

Developing an Eco-social Enterprise

Session 1

Monday 28 March, 2022

Tim Crabtree

Wessex Community Assets & Plymouth University

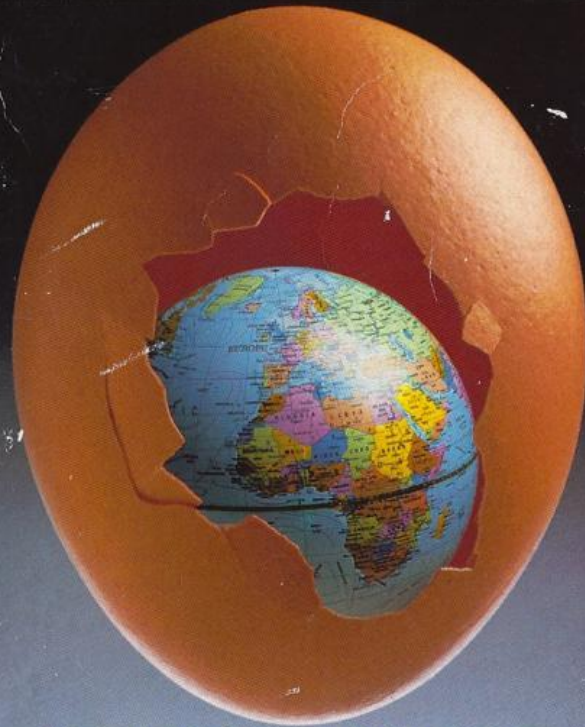






ABACUS

E. F.
SCHUMACHER
SMALL IS BEAUTIFUL



A STUDY OF ECONOMICS AS IF
PEOPLE MATTERED



n e f

economics as if people
and the planet mattered

ABACUS

SMALL IS POSSIBLE

George McRobie



The sequel to E.F. Schumacher's **SMALL IS BEAUTIFUL**
and **A GUIDE FOR THE PERPLEXED**

MONDRAGON



HUMANITY
AT WORK

Finance
Industry
Retail
Knowledge



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MONDRAGON
UNIBERTSITATEA

ENPRESAGINTZA
FAKULTATEA
FACULTAD DE
EMPRESARIALES



Wessex Community Assets: 20 years of innovation

- £13 million home improvement lending service with 20 councils.
- Pioneered the use of community shares.
- Key organisation in the development of community land trusts.
- Developed one of the UK's largest enabling services for community-led housing.
- Supported over 100 community enterprises.



Support for Community Housing since 2001

- Working in Devon, Dorset and Somerset
- 25 projects completed – over 250 houses; 50 projects in progress



Wessex Community Assets: 2001 – 2021

Supporting 75 communities across Devon, Dorset & Somerset





Small number of projects with focus on sustainability



Christow CLT and Teign Housing completed 18 Passivhaus affordable homes in the Dartmoor National Park

wessexca.co.uk

Refurbishment



Brixham Yes



- Provide **affordable flats for young people**;
- Converted 2 properties which provide **homes for 6 young people**;
- Funded by a combination of **grant and social investment funding**.

The challenge:

We need the majority of new houses to be affordable and sustainable....

And we need to transform the existing housing stock.



Bridport Community-led Economic Development

Local Materials in Construction

Tim Crabtree

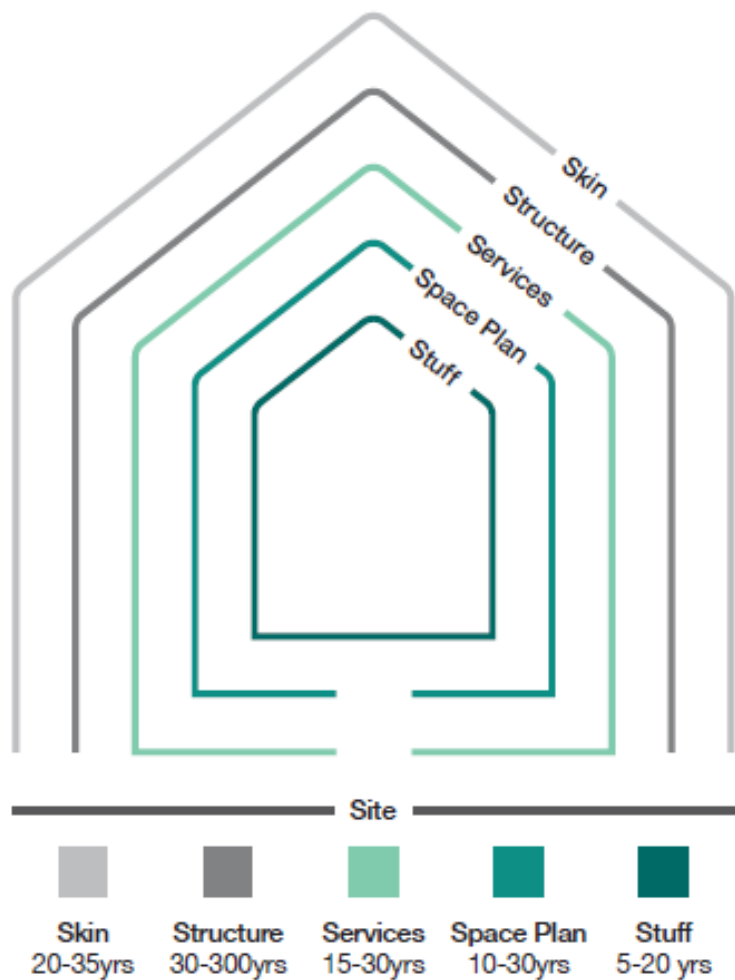
2017

Timber & other local materials as key inputs



Affordable, sustainable houses





Site is the fixed location of the building

Structure is the building's skeleton including the foundation and load-bearing elements

Skin is the façade and exterior

Services are the pipes, wires, energy and heating systems

Space Plan is the solid internal fit-out including walls and floors

Stuff is the rest of the internal fit-out including the furniture, lighting, and ICT

Source: ARUP & Ellen MacArthur Foundation (2020).
From Principles To Practices: Realising The Value Of
Circular Economy In Real Estate

Potential local building materials

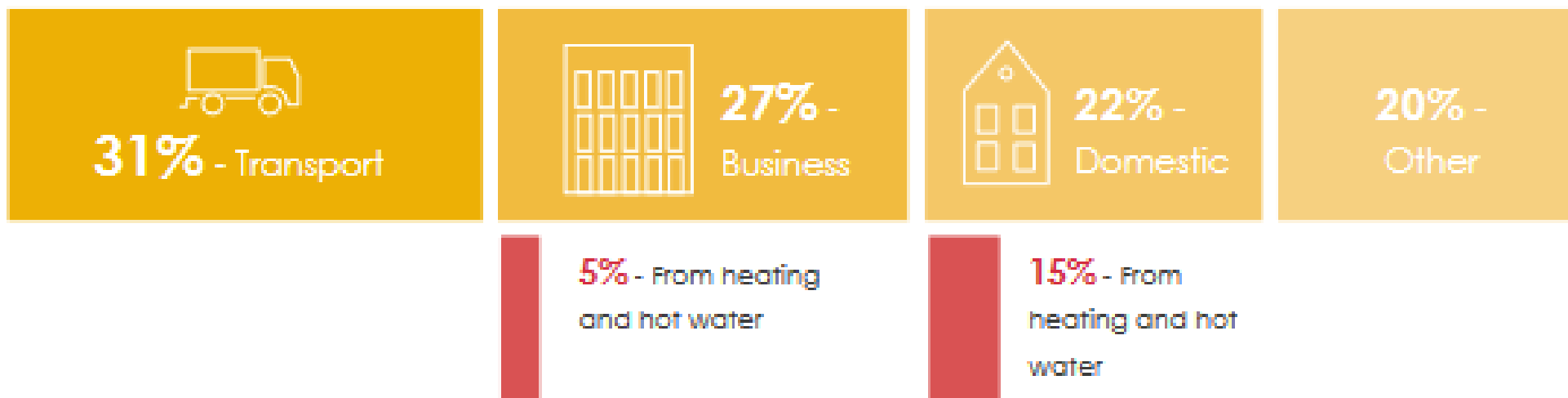
Raw material	Product	Possible sources
Stone	Stone facing	Existing small quarries
Boulders	Saddle stones	Local farms
Lime	Lime putty	Small scale clamp burning
Slate	External floor slabs	Several local quarries
Cobbles	External floors and paths	Local rivers, streams.
Gravel	For back-fill and bedding	Local quarries
Sand	For mortars, renders and plasters	Local quarries and rivers, seashore, streams
Subsoil for cob	Cob for mass walling	Local farms
Clay for plasters	Base coat plasters, clay slips and clay/straw infill panels	Extensive clay beds in the local area. Also available as processed dry clay in bags
Clay for pigments	Natural clay and lime based paints	Extensive in the local area
Naturally durable timber	Rafters, beams, joists and cladding and roof shingles	Oak, Sweet Chestnut, larch, Douglas Fir, Western Red Cedar
Non durable timber	Studwork and internal boarding and joinery	Spruce, Scots pine, Ash, Willow, as well as the above
External Joinery grade timber	Windows and Doors	Oak, Sweet Chestnut, European Larch
Floor boards	Heavy use	Oak, Sweet Chestnut, Ash
Straw bales	Straw bale walls and staw/clay slip infill	Local arable farmers
Agricultural hemp	Cast lime/hemp shiv infill	Local arable farmers
Sheeps wool	Loose insulation	Local Farmers
Thatching reed	Roofing	Sourced from local wetlands

