

Dr Tyra Oseng-Rees, BA(hons), PhD, FRSA

Oseng-Rees Reflection

18th October 2019

UWTSD

Circular economy:

Case study: Interdisciplinary
student and research project

Where does the waste go?
...a pilot experiment...



Interdisciplinary student
and research project:
collaborations as a
pedagogic tool to enhance
learning and teaching

Showcase with Low
Temperature Fused
Recycled Glass
for a reception desk in the
SA1 Waterfront
Development

Dr Tyra Oseng-Rees

Dr Juan A Ferriz-Papi, Built and Natural Environments

Ian Standen, Architecture

Dr Gregory Owen, Engineering

Lara Hopkinson, Architecture, Built and Natural Environments

Allan Nantel, Built and Natural Environments

Lisa Burkl, Glass, Swansea College of Art

BALDWINS
a Cogital company

Working
with you
to grow
your business

Whatever your
ambitions
for the future,
Baldwins have
experts on hand
to deliver
accountancy and
business advice
to help
your business
grow!

baldwingroup.com

Swansea Office:
01792 790444

IN ASSOCIATION WITH BUSINESS-LIVE.CO.UK
WIN A TRIP TO BARCELONA >>>

BusinessLive

W Business ▶ Business News ▶ University of Wales Trinity St David

Swansea Waterfront Innovation Quarter gets planning permission as councillors praise 'impressive' scheme

The Innovation Quarter is a major part of University of Wales Trinity St Davids multi-million pound investment in Swansea

SHARE



COMMENTS

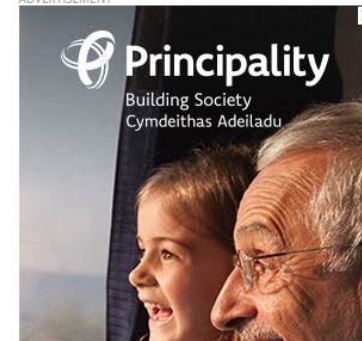
By **Chris Kelsey**

15:03, 12 NOV 2015 | UPDATED 08:27, 13 NOV 2015

BUSINESS



ADVERTISEMENT



BALDWINS
a Cogital company

Working
with you
to grow
your business

Whatever your
ambitions
for the future,
Baldwins have
experts on hand
to deliver
accountancy and
business advice
to help
your business
grow!

baldwingroup.com

Swansea Office:
01792 790444

**Research
proposal 2015**

Recycled glass for SA1

Wider benefits

What to do?

Cross disciplinary

Engineering

- Freeze/thaw cyclic testing
- Impact test
- Durability
- Accelerated weathering tests

Product design

- Product development
- Urban design
- Mass manufacturing /upscaling

Art & Design

- Design development
- Aesthetic development

Psychology

- Likability test
- Behavioral change towards sustainable products

Business

- Business case for spin-out
- Industrial links

Architectural /Built environment

- Building specs
- Space development

Why do it?

Raise UWTSD profile in Sustainability

Economic

- Research funding (EPSRC/ AHRC)
- Business investment for equipment, test center and manufacturing
 - Stone Care Swansea,
 - GlassTech
 - HOS Civils Ltd
 - Premier Concrete
 - Tidal Lagoon
- Business to establish at SA1 Innovation Quarter

Social

- Public realm
- Usability test
- Community engagement with UWTSD
- Research support staff
- PhD scholarship
- Jobs in the industry
- Safeguarding and creating jobs

Environmental

- Recycled material
- Locally manufactured
- Locally sourced material

***A unique sustainable
architectural showcase for
Swansea Waterfront
Innovation Quarter***

Increase expertise and reputation

- Heritage from Swansea College of Art
- Business links/ R&Ds
- Spin-out companies
- Create a test centre
- University collaborations
- Oslo and Akershus University College
- Sheffield University,
- Cardiff University

Research funding

- EPSRC, AHRC

Interdisciplinary research environment

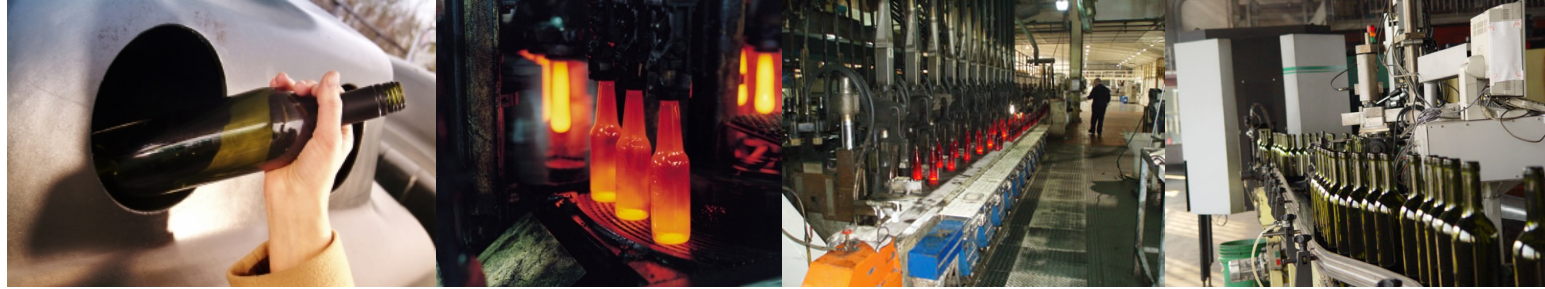
- REF outputs
- PhD scholarship

Recruit students and post doctoral

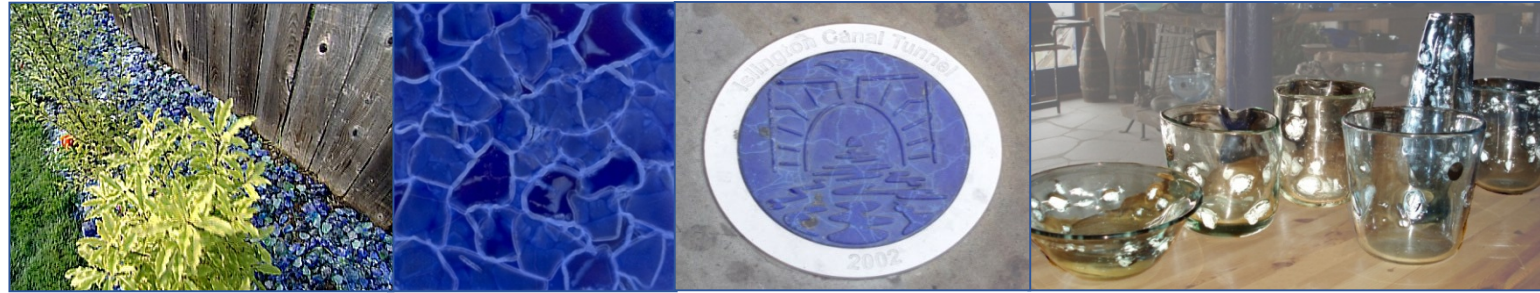
- Feed into teaching
- MA in sustainability

Recycled Glass,

Circular
Economy



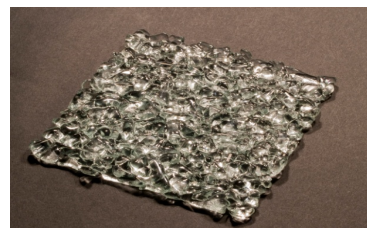
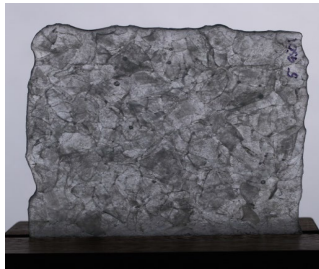
Up-cycling

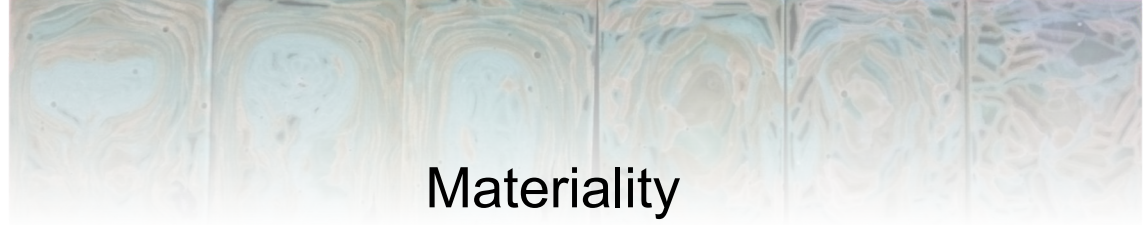
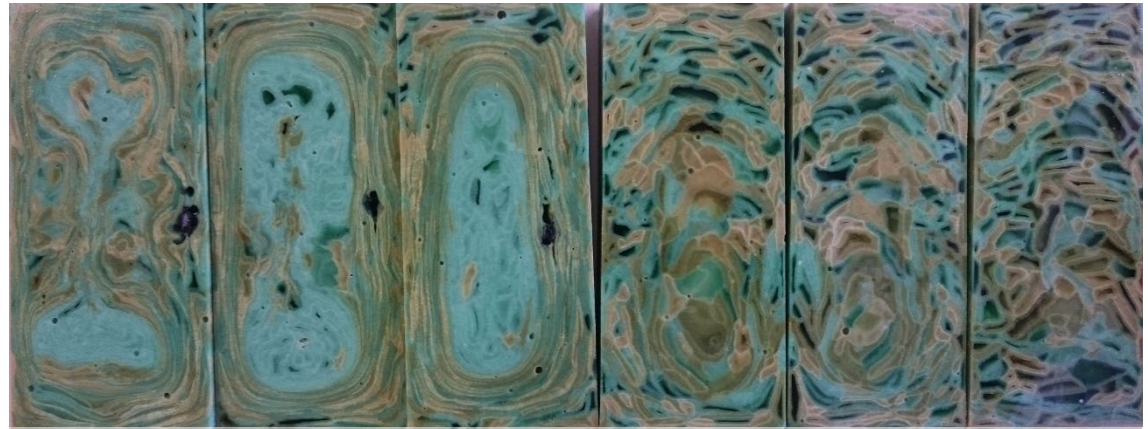


