

FUTURE OF SUSTAINABLE HOUSING AND ARCHITECTURE

Associate Professor
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**SUSTAINABLE
TRANSFORMATION OF
URBAN
ENVIRONMENTS**

A RESTORATIVE 2030 VISION

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ABOUT ME

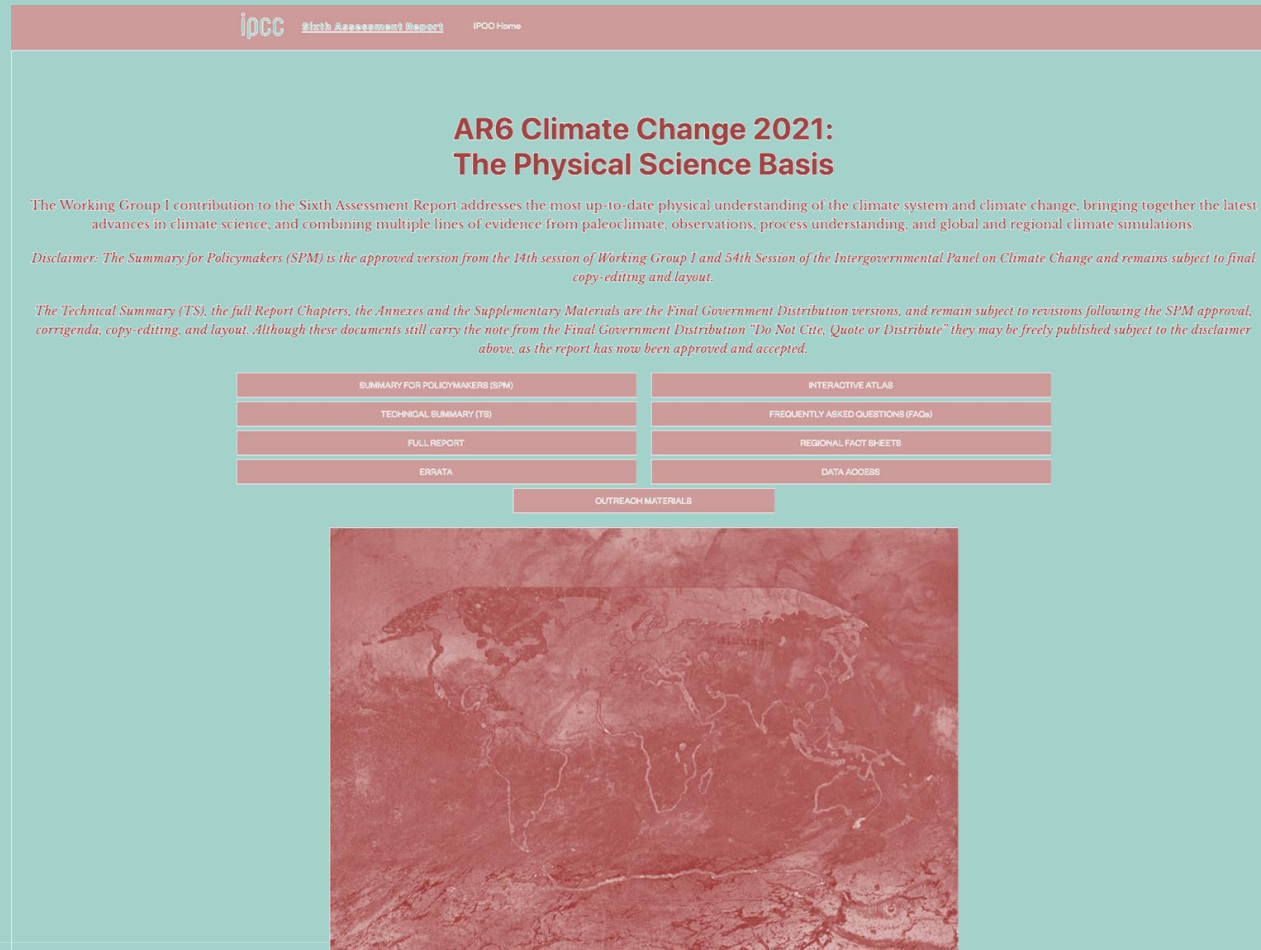
- Dedicated the past 20 years to sustainable architecture, especially, low-energy, affordable housing
- I bring experience from Belgium, UK and Denmark – now Finland!
- Associate Professor in Sustainable Housing Design, Chair of the ASUTUT research group
- **We study and re-imagine responses to current and future predicted societal and environmental challenges, and we investigate the implications in living environments**
- Part of Tampere University's Profiling area **Sustainable Transformation of Urban Environments (STUE)** – **we are creating new solutions** through multidisciplinary research, new concepts and community involvement <https://projects.tuni.fi/stue/>

CONTENT

- Societal and environmental crises we face
- Why we need **restorative design**
- Exemplary developments in Finland
- Room for improvement to achieve restorative design
- Summary

SOCIETAL AND ENVIRONMENTAL CRISES WE FACE

THE CLIMATE CRISIS



August 2021+ April 2022: IPCC (Intergovernmental Panel for Climate Change) released their 6th report

They issued a **‘Code Red’** because climate change is widespread, rapid, intensifying, and some trends are now irreversible (e.g. ice melt, sea level rise)

But the message was also clear that there is still time to limit further climate change. That time is now.

CLIMATE CHANGE IS NOT FAR INTO THE FUTURE... IT IS HERE ALREADY

- globally we reached 1.2°C in 2020! → close to the 1.5°C limit!
 - Finland & arctic region: increase of 2.4°C
 - Not just warming but a combination of changes:
 - Increased SEA level rise & SUPER STORMS → flooding, damage to infrastructure
 - SUMMER: increased rainfall, more sunshine and heatwaves → flooding, buildings overheat
 - WINTER: milder, more rainfall (less snow, mental health implications) → local flash floods inland, loss of life and property; increased moisture damage (leading to e.g. mould growth)
- Impacts on nature and ecosystems and the built environment
- Affects human health and well-being and lives
- Affects our economies and business models

BUILT ENVIRONMENT PLAYS MAJOR ROLE

- 36% of CO₂ emissions in EU are associated with the built environment
- In Finland, housing, mobility and food account for two thirds of CO₂ emissions
- Finland aims for a carbon neutral society by 2035, Tampere city by 2030
- **Countries cannot be carbon neutral without also the built environment urgently transforming**

Finland wants to be carbon neutral by 2035. But how will it get there?

Finland hit the headlines earlier this year when the incoming government announced a target of zero net carbon emissions by the year 2035.

Share



WHAT IS NEEDED:

TRANSFORMATIONAL CHANGE

(NO MORE SMALL CHANGES)

(EU Environmental Protection Agency)