Net zero and sustainable construction

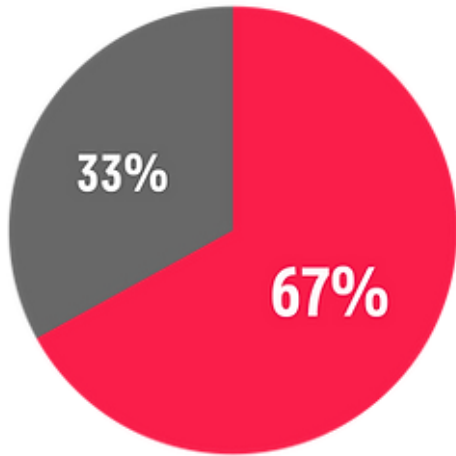


<https://www.materialepyramiden.dk/>

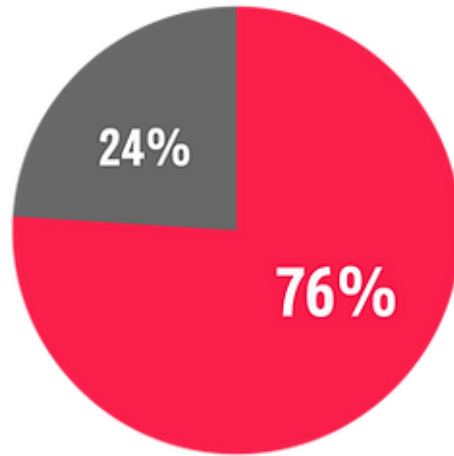
Total UK greenhouse gas emissions



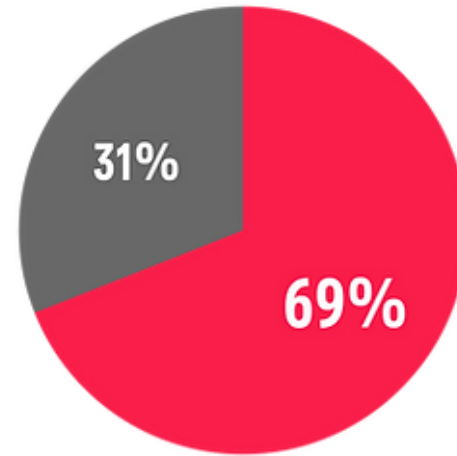
OFFICE



WAREHOUSE



RESIDENTIAL

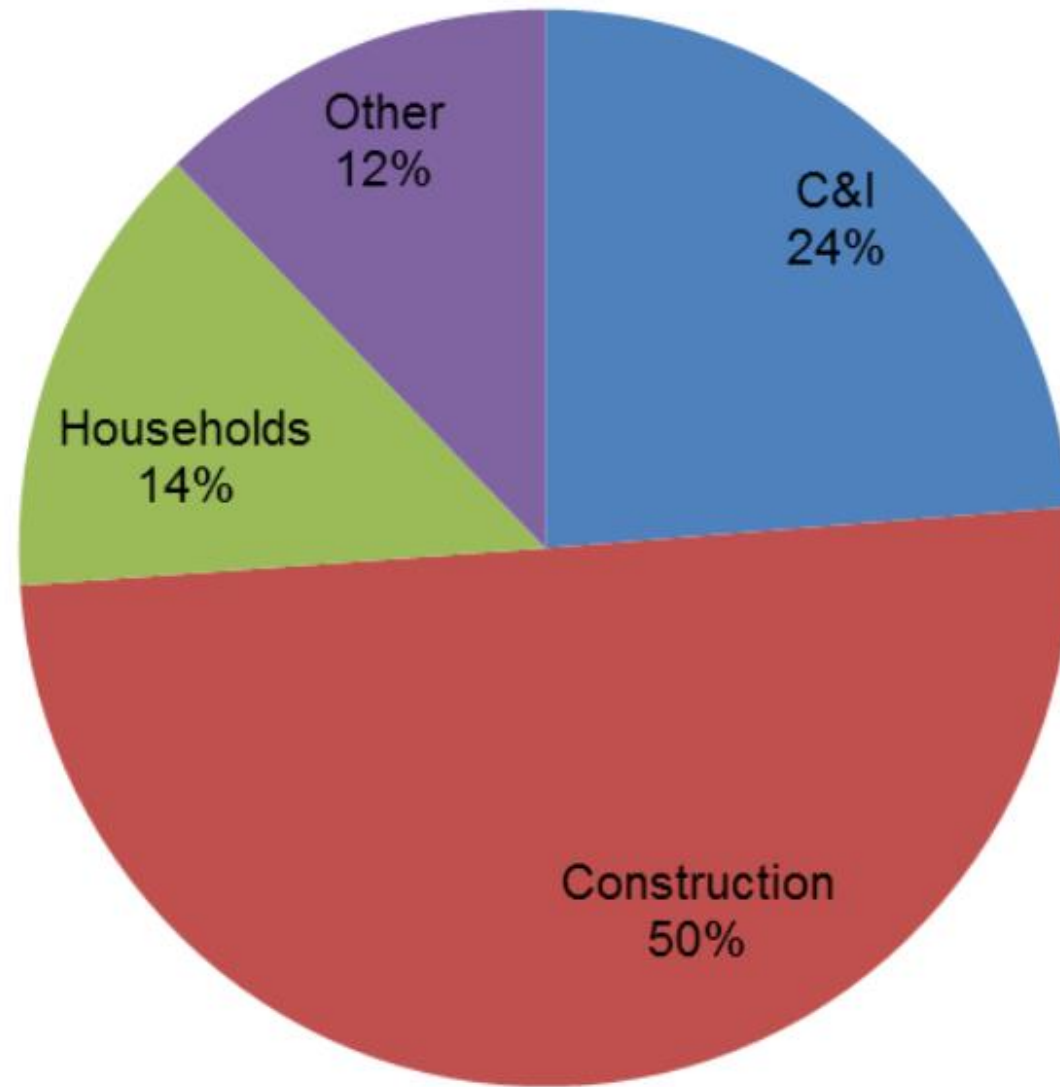


Operational Carbon Emissions



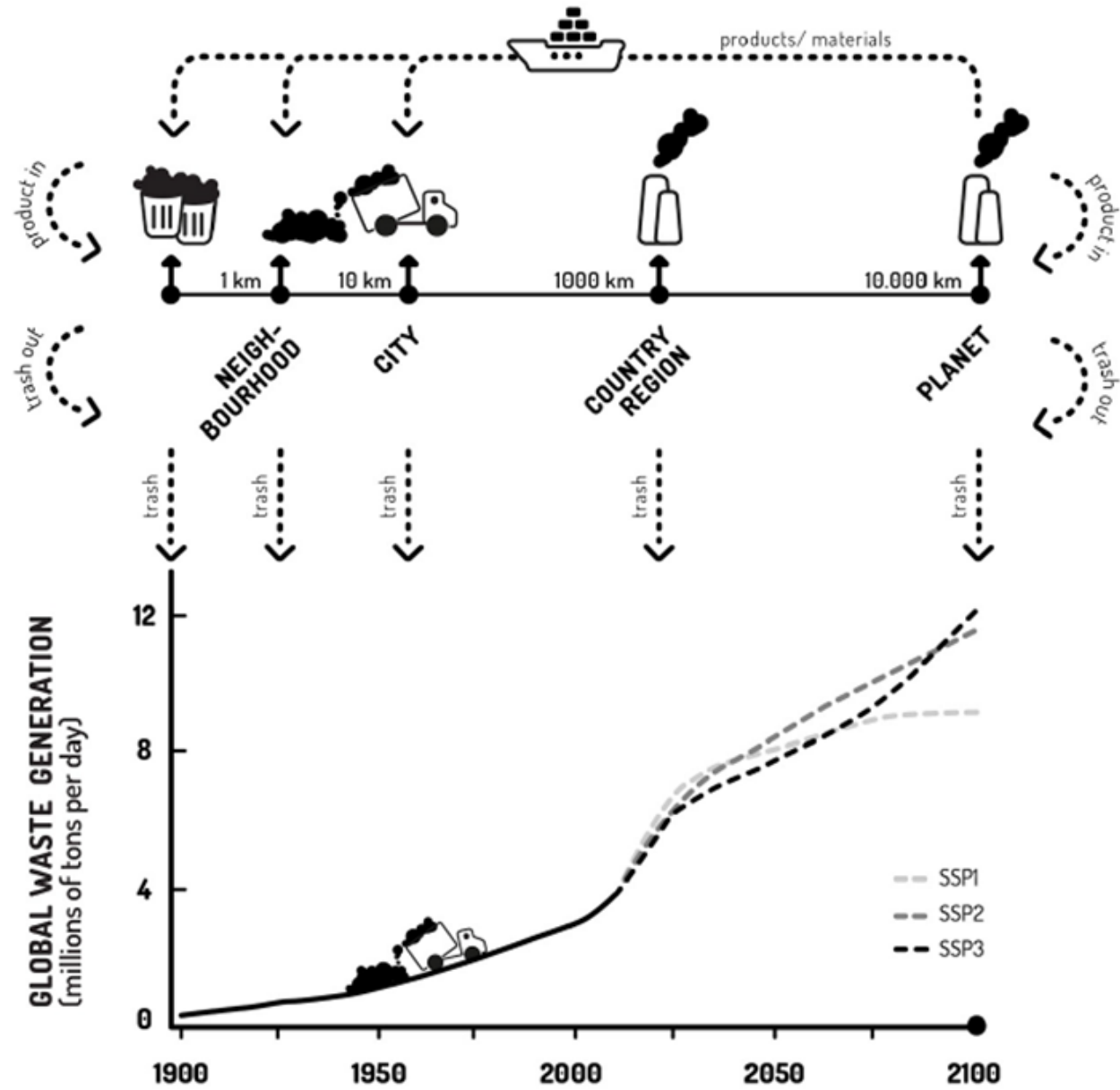
Embodied Carbon Emissions

Diagrams: Sturgis Carbon Profiling/ RICS.



Source: Waste Statistics Regulation return

The City: a linear trash machine



Industrial revolution after 200 years:



↳ PITO - Product in / Trash out

From linear to spiral production ecosystems:

↳ **DIDO - Data in / Data out**

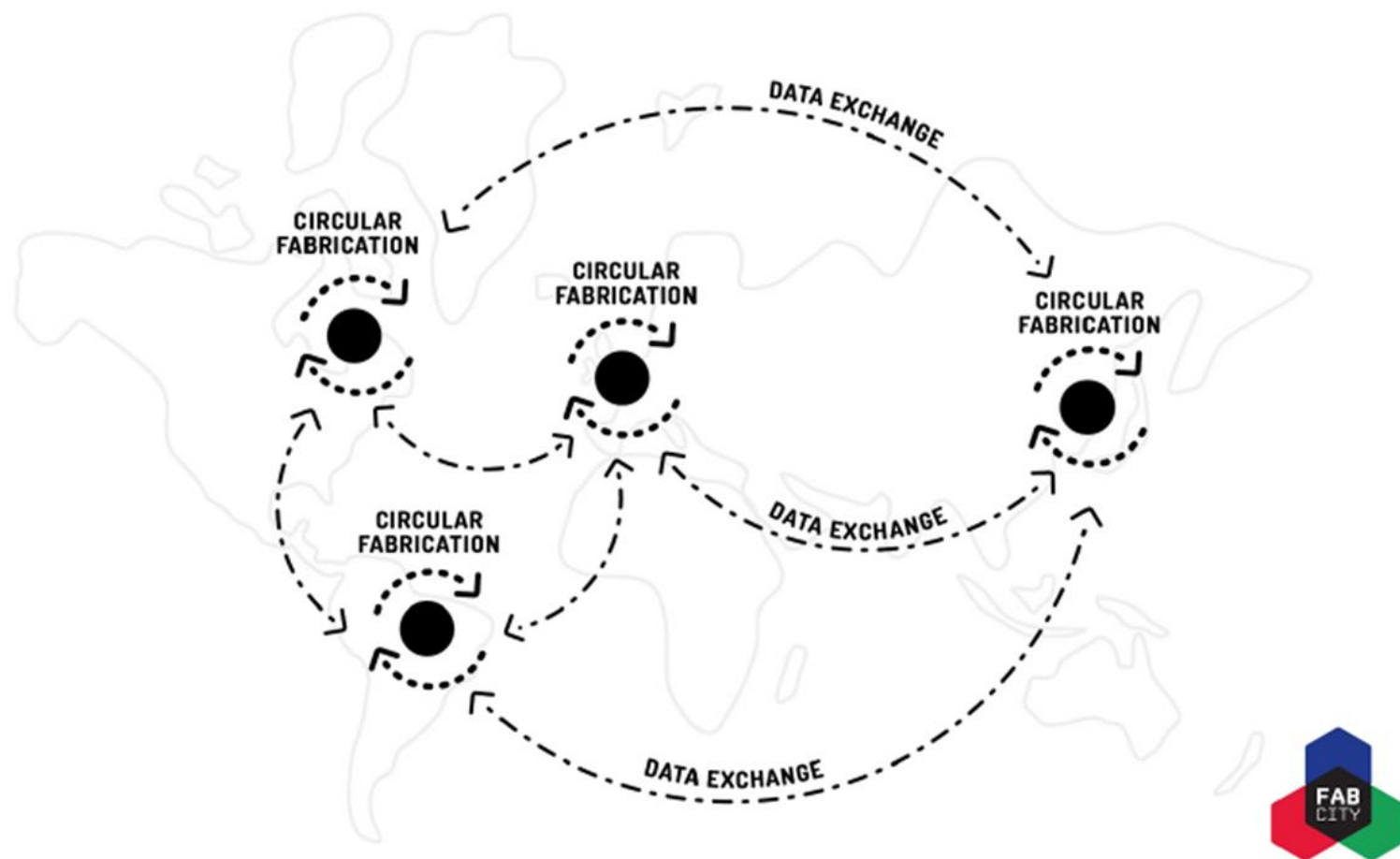


Image 4. Global connected production. Materials stay within accepted distances in cities and regions, information travels on how things are made. We share the recipes of how to construct our world. Source: Fab City