Down-cycling

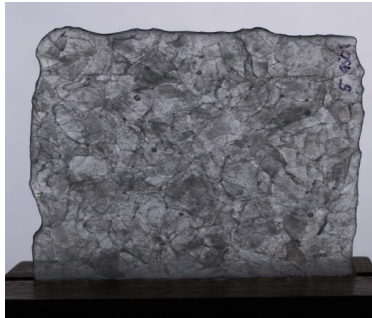


The process of working with bottle glass;
Cleaning, crushing, fusing





Materiality



Oseng-Rees
REFLECTION



Swansea Waterfront Innovation Quarter
New UWTSD SA1 Campus

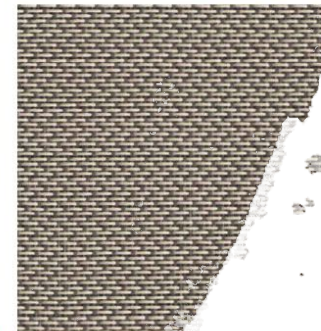
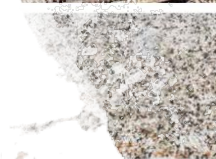


2.72 Materiality

The emphasis here is on a base set of materials that are honest, simple and natural. Recycled, rugged and of the earth. At the same time these will be softened by warm and sound absorbing materials such as felt and cork.

Texture, colour and surface are inspired by minerals and timbers in the environment, worn and weathered by time.

The concept design will build on these and bring together a harmonious set of finishes that are fit for purpose and the design concept.





Artistic visualization of a
reception desk made from
fused recycled glass
Designed by Kenton Simmons

Showcase: Low Temperature Fused Recycled Glass as a reception desk in the new SA1 Waterfront Development

- **Aim:** Enhance learners' experience through an interdisciplinary life project.
- **Disciplines:** Arts, design, architecture, project management, environmental conservation and mechanical engineering
- **Collaboration:** Swansea College of Art, Faculty of Architecture, Computing and Engineering
 - School of Mechanical and Manufacturing Engineering
 - School of Architecture, Built and Natural Environments



Activity planning

Defined the needs for the reception desk design and development

Presented to students the overall project with small projects proposals they could get involved in as well as being open to their suggestions.

Discussions started on individual level to define their end of year project within their expertises and interests

Creation of interdisciplinary group

Management of SA1 team expectations throughout the process

Projects

Art glass student: Recycled glass aesthetics, texture and design development

Engineering student: Design and manufacture of a bespoke glass crusher

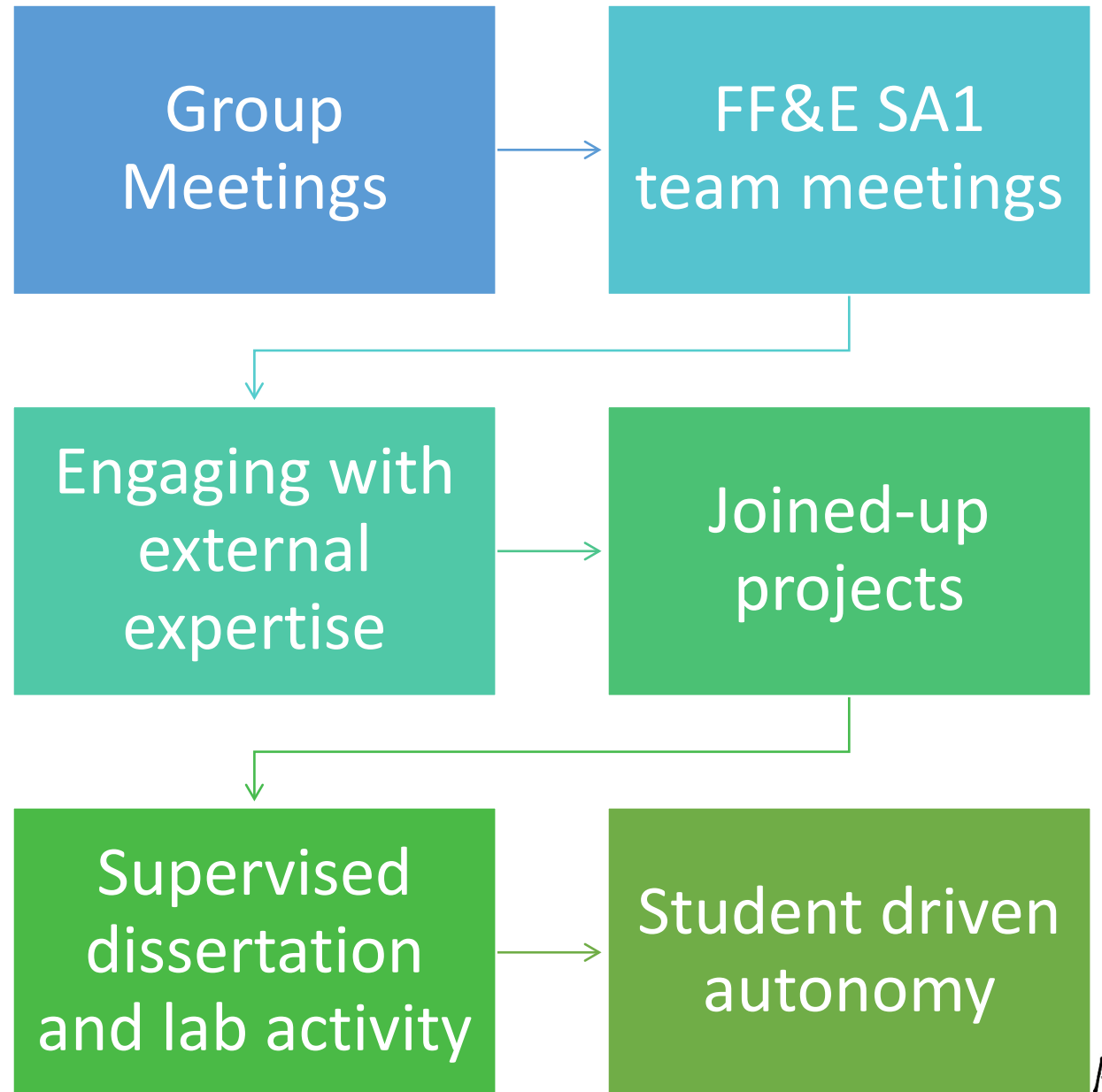
Environmental student : Carbon footprint of recycle glass manufacturing

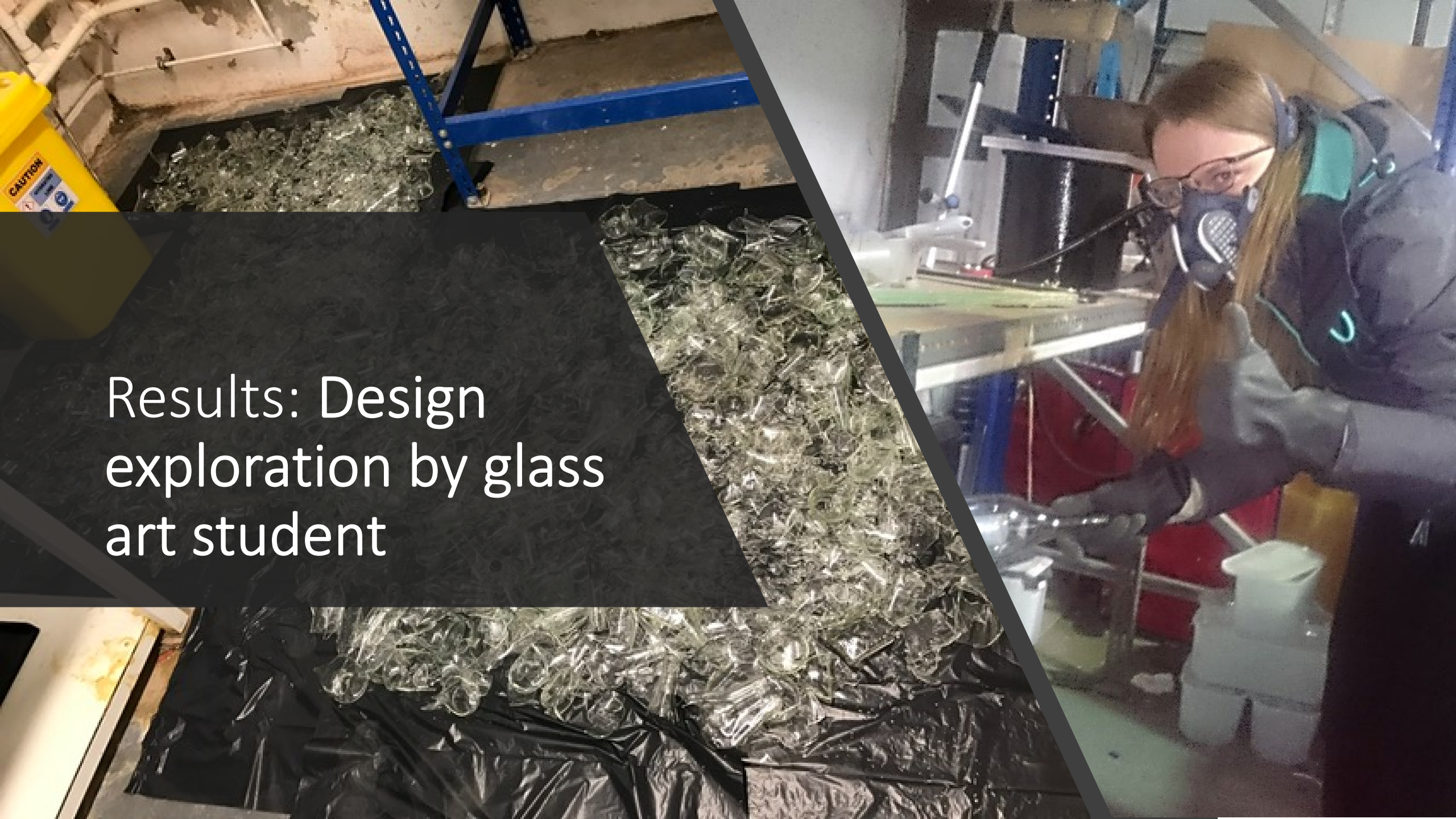
Project Construction Management student: Impact resistance with and without Recyclamine recyclable epoxy coating