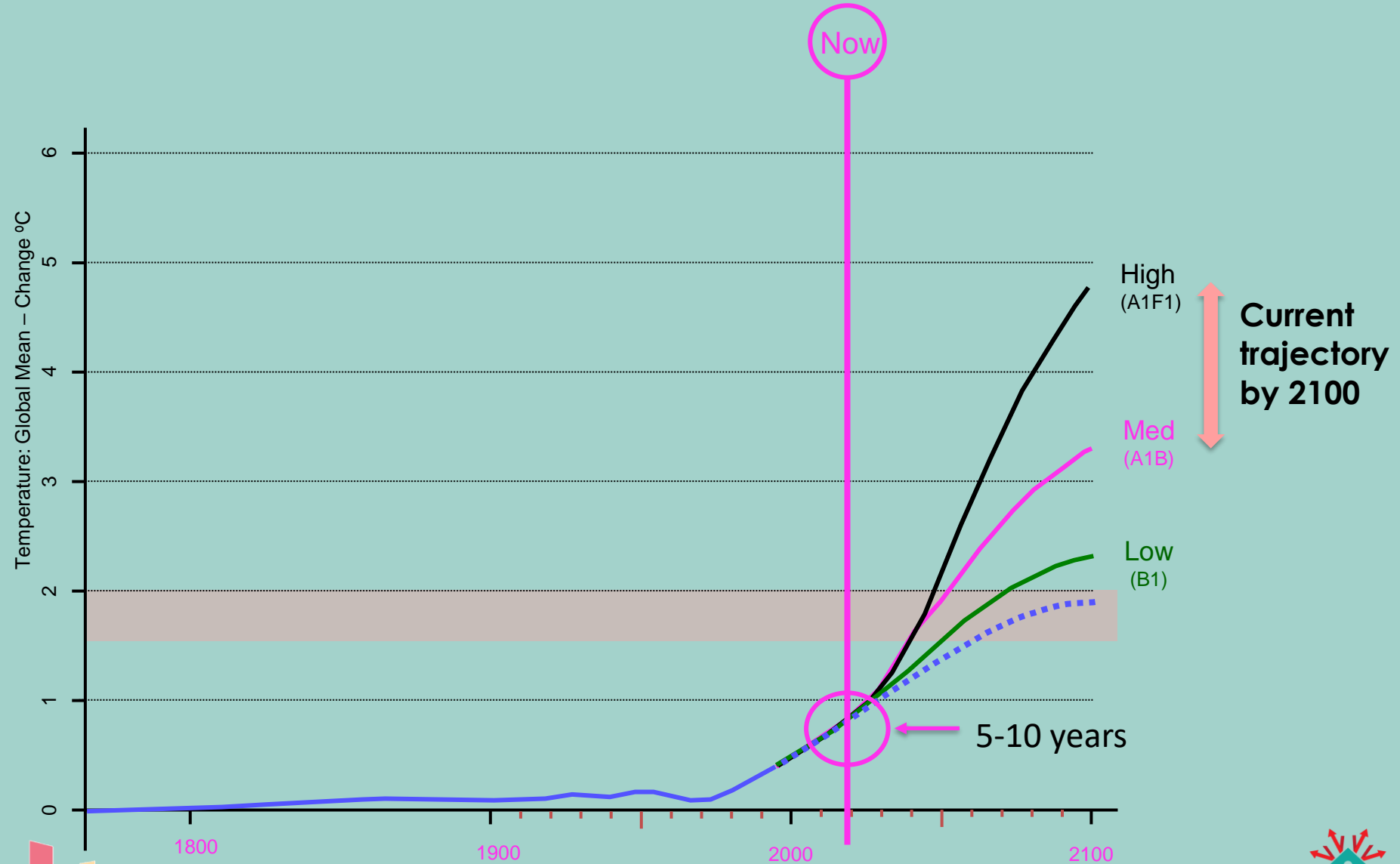
The time to act is **NOW**

NOW: we can still shape the future

Graph adapted from Andy Macintosh

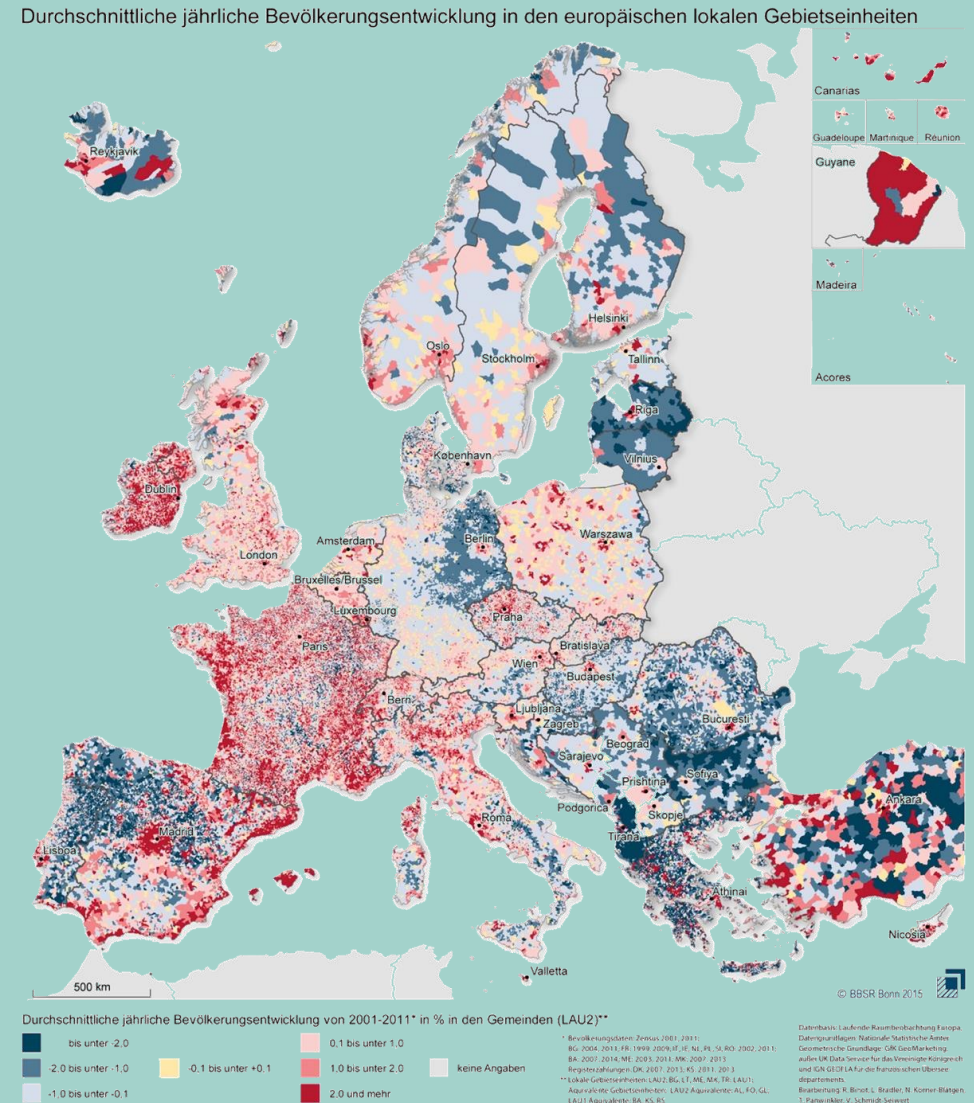
Project Architect Feilden Clegg Bradley

Globally, governments agree that limiting global warming to a 2°C rise is essential. (Ideally 1.5°C)



OTHER KEY SOCIETAL CHALLENGES WE FACE

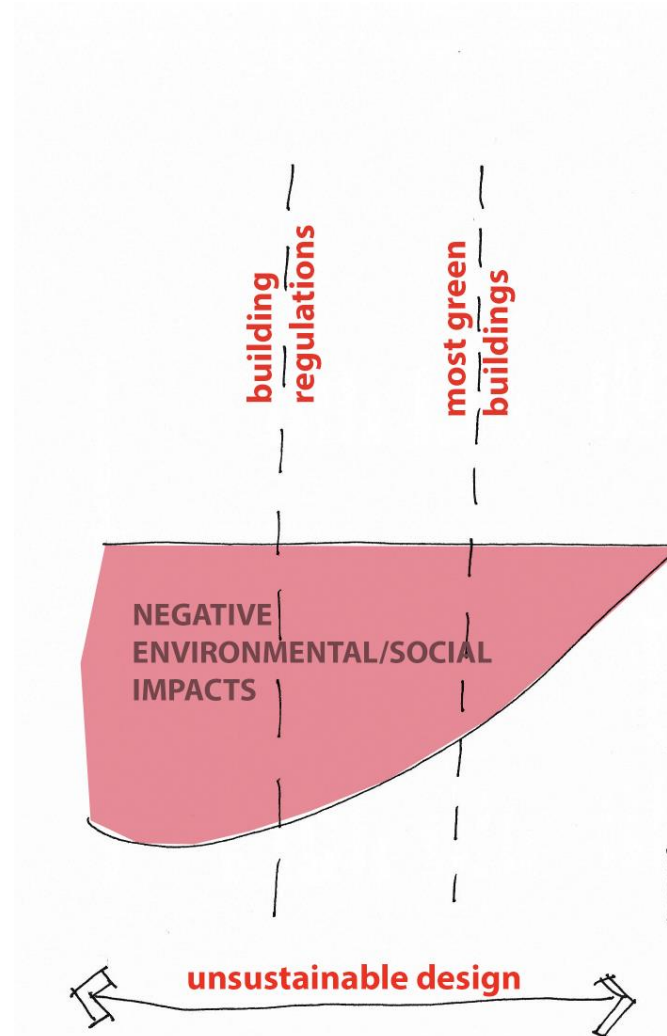
- **Biodiversity loss** – what does it mean for integrating other species in our cities?
- **Increased ageing population**, not always in good health: what does it mean for our cities and spaces?
- **De-growth areas**: internal migration - ageing infrastructure & left-behind residents
- **Integrating new people** in existing urban settings (e.g. climate / conflict refugees) → requires designing buildings and urban spaces **for diversity and with flexibility (ability to change)**
- **Equity issues: uneven access**



