício 1735 [Indisponível]

Espelhos de puxadores em pau santo

€45.00





Categorias

- Acessórios
- Azulejos / Mosaicos
- Cantaria
- Ferragens
- Janelas
- Mobiliário / Decoração
- Portas / Portadas
- Sanitários / Bancas de pedra
- Soalho / Taco
- Vários
- Vigas

PROJECTE D'EXECUCIÓ DE LA

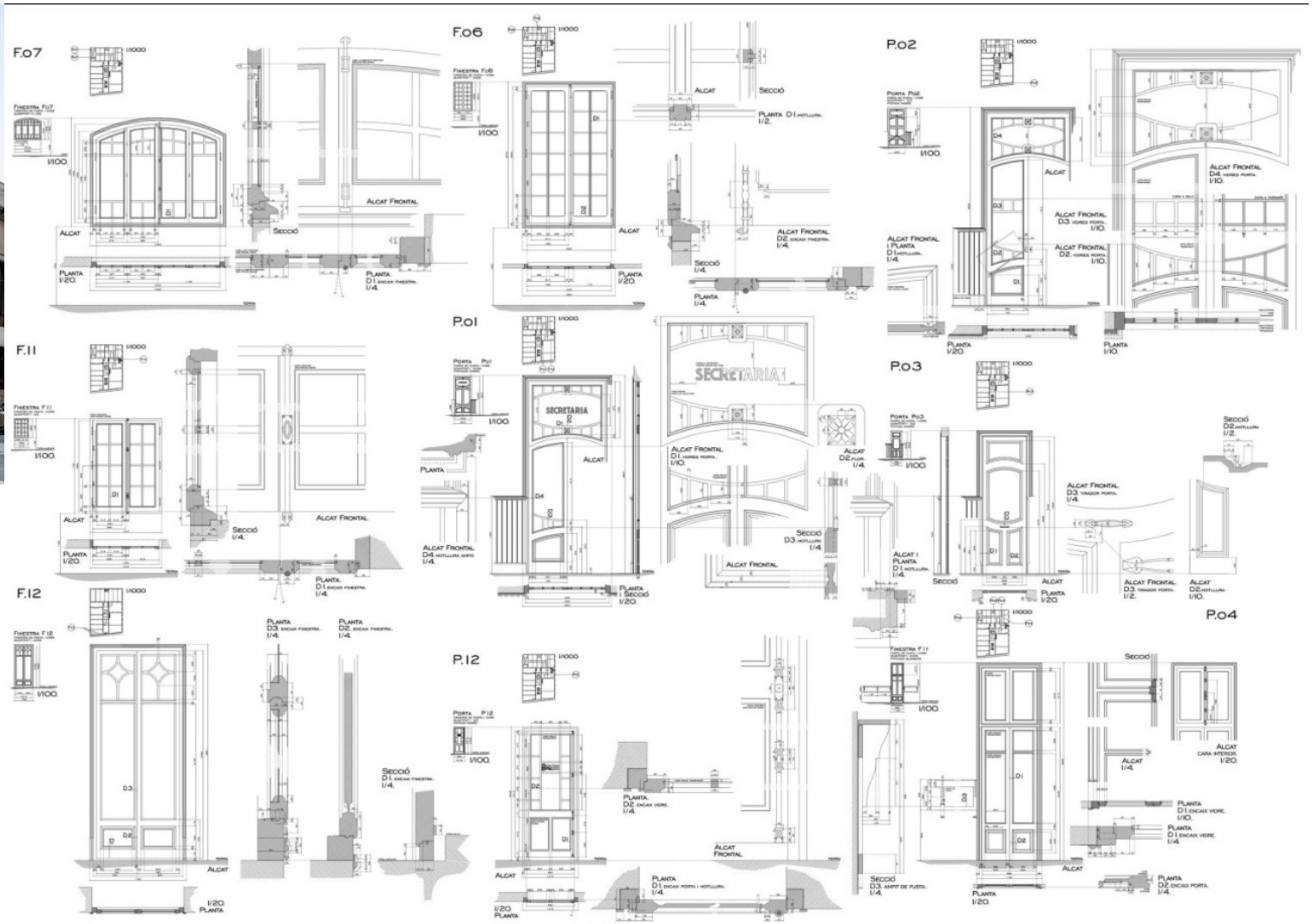
NOVA SALA BECKETT

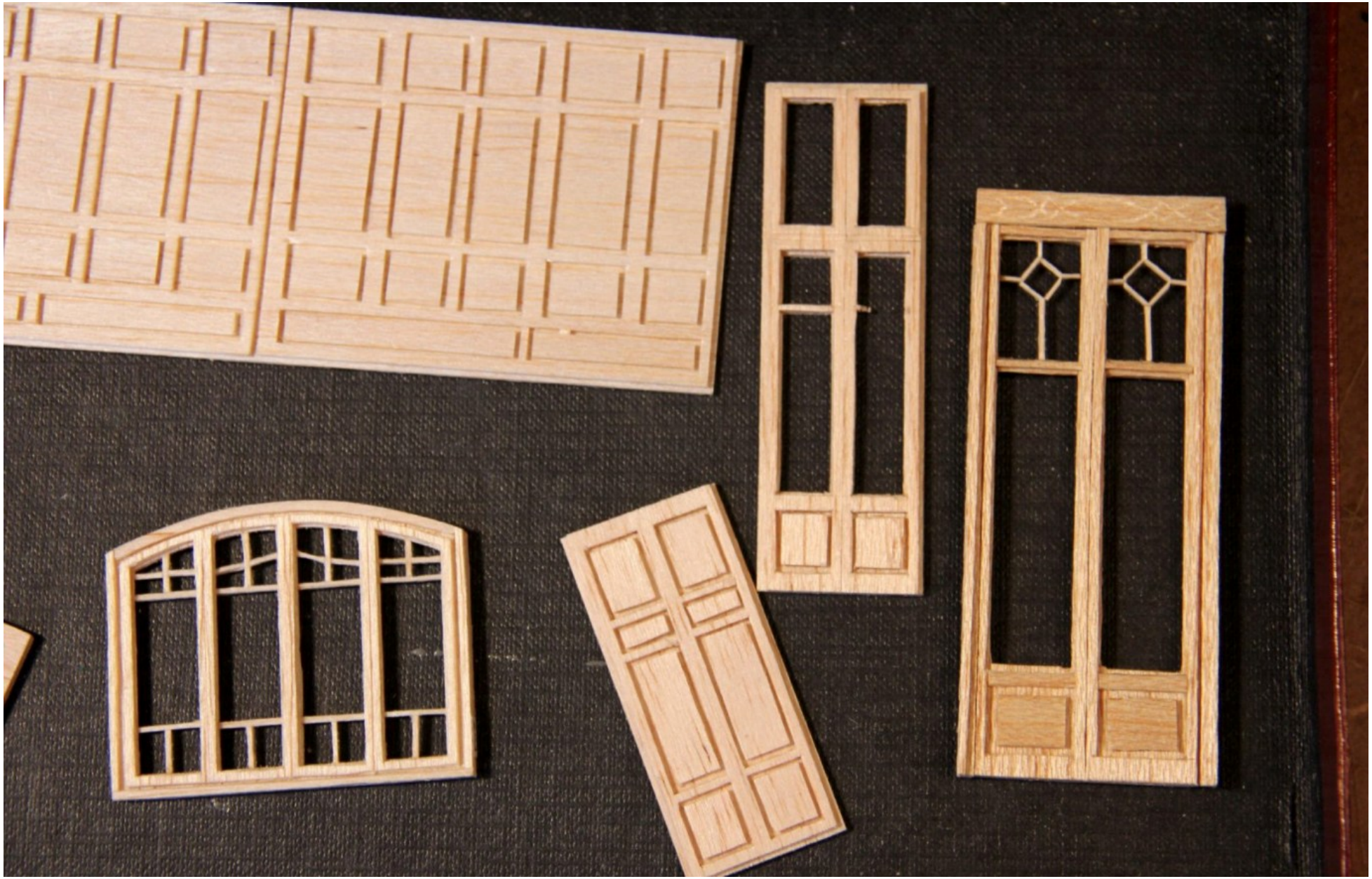
C/ PERE IV 228-232, BARCELONA.