Architecture student: development and making of desk carcass and fittings

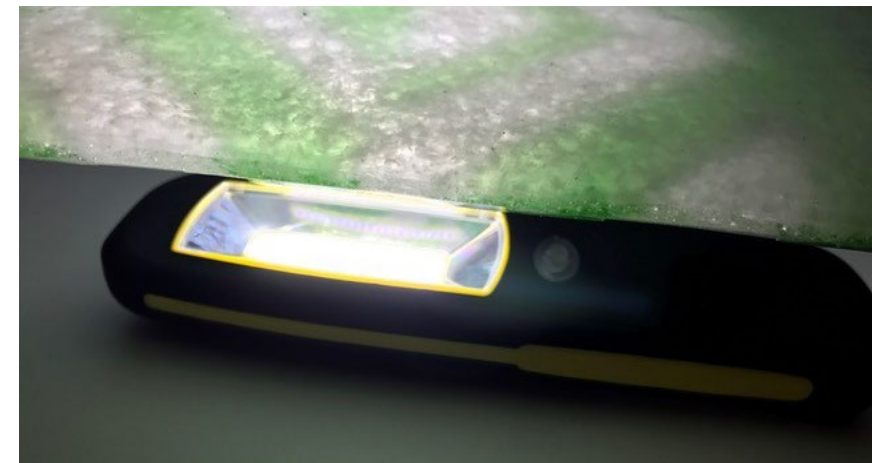
Environmental student: Life Cycle analysis of recycled glass processing