RAISE THE ROOF



WESSEX
COMMUNITY
ASSETS

**ASSEMBLE
COMMON GROUND**



Dorset
Area of Outstanding
Natural Beauty



Supported using public funding by
**ARTS COUNCIL
ENGLAND**

**Dorset
Woodhub**



Bridport
Town
Council





ASSEMBLE

Assemble's initial propositions

Key types - Mansion Type



Key types - Courtyard Row Type



Construction -

Extensive use and expression of natural and site-based materials



Wall buildup



Exterior cladding

Technology -

combining building crafts with contemporary technology

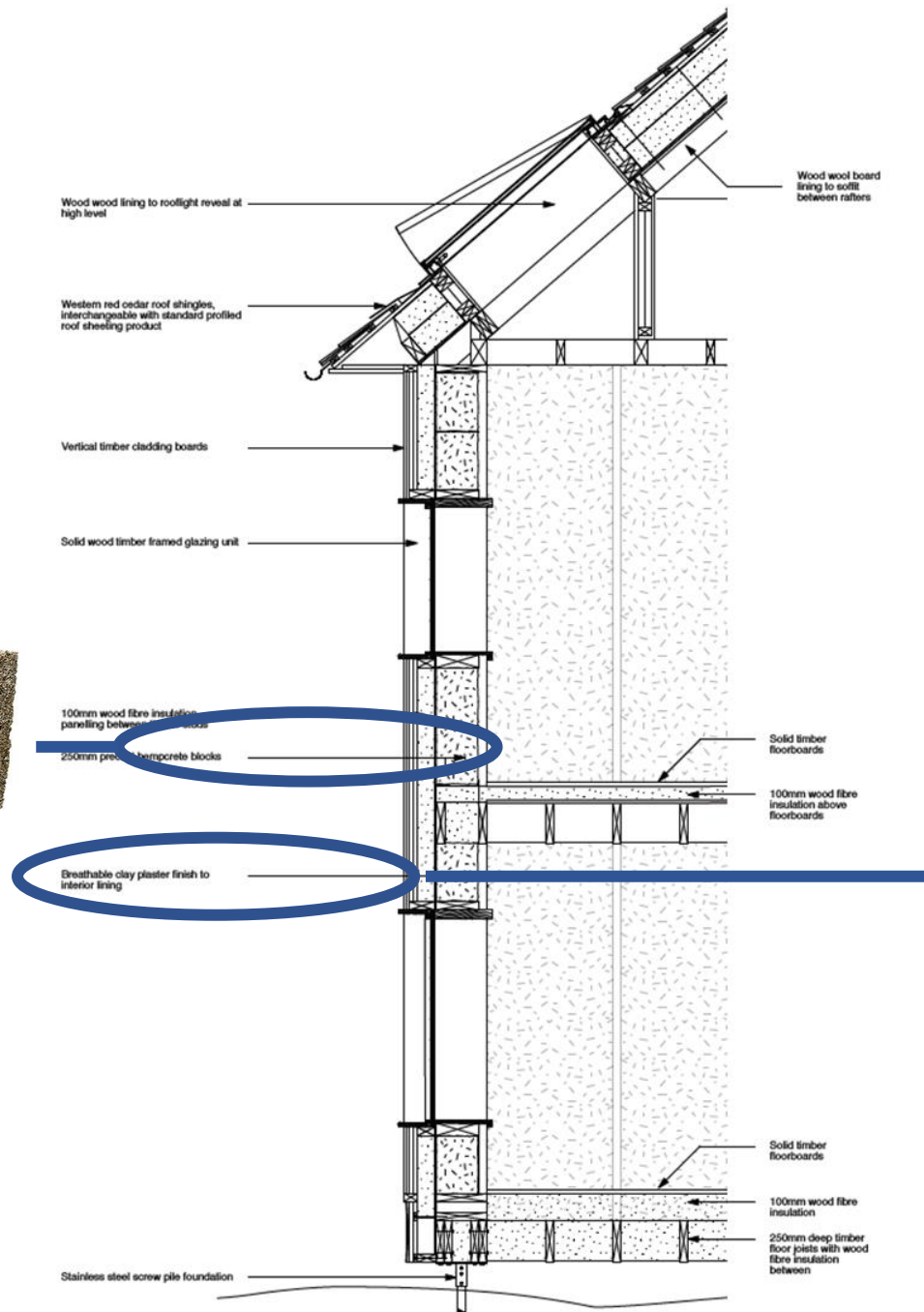


Structure



Envelope

Hempcrete insulation within timber panels



Clay plaster finish



Timber shingles

Western red cedar roof shingles, interchangeable with standard profiled roof sheathing product

Timber cladding

Vertical timber cladding boards

Timber stud work

100mm wood fibre insulation parallel between timber studs

Timber floorboards

Solid timber floorboards

Timber floor joists

insulation

250mm deep timber floor joists with wood fibre insulation between

Wood wood lining to rooflight reveal at high level

Wood wood board lining to eave between rafters

Solid wood timber framed glazing unit

Breathable clay plaster finish to interior lining

Solid timber floorboards

Stainless steel screw pile foundation



Western red cedar



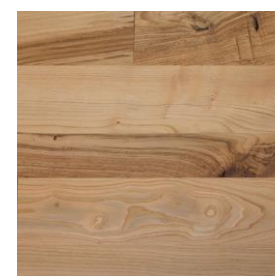
Oak



Beech



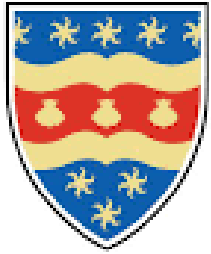
Ash



Sweet chestnut



Larch

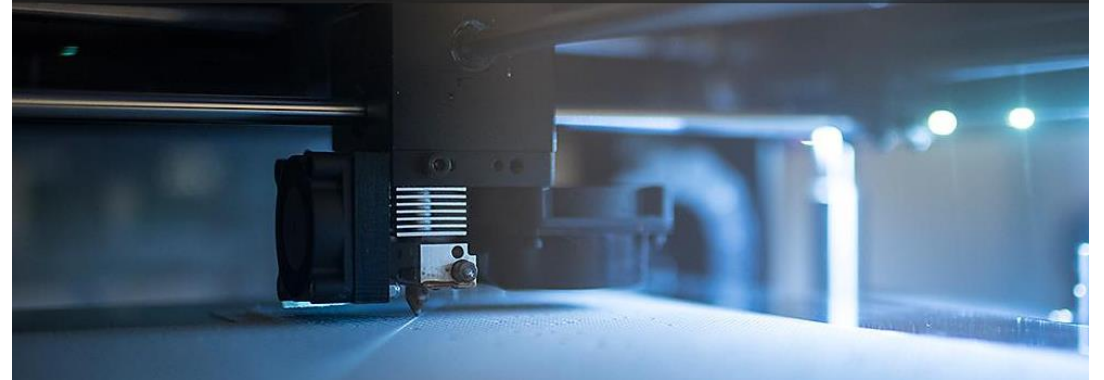


UNIVERSITY OF
PLYMOUTH
Doctoral College

Social innovation in
affordable housing

Digital Fabrication and Immersive Media Laboratories (DFIML)

Technologies in virtual and augmented reality, robotics, 3D scanning and printing, and motion capture



connected
everything.