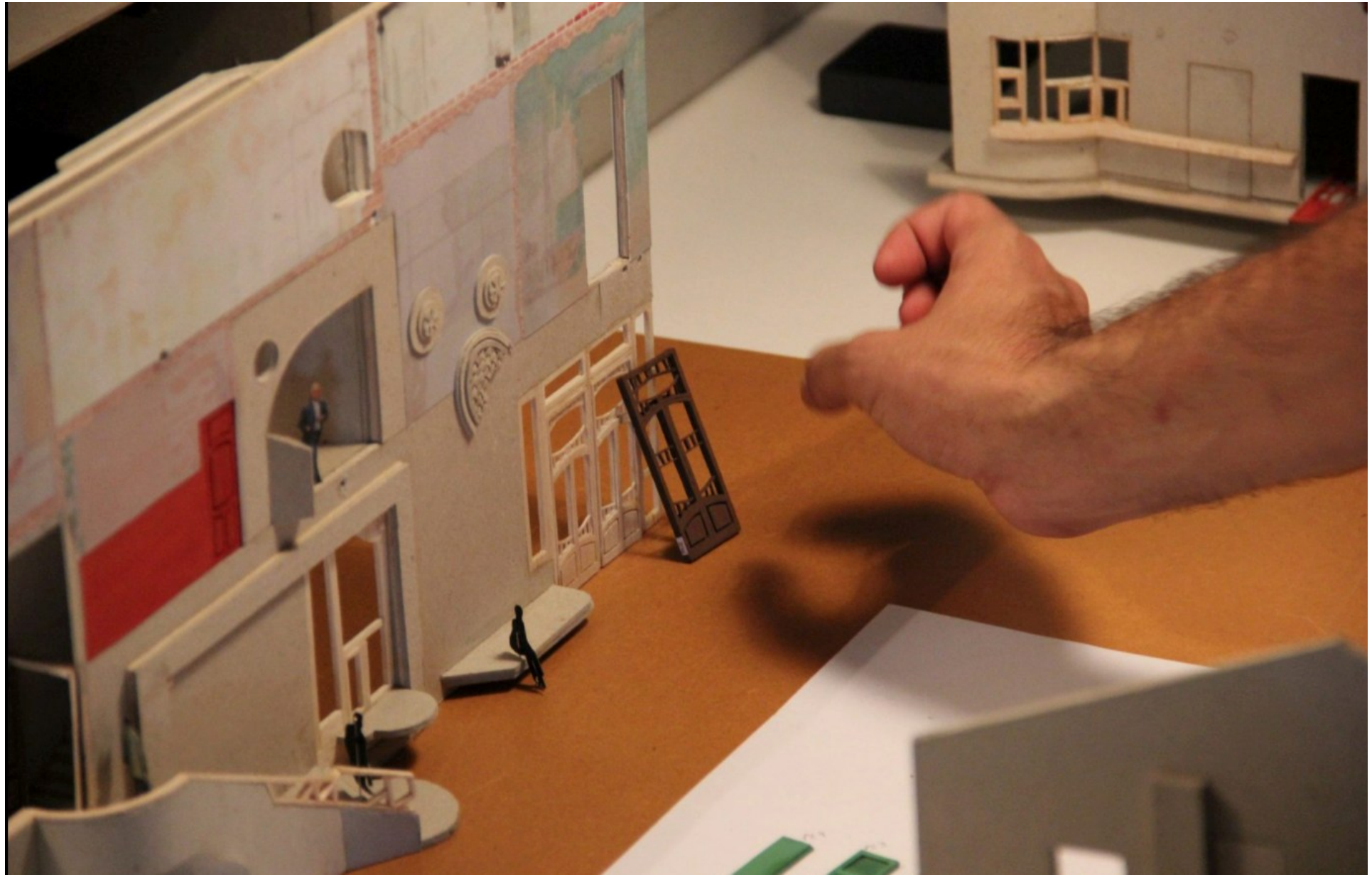
SECCIÓ LONGITUDINAL B

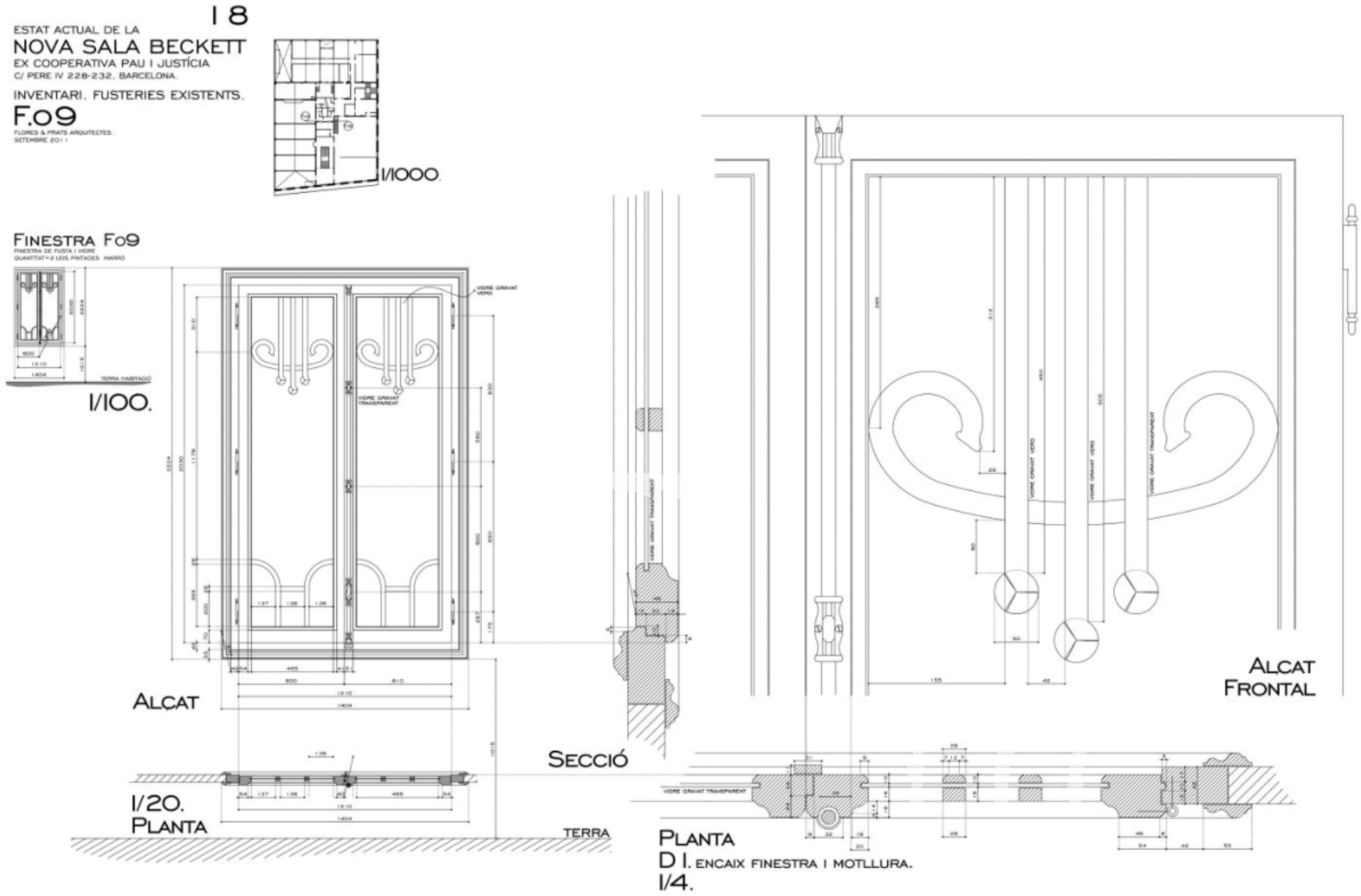
FLORES & PRATS ARQUITECTES.
FEBRER 2016

Sala Beckett
Flores & Prats Architects
Ricardo Flores and Eva Prats

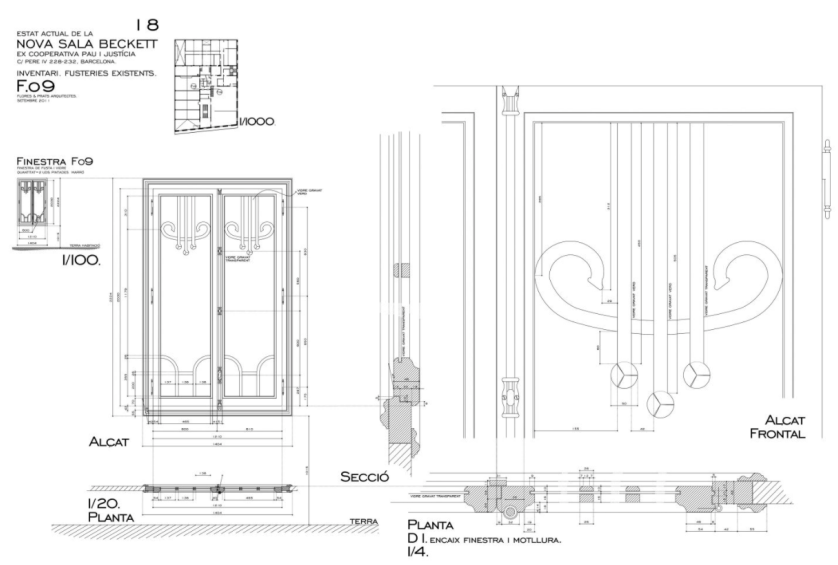


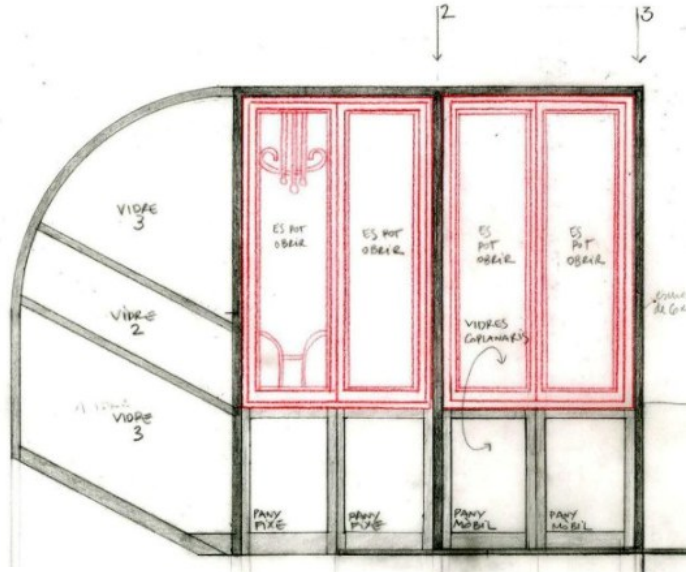


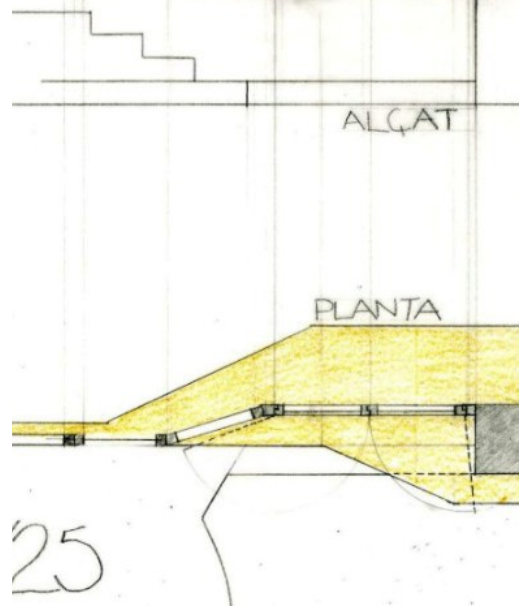



18
ESTAT ACTUAL DE LA
NOVA SALA BECKETT
EX COOPERATIVA PAU I JUSTÍCIA
C/ PERE IV 228-232, BARCELONA.
INVENTARI. FUSTERIES EXISTENTS.
F.09
FLORES & PRATS ARQUITECTES.
SETEMBRE 2011
1/1000.
FINESTRA F09
FINESTRA DE FUSTA I VIDRE
QUANTITAT= 8 LLOS PINTADES HARRO
1/100.
ALÇAT
1/20.
PLANTA
SECCIÓ
TERRA
ALÇAT
FRONTAL
PLANTA
D I. ENCAIX FINESTRA I MOTLLURA.
1/4.


Sala de Gall
Aules

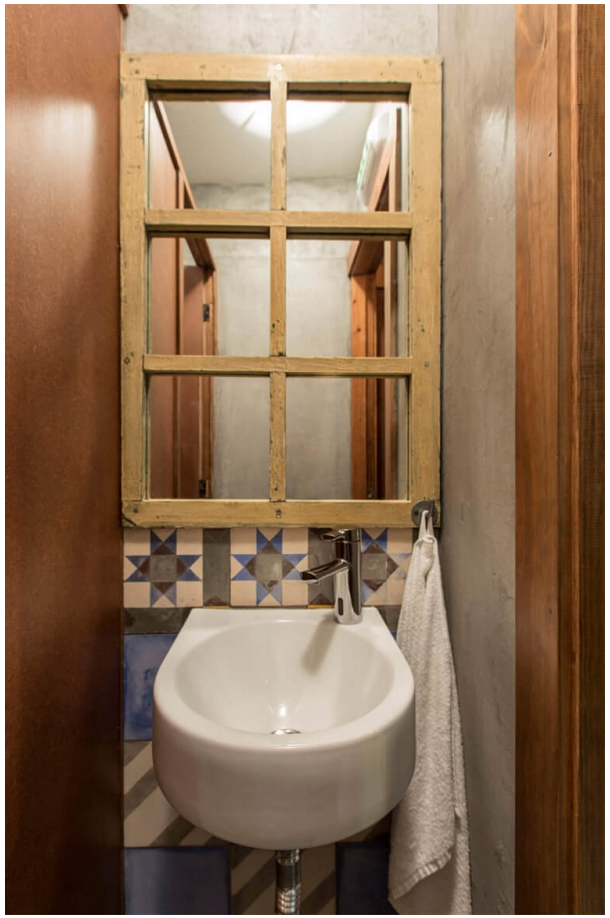

ESTAT ACTUAL DE LA
NOVA SALA BECKETT
EX COOPERATIVA PAU I JUSTÍCIA
INVENTARI. FUSTERIES EXISTENTS.
F.09
1/1000.
FINESTRA F09
1/100.
ALÇAT
1/20.
PLANTA
TERRA
SECCIÓ
ALÇAT
FRONTAL
PLANTA
D I. ENCAIX FINESTRA I MOTLLURA.
1/4.


2
3
VIDRE 3
VIDRE 2
VIDRE 3
ES POT OBRIR
ES POT OBRIR
ES POT OBRIR
ES POT OBRIR
VIDRES CONTRAPARETS
PANY FIXE
PANY FIXE
PANY MOBIL
PANY MOBIL


ALÇAT
PLANTA
25

Nave 8 – Matadero Madrid
Arturo Franco

Sandeira Restaurant
Paulo Moreira Arquitecto



Caldeireiros house
Paulo Moreira Arquitecto

What have been some of the biggest problems encountered in introducing reuse practices?

Architectural and Engineering Education Gap

Contemporary Building Methods and Materiais Agglutination

Selective Demolition vs. Full Demolition

Absence of Selective Demolition Practices

Materials are seen as waste and not as a resource

Storage and Logistics Barriers

Fragmented Market for Reclaimed Components

Lack of Supporting Policies and Systems

Part 2
Nada Novo | Nothing New


Reuse of stones?

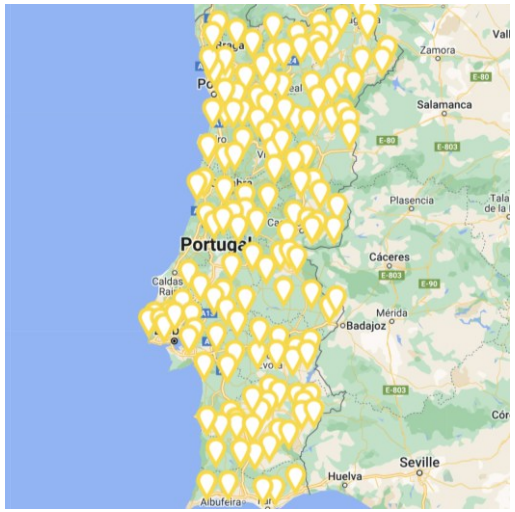

Reuse of stones?
NADA NOVO
Nothing New

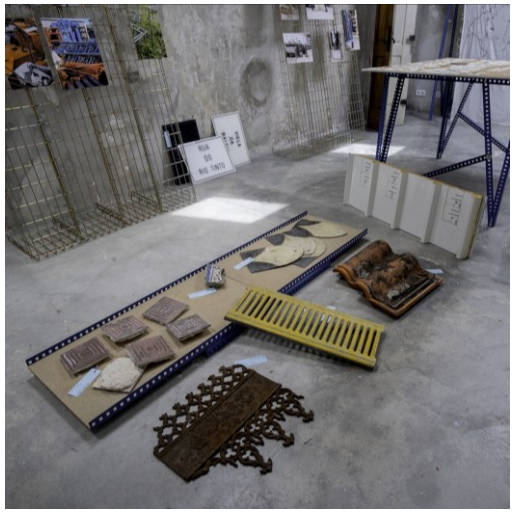
NADA NOVO

Nothing New

NADA ~~NOVO~~ – Fields of action

(i) Mapeamento / Mapping
(ii) Oficinas teóricas / Theoretical workshops
(iii) Exposições / Exhibitions
(iv) Conversas / Conversations
(v) Construção experimental / Experimental construction
(vi) Publicações / Publications
(vii) Prática artística / Artistic practice





NADA NOVO

Nothing New

FÓRUM NADA ~~NOVO~~

PEÇAS DESGARRADAS: A ORIGEM DOS MATERIAIS*

Nesta primeira atividade do projeto **FÓRUM NADA ~~NOVO~~**, a oficina **'PEÇAS DESGARRADAS: A ORIGEM DOS MATERIAIS'** propõe explorar os percursos dos destroços dos edifícios que demolimos para renovar a cidade e o seu potencial de reutilização. Contaminamos o olhar pelas perspectivas dos valores sociais do património material, sustentabilidade ambiental e das desigualdades de género nas profissões da construção.