WHY WE NEED RESTORATIVE DESIGN

WE NEED RESTORATIVE ARCHITECTURE

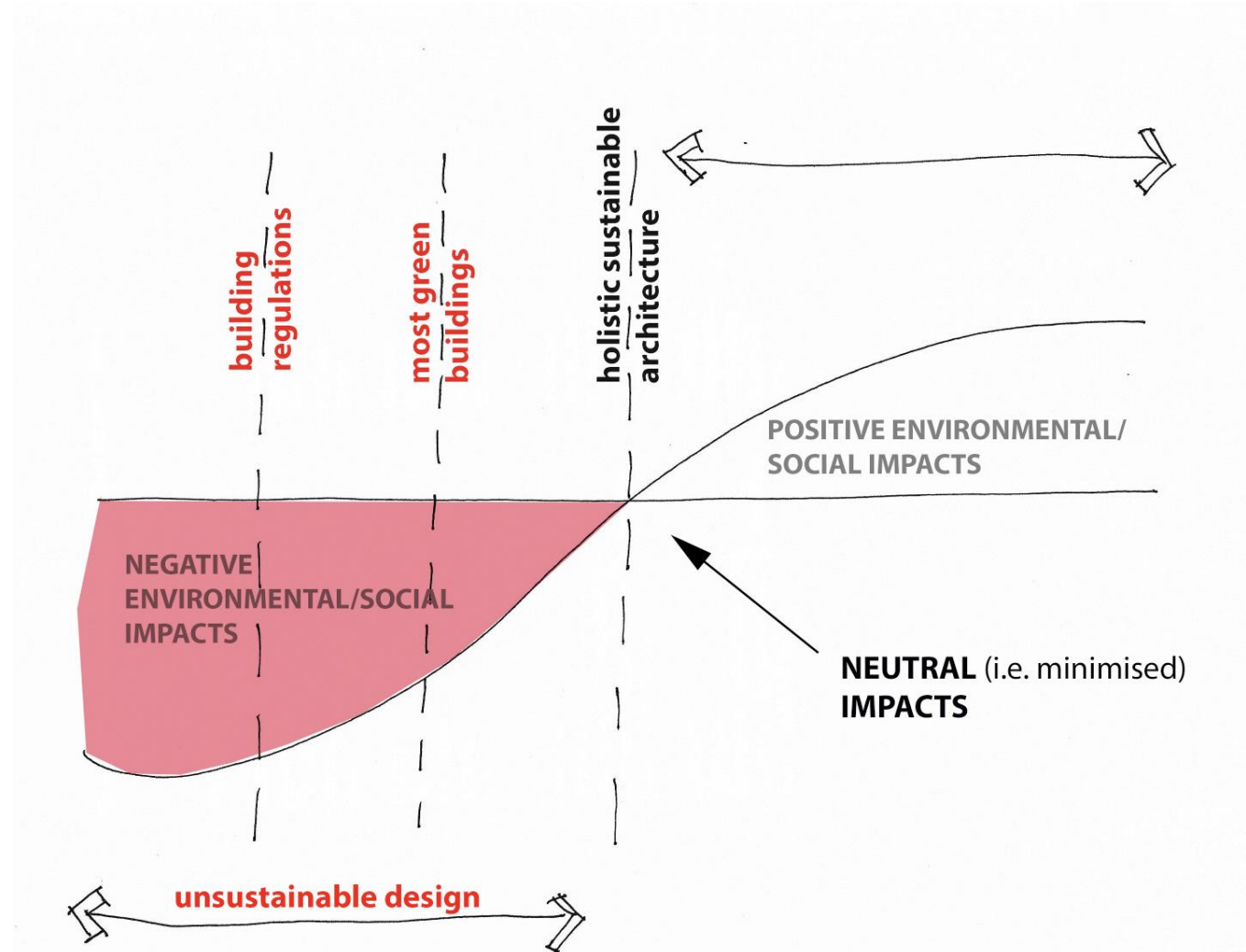
Restorative development means....
reversing damaging processes of the
current design, but also
offsetting aspects of previous damage



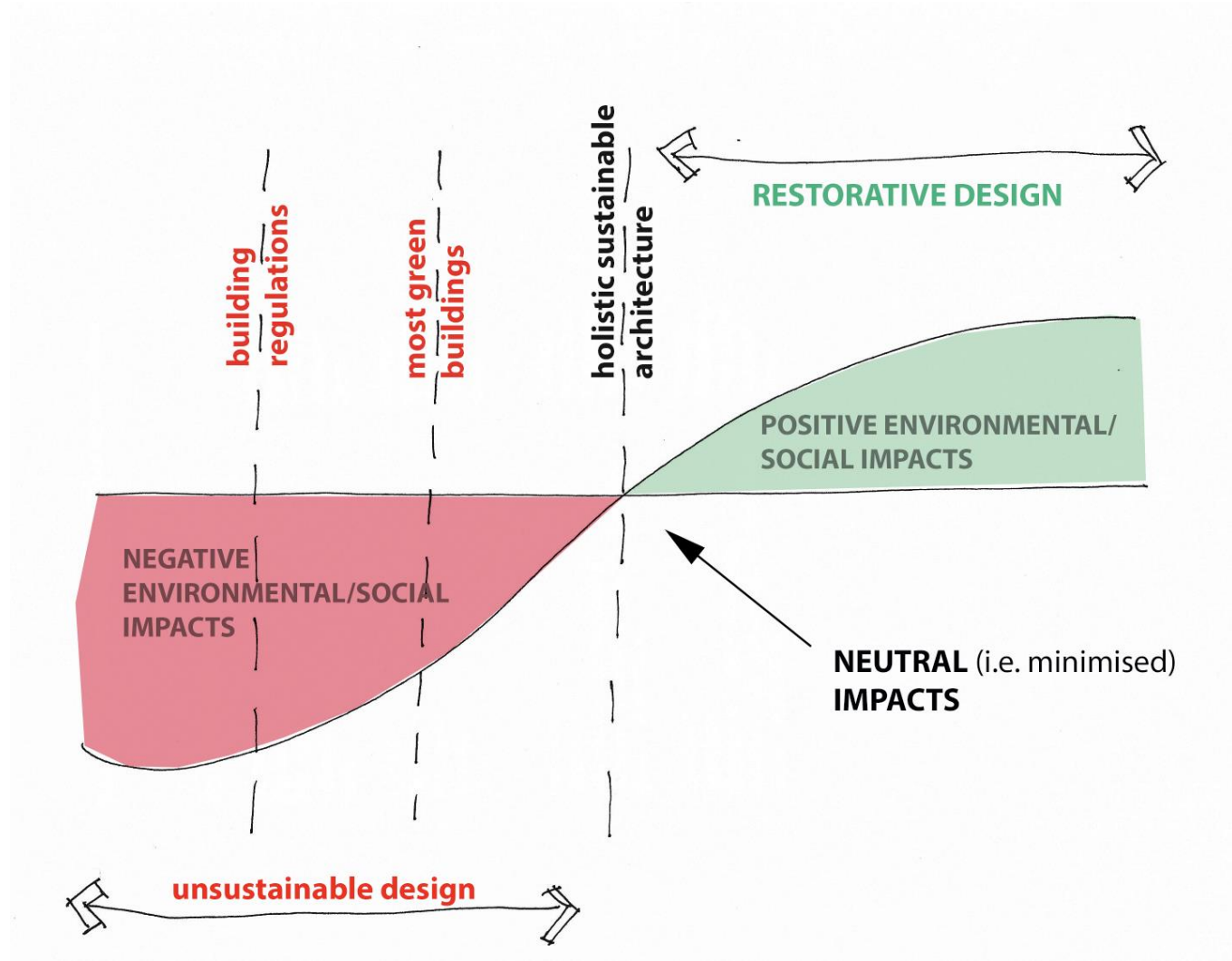
MEETING BUILDING REGULATIONS IS
THE WORST WE CAN GET AWAY WITH

→ STRIVE TO A LOT BETTER!