Engineering and
Physical Sciences
Research Council

RESCALING GLOBAL MANUFACTURING

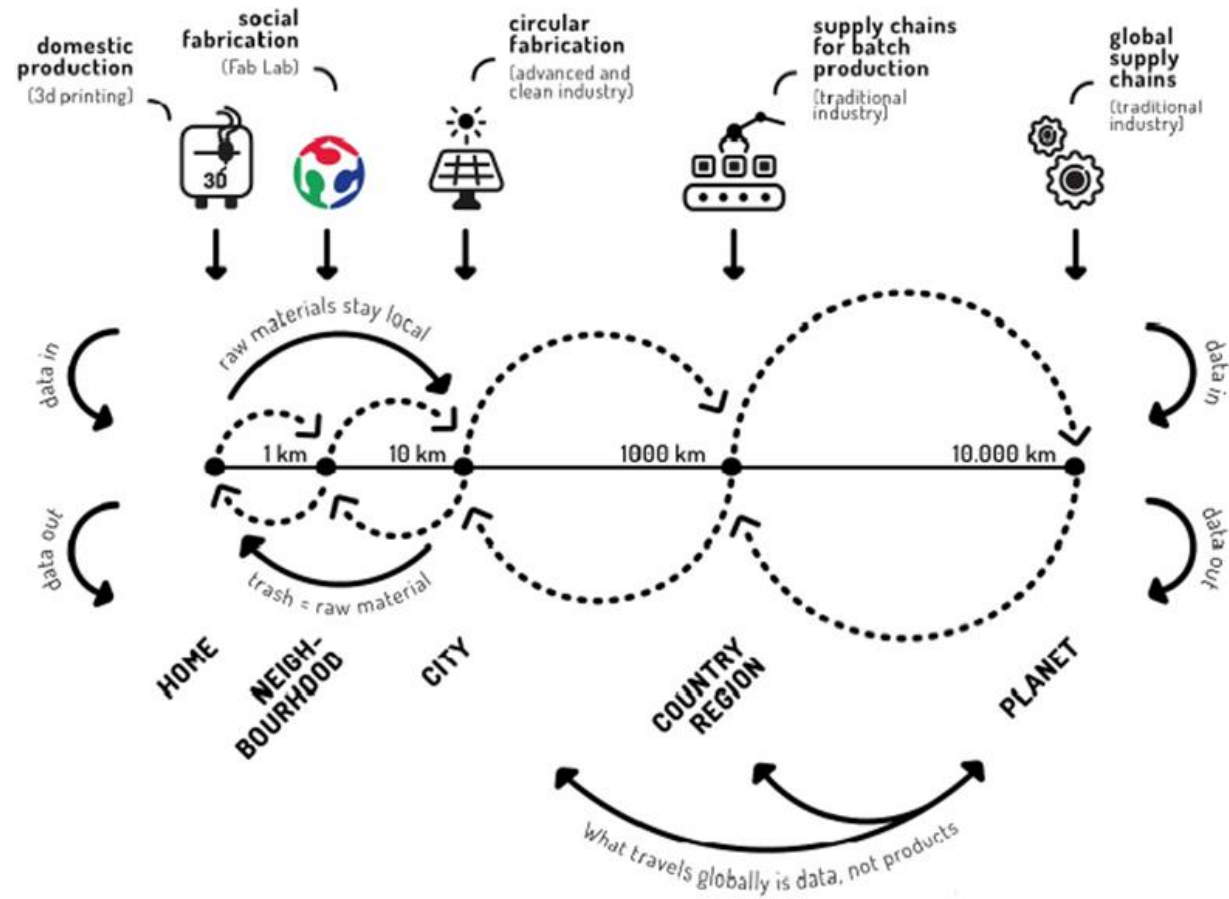
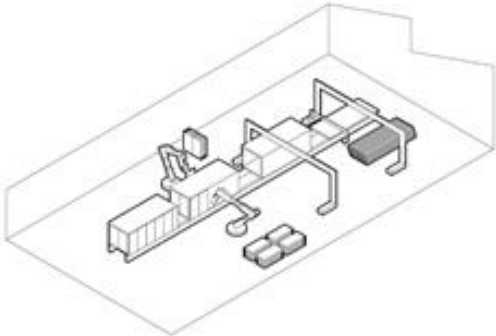
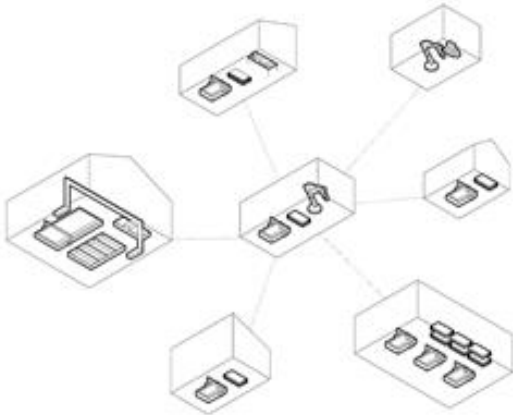


Image 3. A multiscale and complementary fabrication ecosystem. Source: Fab City

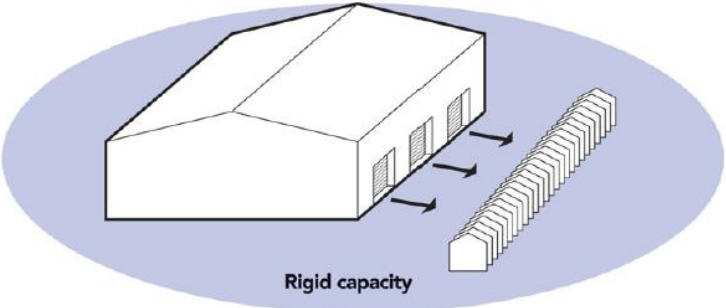
Distributed off-site fabrication



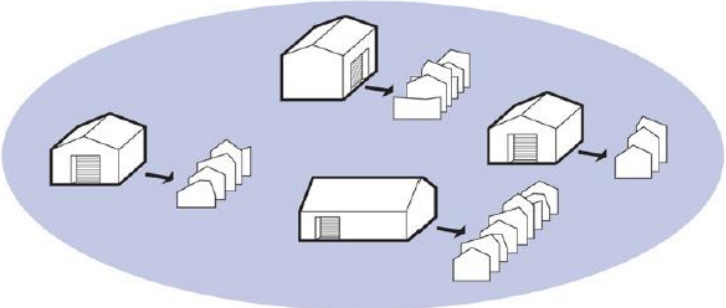
Centralised manufacturing



Distributed manufacturing

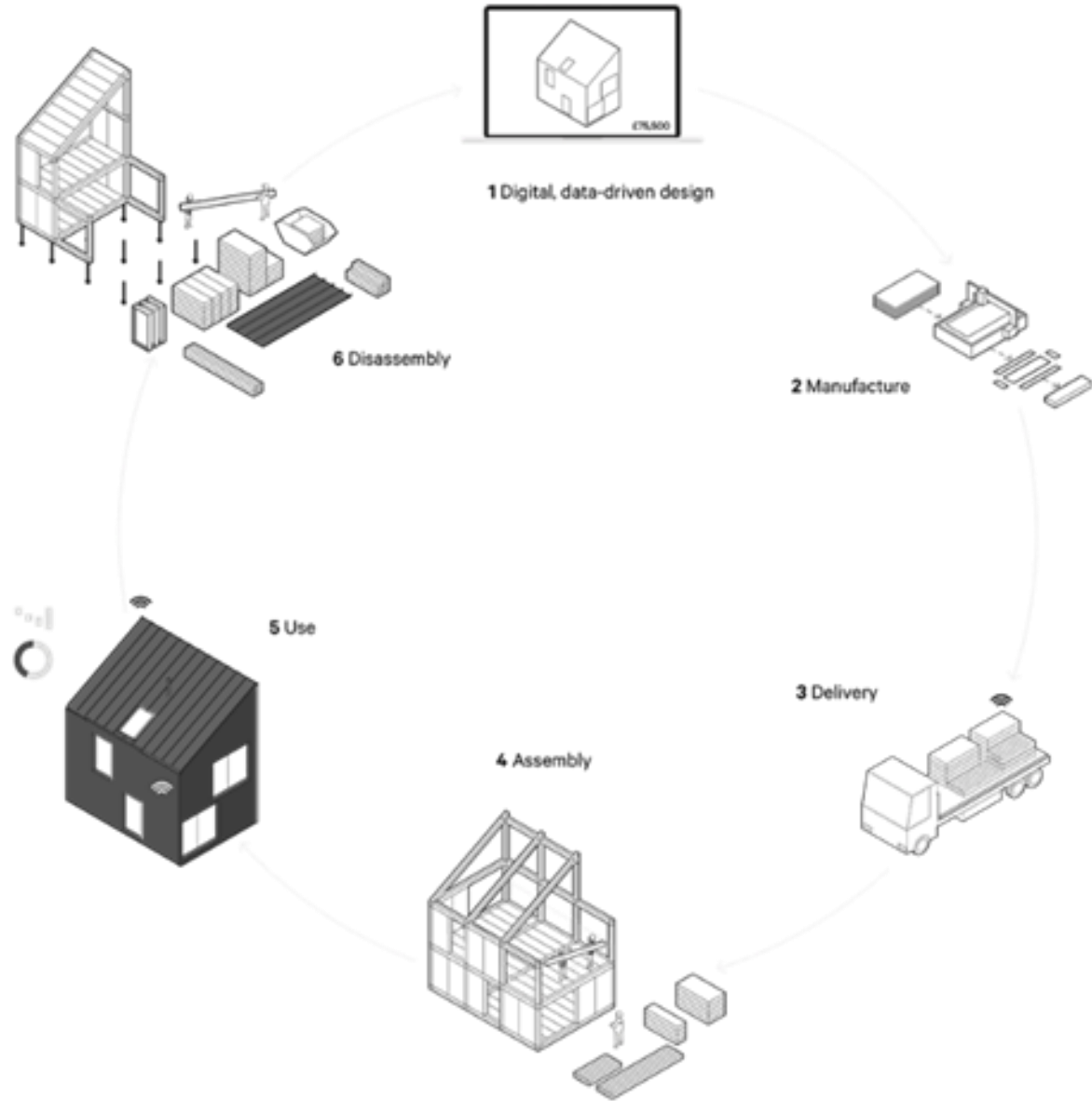


Rigid capacity

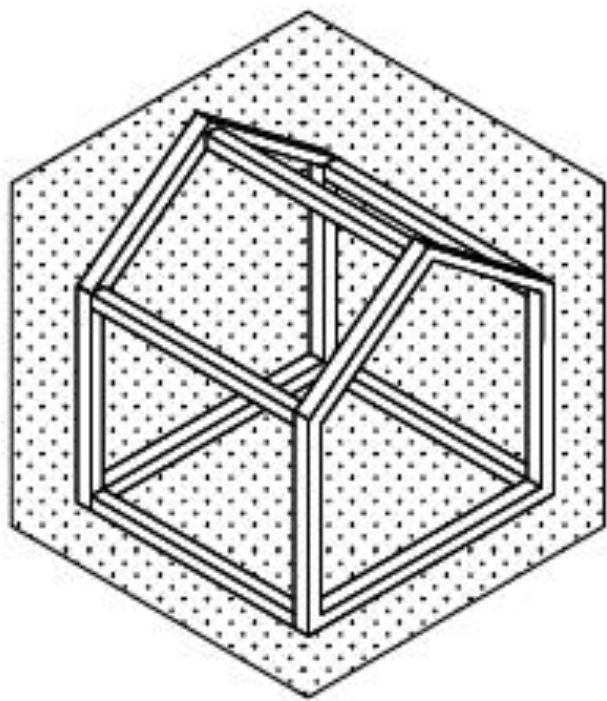


Dynamic, flexible capacity

On-site assembly and finishing



Framed with Cassette Infill Panels



AN OPEN COMMUNITY CONSTRUCTION SET



www.wikihouse.cc

WikiHouse is a mass collaborative design project. Its aim is to make it possible for almost anyone, regardless of their formal skills, to freely download and build structures which are affordable and suited to their needs. There is no single design, or single designer. Houses and components are designed by an open community of designers and users for everyone's benefit.

Used with permission. All rights reserved. Images are published under a Creative Commons Attribution-ShareAlike license. You are allowed to share the model, and when and where you like, provided the original author is also attributed and that the license is also observed in the same locale. The technical design and its implementation are provided under the Apache License 2.0. You can find the license in any way you wish.



1 Download houses and components which are created and shared by an open community of users around the world. Individual components can be combined or adapted to form a structure which responds to an individual site or set of needs.



2 Click 'Make this house'. From the model, WikiHouse generates a complete set of milling drawings which can be used by a CNC cutter to fabricate the house parts.



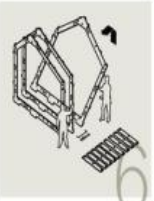
3 The parts are cut by a CNC mill using locally sourced material. This is 18mm plywood, in the standard sheet size of 2440mm x 1220mm (8' x 4').



4 Set out the parts for each section onto the ground, assembling it like a jigsaw.



5 Wedge together the two layers to form a single section.



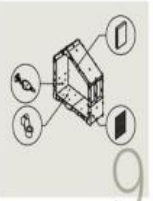
6 Stand the sections up vertically, positioning them approximately at 600mm intervals.



7 Fit the connector pieces into the slots in the section. These should be staggered alternately. Use the mallet provided on the milling sheets to hammer these tightly into place.