24 JAN - 1 FEV '24

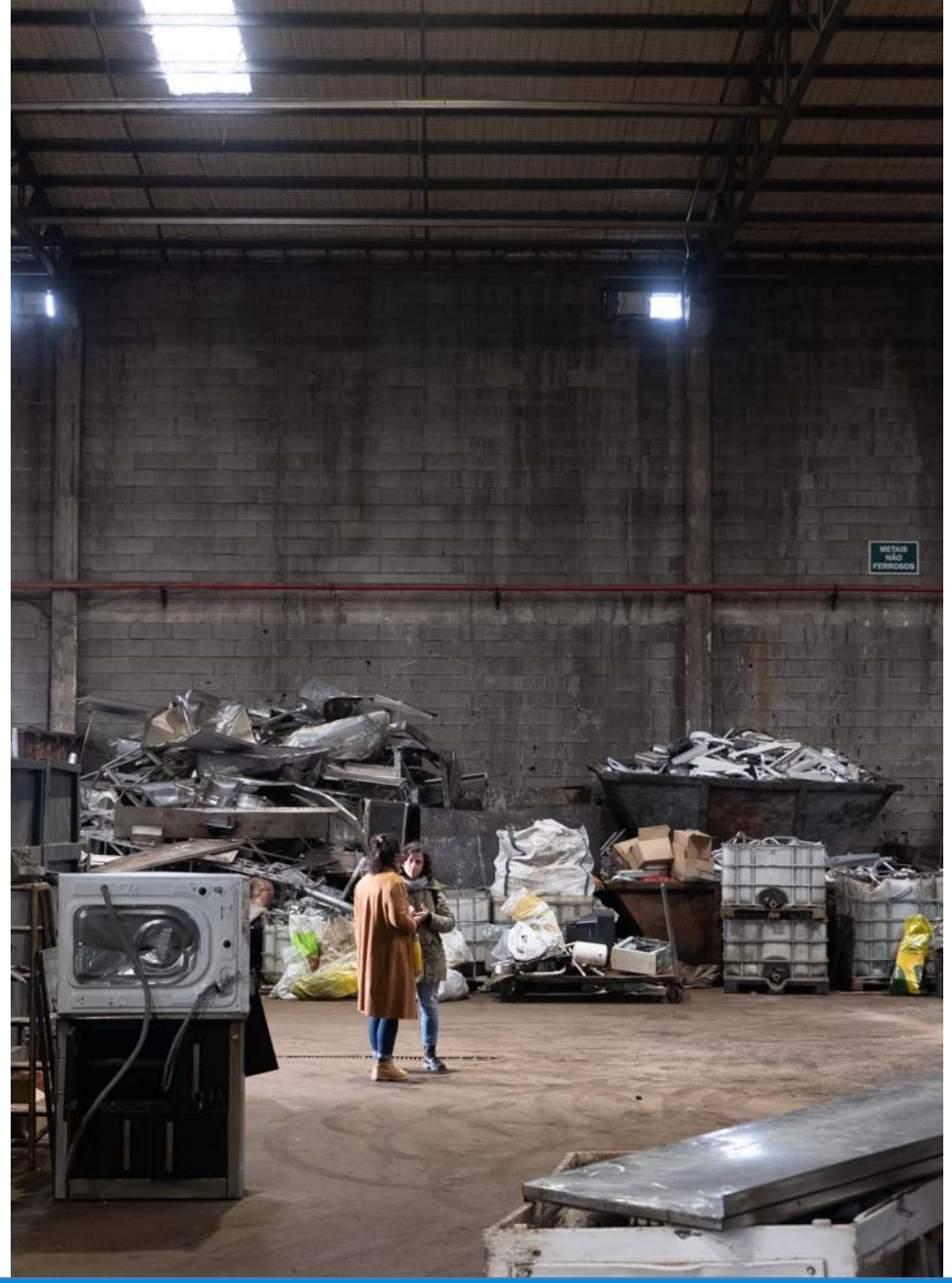
PORTO [FAUP] + GUIMARÃES [EAAD]


2. Armazém das oportunidades
4. Pinheiro Antiques
3. MV – Gestão de resíduos
1. Banco dos materiais
5. Costa Almeida Ambiente
Póvoa de Lanhoso
Braga
Nogueira
Esposende
Barcelos
Celeirós
Cabeceiras de Basto
Apúlia
Cerva
Fafe
Joane
Guimaraes
Vila Nova de Famalicão
Mondim de Basto
Povoa de Varzim
São João de Caldas de Vizela
Felgueiras
Parque Natural do Alvão
Vila do Conde
Trofa
Santo Tirso
Paços de Ferreira
Lousada
Amarante
Vila Meã
Maia
Penafiel
Matosinhos
Rio Tinto
Valongo
Marco de Canaveses
Porto
Baião
Mesão Frio
Vila Nova de Gaia
Ancede
Resende
Lamego

1.

2.

3.



4.

FÓRUM NADA ~~NOVO~~

PEÇAS RESGATADAS: PRÁTICAS CONCEPTUAIS E CONSTRUTIVAS*

Nesta terceira atividade do projecto **FÓRUM NADA ~~NOVO~~**, a oficina **'PEÇAS RESGATADAS: PRÁTICAS CONCEPTUAIS E CONSTRUTIVAS'** aborda as implicações da reutilização nas práticas conceptuais e construtivas, com técnicas experimentais e usos não convencionais de materiais, e na exploração da linguagem estética da reutilização.

4 - 17 JUL '24
PORTO [@ADEGA - PELE]

Peças desgarradas > Peças resgatadas
Stray parts > Salvaged parts

APOIO FINANCEIRO: Direção-Geral das Artes, Portugal.

REPÚBLICA PORTUGUESA CULTURA — dgARTES DIREÇÃO-GERAL DAS ARTES

PARCERIA: Escola de Arquitectura, Arte e Design da Universidade do Minho (EAAD) / Faculdade de Arquitectura da Universidade do Porto (FAUP) / Pele, Porto / Mulheres na Arquitectura (MA), Portugal / O Instituto, Porto / Banco de Materiais do Município do Porto.

Universidade do Minho Escola de Arquitetura, Arte e Design — U.PORTO FACULDADE DE ARQUITECTURA UNIVERSIDADE DO PORTO — pele — MA MULHERES NA ARQUITECTURA — INSTITUTO — Porto.

APOIOS: Rotor, Bélgica / NEB goes South, União Europeia / Lab2pt, Portugal / Junta de Freguesia de Campanhã, Porto.

lab2pt Laboratório de Paisagens, Património e Território

APOIOS INSTITUCIONAIS: Secção Regional do Norte da Ordem dos Arquitectos (OARSN), Portugal / Associação Portuguesa para a Reabilitação Urbana e Protecção do Património (APRUPP), Portugal.

DOAÇÃO DE MATERIAIS: Costa Almeida Ambiente e Costa Almeida Demolições, Portugal / MV - Gestão de Resíduos, Portugal / Coeng 08 – Construção e Engenharia Lda, Portugal.

COSTA ALMEIDA AMBIENTE — COSTA ALMEIDA DEMOLIÇÕES — MV Gestão de Resíduos, Lda. — cøeng CONSTRUÇÃO


adeg
PAVIMENTO
FUNDAÇÃO
ESTRUTURA
MOBILIÁRIO
COBERTURA
PELE


pisos hidráulicos
~120 un
€0 OFERTA
Ilha Rua São Victor - COENG / BAAU
CMP SRU (Bairro da Lomba, Porto)
Enferrujadas
40 un
69 X 13 X 9
€0 OFERTA
MV - GESTÃO DE RESÍDUOS
estruturas claraboia
~x2 un
€0 OFERTA
Ilha Rua São Victor - COENG / BAAU
telhas
~50
€0 OFERTA
Ilha Rua São Victor - COENG / BAAU
madeira
?
€0 OFERTA
PELE
Inventário
- materiais
- dimensões
- quantidade
- peso (aproximado)
- cor
- condições
- características estruturais
- origem/história (conhecida/especulação)


ARM + PLATAFORMA
GUA + COB
ARM
BAN ARM
rede de plástico ~1.2m? x ? €20
VED BÁN
COB
COB
BAN
PLA ARM
ARM + COB
PAVIMENTO
FUNDAÇÃO
ESTRUTURA
MOBILIÁRIO
COBERTURA
PELE
COBERTURA
PLATAFORMA
VEDAÇÃO
ARMAZÉM
BANCOS


ARQUIVO

FÓRUM NADA ~~NOVO~~: THE “WAREHOUSE OF MATERIALS” @ ADEGA, PELE

> Re-use stories - approximate quantities, modifications, people and time:

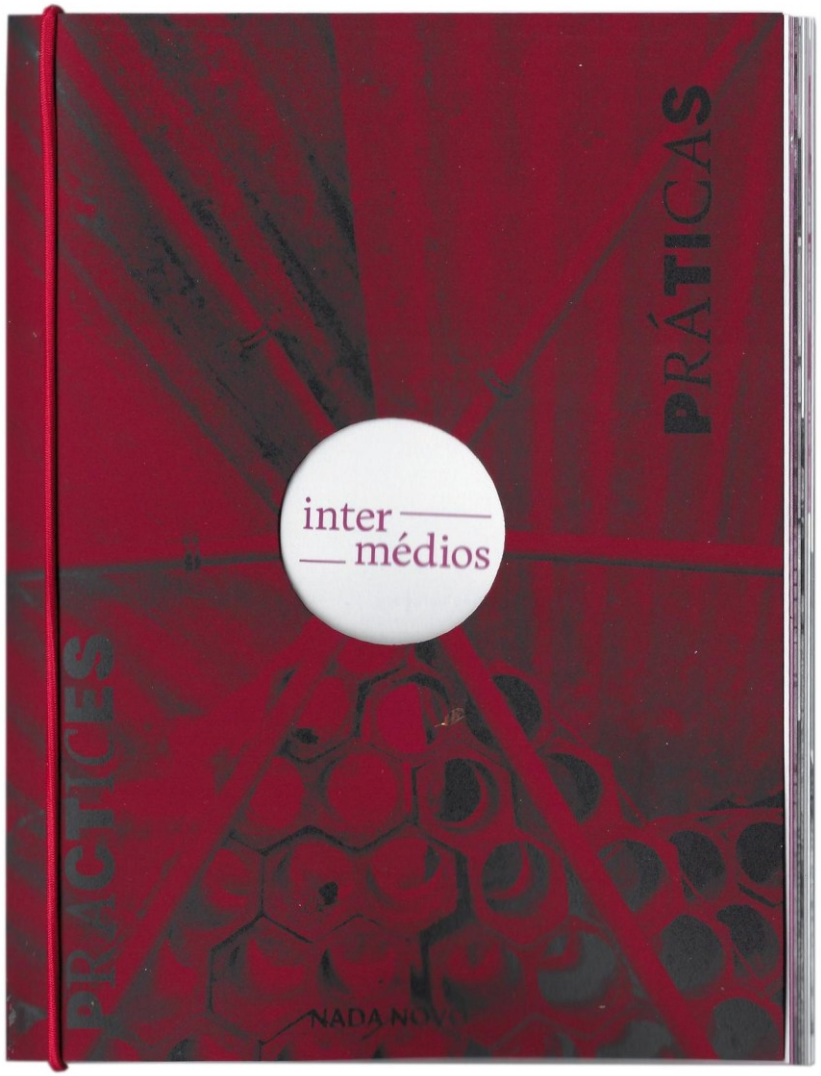
- 0.75x ‘big bag’ (reused, unstiched+stitched)
- 2x industrial storage vertical frames (reused,12 new 8mm holes)
- 2x cans of left-over spray paint
- 5x electrical cable servicing trays (reused, 5 new cuts)
- 6x industrial storage unit beams (reused, no modifications)
- 6x rectangular section metal profiles (reused, 6 new cuts)
- 10x perforated metal sheets (reused, no modifications)
- 10x m6 bolts, nuts and washers (new)
- 12x m8 bolts, nuts and washers (new)
- 28x acrylic panels (reused, 28x new 4mm holes)
- 36x 300x5mm white nylon cable ties (new)
- 112x 200x3mm white nylon cable ties (new)
- ~192 person-hours / 18 collaborators.