Activity





Results: Design
exploration by glass
art student











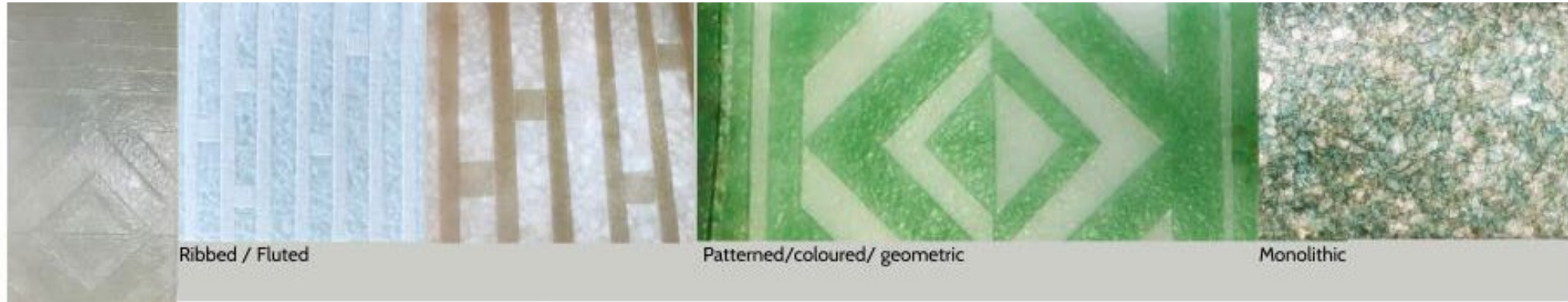
1

FACE MATERIAL IN RECYCLED GLASS PANELLED SYSTEM ON
SUPPORT FRAMEWORK WITH SILICONED BUTT JOINTS



RECEPTION DESK OPTION - Elevation

1

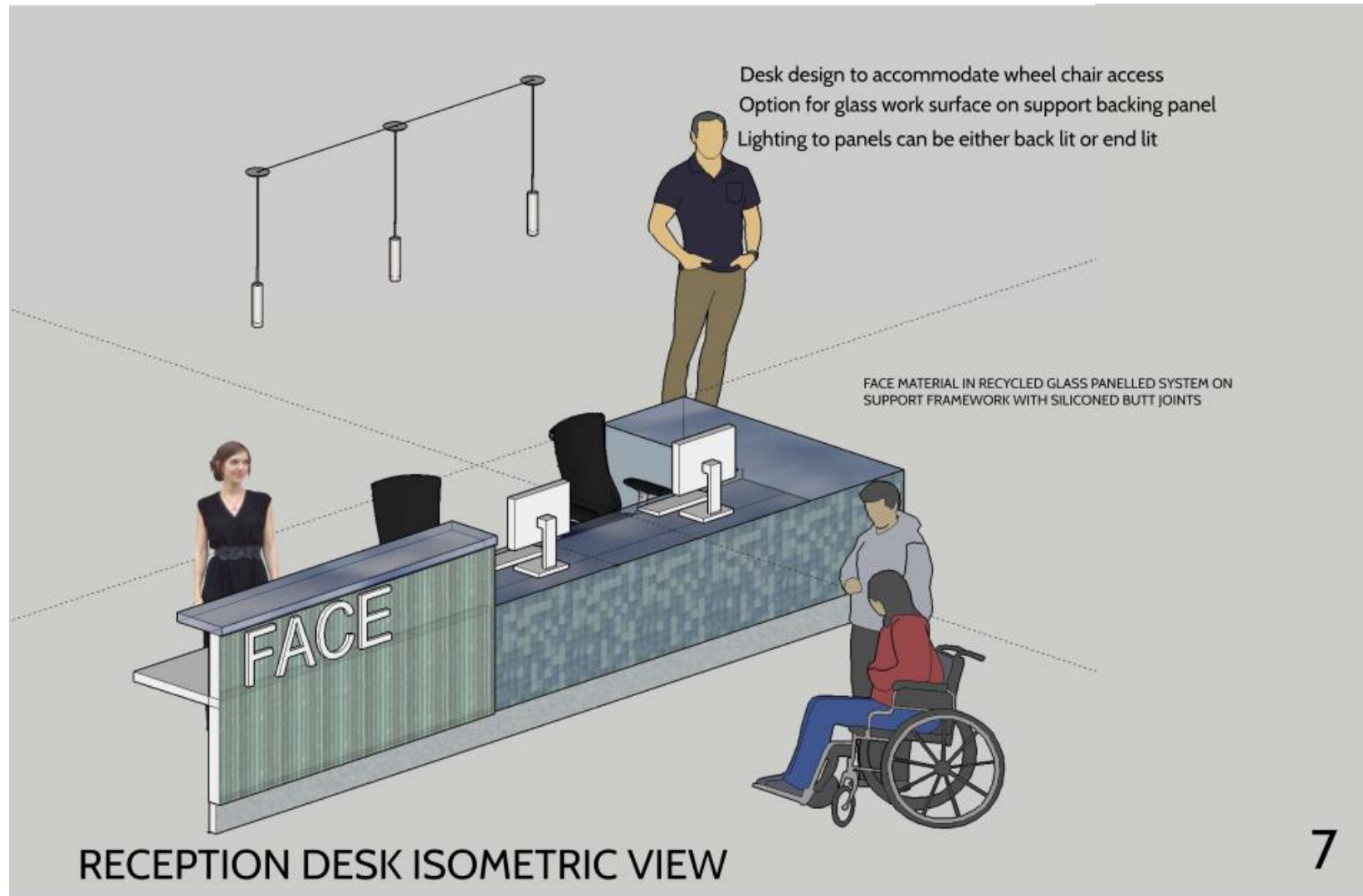


A selection of the recycled glass patterns

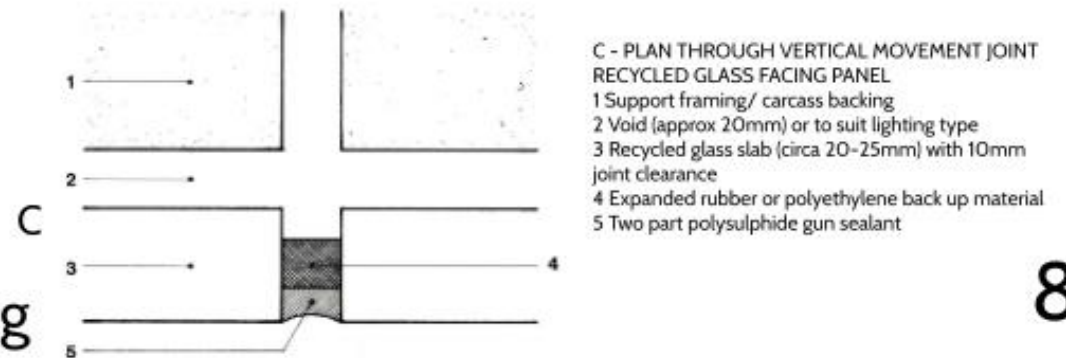
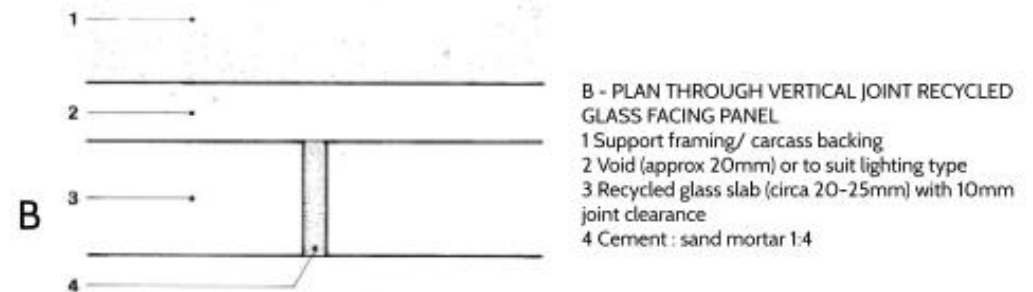
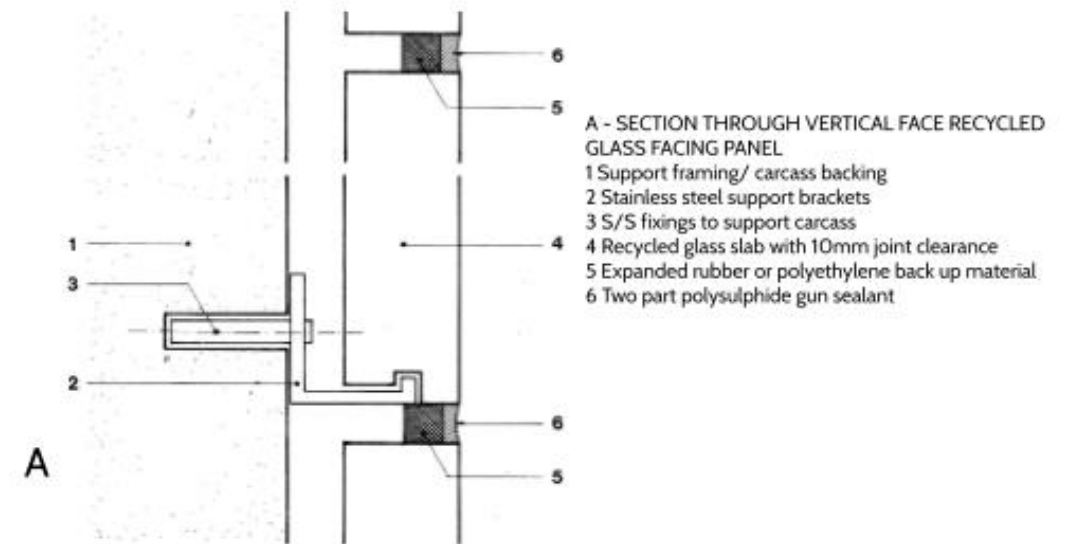
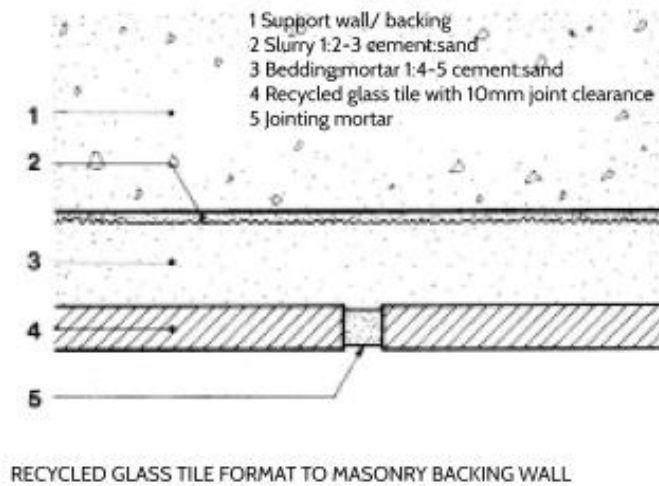
Recycled glass work surfaces possibilities:
A Tile or slab on fully supported deck
B Slab on support framework aperture