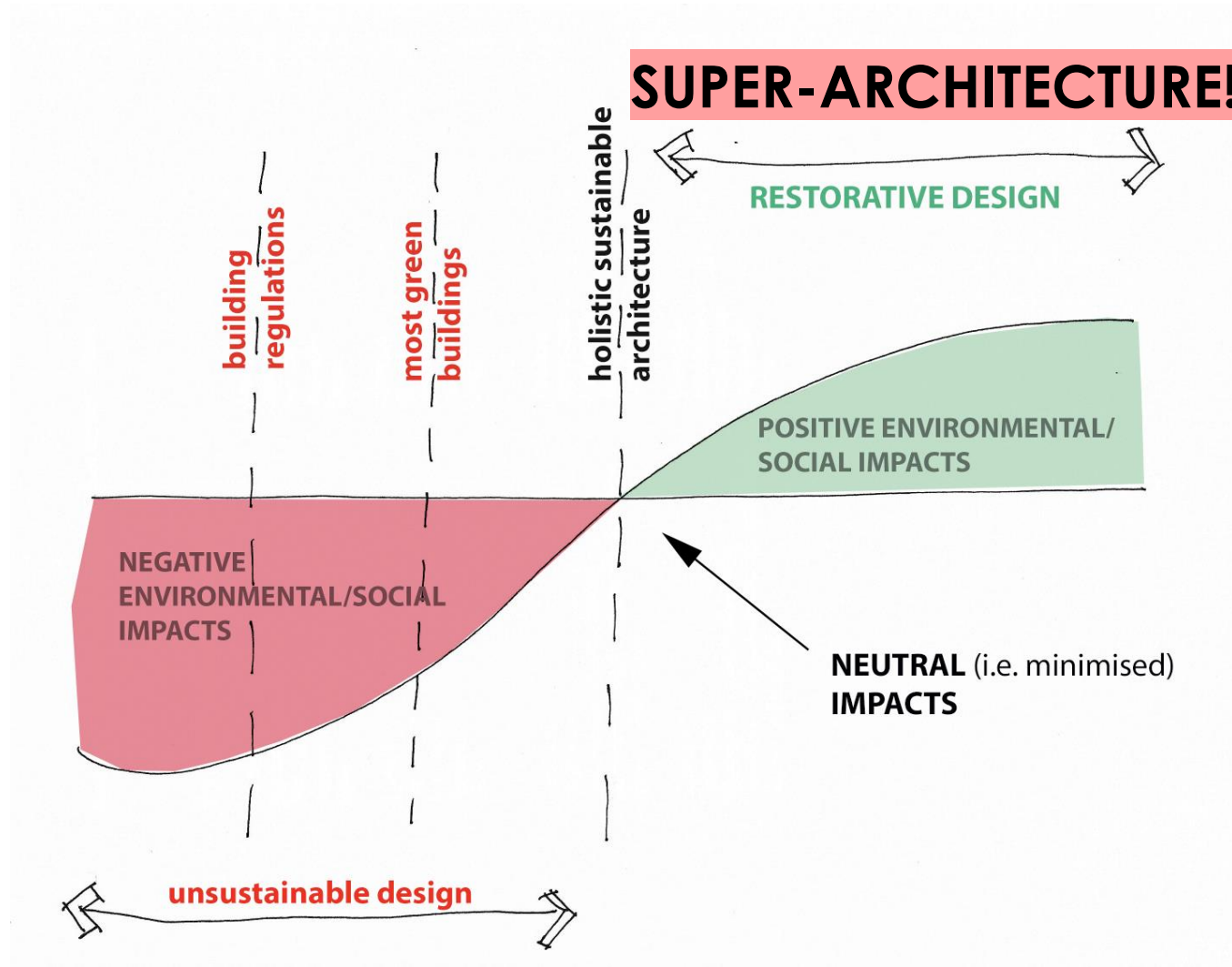
WE NEED RESTORATIVE ARCHITECTURE



WE NEED RESTORATIVE ARCHITECTURE



WE NEED RESTORATIVE ARCHITECTURE



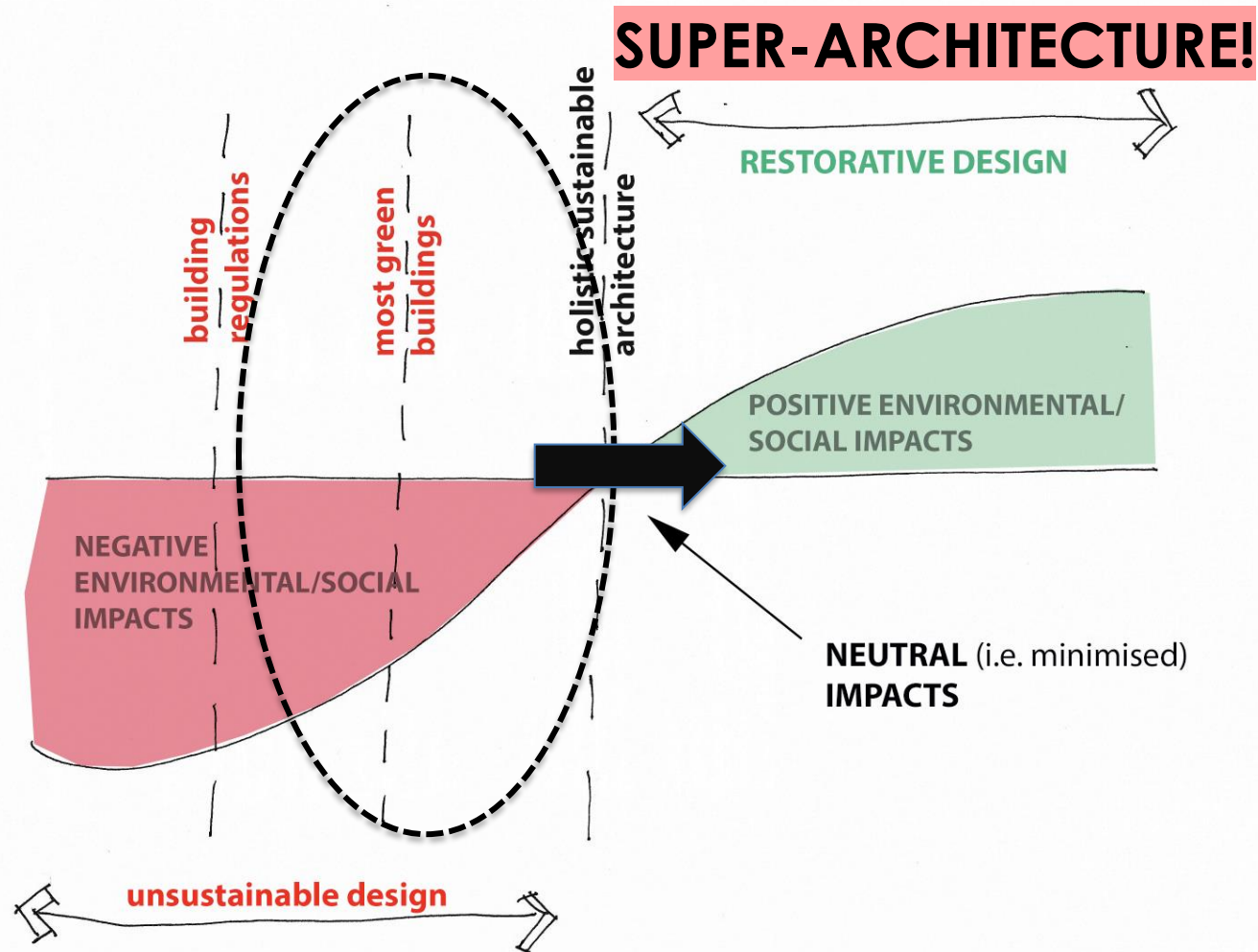
EXEMPLARY DEVELOPMENTS IN FINLAND

FINNISH SUSTAINABLE SUCCESS

- Cleanest air in Europe!
- (almost) tackled homelessness
- Little energy poverty compared to other countries
- Finland has the most ambitious target in EU and policies in place
- Most secure housing / cities in Europe / world? (i.e. bomb shelters)
- Tampere: district heating being decarbonised, Rattika sustainable mobility
- Finland is leading the way in:
 - embodied carbon legislation
 - timber construction methods
 - fabric energy efficiency standards (though still room for improvement to reduce operational energy further)
 - Exemplary at technical sustainability and engineering solutions (e.g. ventilation systems)

BUT ROOM FOR IMPROVEMENT TO ACHIEVE RESTORATIVE DEVELOPMENT

(7 key areas)

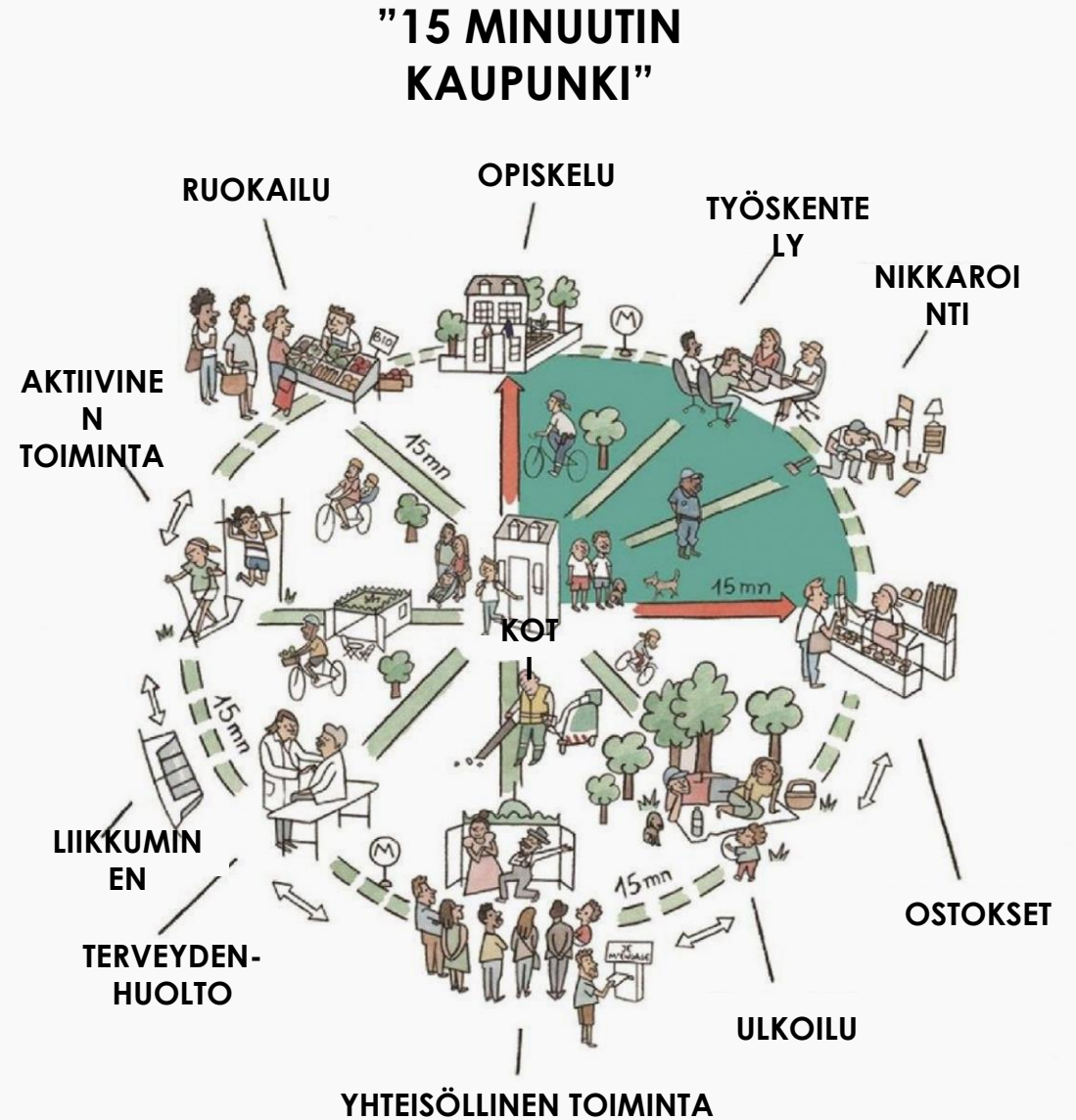


BETTER ORGANISATION OF THE CITY

1

15 minute city...

... how to transform our existing cities and neighbourhoods towards carbon neutrality in accessible ways?