FÓRUM NADA ~~NOVO~~ : THE “FÓRUM” @ ADEGA, PELE

> Re-use stories - approximate quantities, modifications, people and time:

- 2x cross-bracing elements of industrial shelving units (reused, dismantled)
- 2x metal porch structures (reused, 8 new 8mm holes)
- 3x perforated screen frames (reused, no modifications)
- 4x ‘big bags’ (reused, unstitched and restitched to combine)
- 4x cable pullies (new)
- 4x perforated metal sheets (reused, 10 cuts)
- 4x wooden beam sections (reused, no modifications)
- 5x cans of left-over spray paint
- 6x vertical sections of industrial shelving units (reused, dismantled/reusable)
- 6x cable clamps (new)
- 10x m10 bolts, nuts and washers (reused, no modifications)
- 15x plywood shelves (reused, no modifications)
- 16x assorted stones (reused, painted)
- 16x m12 bolts, nuts and washers (new)
- 18x 6mm screw fixings (new)
- 24x concrete post blocks (reused, no modifications)
- 30lm 4mm cable (new)
- ~223 person-hours / 24 collaborators

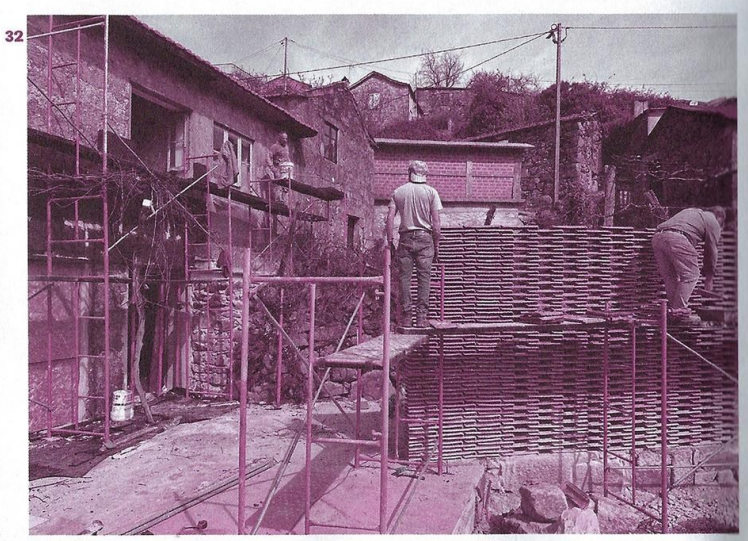

ARQUIVO

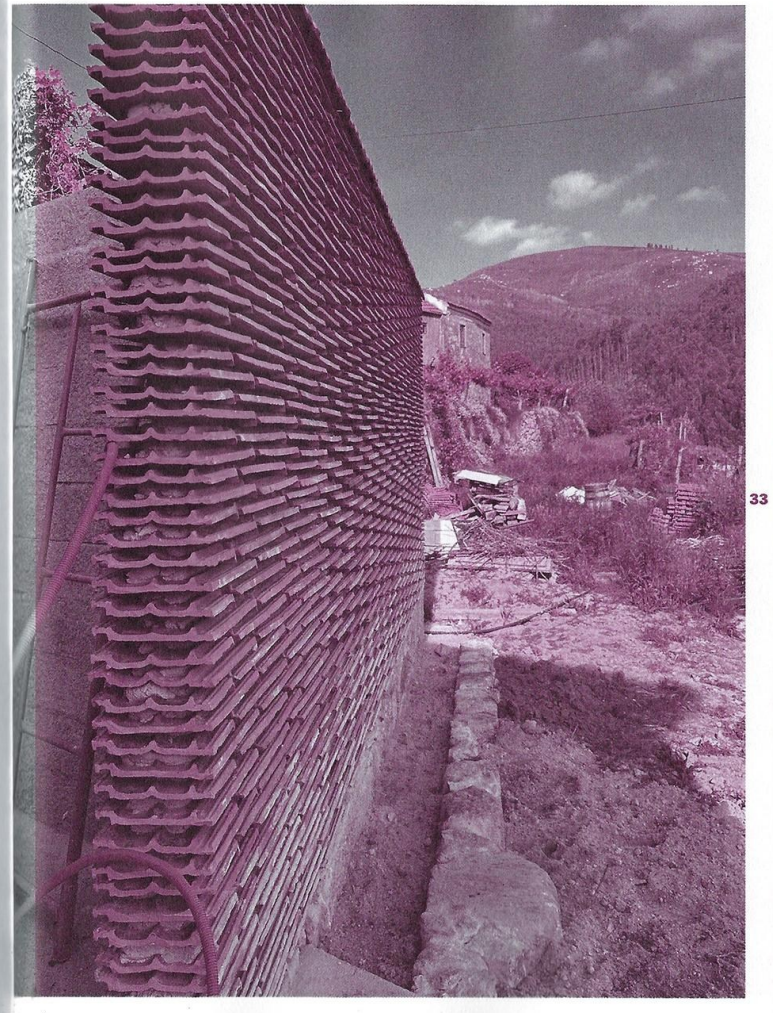


PAREDE DE TELHAS
WALL OF ROOF TILES
Filipe Brandão, Vale de Cambra, 2023-24

Telhas removidas do telhado da casa... Sem desenho. Expliquei o que queria... foram feitas duas tentativas... O principal problema foi a morosidade do processo. Como a altura da argamassa de assentamento entre telhas é grande, era necessário esperar que ganhasse presa antes de começar a acrescentar fiadas. Hoje teria procurado uma forma diferente de fazer, possivelmente com uma argamassa com presa mais rápida ou com outras combinações de telhas.
— Filipe Brandão, 2025.

Roof tiles removed from the roof of the house... No drawing. I explained what I wanted... two attempts were made. ... The main problem was the length of the process. As the height of the mortar between the tiles is great, it was necessary to wait for it to set before starting to add rows. Today I would have looked for a different way of doing it, possibly with a faster-setting mortar or with other combinations of tiles. — Filipe Brandão, 2025.



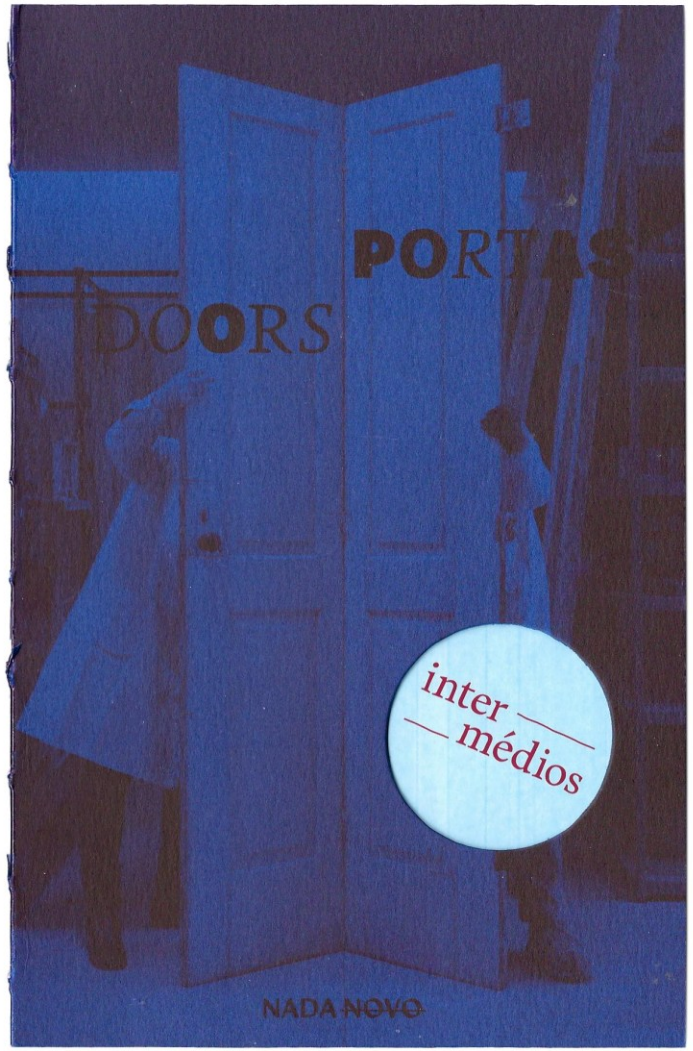


Santo Tirso.
Quinta devoluta.
Abandoned farm.

DOORS AT RISK

Bairro da Lomba, Porto.
Demolição.
Lomba neighbourhood, Porto.
Demolition.

PORTAS EM RISCO



NADA NOVO

nadanovo.org
nadanovo.associacao

Part 3
Orange Grove House | Casa do Laranjal

What have been some of the biggest problems encountered in introducing reuse practices?

Trying to use the intervention at Casa do Laranjal/Orange Grove House as a research project and laboratory

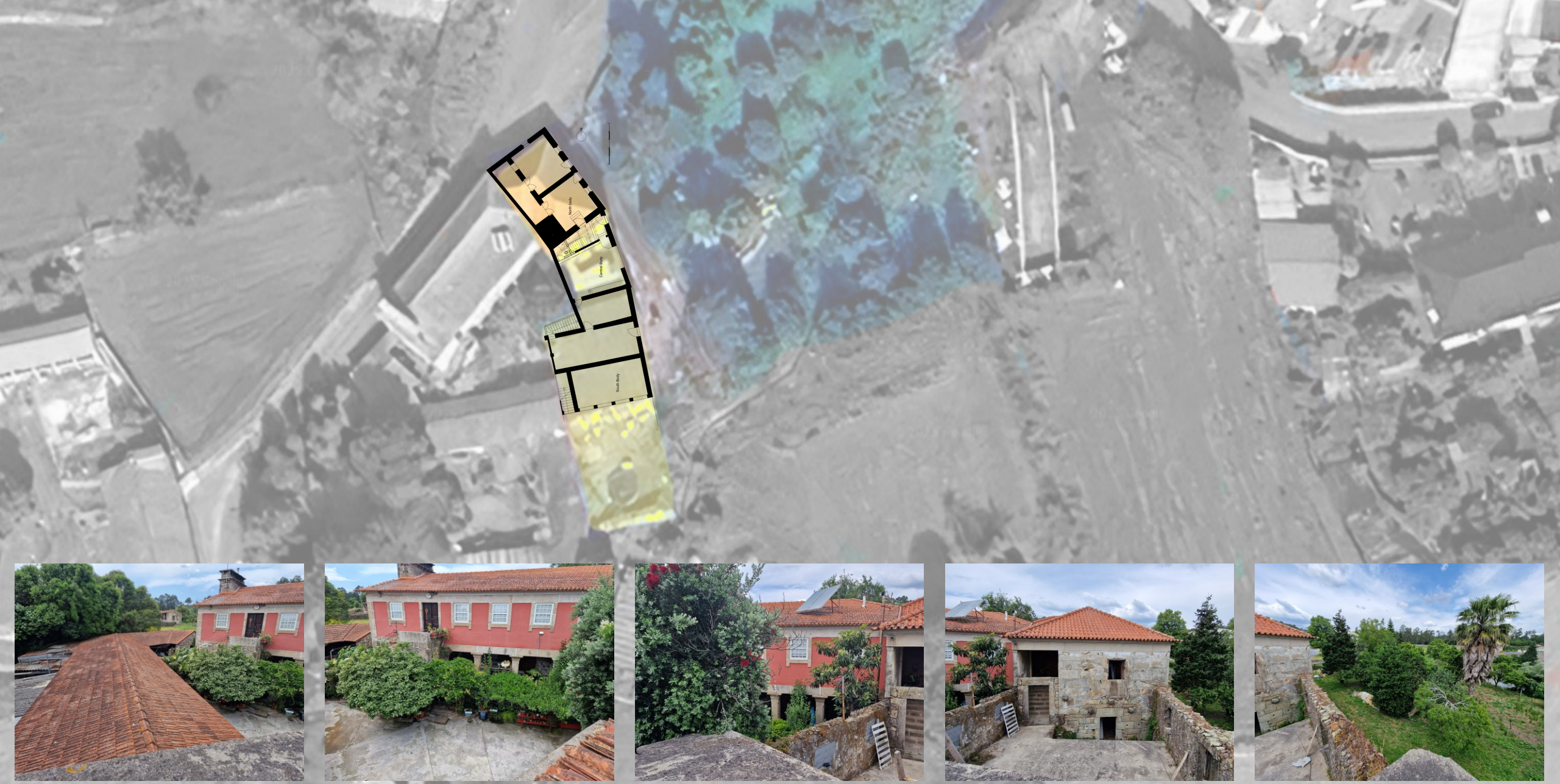

1990s


2000s

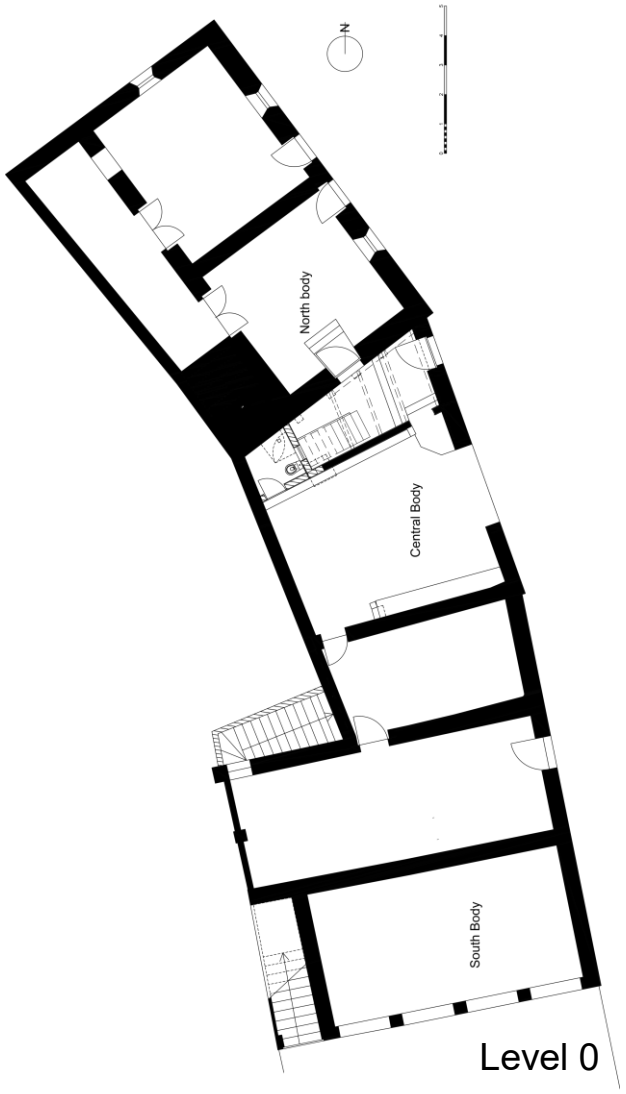
Casa do Laranjeira/Orange tree house agricultural complex