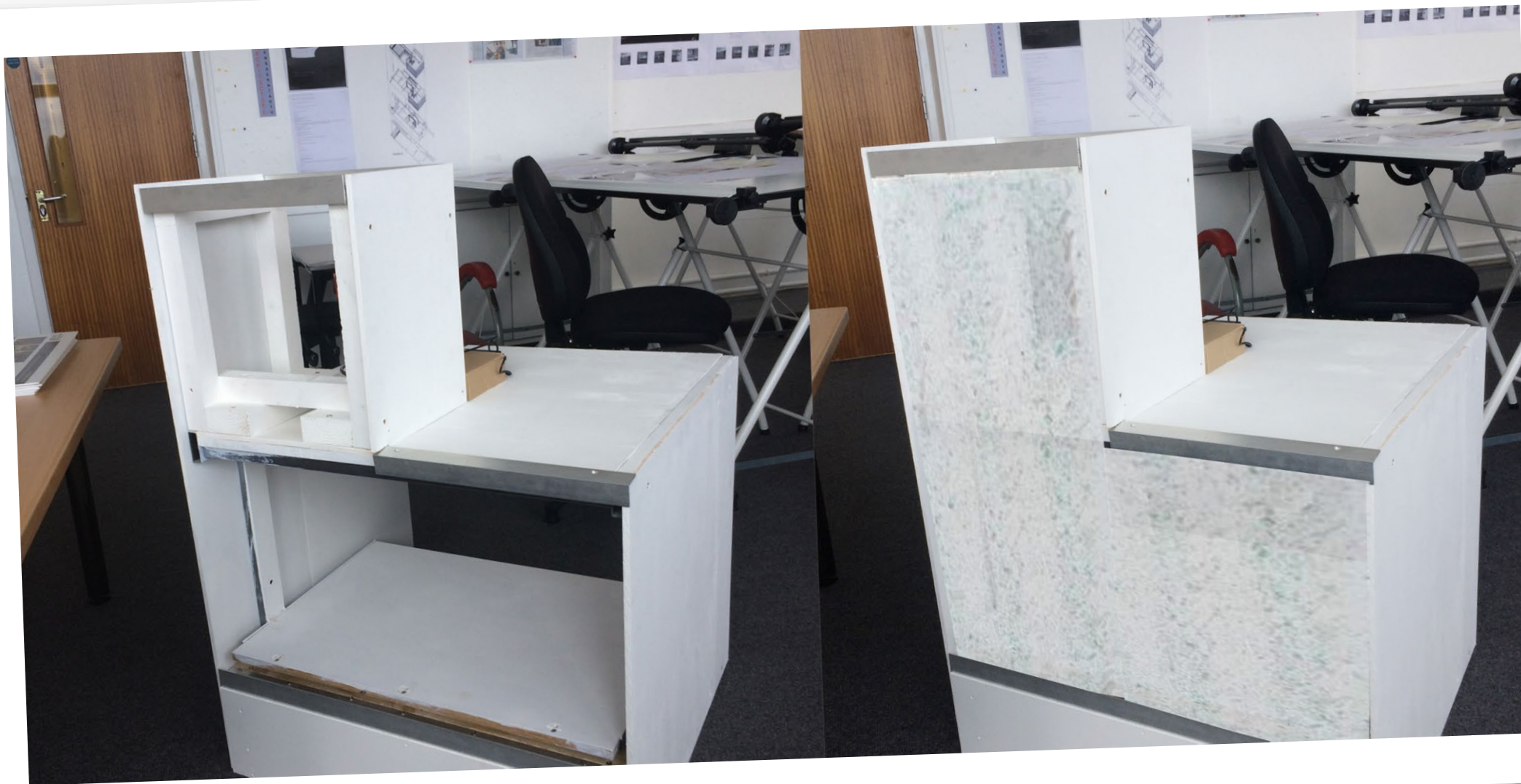
reception desk plan

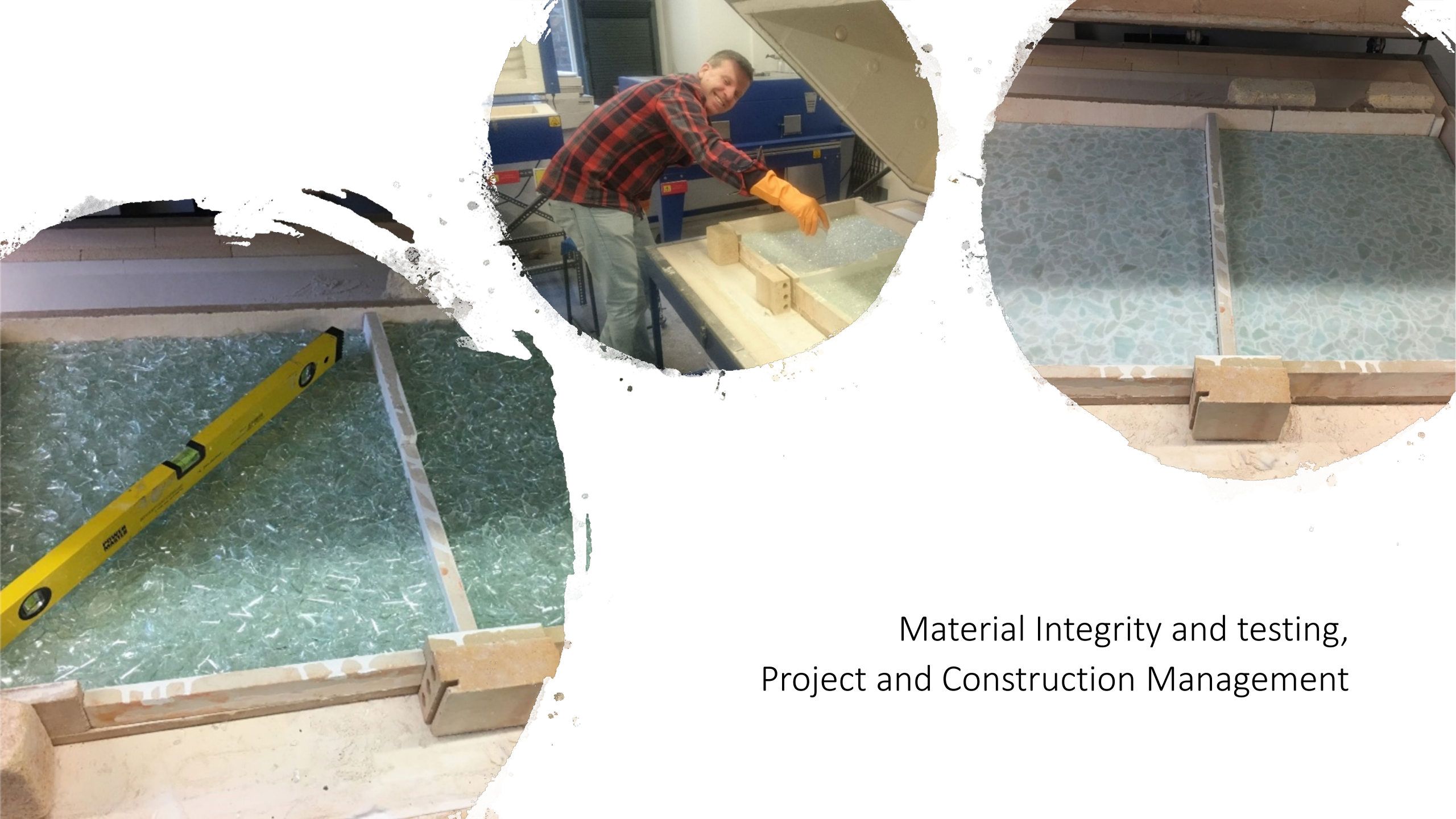


Internship: Architecture

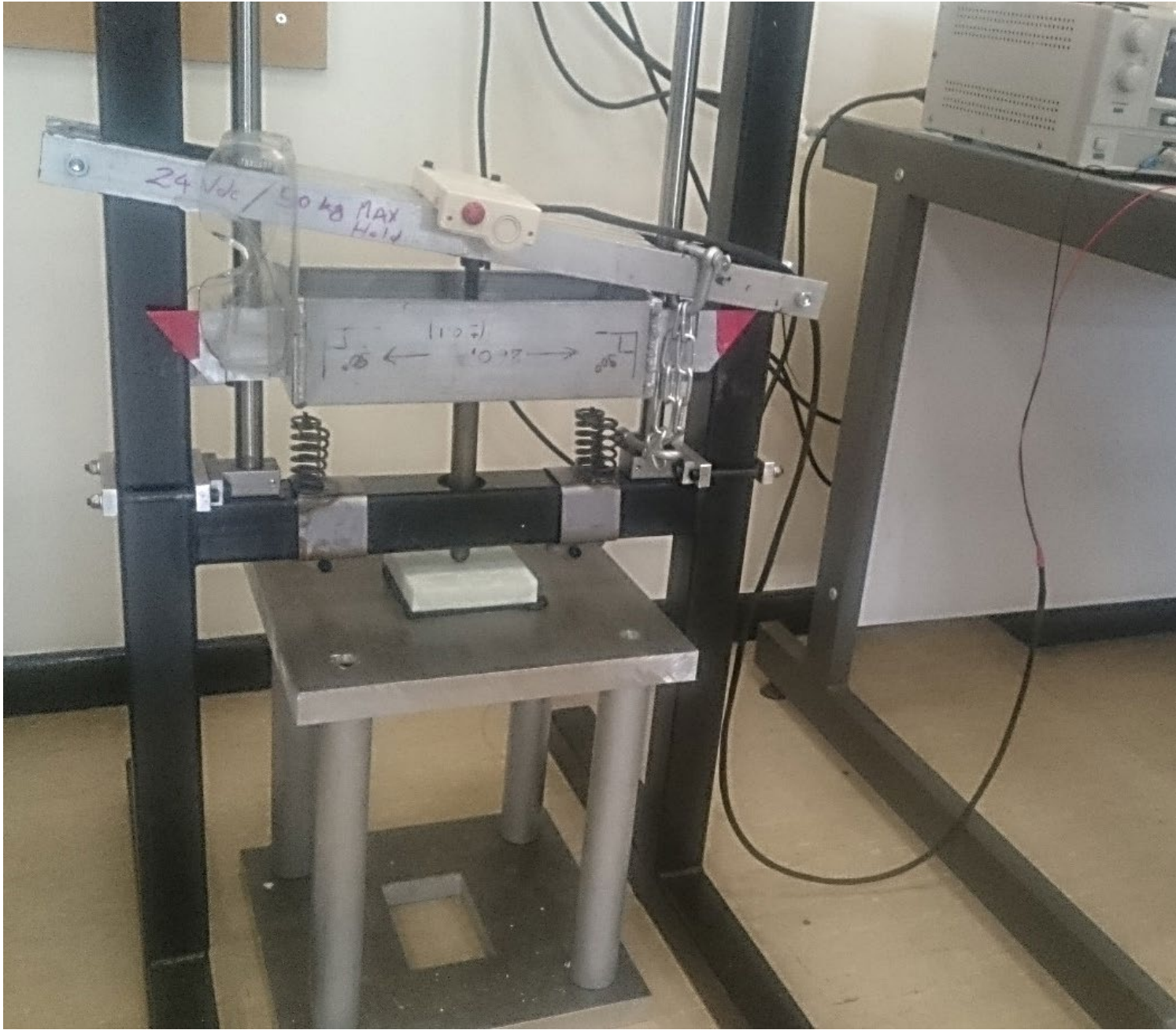


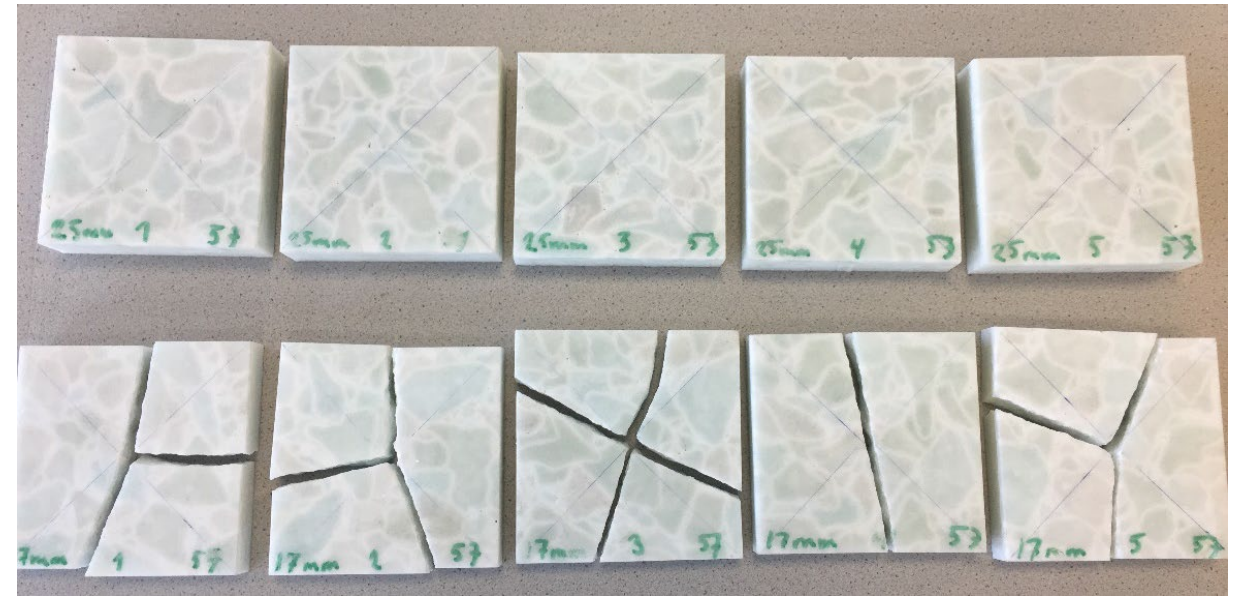
RECEPTION DESK - Detailing





Material Integrity and testing,
Project and Construction Management





- Dissertation: The Resistance to Impact of Recyclamine Coated and Non-Coated Low Temperature Fused Recycled Glass for the Use as a Reception Desk
- Research outcome: Halley, D., Oseng-Rees, T., Pagano, L., & Ferriz-Papi, J.A., 2017, Procedure for Impact Testing of Fused Recycled Glass, 19th International Conference on Architectural Engineering and Construction Materials, Paris, France