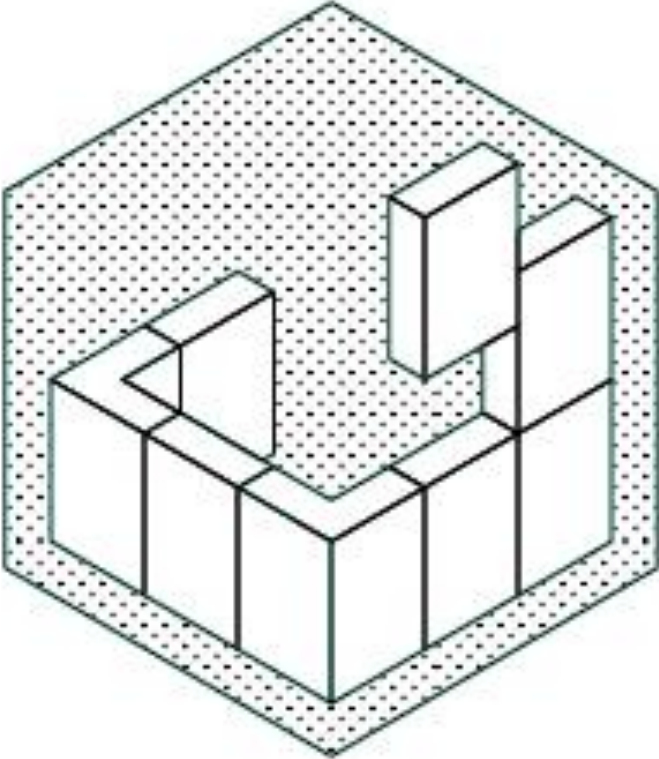
8 Fit the internal and external cladding panels onto the structure. Internally these usually need to be screwed into place.



9 The structure is ready for insulation, cladding and services.



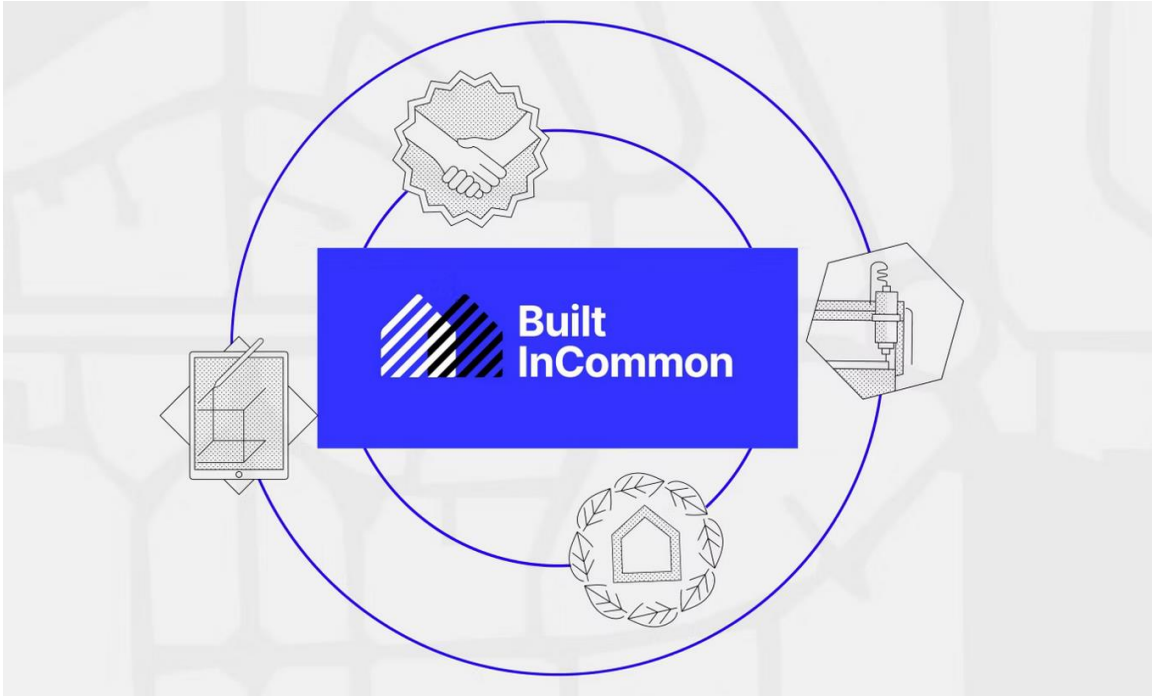
Structural Timber Cassettes

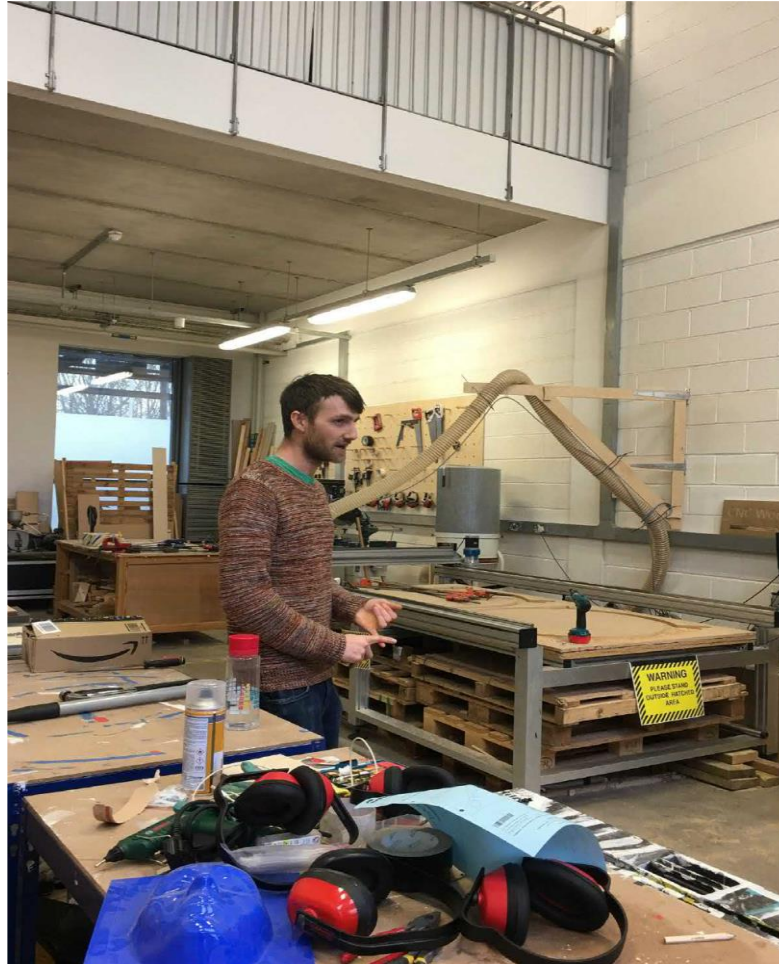




Design Digitally Fabricate Locally Build Sustainably

*A user-centered building system that combines the benefits of
Mass production with Bespoke design*





<https://kwmc.org.uk/projects/wecanmake/>

<https://kwmc.org.uk/thefactory/>

Next steps: Connected Everything (EPSRC programme): Development of models & prototypes with Plymouth University's Digital Fabrication Lab

UNIVERSITY OF PLYMOUTH

Alejandro Veliz Reyes (Digital Design & Fabrication)
Pieter De Wilde (Building Performance Analysis)

ADVISORY PANEL

Tim Crabtree, Wessex Community Assets
Mollie Claypool, Automated Architecture Ltd



Computing Craft 2018-20



SWCTN Automation Fellowship 2019-20



UBB Chile, 2019



AUAR 2020



AUAR 2020





• Tiny House Building Course • • 26-30. July and 23-27 Aug •



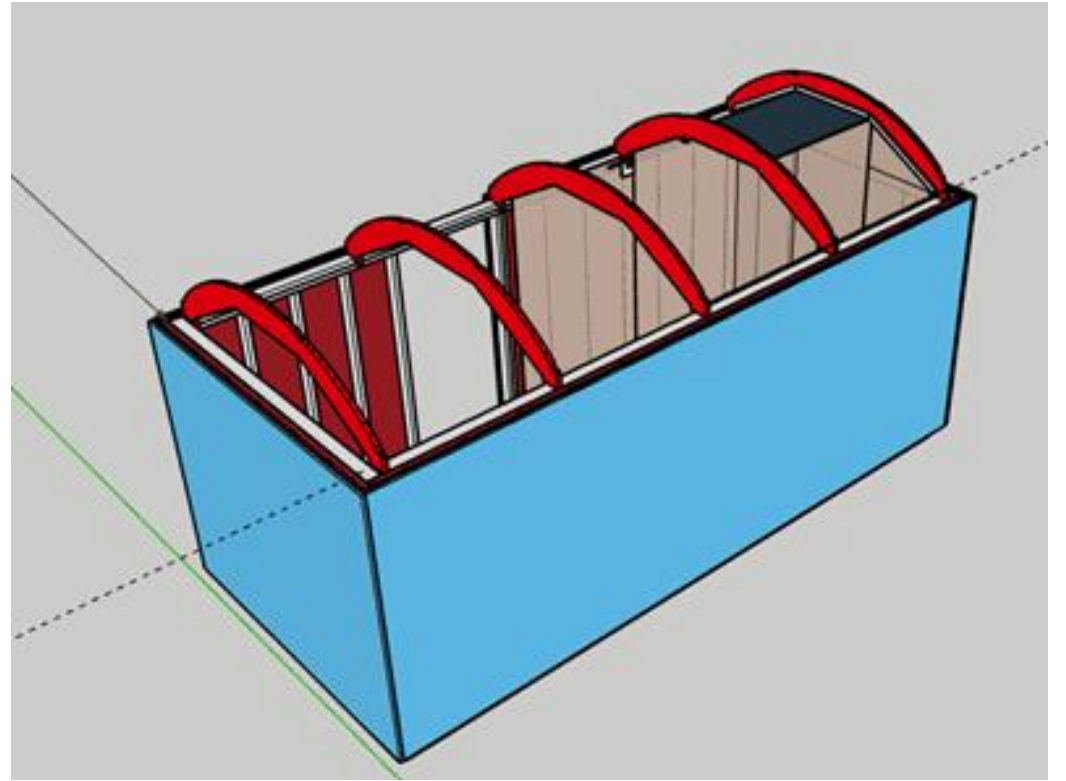
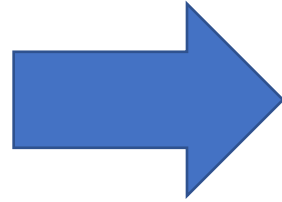
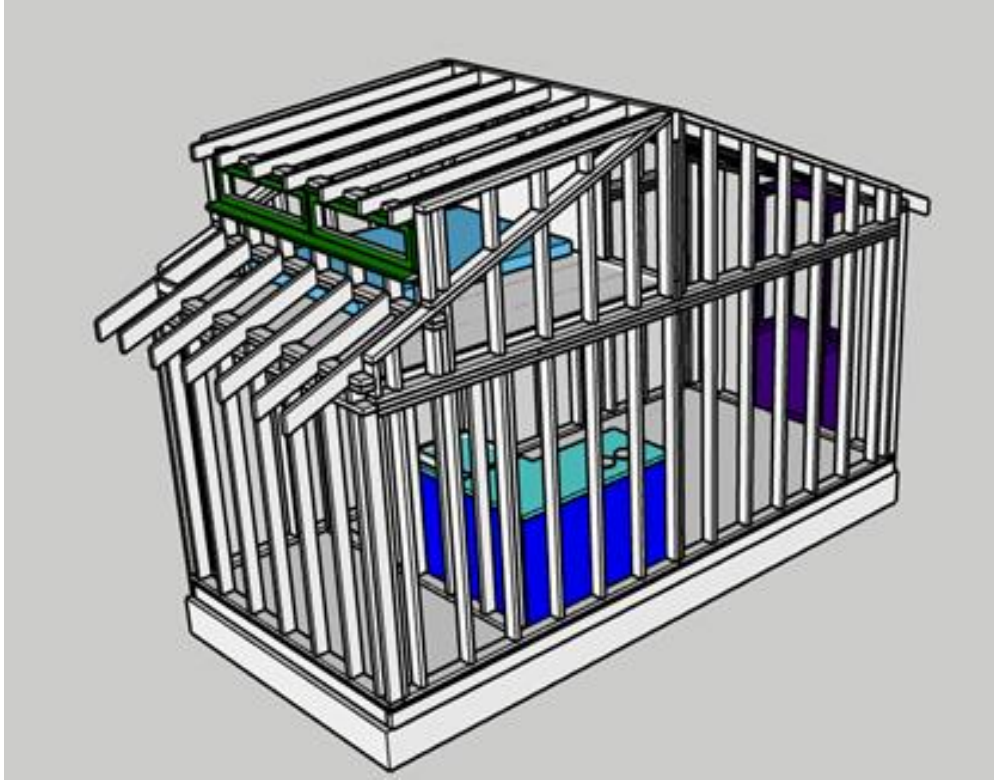
Do you dream of building a small home and wonder about off-grid living? Then join us for a two-week practical course in Dorset.