EXAMPLE: FREIBURG, GERMANY

5000 inhabitants and 600 jobs. Sustainable mobility, few private cars - lots of space for nature and social activities



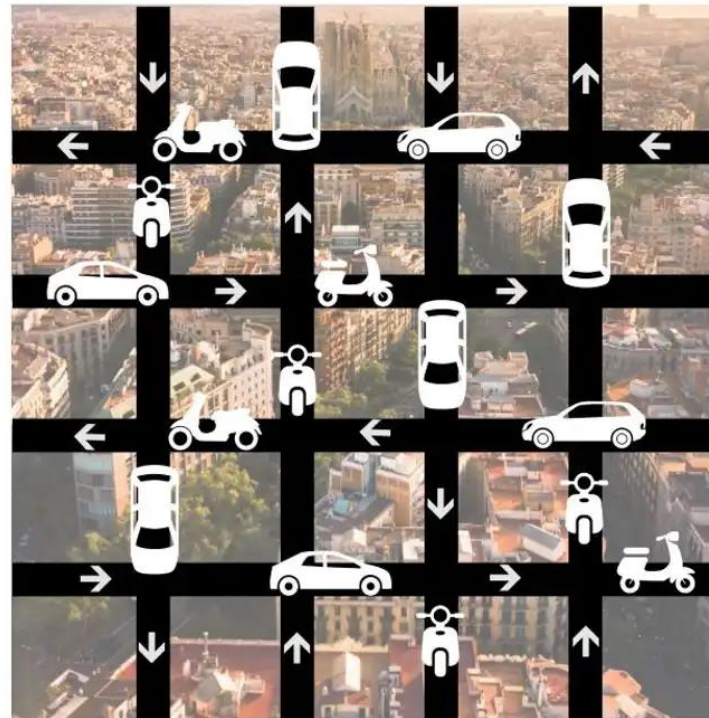
1



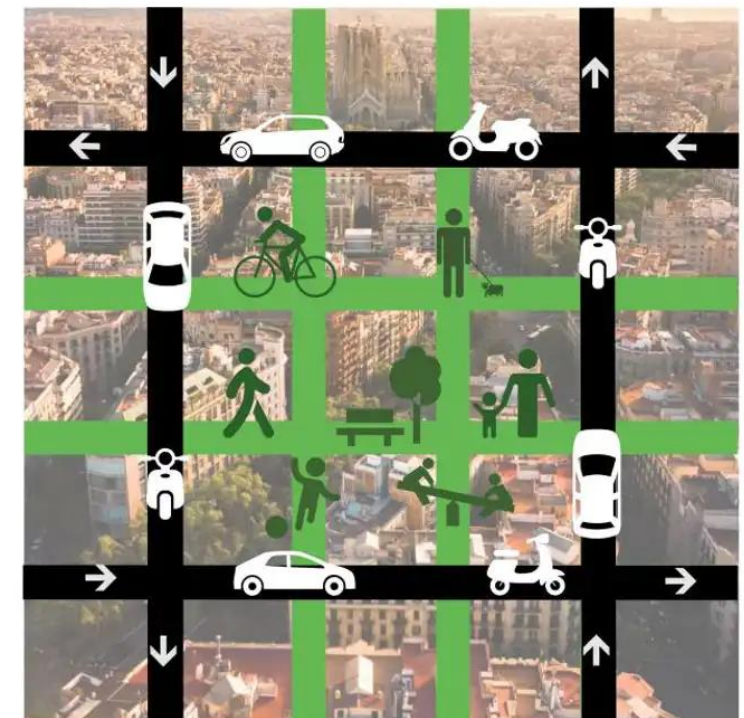
EXAMPLE: BARCELONA SUPER BLOCKS, SPAIN

1

- Motorised vehicles moved to perimeter of 9 blocks
- Streets given over to people and greenery
- **Benefits:** less resource use, less pollution, less noise, opportunities for social infrastructure → more active, healthier residents



Baseline situation

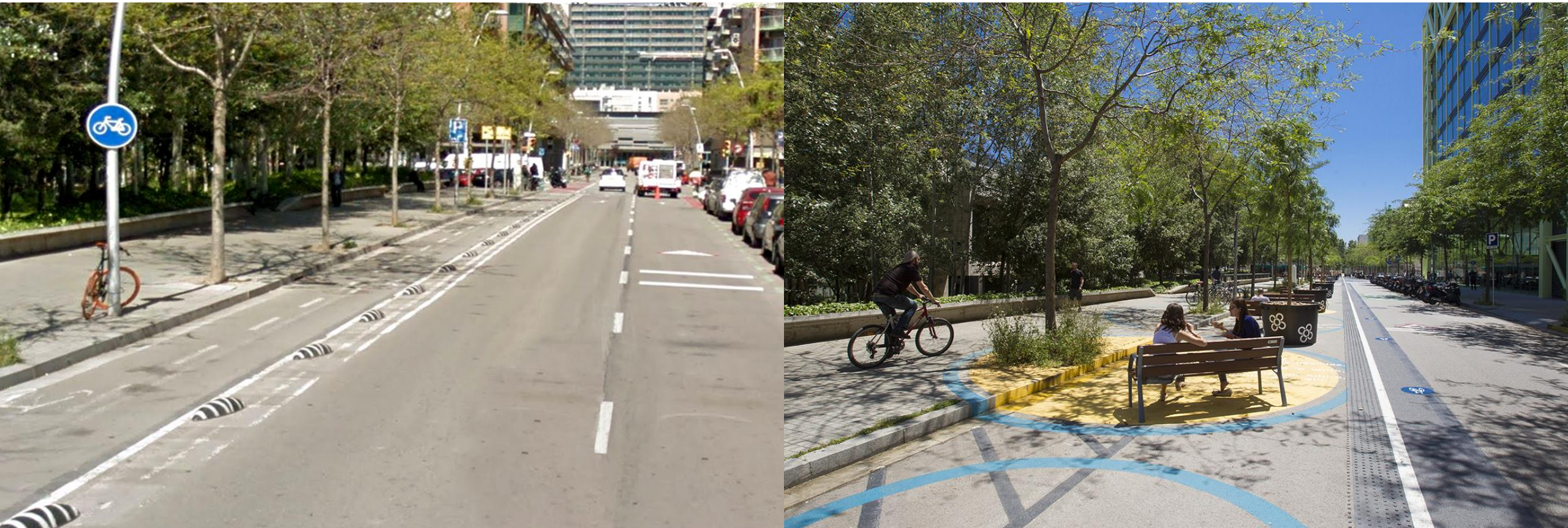


Superblocks model

<https://theconversation.com/superblocks-barcelonas-car-free-zones-could-extend-lives-and-boost-mental-health-123295>

EXAMPLE: BARCELONA SUPER BLOCKS, SPAIN

- Adaptation of existing cities can support **active and sustainable lifestyles**
- **And can help green cities!**



GREENING / REWILDING THE CITY

2

In EACH development we need to create space for humans AND non-humans, and nature.

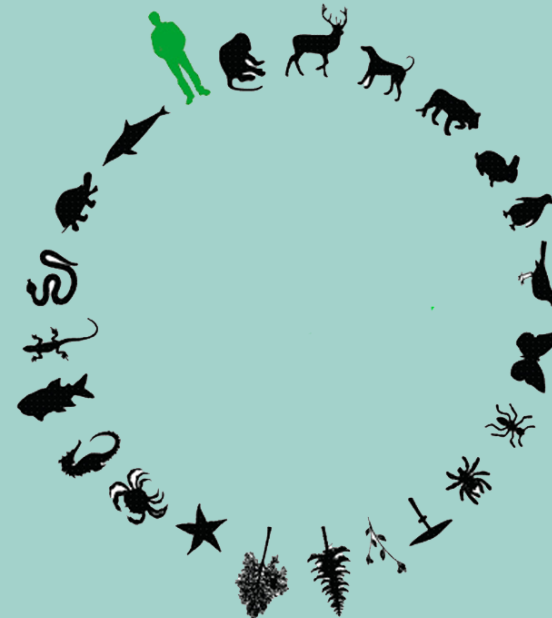
Benefits:

- Protecting natural biodiversity
- Reduced local pollution
- Improved citizen health and well-being (more active citizens, better mental health)
- Local climate change adaptation (e.g. flood and heatwave resilience)
- Mitigation of global climate change

anthropocentrism



Biophilia, radical
inclusivity



WE NEED GREEN AND SPONGE CITIES

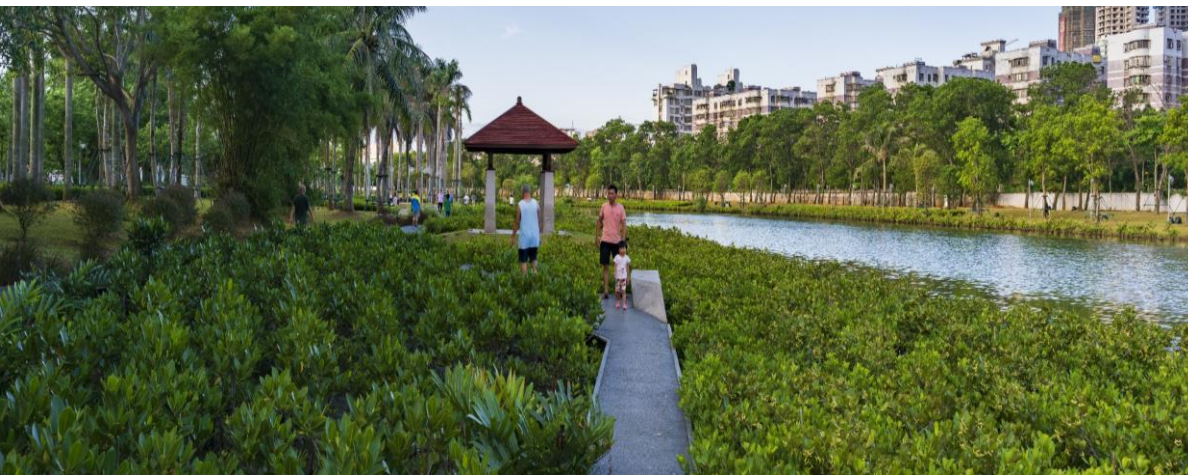
<https://www.turenscape.com/en/home/index.html>

2

TURENSCAPE, China

EXAMPLE:

Removal of concrete defensible barrier, creating accessible waterway for water, other species, humans.