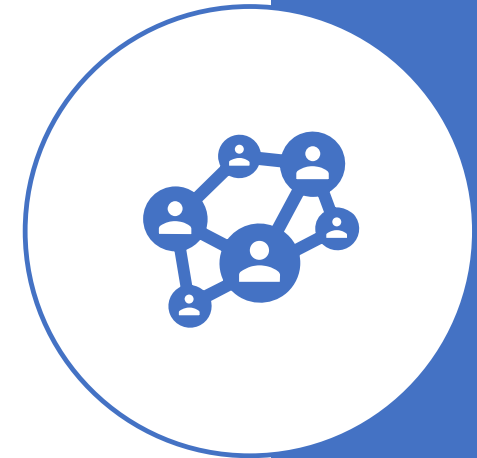
Summary of feedback

Different aspects assessed and thoughts gathered from students and staff participating in this project

Wellbeing of Future Generations (Wales) Act 2015

Five ways of working:

- Long term view
- Prevention
- Integration
- Collaboration
- Involvement



Summary of feedback

Long term view

- Provided more lifelong learning skills for future learning/teaching
- Enrichment of the overall educational experience
- Widening of knowledge of every participant
- Reflected upon teaching practices and incorporate new ones where appropriate
- Improvement of relationship and collaboration between departments
- Challenges with low or non-existing budget. Development of internships as a short-term solution
- Engagement with company partners: Kier, design team and project management

Summary of feedback

Prevention

- Initial proposals were made to students, allowing their own contribution according to their interests to be adapted to the project requirement
- Close supervision and project flexibility helped detecting problems and change their topics or adapt to new circumstances
 - Initial commitment from 2 students was not developed
 - Progress of research was challenging as had to be adapted according to customer needs and new findings

Summary of feedback

Integration

- Students had the opportunity to participate in interdisciplinary project, with support from staff with different expertise areas
- Integration of students from different background to the same project
- Integration with teaching programmes was achieved as students worked within their discipline area/study program
- Improvement of relationship and collaboration between participating staff

Summary of feedback

Collaboration

- Collaboration between Schools and Faculties in the same project
- Collaboration and interaction between students to solve their needs for each contained student project
- Improvement of opportunities with cross interdisciplinary work
- Better understanding between aesthetical and engineering aspects
- Interdependency between students' projects improved collaboration
- Time management, reviewing and reflecting upon set goals and considerations were necessary for a successful outcome and enabled the students to gain skills in collaboratively working as a team in addition to a high degree of communication skills

Summary of feedback

Involvement

- Staff had difficulties to meet due to full teaching capacity
- Promotion of students and staff participation in activities of different departments
- Improvement of inter-departmental interest in this project
- Benefits of participating in a life project with real customers. Students' contribution was positive
- Not all Lecturers achieved the same level of communication with students. Problems with agenda and teaching load.
- Engagement with students was challenging, as two students disengaged
- Lecturers would have been able to improve their contribution with more time
- Initial difficulties to engage students in the project

Summary of feedback

Technical proposals to go forward

- Explore the aesthetic possibilities of using low temperature fused glass
- Given that glass is infinitely recyclable, does this mean that taking some of one particular stream to make the product is placing additional pressure elsewhere within the process / supply chain?
- Could the carbon footprint be reduced in some way – would upscaling of the process assist in this?
- Confirmation this proposal meets criteria for circular economy
- Study of impact testing of other mechanical properties

Summary of feedback

Proposals to go forward

- Communication of project results (publications, conferences, etc.)
- Encouragement of cross faculty teaching
- Introduction of postgraduate students (Masters, PhD)
- New sources of funding (KESS, KTP, Smart Expertise, etc.)
- Creation of interdisciplinary group for teaching and research in innovative sustainable materials



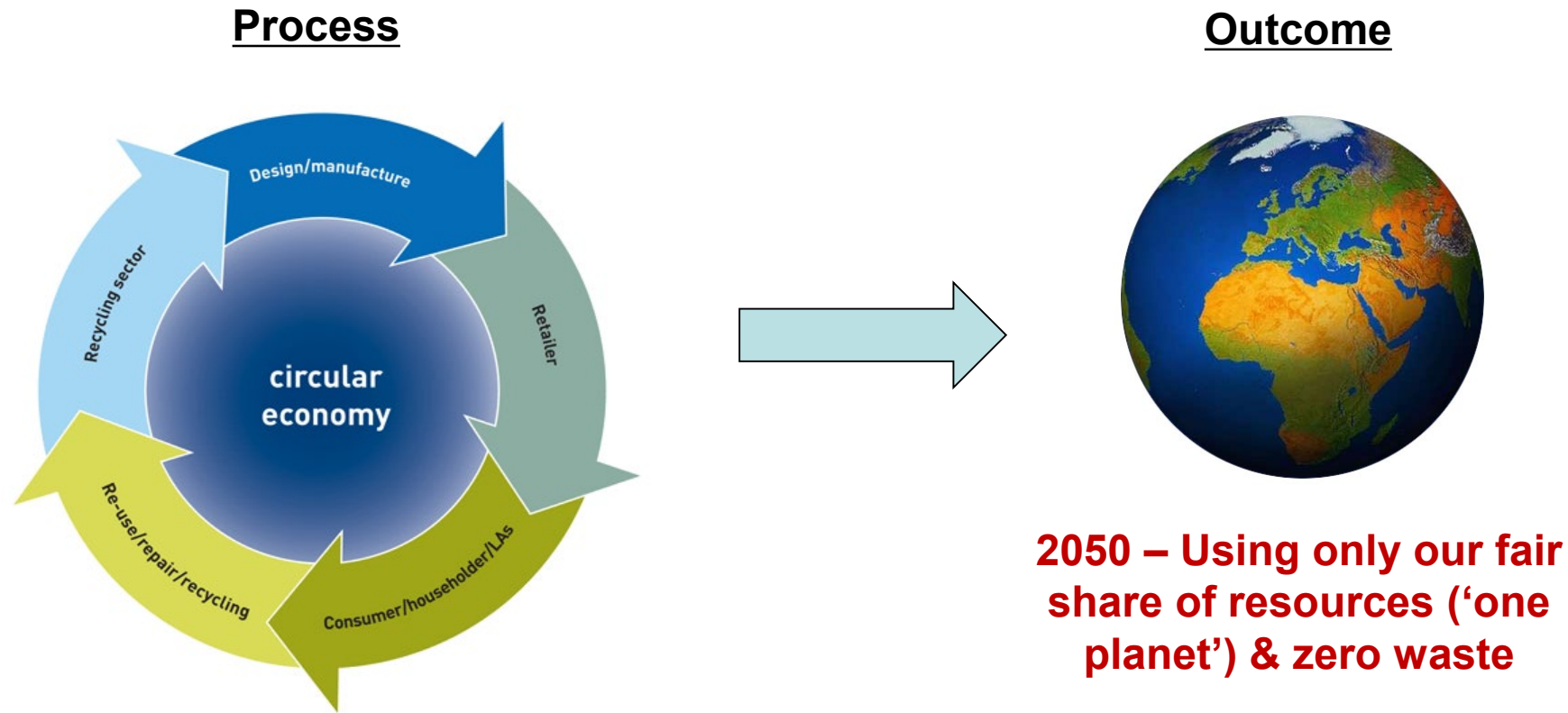
Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David