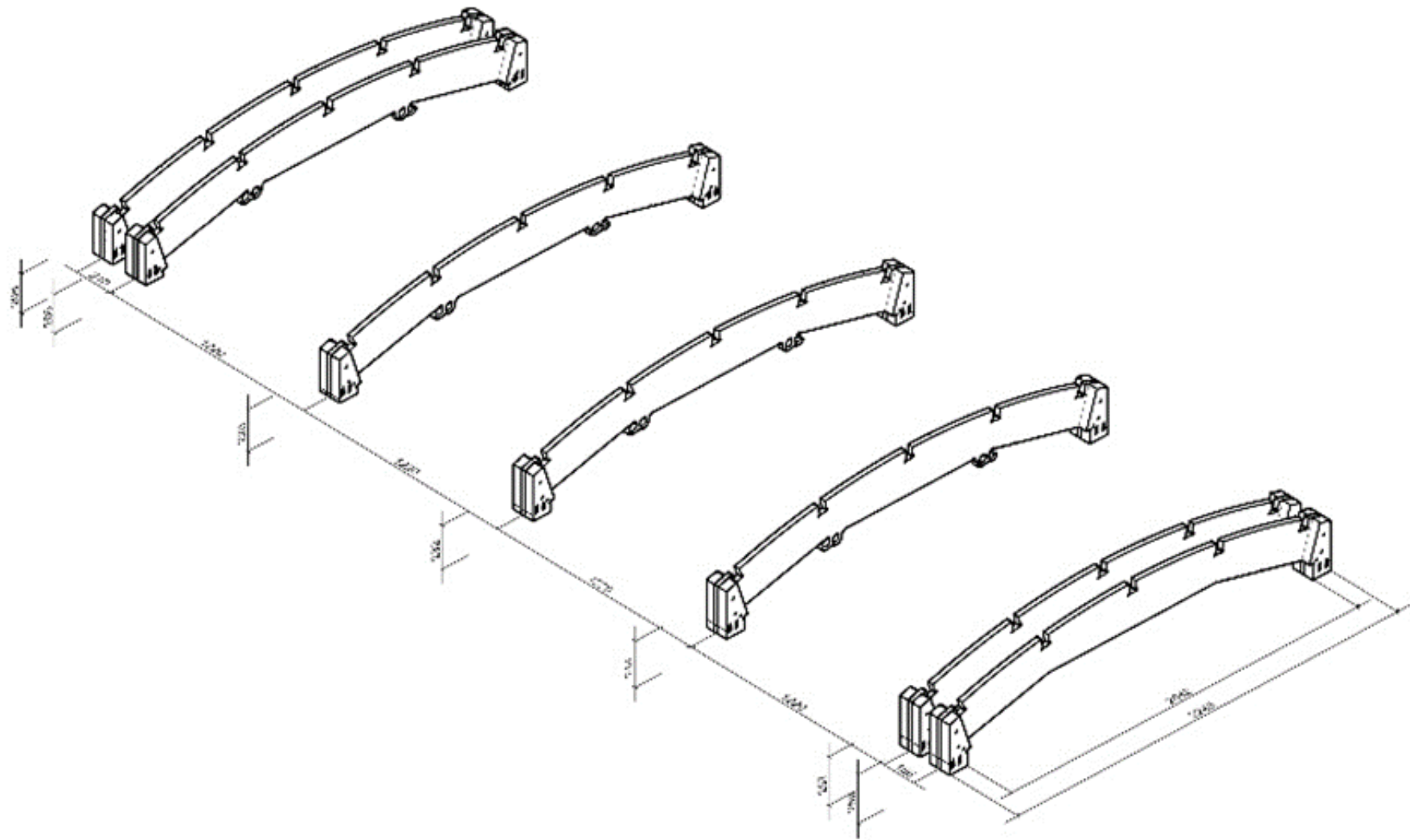
Please enquire for further details: training@wessexca.co.uk

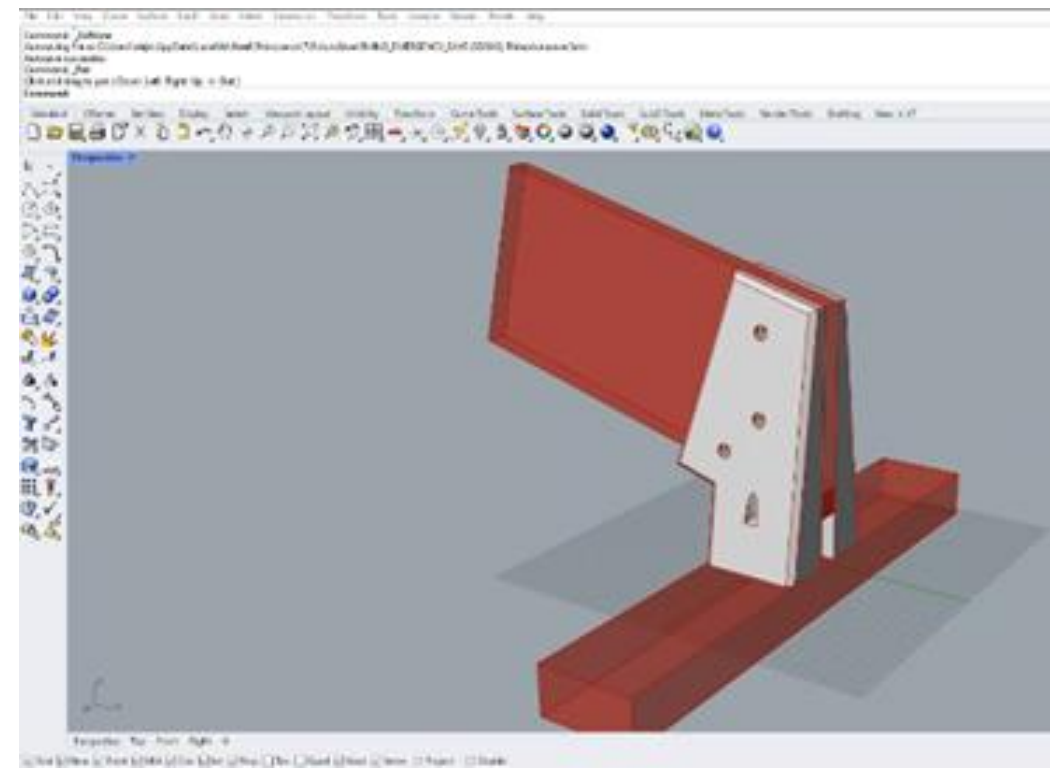
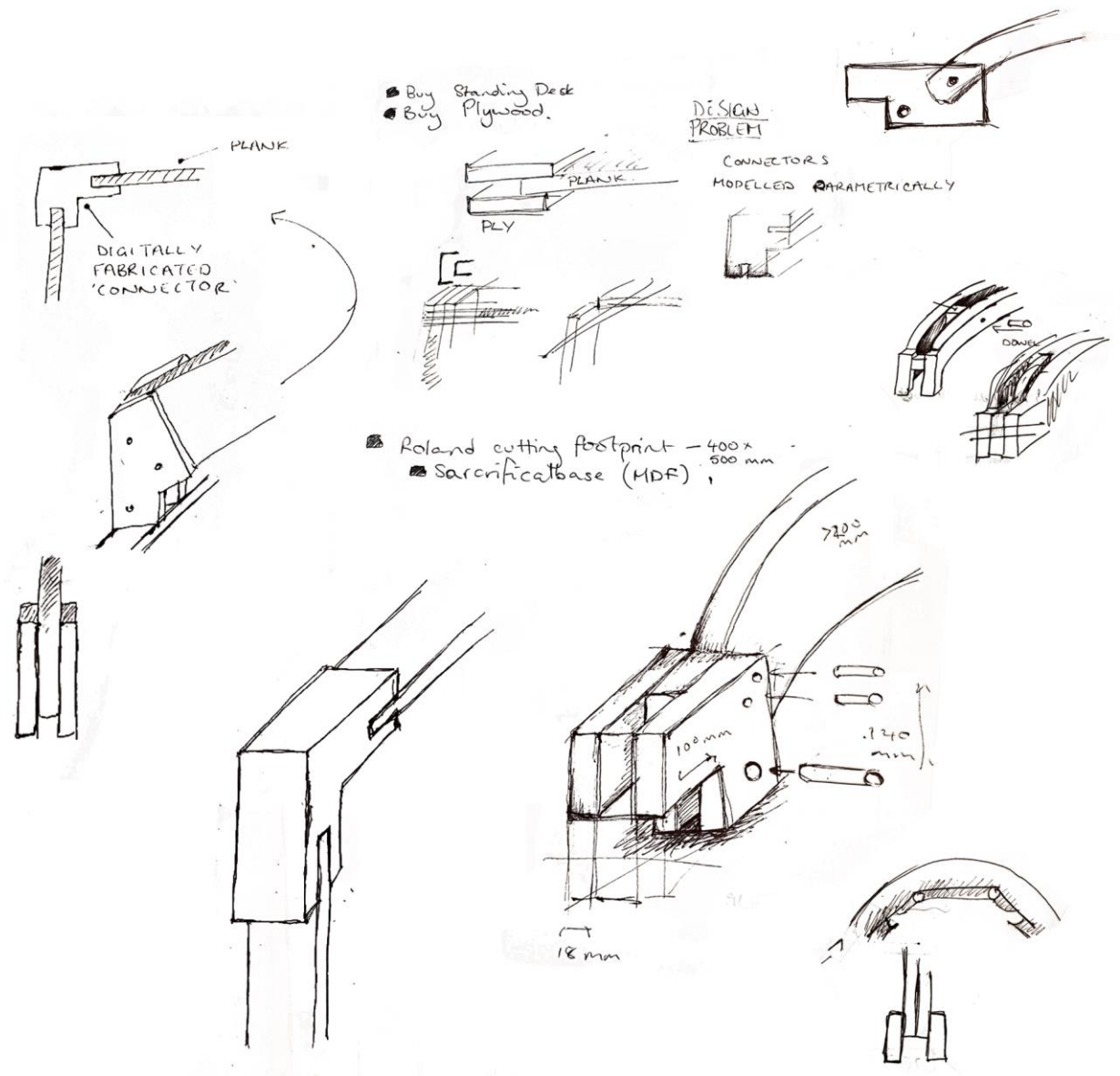


