

Where Quality and Quantity - *are Essential*



THE UNIVERSITY of EDINBURGH
School of Engineering



Prof Sean Smith



LinkedIn

Chair of Future Construction, School of Engineering
Director – Centre for Future Infrastructure
Edinburgh Futures Institute
University of Edinburgh

Email: sean.smith@ed.ac.uk

Prof Sean Smith BSc PhD FIOA FRSA FHEA HonFRIAS



*The importance of supply chain
development & innovation*

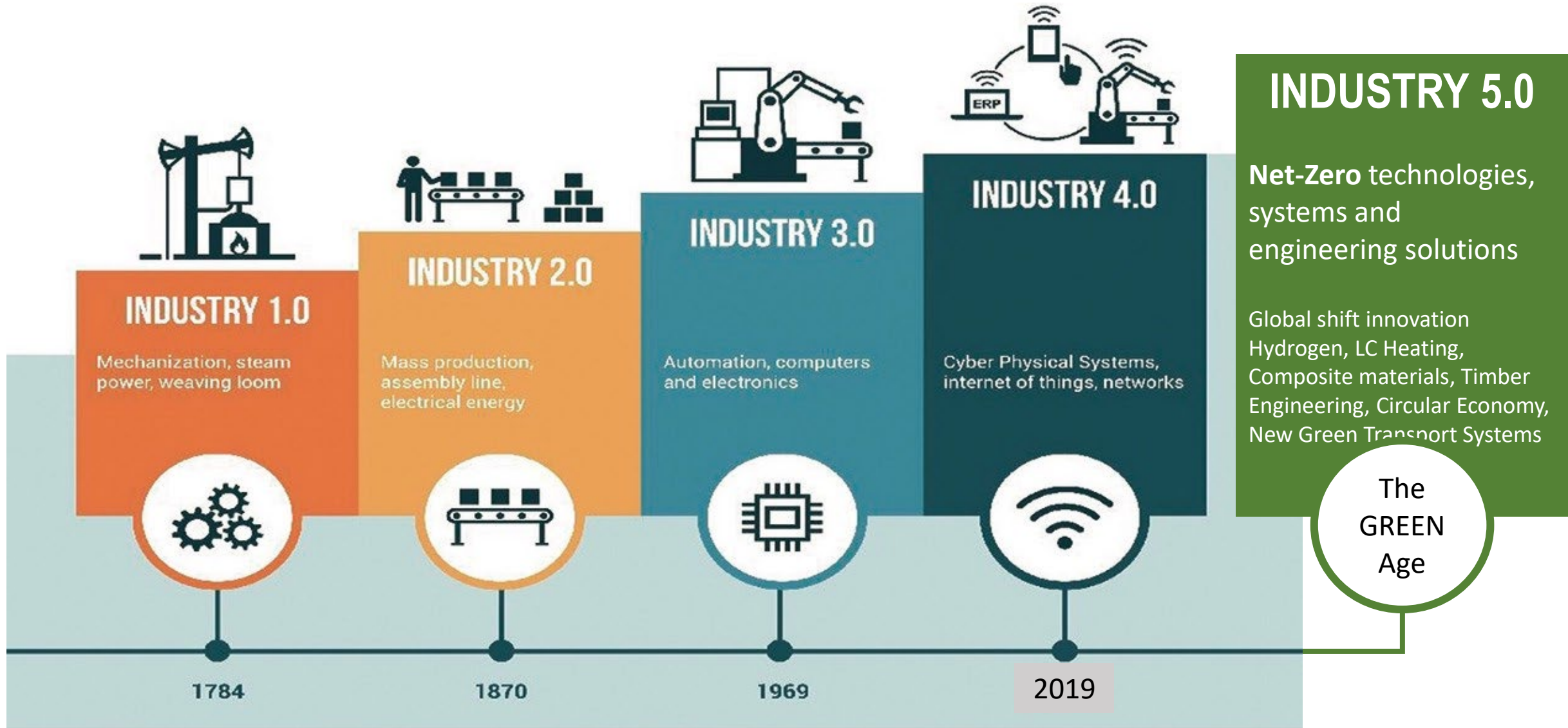


THE UNIVERSITY of EDINBURGH
Edinburgh Futures Institute



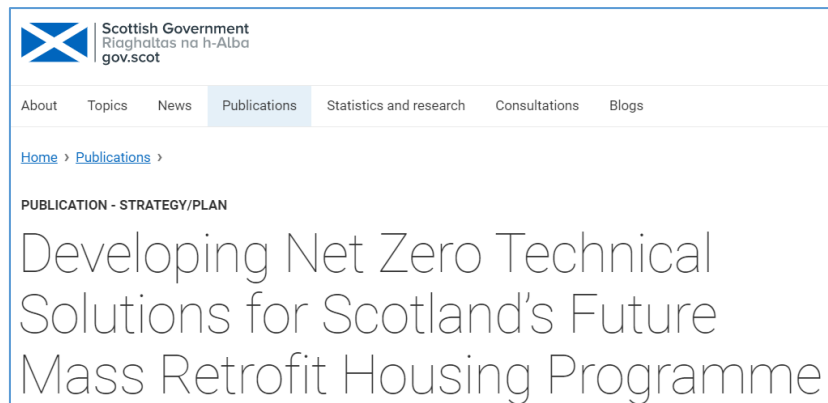
OVERVIEW

- Overview of this morning
- Significance of innovation
- Supply chain development
- Quality & Quantity
- Waste reductions



Retrofit of Buildings – ZEST Report

- Joint LA and HAs led report
- Strong focus on ‘Fabric First’
- Reduce fuel costs & fuel poverty
- Readiness for future energy systems
- Planning for Archetype approaches (*Mass retrofit approach for economies of scale*)
- Align property portfolio with Archetypes