Case study- Recycled bottle glass in the construction industry

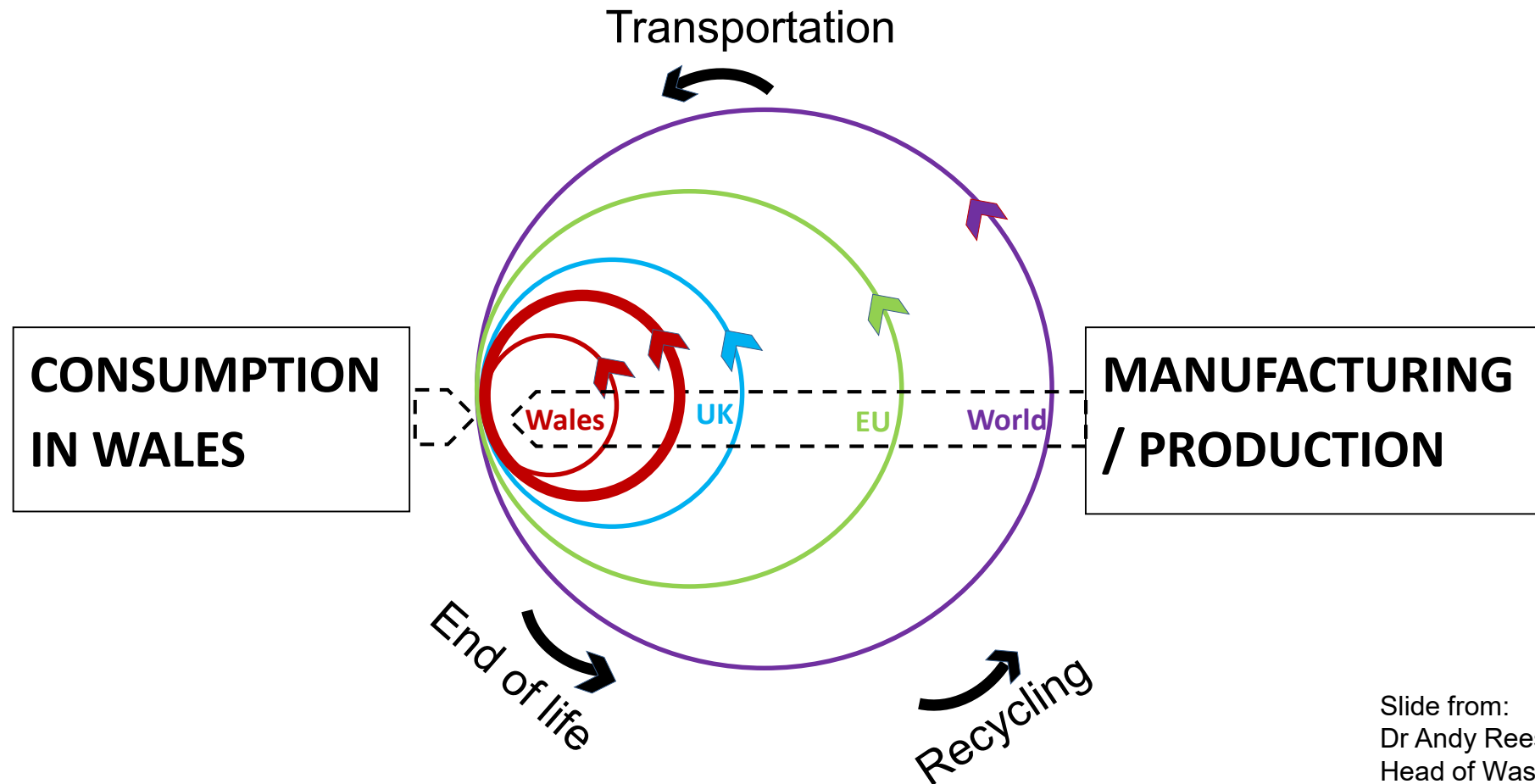
The strategic response that's needed – **A concerted, joined up effort, to work towards a circular economy**



With integrated effort from global - to global region – to country – to region – to local council – to people and businesses

Slide from:
Dr Andy Rees, OBE
Head of Waste Strategy Waste &
Resource Efficiency Division, Welsh
Government

Material recycling circles reflecting Wales' place in the global economy – consumption in Wales and sources of production: our aim is to increase the Welsh recycling circle



Slide from:
Dr Andy Rees, OBE
Head of Waste Strategy Waste &
Resource Efficiency Division, Welsh
Government

Wales' current strategic approach to resource efficiency through a more circular economy approach:

Towards Zero Waste (2010): key milestones to the goal of one planet resource use by 2050

2025: Towards Zero Waste

Significant waste reduction (including reuse) (27% reduction)

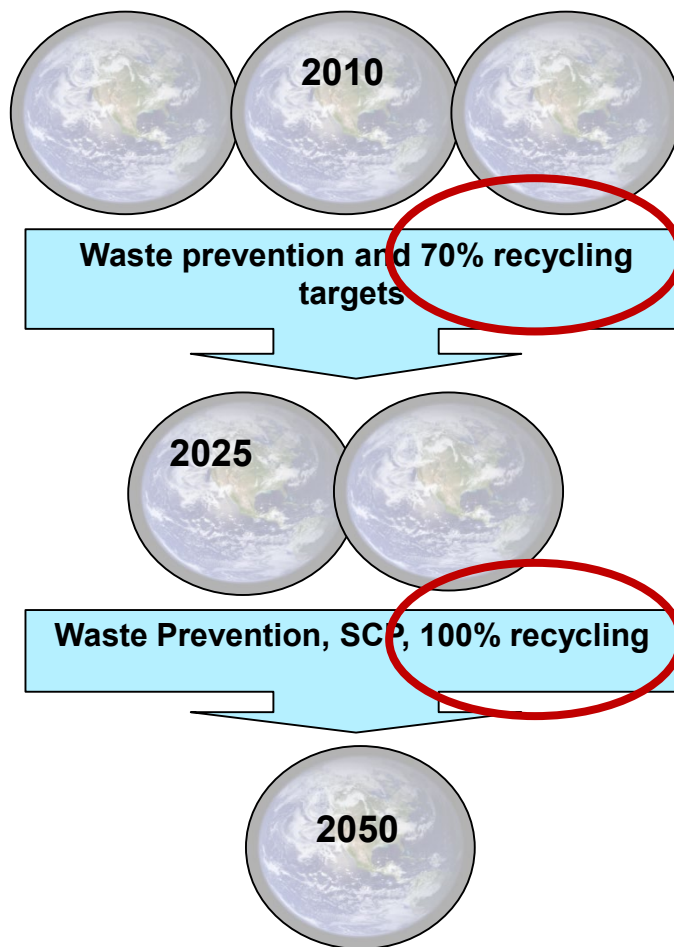
Recycling rate of at least **70%**

AD food waste priority

'Closed loop recycling' systems (high quality, separate collection)

Residual waste to high efficiency EfW

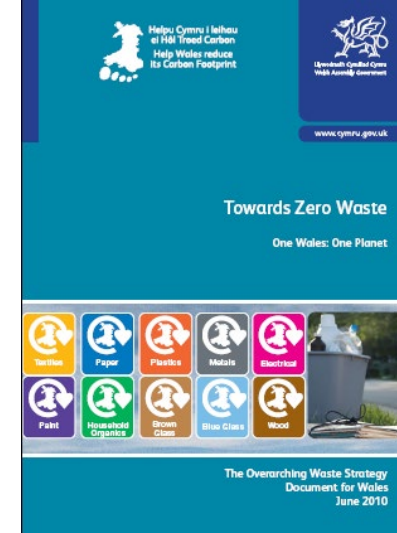
As close to **zero** landfill as possible



2050: Achieving Zero Waste

Reduce our share of Wales' ecological footprint to 'one Wales: one planet' levels by 2050 (**65%** reduction of waste)

Produce no residual waste, through more sustainable consumption and production - any waste that is produced is re-used/ recycled (at **100%**).



Slide from:
Dr Andy Rees, OBE
Head of Waste Strategy Waste &
Resource Efficiency Division, Welsh
Government

Increasing business recycling: **The legal bit - powers**



The Environment (Wales) Act 2016 amends the Environmental Protection Act 1990 to provide the Welsh Ministers with the powers to:

- Require businesses to present their wastes separately for collection
- Require waste collectors such as waste management companies to collect specified materials by way of separate collection.

The Act also amends the Waste (Wales) Measure 2010 in order to confer the power to ban specified waste materials from incineration.

The Act also bans the disposal of food waste to public sewer from business premises in Wales, subject to a commencement order.

The Waste (Wales) Measure 2010 (the Measure) provides the Welsh Ministers with the power to ban specified waste materials from landfill.

Slide from:
Dr Andy Rees, OBE
Head of Waste Strategy Waste &
Resource Efficiency Division, Welsh
Government

The new legal requirements

The Welsh Government intends to bring forward regulations under the aforementioned provisions and to commence the ban on the disposal of food waste to sewer.

The Welsh Government will thus require:

- business waste producers (including the public sector) to present their wastes separately for collection
- separate collection of business wastes (including public sector wastes)

and:

- ban specified materials to landfill
- ban specified materials to incineration
- ban the disposal of commercial food waste to sewer

Natural Resources Wales (NRW) will regulate all the above requirements other than the ban on the disposal of food waste to sewer from non-domestic premises, which will be regulated by Local Authorities.

Slide from:
Dr Andy Rees, OBE
Head of Waste Strategy Waste &
Resource Efficiency Division, Welsh
Government

The why – well-being/SD impacts

The purpose of making the regulations is to create a framework to:

- drive up levels of high-quality recycling, food waste treatment and energy recovery and reduce disposal to landfill by business, end the incineration of specified recyclable materials,
- provide additional jobs and investment in the waste supply chain and in doing so,
- help protect human health, the environment and natural resources.

This will make a major contribution to ‘green growth’ in Wales which is a crucial aspect of Taking Wales Forward, sustainable development and a low carbon circular economy.