Casa do Laranjal / Orange grove house

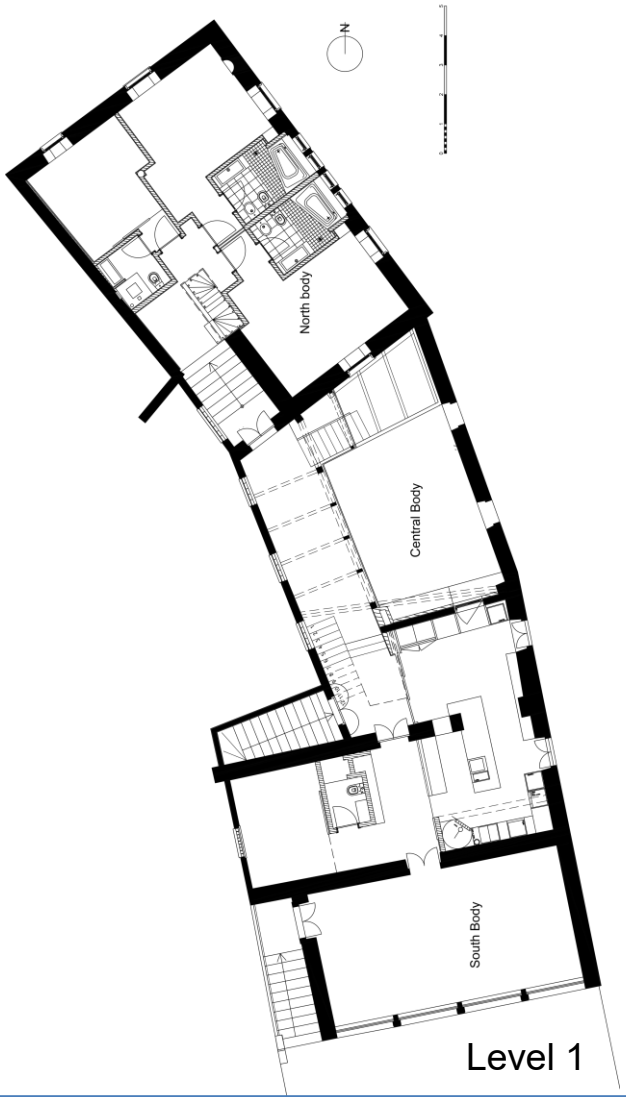

North Body
Central Body
South Body


North Body
Central Body
South Body


North Body
Central Body
South Body



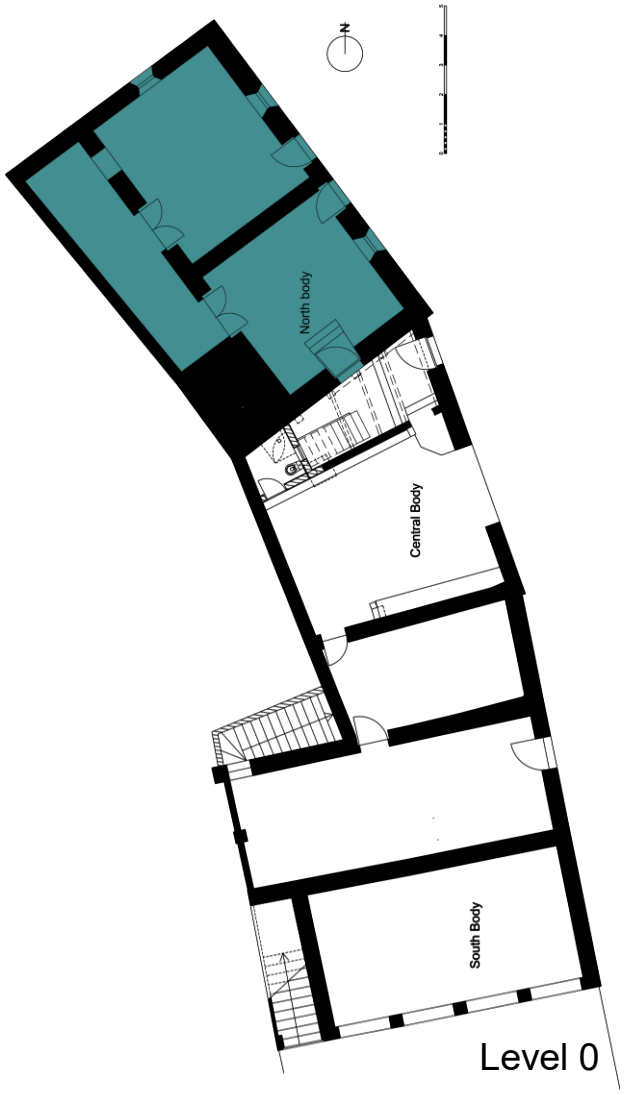
Level 0



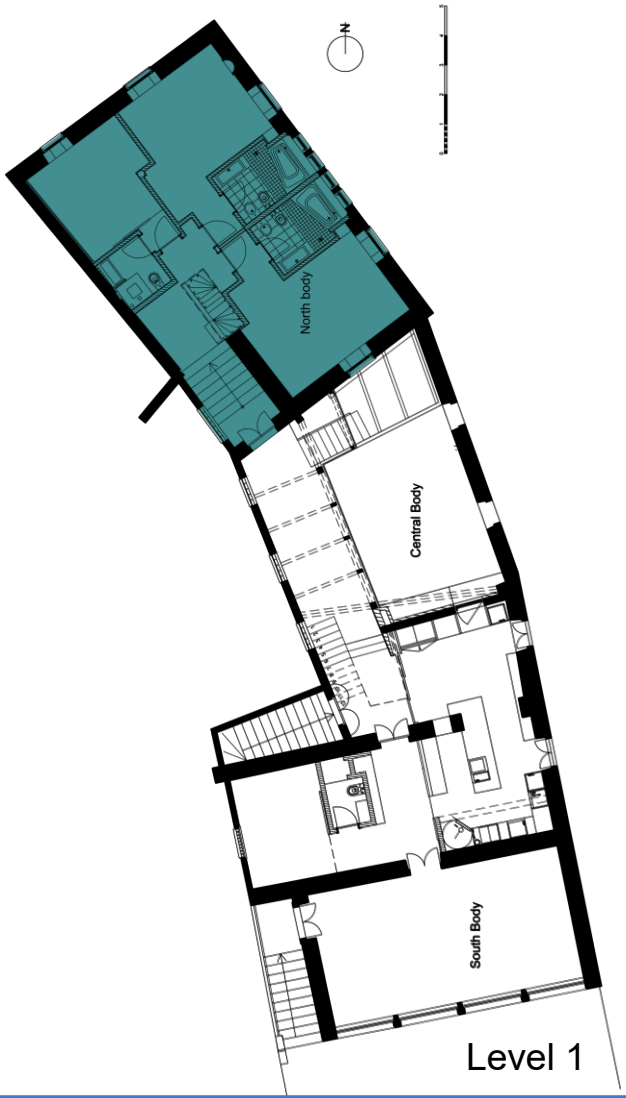
Level 1

North Body

Built in 1777
2000s intervention



Level 0



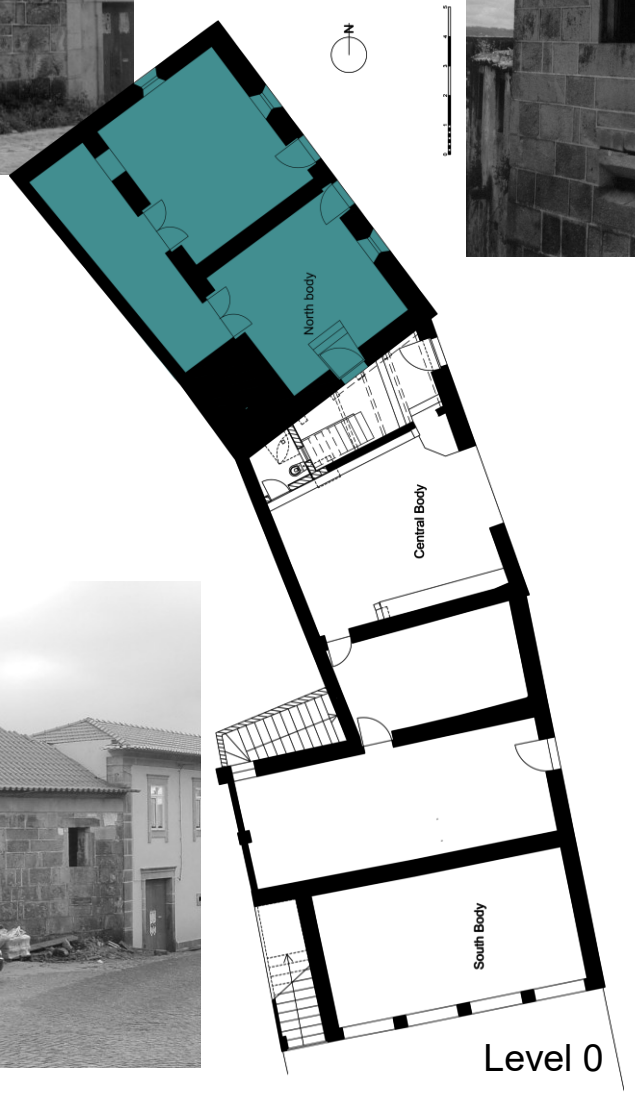
Level 1

North Body

Built in 1777
2000s intervention

1990s

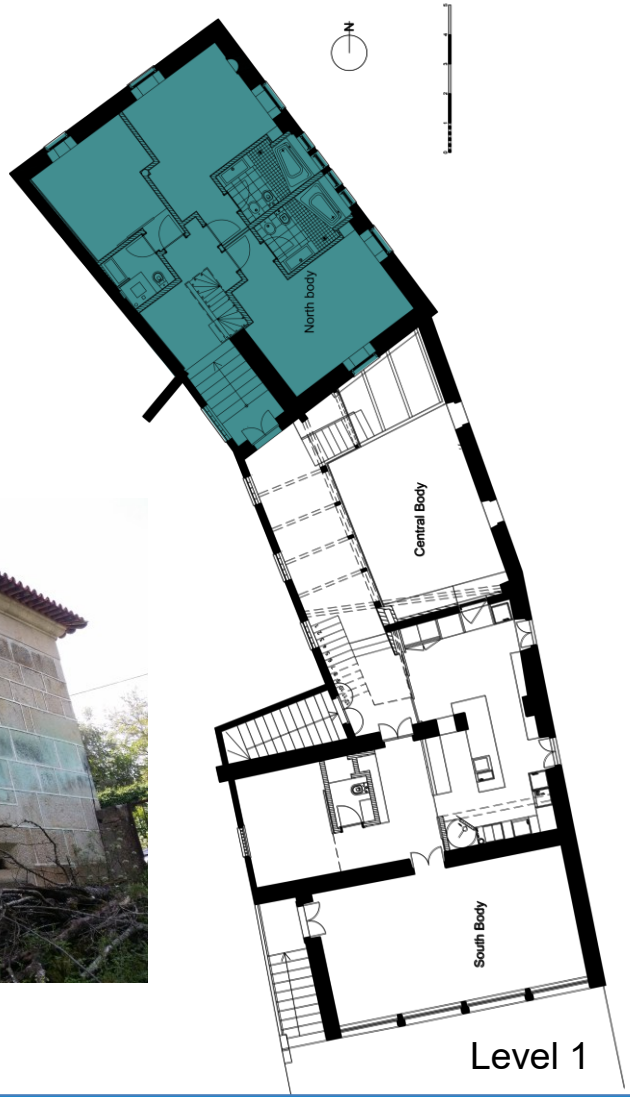
1990s



Level 0

2000

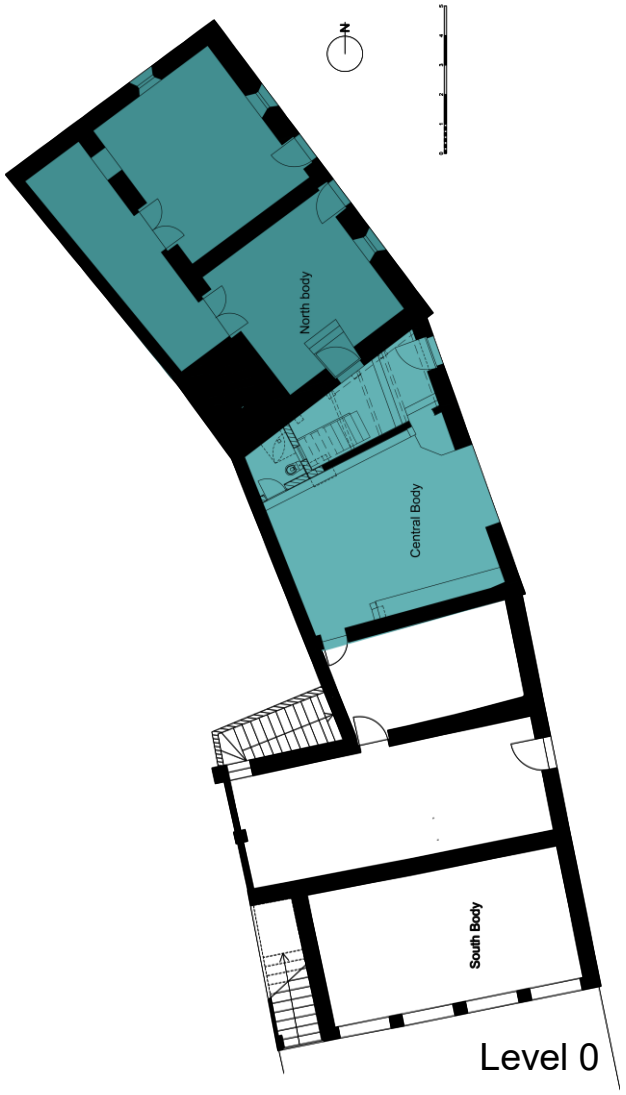
2007



Level 1

Central Body

Built in 18??
1950s intervention



Level 0

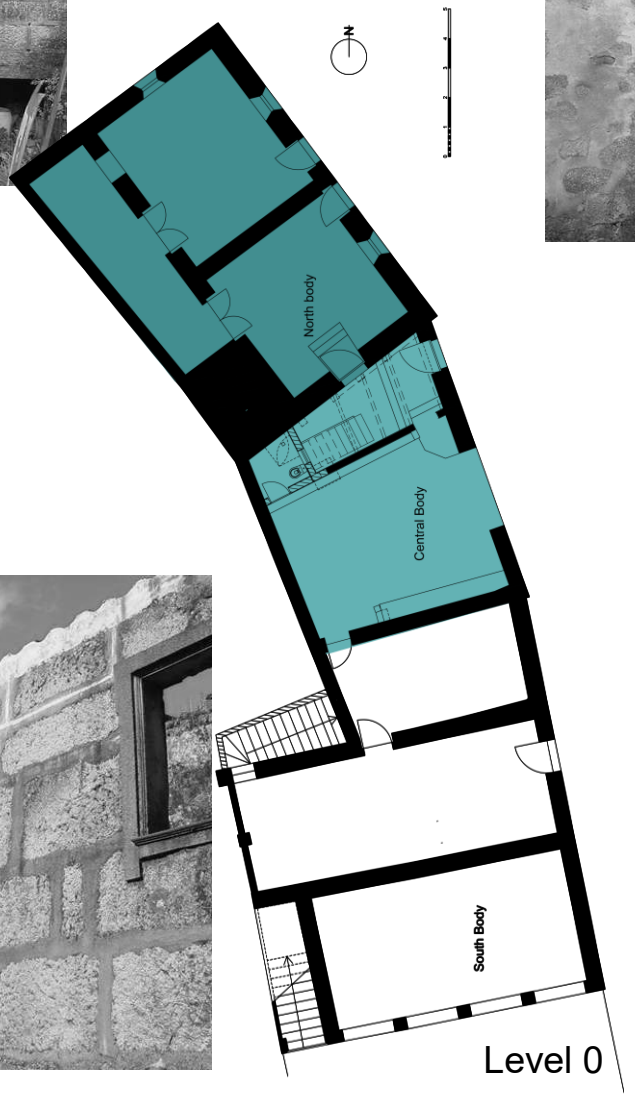