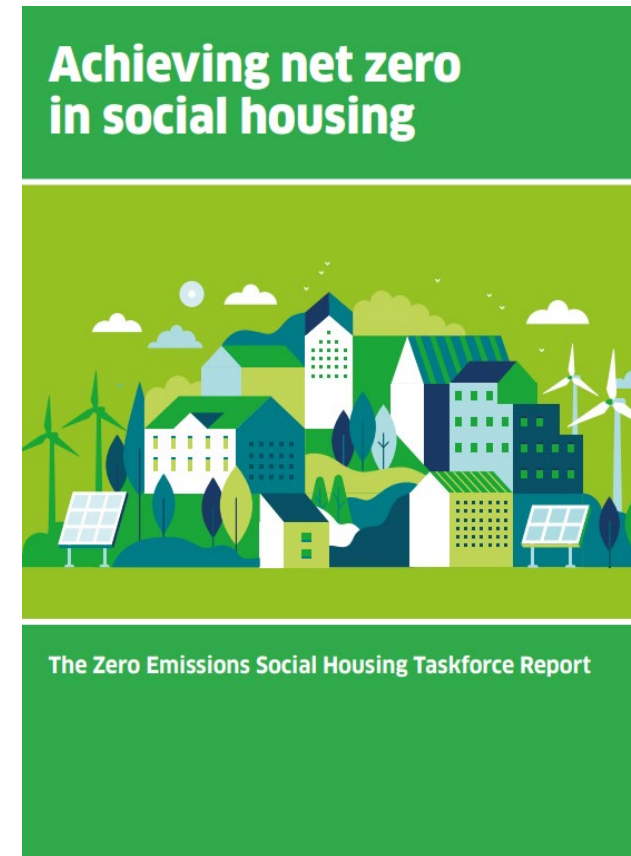
<https://www.gov.scot/publications/developing-net-zero-technical-solutions-for-scotlands-future-mass-retrofit-housing-programme/>



THE UNIVERSITY of EDINBURGH
School of Engineering

PUBLICATION - INDEPENDENT REPORT

Achieving net zero in social housing:
Zero Emissions Social Housing
Taskforce report



<https://www.gov.scot/publications/achieving-net-zero-social-housing-zero-emissions-social-housing-taskforce-report/>

DATA & Retrofit of Buildings

- Significance of evidence data based approaches / decisions
- In-situ as built data
- U-values, air leakage, system approach
- What works – what doesn't?
- What can be improved?
- Learning outcomes
- Track and trace carbon measures

DATA



If we don't get this right!..... Society will not be forgiving

Innovation - heating

- ASHPs, GSHPs, PV, Solar-thermal
- Thermal battery storage
- Hydrogen?
- Microwave heating systems

Considerations...apart from purchase costs?