MEISHE RIVER GREENWAY AND FENGXIANG-PUISTO

HAIKOU, CHINA | TURENSCAPE

2



THE VAUBAN, FREIBURG, GERMANY

2

https://www.ecovillagefindhorn.com/docs/Freiburg_Vauban_CarstenSper.pdf

People have much improved mental health when views of nature



BUT OFTEN RECENT CITY DEVELOPMENT IN. FINLAND IS NOT OFFERING MUCH GREENERY (AND REMOVING ACCESS TO IT)

2



otie.fi / asunnot

otie.fi / asunnot

WE HAVE TO STOP 'UN-GREENING' THE CITY

2

Mature city trees cut down to make way for the sustainable Rattika, or new housing: **this is NOT sustainable or restorative**

Today: we need different values, but we still face the consequences of these 'old values'. **We need real evidence-based design** about the true 'costs' of cutting trees.

(e.g. water needed to re-grow, failing trees in changing climate, loss of biodiversity and area desirability, increased pollution, higher local temperatures in heatwaves as no shade, carbon released again in atmosphere...etc all on top of €)



Competition 5 years ago (2017): not all projects proposed such destruction of the mature treescape...



Tampere tram line, (wikipedia images), and YLE <https://yle.fi/uutiset/3-10788641>

INCLUDE CLIMATE CHANGE ADAPTATION 3

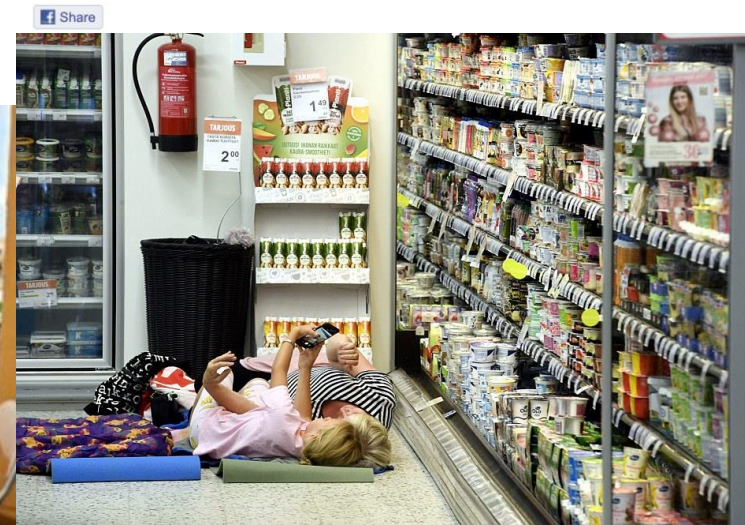
GREENERY ALSO PROVIDES COOL SPACES IN SUMMER HEATWAVES:

- Can be a forest, shaded park
- A balcony or common space
- Can be community spaces: e.g. library's and community centres are opened up in hot states in USA

News 3.8.2018 11:56 | updated 3.8.2018 12:10

Supermarket sleepover: Helsinki grocery invites customers to cool off Saturday night

After several weeks of scorching hot weather, a Helsinki grocery store has invited its customers to a chilled-out sleepover on Saturday.



SOLAR SHADING

3

Vegetation, external solar shading (curtains not as effective)



Small apartments with windows in one direction and apartments on the top floor are most prone to overheating
Elderly are most vulnerable
High rise towers especially at risk as very exposed

BETTER CONTEXTUAL CONSIDERATIONS

4

- A current tendency for bigger, deeper, taller blocks: high rise buildings lack empathy for people living, working and using the city.
- Tall buildings in the Nordic region create shadows that **are 150-200m long**, shadowing the entire surrounding blocks, and public spaces.
- It takes views away, creates movement in high winds, making people ill; also often increased crime and security issues on ground level and wind tunnels
- Obstructs free solar heat (for heating of spaces or renewable energy)
- **We need to balance density in cities with livability**
- **HIGH-RISE HOUSING IN FINLAND should be a RARE occurrence (and if so, only slim towers!)**



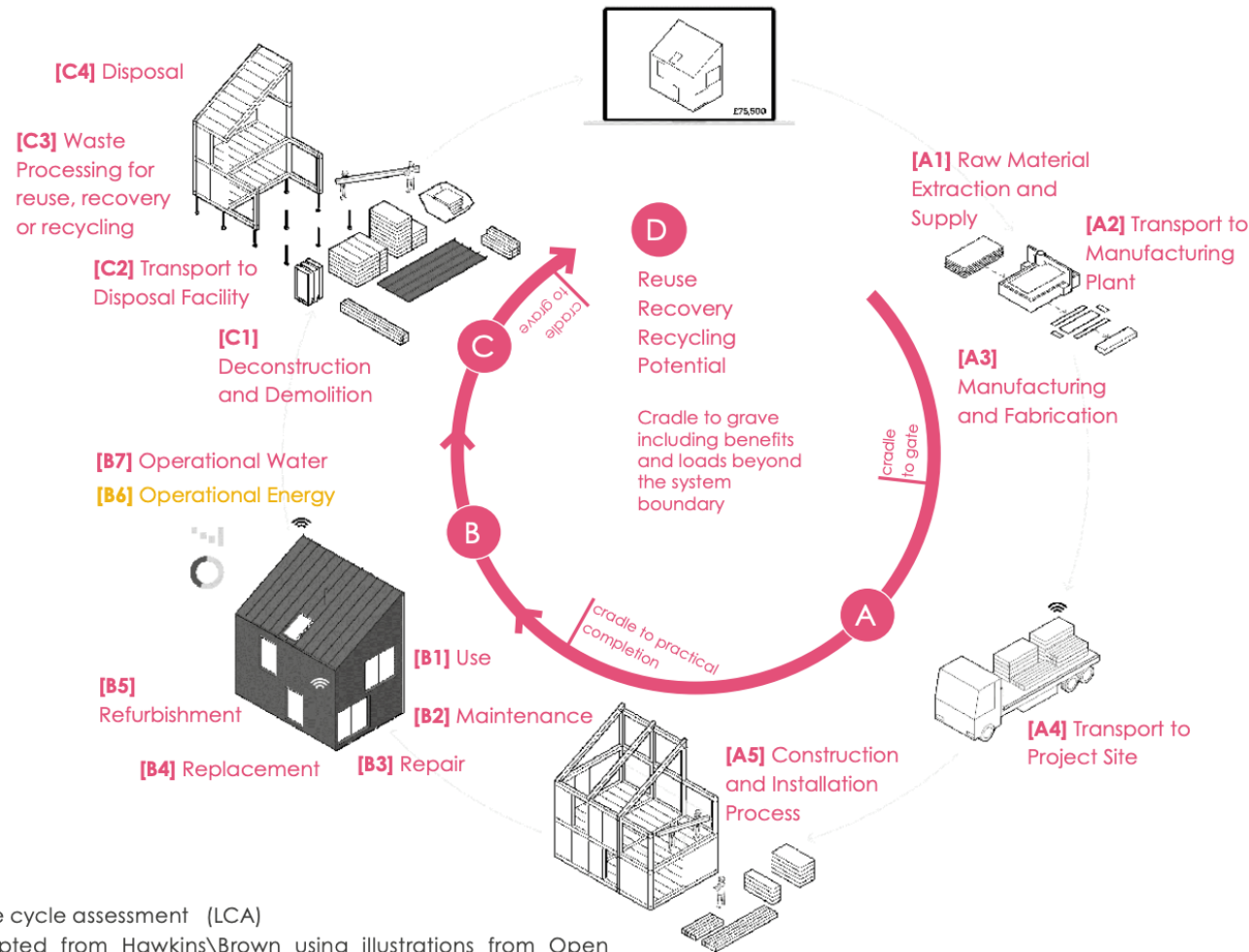
LEAD IN CIRCULAR CONSTRUCTION

5

- Already good in Finland with local sourcing – e.g. timber.... But more than that:
- Circular construction is about prioritising **the reuse and transformation of buildings and materials that EXIST already**, instead of demolition and building anew.