Level 1

Central Body

Built in 18??
1950s intervention

2000

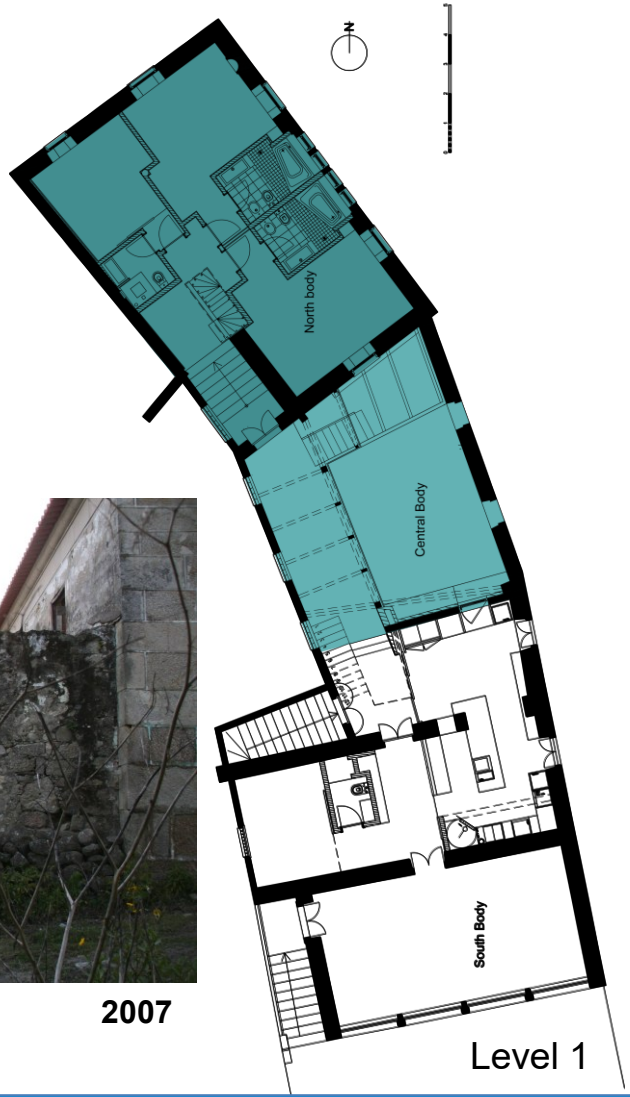
2000



Level 0

2000

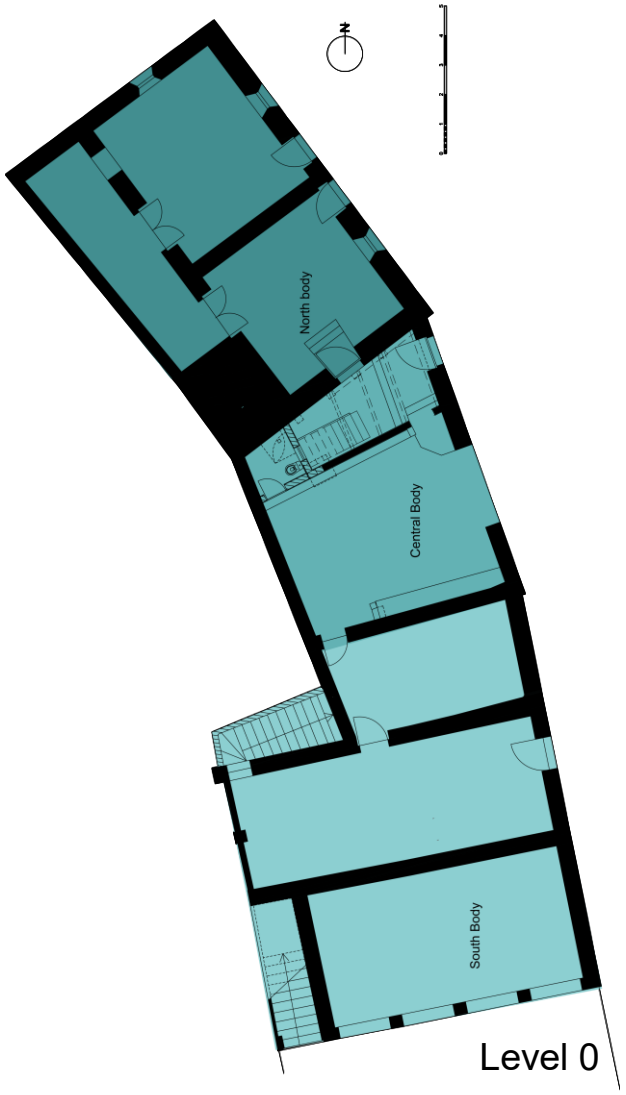
2007



Level 1

South Body

Built in 1861
1970s intervention



Level 0

2000

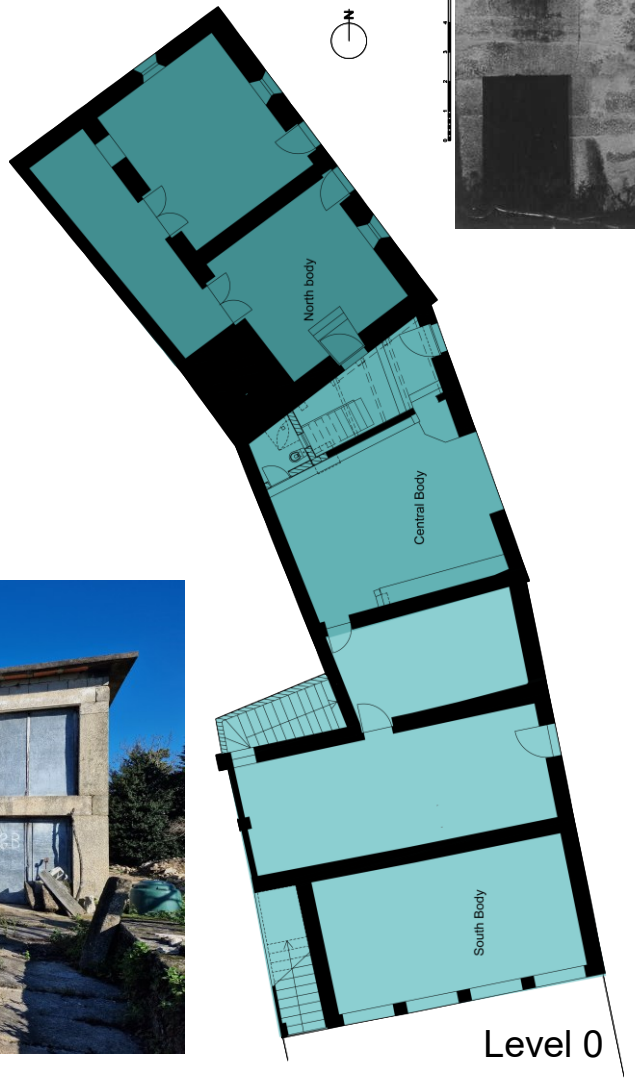
Level 1

South Body

Built in 1861
1970s intervention

1960s

1990s



Level 0

2000

Level 1

2023

2023 onwards intervention

Designer and owner as the same person

Project and the construction work as a test / laboratory

- reducing the impact of buildings

- use of traditional materials and constructive systems

- reuse/repurpose of existing, donated or purchased materials and components.