- Real...contribution to net zero
- Real influence.. heating costs
- Reliability / performance / efficiency
- Application to houses and flats
- Existing services / pipework
- Ease of install & maintenance
- Space utilisation & noise

SUNAMP

Thermal battery storage



Traditional hot
water cylinder

Sunamp heat
battery

<https://sunamp.com/residential/>

HEAT WAYV

Microwave heating



Expected 2025 after pilot
trials 2022-24

<https://www.heatwayv.com/resources/faq2/>

Retrofit of Buildings – *Quality & Quantity*

For Scotland to hit the net zero target by 2045 it will require to retrofit **113,000 homes** per year (*NOTE: Target for net zero heating systems is 2040*)

2050 Net Zero targets

- England retrofit needs: **850,000 homes** per year
- Europe retrofit needs: **11 million homes** per year



Parallel synergetic demand on similar construction and low carbon heating systems across so many countries will place high demand pressures and result in increased costs, particularly as the **UK is very dependent on importing such energy systems.**

Net Zero Targets = Material Needs



- Mainly focused currently on “operational carbon”
- Governments yet to state *when and if* embodied carbon, whole life carbon will be included
- Focus on your Scope 1 & 2 emissions first - direct control of via assets emissions (1) and source of energy (2)
- Scope 3 is related to indirect control – including supply chains
- Net Zero is a medium to long term delivery schedule. Don't rush to install energy systems you may require to remove later
- Fabric first is key

Net Zero Targets

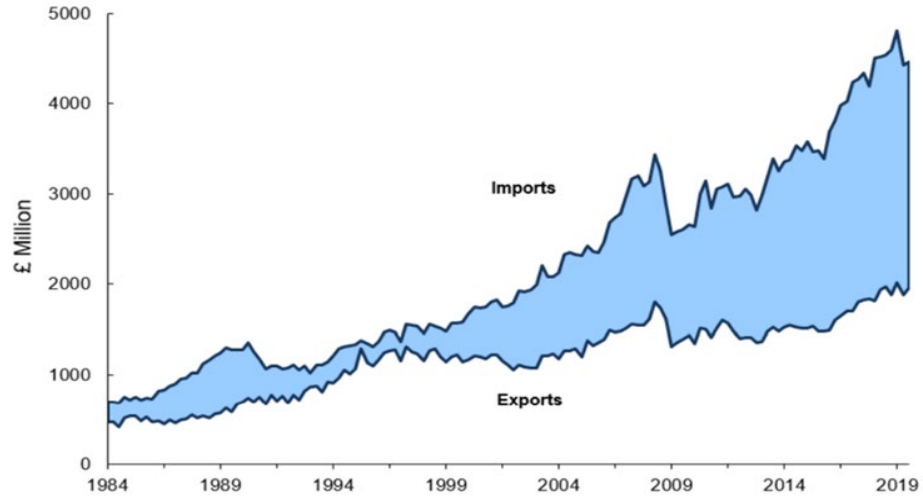
Glasgow	2030
Edinburgh	2030
Scotland (heating)	2040
Scotland	2045
UK	2050
EU	2050

Imports / Exports Key Products



Imports and Exports of Construction Materials

Chart 7: Exports and Imports of Construction Materials, UK.
Value in pounds sterling