Slide from:
Dr Andy Rees, OBE
Head of Waste Strategy Waste &
Resource Efficiency Division, Welsh
Government

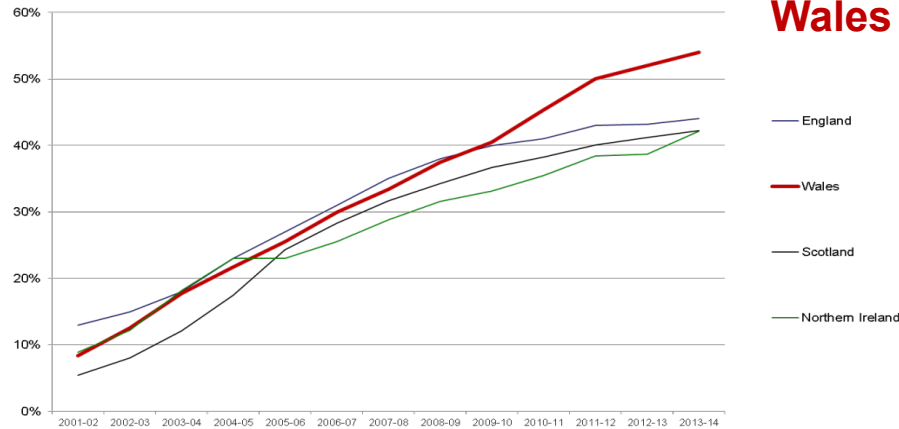
The why – meeting WG policies

Also supports key Welsh Government goals, including:

- The resource efficiency commitments in Programme for Government (Taking Wales Forward), the National Strategy (Prosperity for All) and A Low Carbon Wales
- The Economic Action Plan goals for sustainable economic growth.
- The Well-being of Future Generations (Wales) Act 2015, in particular regarding the aims of a prosperous, resilient and globally responsible Wales.
- Towards Zero Waste, the waste strategy for Wales.
- The Carbon budget and targets set under Part 2 of the Environment (Wales) act 2016.
- The Natural Resources Policy for Wales, in particular the aims of increasing resource efficiency and moving towards a more circular economy.
- Wales' commitment to the United Nations Sustainable Development Goals, for example goal 12 'Ensure sustainable consumption and production patterns' and its associated targets'.

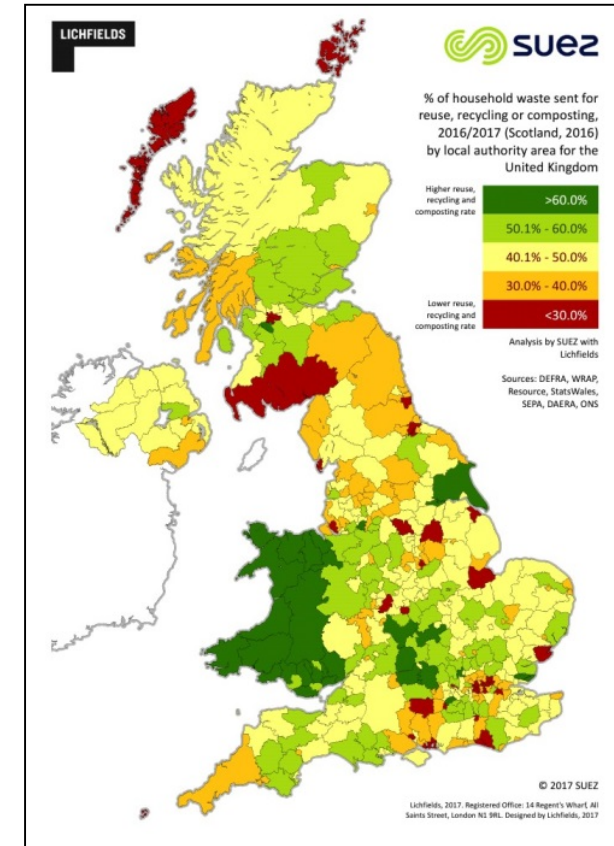
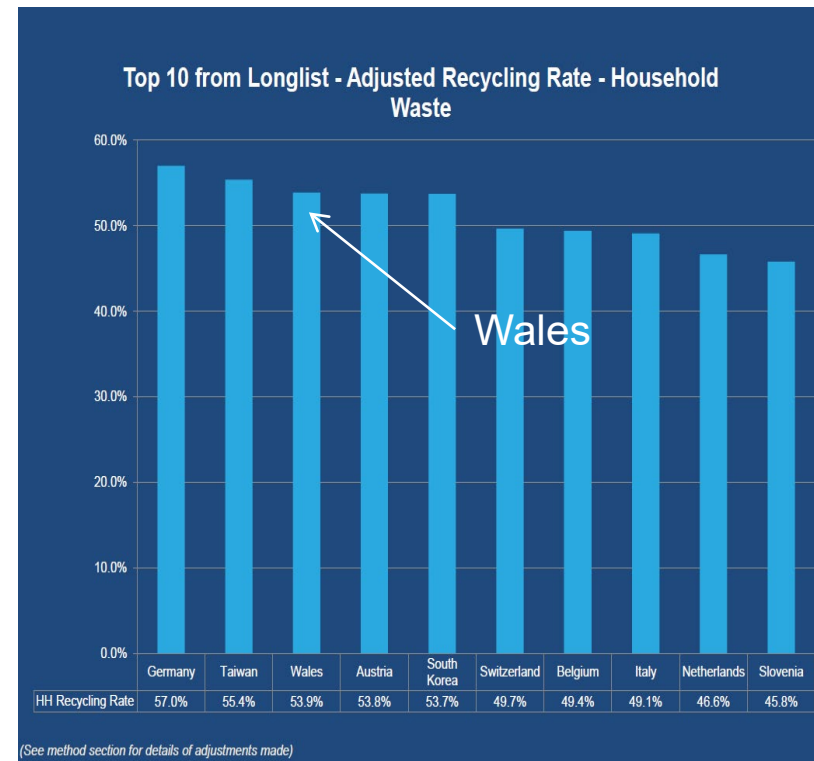
Slide from:
Dr Andy Rees, OBE
Head of Waste Strategy Waste &
Resource Efficiency Division, Welsh
Government

Municipal waste recycling rate by devolved administration

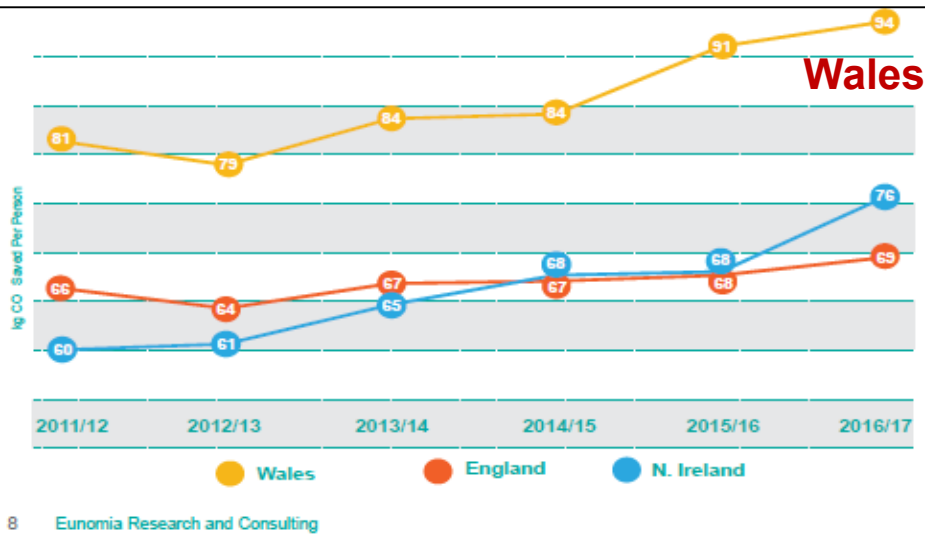


**And finally,
celebrating some
success!**

World recycling league table (%)



**Recycling rates for each UK
Local Authority (Suez)**



**Carbon reductions from recycling (comparing
Wales, England & NI)**

Source: Eunomia Recycling Carbon Index 2016-17

ISSUE 2

Recycling – who really leads the world?

Identifying the world's best municipal waste recyclers



Slide from:
Dr Andy Rees, OBE
Head of Waste Strategy Waste &
Resource Efficiency Division, Welsh
Government

Where does your recycling go?

Resource Efficiency Wales

- Collaborating Local Authorities in Resource Efficiency (CLAIRE) Wales group.
- If two or more waste authorities were prepared to examine the potential for benefits arising from a collaborative and co-operative liaison, the Trust would fund a feasibility study to that effect
- Provide a service to local authorities to work collaboratively in achieving environmental and economic efficiency savings, growth in social value, shared technical knowledge
- To working together on regional recycling and reuse contracts

Where does the waste go?
...a pilot experiment...

Where does your recycling go?

- Glass
 - How is it collected?
 - Who is responsible for collection?
 - Who is responsible for the waste?
 - Where does it go after collection?
 - How is it processed?
 - Is there different types of processes?
 - Who does the processing?
 - Private, public?
 - What is the end product? More than one thing?
 - Or is it a part of many?
 - Who earns money at all these stages?
- <https://myrecyclingwales.org.uk>

<https://www.youtube.com/watch?v=KYiMR94T8D4>



Thank you for listening

Any questions...

Dr Tyra Oseng-Rees, BA(hons), PhD, FRSA
tyra@osengreesreflection.com
Founder and Director

Oseng-Rees
REFLECTION



Climate change and the Bristol Channel coast

**Public lecture
by
Professor Simon Haslett**

**Swansea's Dylan Thomas
Centre, SA1 1RR**

**Friday, 18th October at
12.30pm**