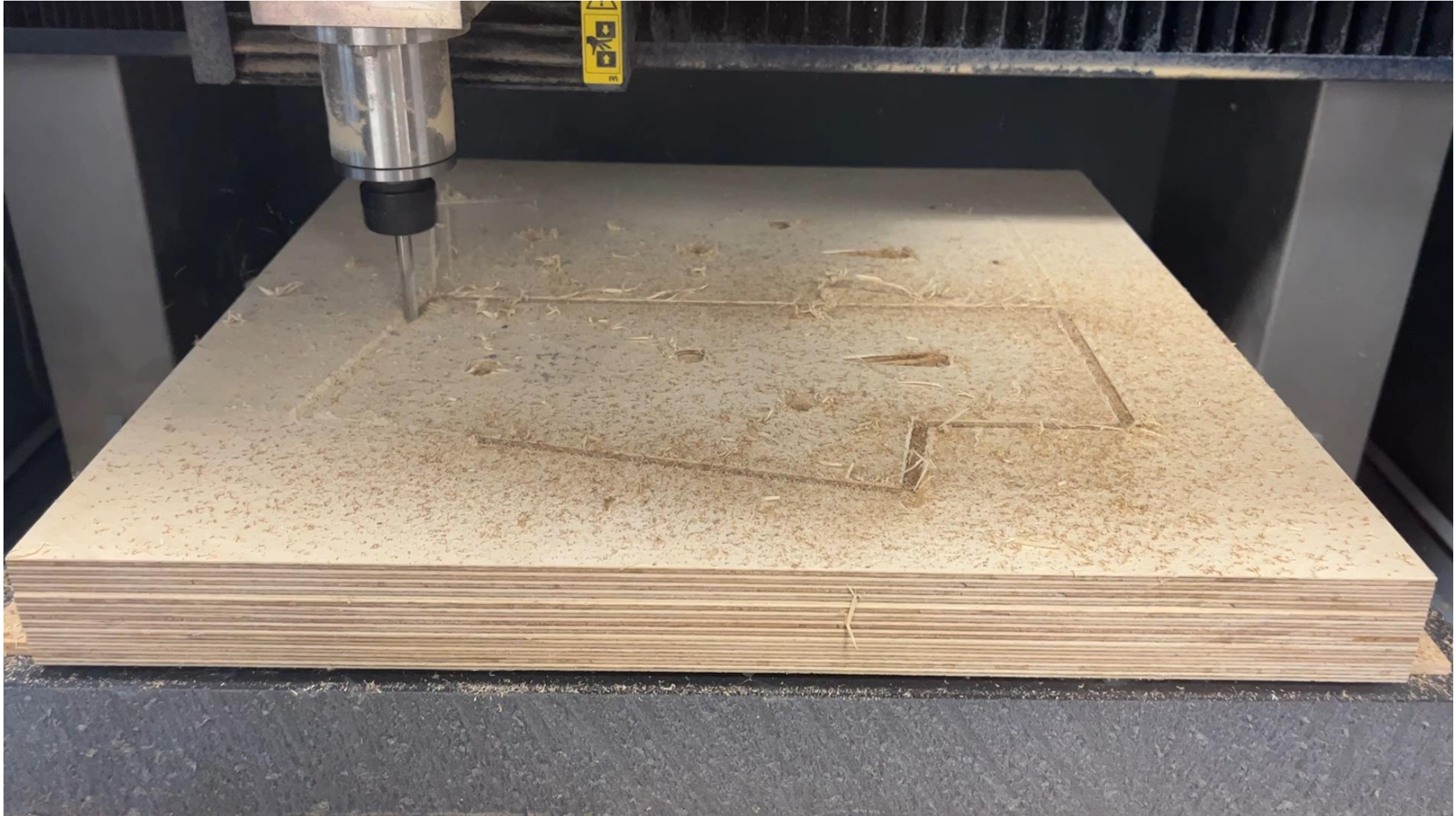
<https://wessexca.co.uk/2021/06/learn-how-to-build-a-tiny-house/>