2023 onwards intervention

Designer and owner as the same person

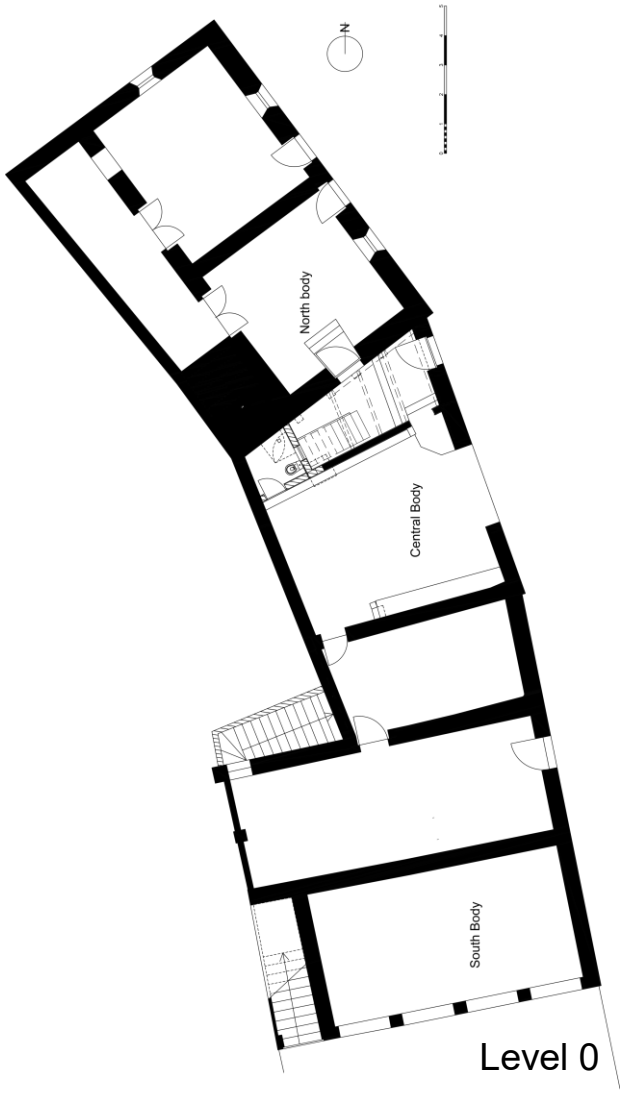
Project and the construction work as a test / laboratory

- reducing the impact of buildings

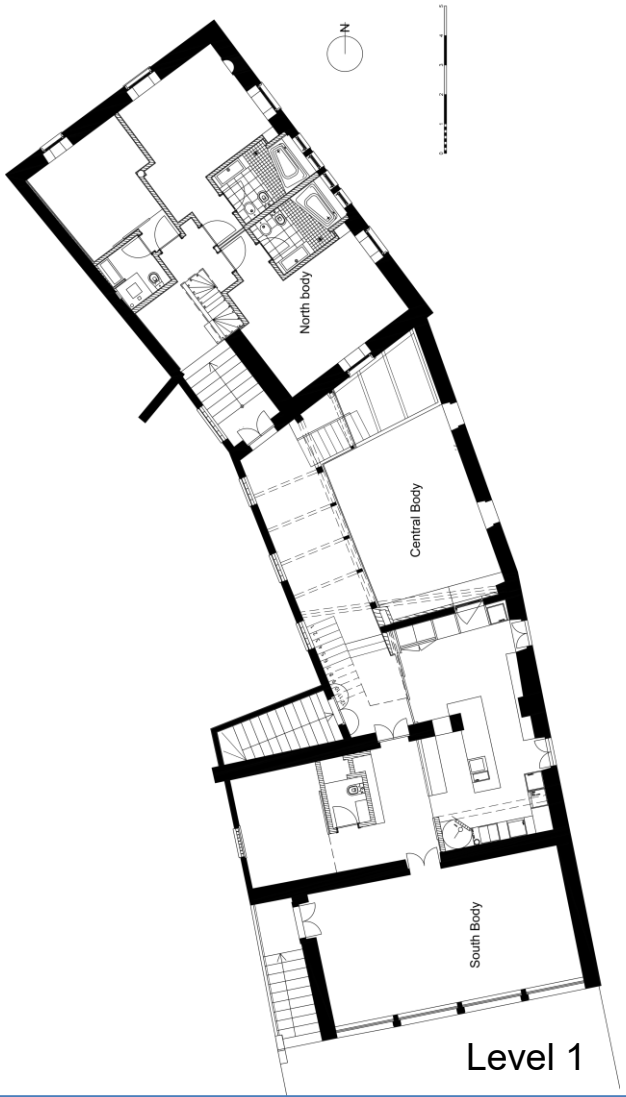
- use of traditional materials and constructive systems

- reuse/repurpose of existing, donated or purchased materials and components.

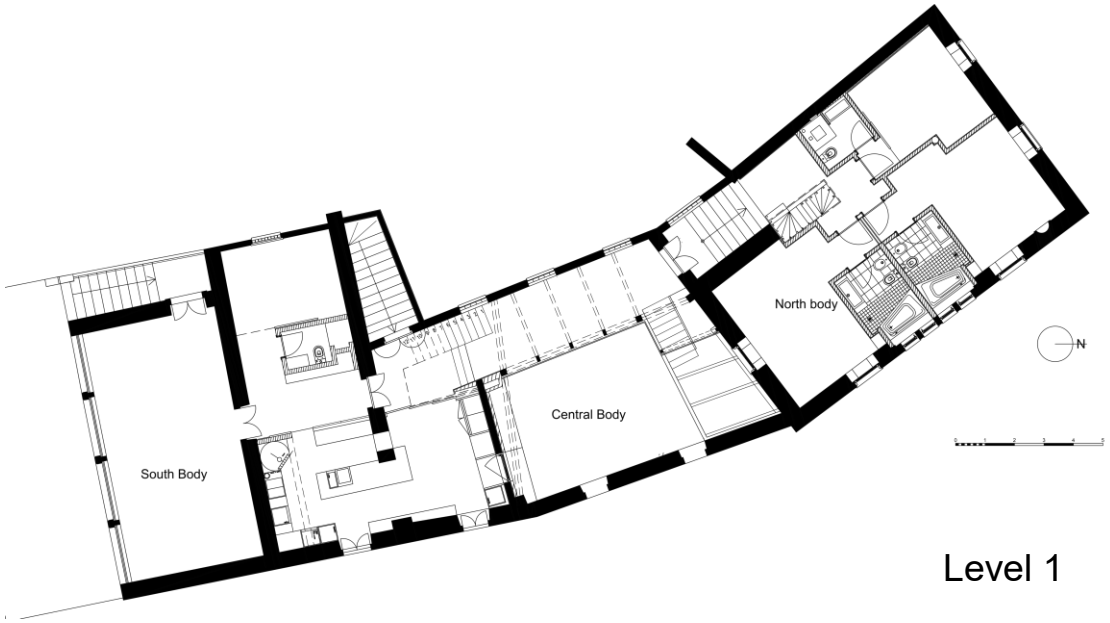
Construction work accompanied 100% of the time