Circular construction: keeping materials and buildings in circulation for as long as possible

5



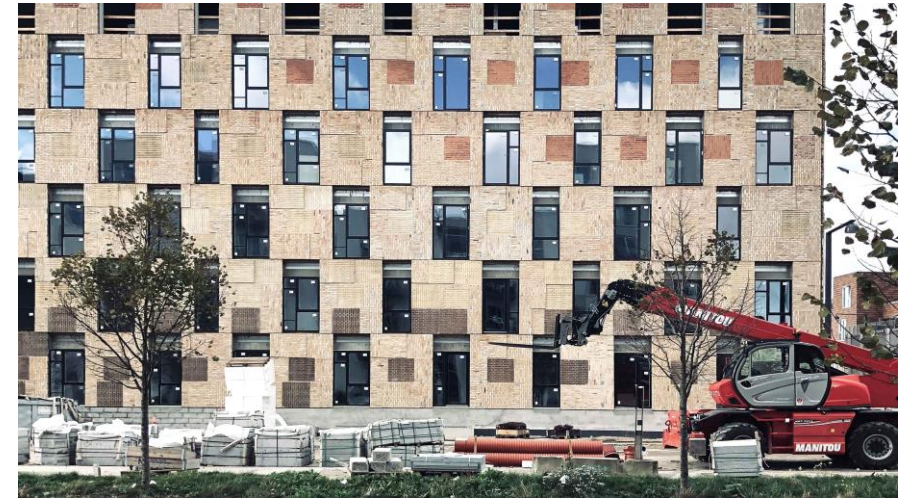
- Estimated that > 60% of materials need to be sourced from re-circulated sources (i.e. NOT NEW!)
- 80% of materials need to be able to be re-used at end of life through deconstruction
- **Changes design (and construction) processes**

Figure 2.1 - Life cycle assessment (LCA)
Diagram adapted from Hawkins\Brown using illustrations from Open Systems Lab 2018 licensed under Creative Commons CC-BY-ND

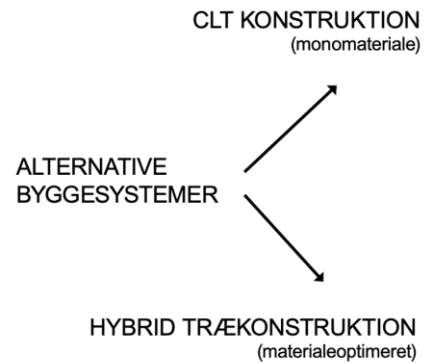
EXAMPLES FROM DENMARK

See Satu Huuhka's work in Finland in this area

5



Lendager Group, DK



Vandkunsten Architects, DK, Use of timber post-beam and CLT (hybrid construction): Design for disassembly/deconstruction.

EUROPA BUILDING, EU HQ, BRUSSELS SAMYN & PARTNERS + STUDIO VALLE

5



EUROPA BUILDING, EU HQ, BRUSSELS SAMYN & PARTNERS + STUDIO VALLE



TRANSFORMATION OF EXISTING (530 UNITS) GRAND PARC BORDEAUX | LACATON & VASSAL

5



TRANSFORMATION OF EXISTING (530 UNITS) GRAND PARC BORDEAUX | LACATON & VASSAL

5



INCLUDE SOCIAL INFRASTRUCTURE

6

- **Social infrastructure = high quality spaces and places that brings people and communities together – ESSENTIAL IN HOUSING DEVELOPMENTS**
- It is about accessible, diverse and inclusive spaces
- Improves well-being, reduces isolation and loneliness important for people who live alone and older adults
- Can reduce mortality in crises as people look out for each other
- Green spaces are important for social infrastructure



Helen & Hard, Vindmøllebakken co-housing; NONCONFORM Ideenwerkstatt, AAA R-URBAN

EXAMPLE: CO-HOUSING IN NORWAY

HELEN & HARD ARCHITECTS, VINDMOLLEBAKKEN

6



<https://helenhard.no/work/vindmollebakken/>

EXAMPLE: CO-HOUSING IN NORWAY

6

‘Gaining by sharing’

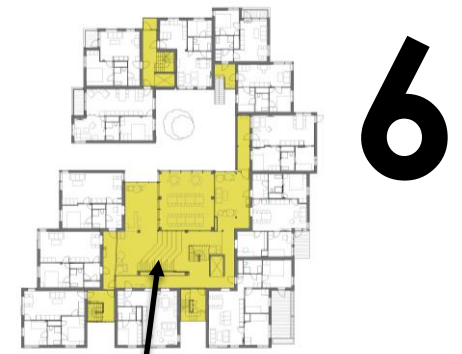
principles: 10% smaller units,
to afford shared spaces,
but units are well-designed

All well daylit, no deep plan
units; CLT construction

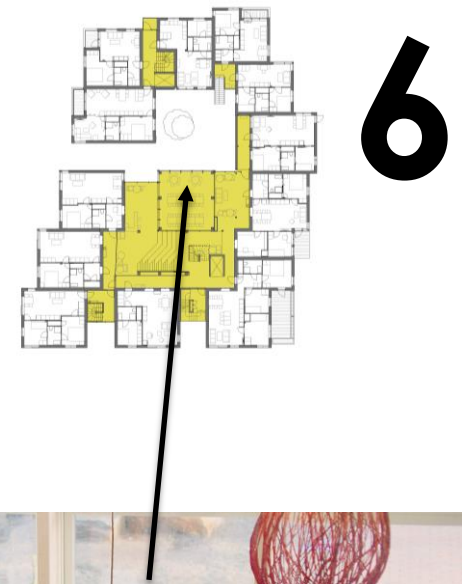


EXAMPLE: CO-HOUSING IN NORWAY

<https://helenhard.no/work/vindmollebakken/>



EXAMPLE: CO-HOUSING IN NORWAY

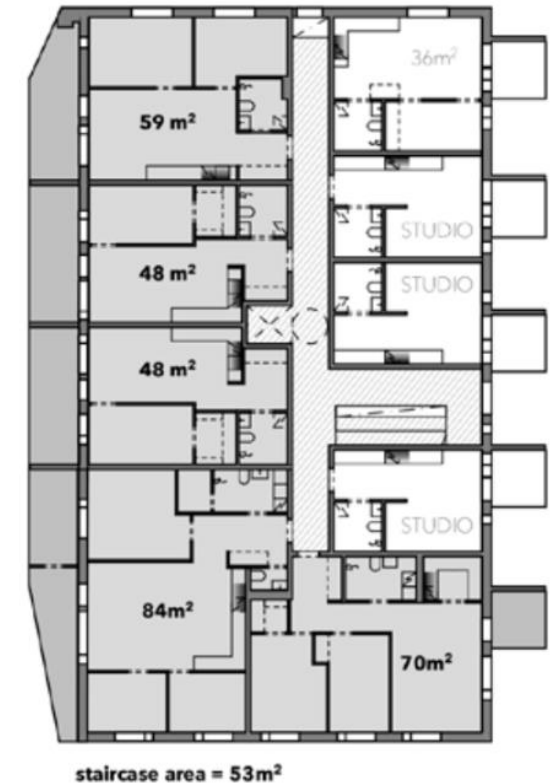


Problems in today's Finnish housing stock

We are 'locking in' low quality housing: too many small, deep plan units, with little access to daylight or outdoor space, definitely no consideration of social infrastructure....

- Affects health and well-being
- Longer term questions about sustainability and risk of premature obsolescence (demolition)
- Majority of units are studios or 1-bedroom dwellings - too many units that are too small
- Studios are the size of a hotel room - this is not high quality or sustainable! **Who** is this for? How long will people live here?
- **Research shows: ideally no more than 30% of a certain kind of unit** (diversity of units needed for diverse needs)

Original building plan



Saarimaa & Pelsmakers:

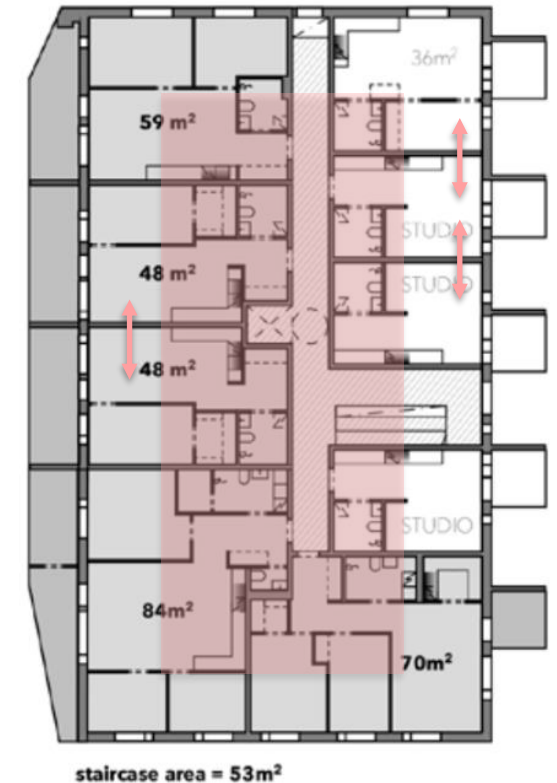
<https://journal.fi/yhdyskuntasuunnittelu/article/view/89676> and Pelsmakers, Saarimaa, Vaatoovaara: <https://researchportal.tuni.fi/publications/avoiding-macro-mistakes-micro-homes-in-finland-today>

Problems in today's Finnish housing stock

The long 'double loaded' corridor is increasingly common but leads to bad housing design, for example:

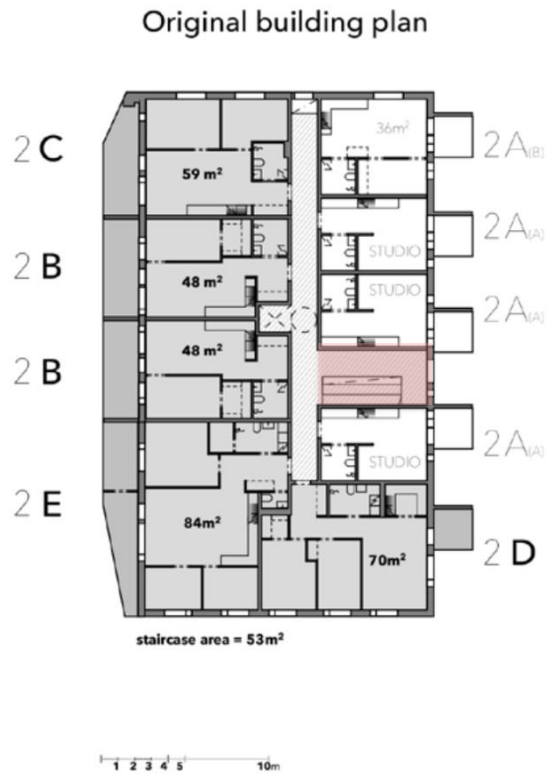
- Most units have only windows on one side (i.e. single aspect) and are 8-9 meters deep)
- **they are too deep plan so they have unacceptable daylighting** (> max depth is 6m if only windows on 1 side)
- **Units are not adaptable** and cannot be combined to create larger units in the future.
- **We can and MUST design better than this!**

Original building plan

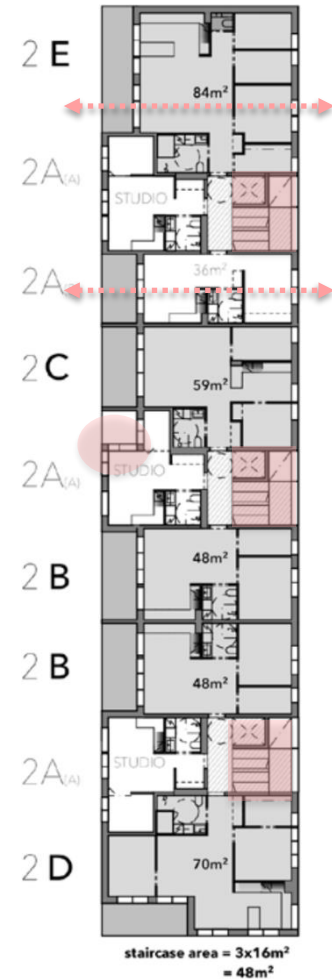


Saarimaa & Pelsmakers:
<https://journal.fi/yhdyskuntasuunnittelu/article/view/89676> and Pelsmakers, Saarimaa, Vaatoovaara:
<https://researchportal.tuni.fi/publications/avoiding-macro-mistakes-micro-homes-in-finland-today>

We can do better!



Modified building plan



Improved design:

- *Same number and size of units, but...*
- 3 instead of 1 entrance/lift → **removes long corridor**
- **better daylight** with 2 orientations through L-shaped plans
- Also allows cross ventilation (helps in heatwaves!)
- façades without balconies (so more/better daylight)
- **increased adaptability**
- **requires re-design of the block: from 'fat' to 'slim'!**

Saarimaa & Pelsmakers:

<https://journal.fi/yhdyskuntasuunnittelu/article/view/89676>

We can do better!



- New design impacts the city plan, but even when keeping the same small number of units, we can create better apartments and housing blocks.
- **BETTER LIVING ENVIRONMENT:** south facing communal garden, 2 apartment orientations for residents
- **Shows that the city plan has a huge influence on sustainability of the building!** (and what architects and developers can / cannot do!)

EXPAND DEMOCRATIC PROCESSES

7

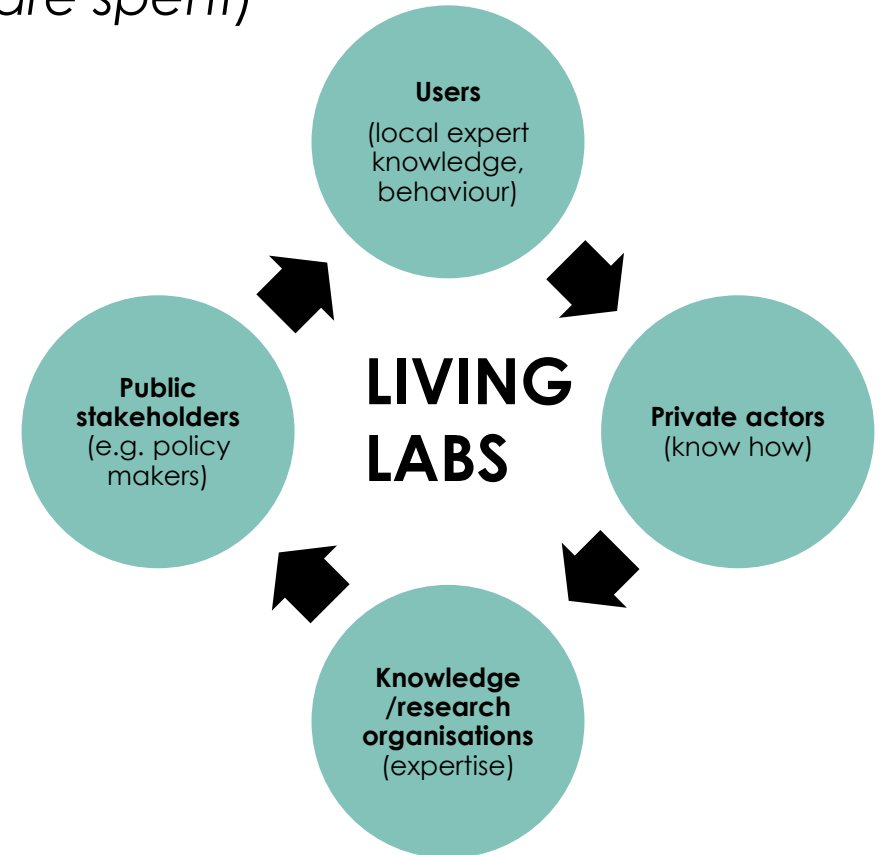
COLLABORATION AND CO-CREATION AS PART OF EACH DEVELOPMENT:

'buy in from all diverse communities' and building trust – i.e. inclusivity to achieve radical societal transformation

(e.g. participatory budgeting – a say in how budgets are spent)



Democratic processes in sustainable urban development e.g. NONCONFORM– Austria



AND CHECKING THAT IT ALL WORKS IN REALITY!

7

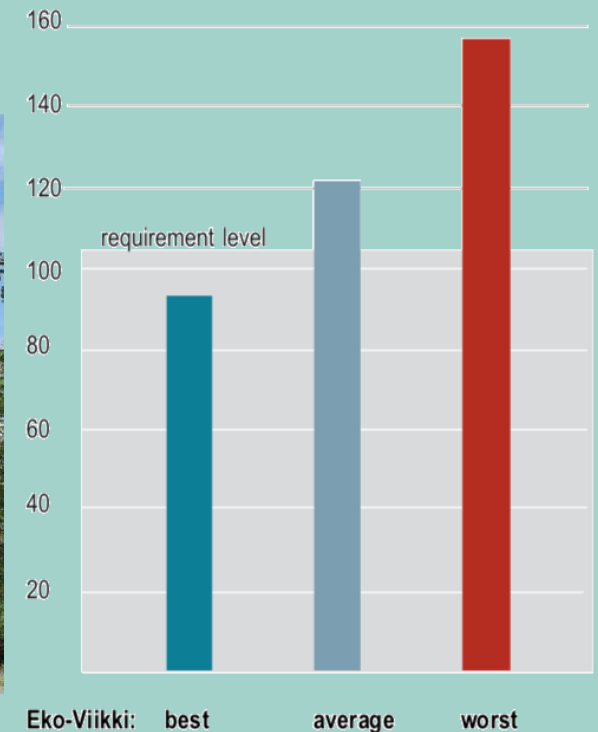
Sustainability is not achieved 'on paper' only:

- we need to go back and check that our designs and interventions work, technically and for users
- fix things and learn from them for the next developments!
- but only 7% of architects in Finland do this (EU average 13%; UK: 19%)



DISTRICT HEATING

weather adjusted specific fuel consumption
kWh/gross m², 2002



7 key areas for improvement for a restorative Finland:

1. Better organisation of the city
2. Rewilding / greening cities
3. Include climate change adaptations
4. Better contextual considerations
5. Lead in circular construction
6. Include social infrastructure
7. Expand democratic processes

BUT EVEN THIS... IS NOT ENOUGH

- Solar panels on buildings
- replacing concrete with timber
- or replacing petrol cars with electric cars is ... **NOT ENOUGH.**
- **We need a radical shift...**
 - **in how we move in the city** (less driving cars!)
 - **in what we build** (less demolition!)
 - **in how we build it** (efficient use of materials, reuse materials, also timber)
 - **in who we develop for** (not jus humans, also nature and non-humans → stop its destruction!)
 - **and how much we consume energy** (deep plan buildings lock-in active systems – the most renewable energy is the energy NOT needed in the first place!)

SUMMARY

- **IPCC 2022 report:** Architecture and planning is "*lagging behind all other sectors*" in climate action
- Urgent action is needed before 2030 → **the long lifespan of buildings / urban and land-use policies 'lock in' emissions and polluting development and behaviours for decades**
- Technology alone will not be enough; we need to rethink the way we work.
- **We have a collective responsibility to protect our planet and industry - WE ARE PART OF THE SOLUTION!**

SUMMARY

Nothing less than radical change is required to avoid 4°C warming

**There is no life,
no architecture,
no 'profit'
in a 4°C world**

Let's work together for a more sustainable world



THANK YOU KIITOS!

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