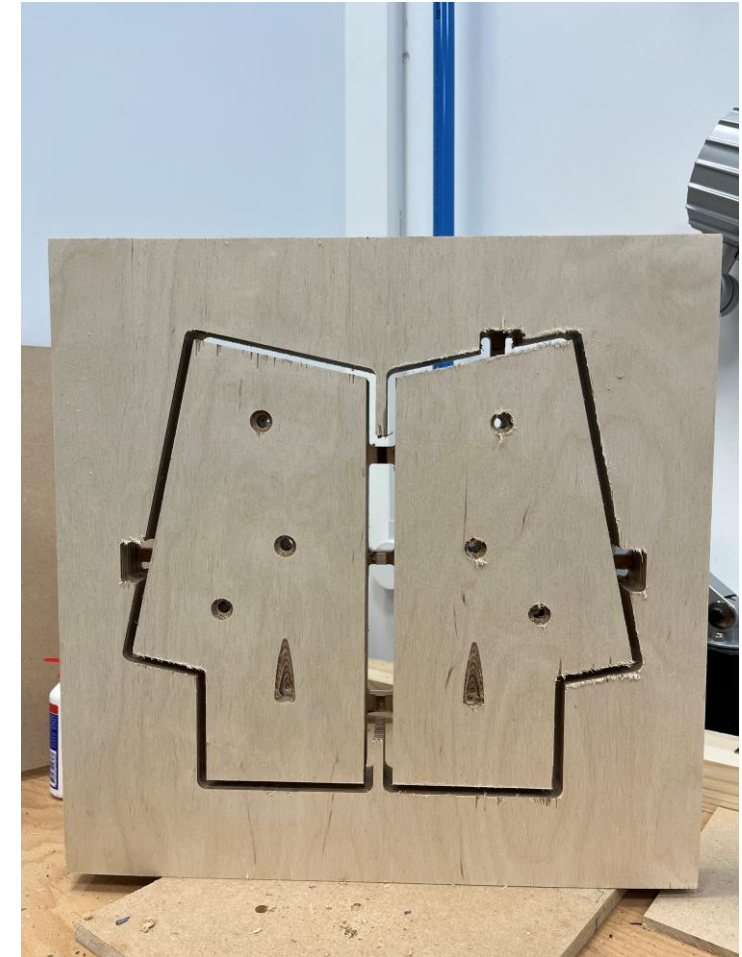


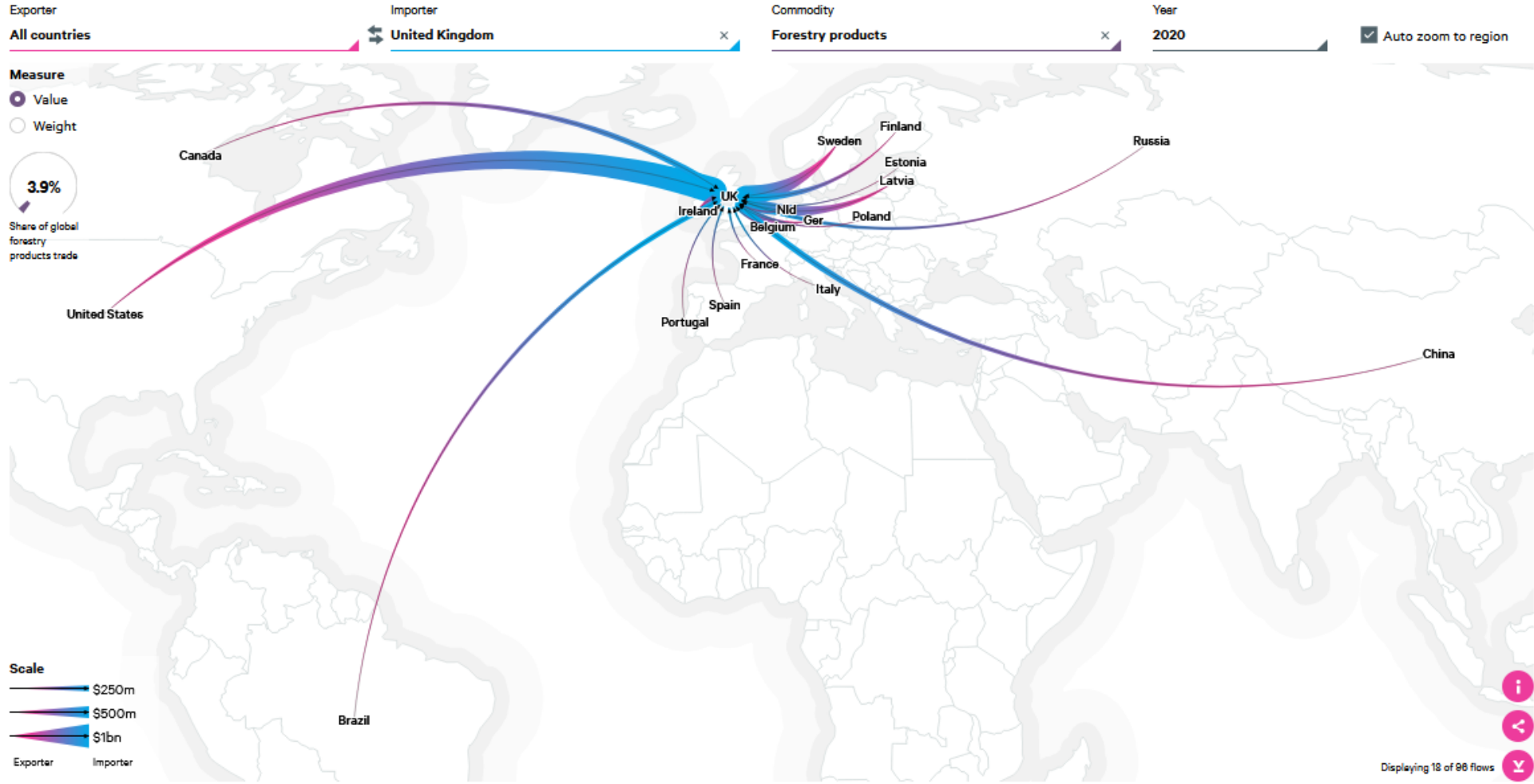












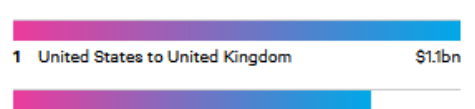
Total value

\$6bn

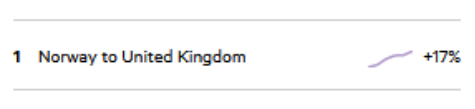


Trade flows | Commodities | Exporters | Importers

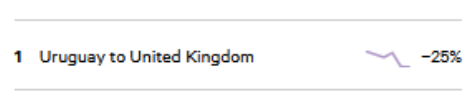
Top 5



Fastest growing



Fastest declining

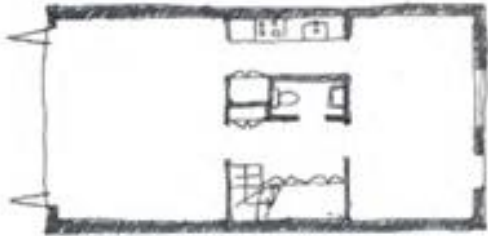
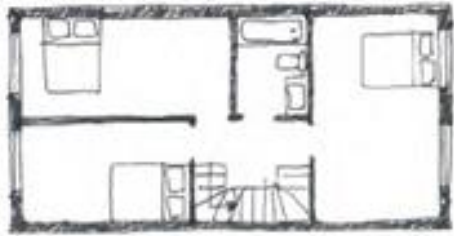




ONCE THE FEEDER SHIPS ARRIVE AT THEIR DESTINATION THE CONTAINERS ARE OFFLOADED

Next steps:

Self-finish terrace of 4 houses with Bridport Area Community Housing



38 House, Ground Floor Plan, 1:100



Technology -
combining building crafts
with contemporary technology



Structure



Envelope

Construction -
Extensive use and expression of
natural and site-based materials



Wall buildup



Exterior cladding

<https://assemblestudio.co.uk/projects/bridport-housing>



Homes for local people,
affordable forever.



**Bridport Area
Community Housing**

Bridportach.org.uk





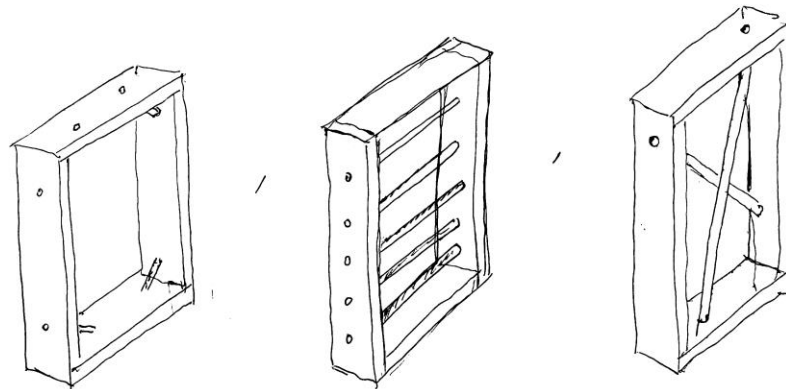
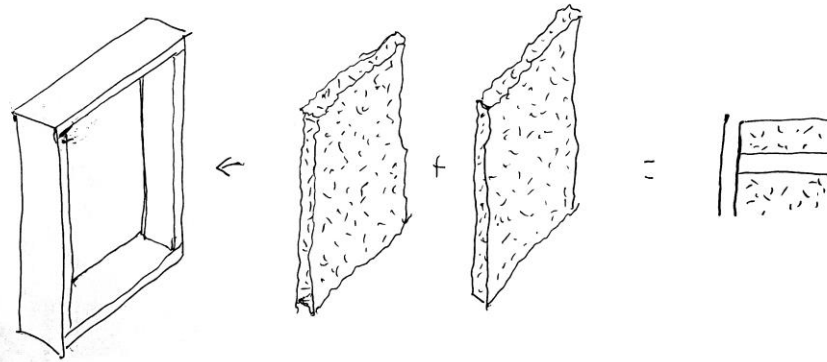
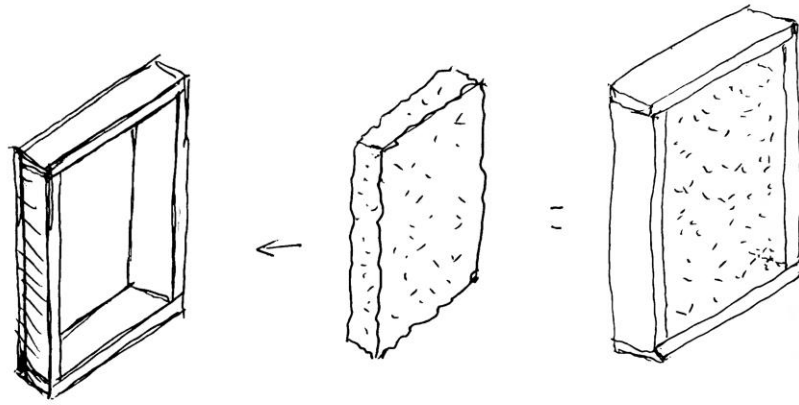
Our Objective

Put simply:

Provide genuinely affordable homes for local people and essential workers that are energy efficient, maximise the use of locally sourced materials and remain affordable 'in perpetuity'.

DunAgro – Netherlands: An example of timber-hemp panels





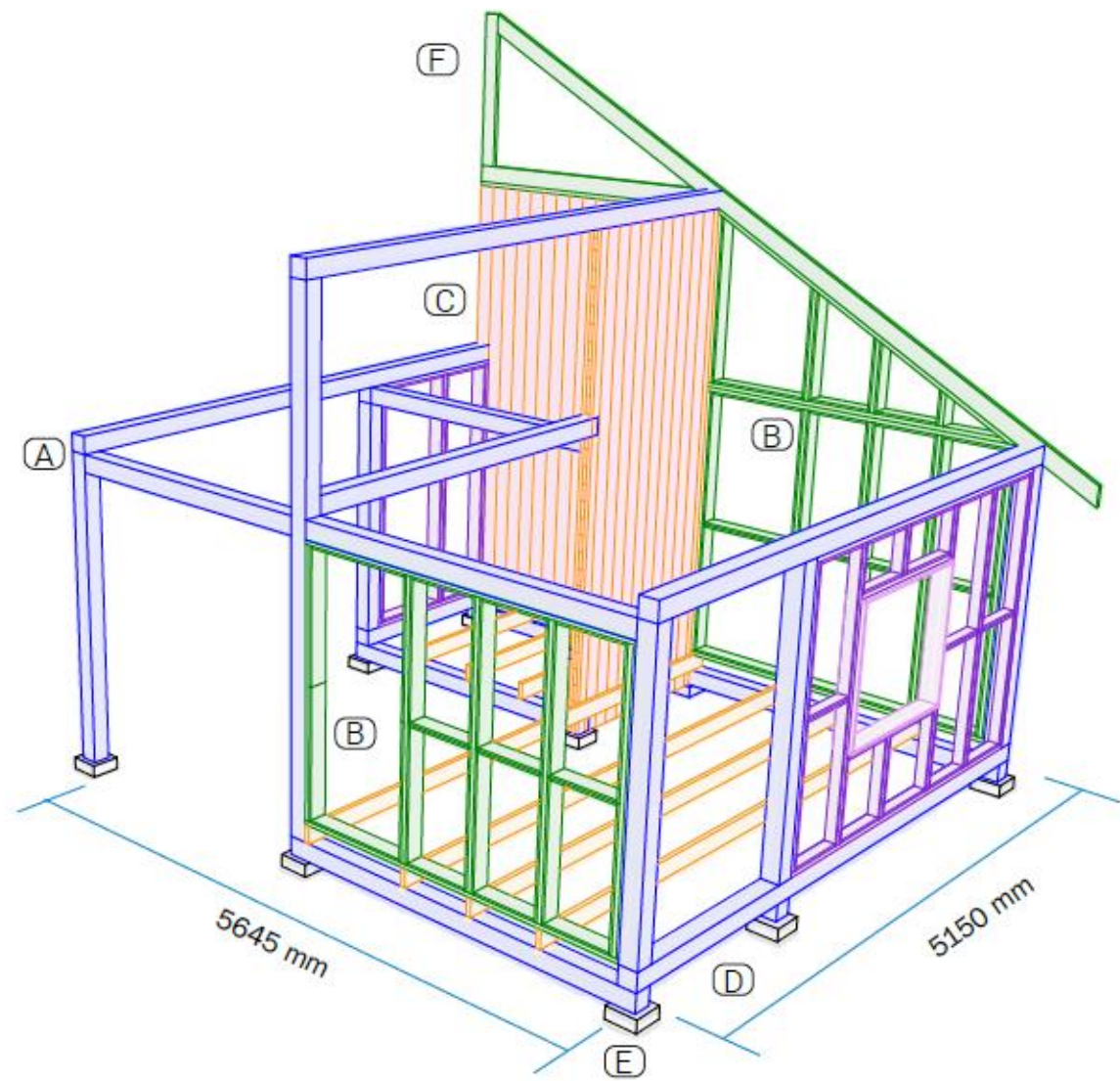
THE WOODLAND presents

HOME THE GLADE WHAT'S ON WOODLAB LOOK & SEE JOURNAL ABOUT CONTACT











Wood Chip Barn | Design + Make

6 years ago | More



Hooke Park

+ Follow

<https://vimeo.com/157159413>

	The concerns we are addressing
Affordable sustainable housing	<p>The housing crisis:</p> <ul style="list-style-type: none">– Lack of affordability– Disparity between house prices and average wages– Lack of security– Lack of sustainability
Local enterprise infrastructure	<p>The crisis of livelihoods:</p> <ul style="list-style-type: none">– Fragile local economies– Job insecurity– Lack of skills & facilities to create regenerative & resilient local economies
Regenerative land management	<p>The ecological crisis:</p> <ul style="list-style-type: none">– Climate change– Biodiversity loss– Pollution, including from intensive agriculture– Resource depletion

Question:

What am I concerned about?

What is it that affects me?

What am I drawn to engage with?

At this point don't talk about your idea for an eco-social enterprise.

	The activities to be delivered by our eco-social enterprise
Affordable sustainable housing	We will work with Assemble and local community-led housing groups to develop new designs for housing, and create a new co-operative to co-ordinate suppliers, contractors and the off-site construction process.
Local enterprise infrastructure	We will develop workspace to process timber, hemp and flax into the key elements of sustainable construction materials, including panels, frames, furniture and other fittings.
Regenerative land management	We will work with partners to support the improved management of woodlands and the cultivation of “woody fibres” such as hemp and flax, linking this to a network of farmers and an on-line platform for co-ordinating the supply of sustainable materials.

Question:

What is the main activity of your eco-social enterprise?