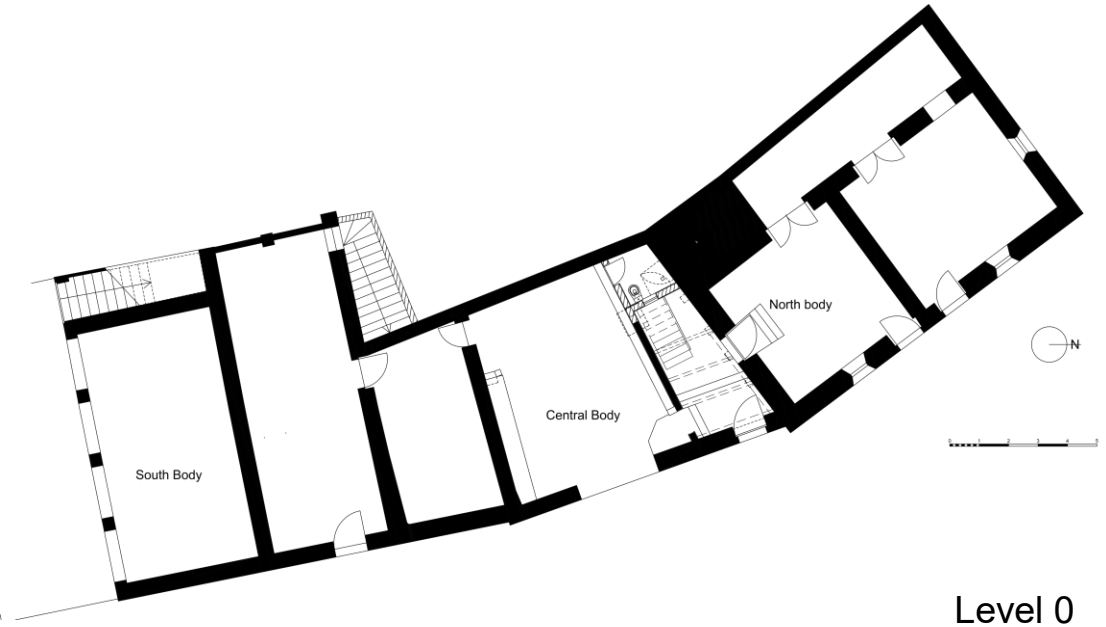
Level 0



Level 1

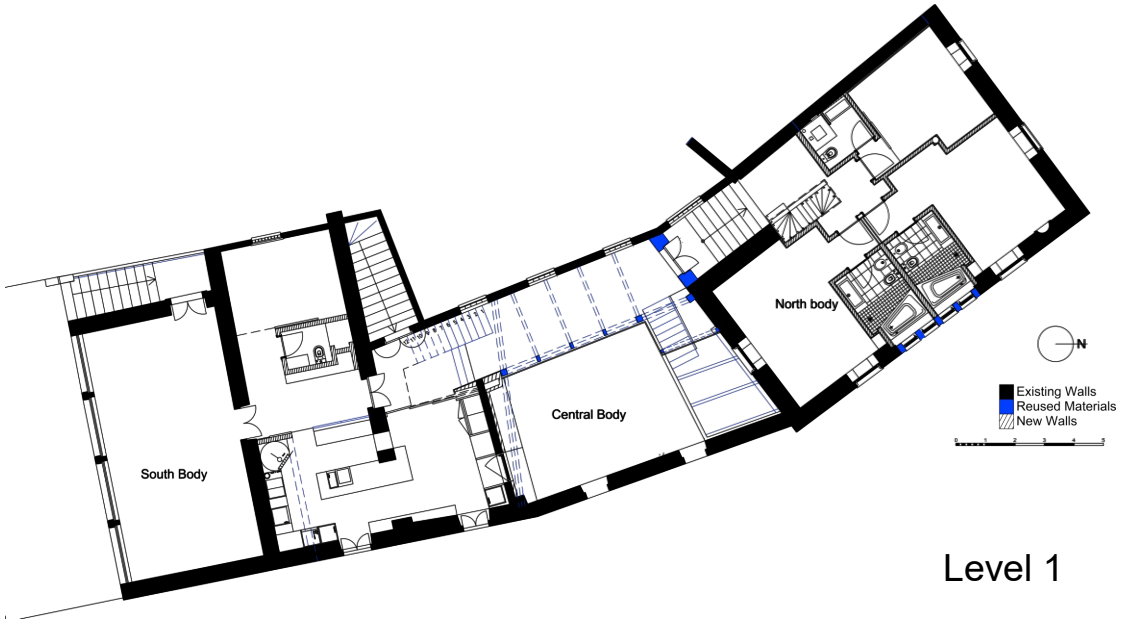


Level 1

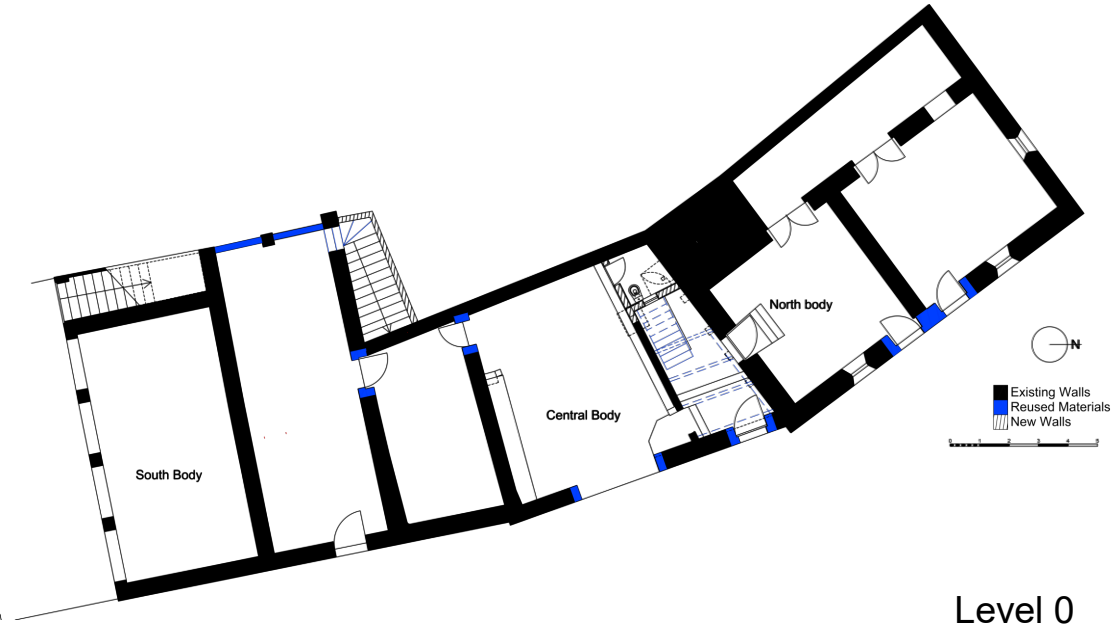


Level 0

Available materials: Stone



Level 1

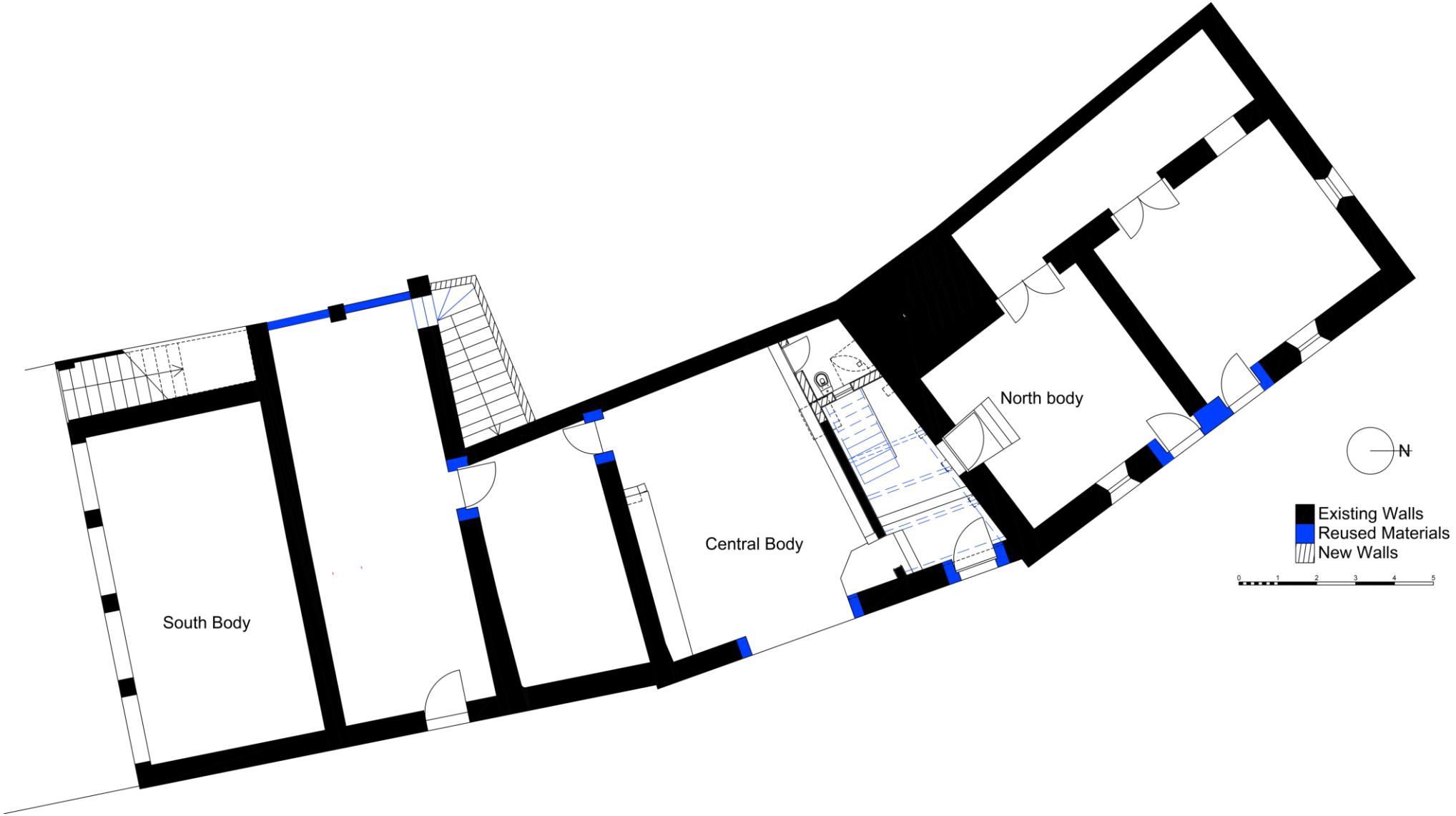


Level 0

Material	Component	Quantity			Unity	Dimensions	Reuse location
		Available	Used	Planned			
Wood	Beams	20		3 + 9	un.	variable (3-6m long)	CB
	Windows	8		8	un.	variable	NB, CB, SB
	Doors	10		10	un.	variable	NB, CB, SB
	Shutters	4		4	un.	variable	NB
	Floorboads (sawn)	30		5	m2	variable	CB
Granite Stone	Door lateral stones	14	11	3	un.	2x,25/0,40x0,60m	NB (6), CB (8)
	Window lateral stones	5	5		un.	1,2x0,20x0,30m	NB (5)
	Lintels	20	10		un.	0,60 m wide	NB (7), CB (3)
	Stone beam	1	1		un.	3x0,3x0,3m	CB (1)
	Stone for masonry		3	5	m2	variable	CB
	Loose Stone		8	20	m3	variable	NB, CB, SB
Steel	I Profil	1	1	0		3,30 m long	CB (1)

Locations: NB - North Body ; CB - Central Body; SB - South Body

Available materials: Stone



Level 0





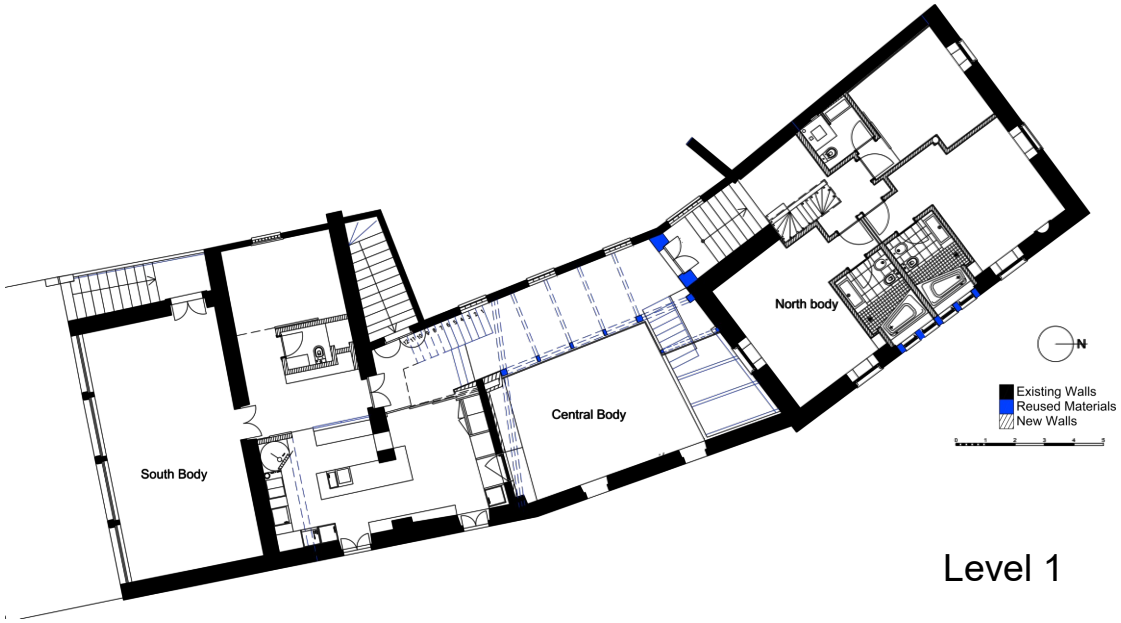
Available materials: Stone



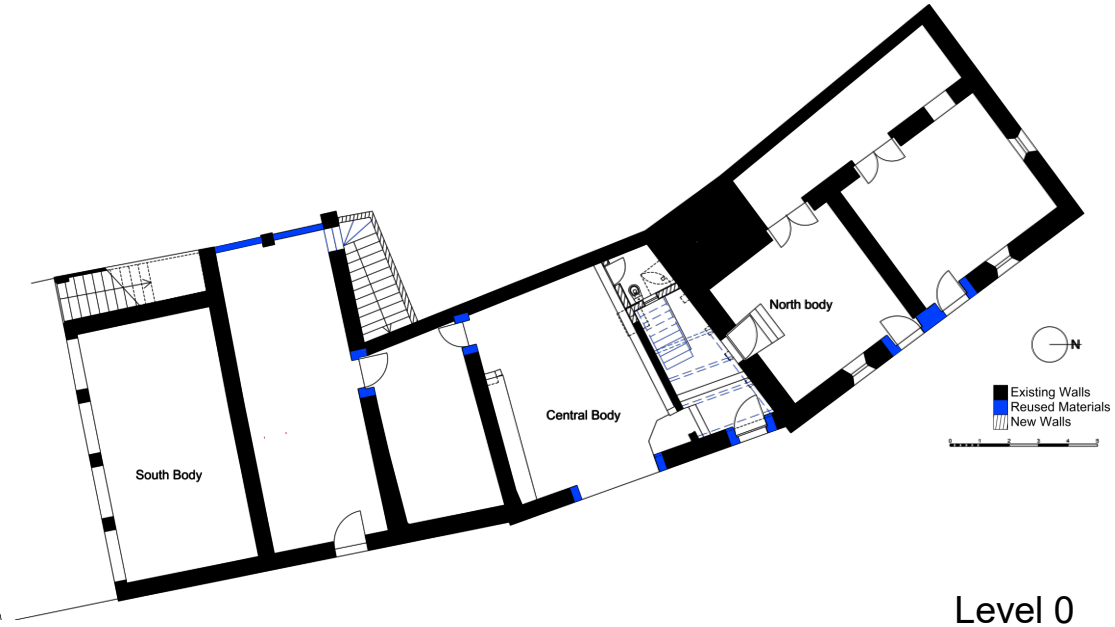


M55
JCB

Available materials: Wood



Level 1



Level 0

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	Shutters	4		4	un.	variable	NB
	Floorboads (sawn)	30		5	m2	variable	CB
Granite Stone	Door lateral stones	14	11	3	un.	2x,25/0,40x0,60m	NB (6), CB (8)
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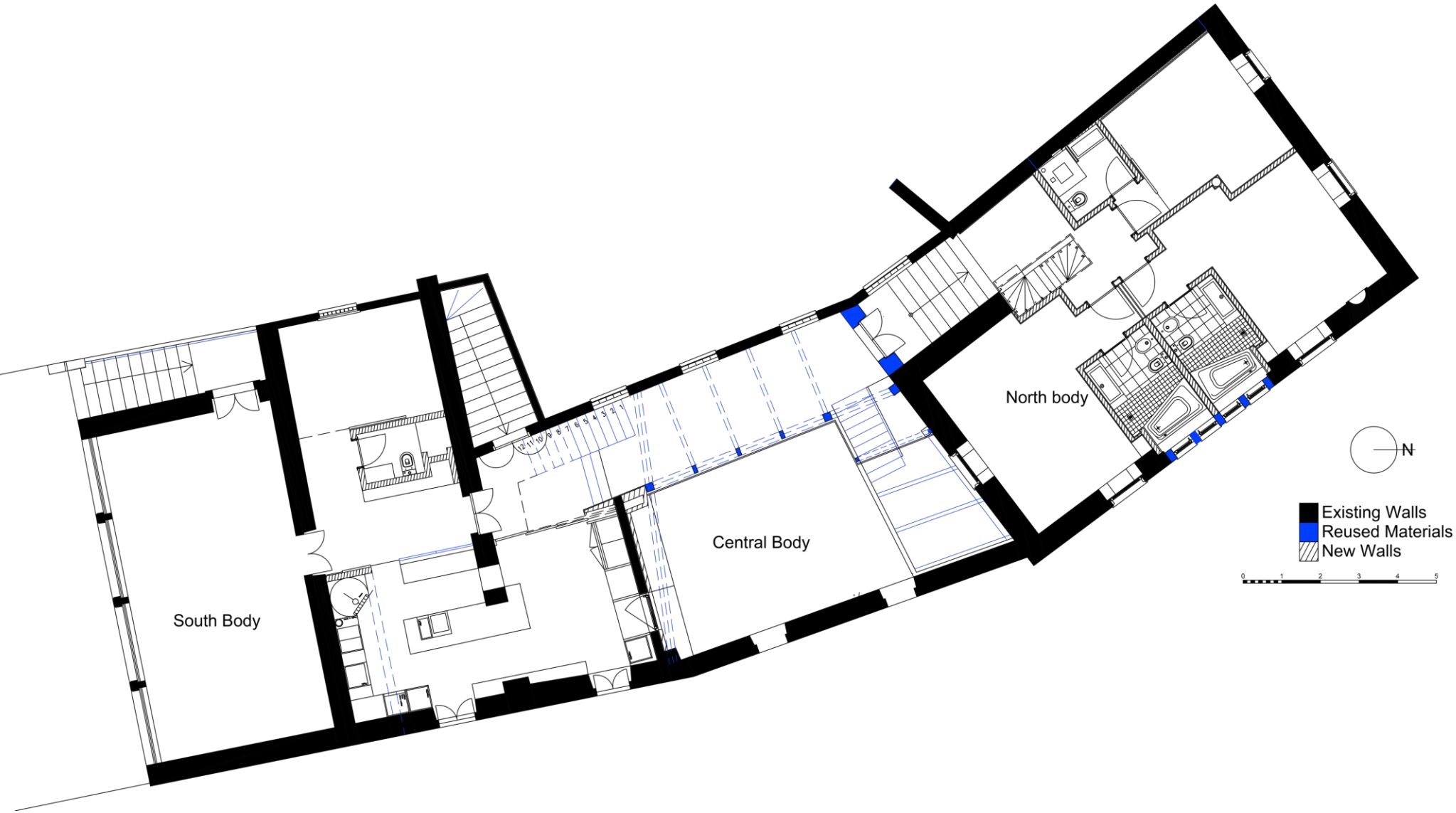
Steel	I Profil	1	1	0		3,30 m long	CB (1)

Locations: NB - North Body ; CB - Central Body; SB - South Body

A painful defeat

My "private supermarket" of reuse components

Available materials: Wood



Planned in the expectation of winning





kangoo

Planned in the expectation of winning

Building a wall around a door

Building a wall around a door

Almost like an epilogue

Almost like an epilogue

Almost like an epilogue

Almost like an epilogue

Acknowledgements

I thank my distant ancestors and my parents who bequeathed me their home and their taste for the cultures of the past.

I would also like to thank those who, as well as sweating, put their love into what they do: Pedro, Rui, Reinaldo, António, Filipe, Cristiano and others.

Clara Pimenta do Vale
Clara_vale@arq.up.pt