Currently

-ve £1 billion on trade for
building services equipment

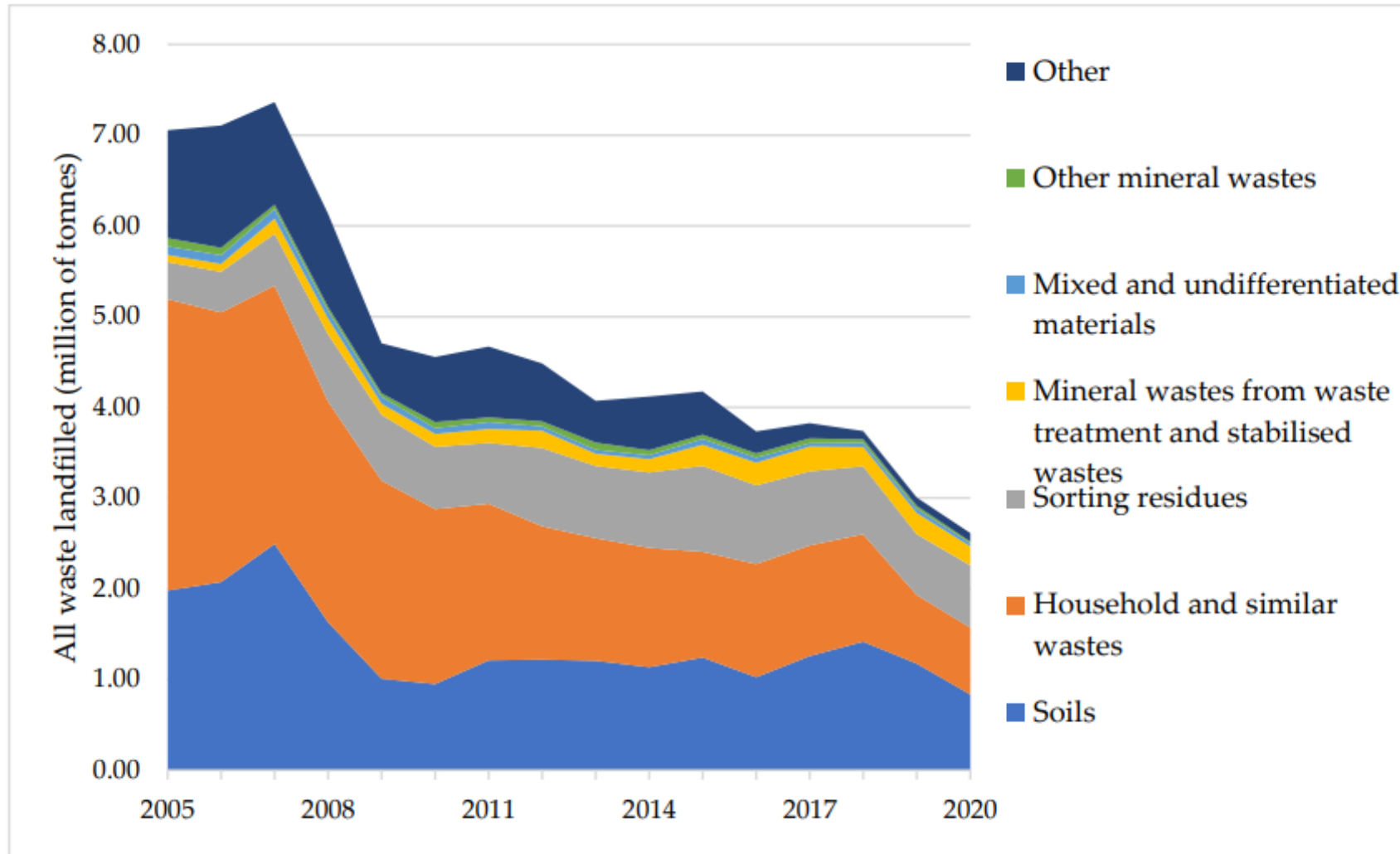
Table 14 : Value of Overseas Trade in Selected Materials and Components
for Constructional Use : Imports (cif) & Exports (fob)

United Kingdom		Current Prices (£'000)					
		2014	2015	2016	2017	2018	2019
Pumps (circulating)	Imports	37,205	38,310	47,261	38,761	65,214	76,338
	Exports	6,894	12,767	10,483	13,573	8,978	9,494
Central Heating Boilers	Imports	590,564	584,030	624,423	640,815	664,916	622,219
	Exports	63,436	75,463	110,656	152,292	180,696	173,005
Radiators	Imports	181,277	184,085	191,200	210,206	213,025	226,528
	Exports	41,046	40,929	45,208	49,243	50,045	40,353
Water Heaters	Imports	122,971	127,898	139,385	148,614	153,555	164,460
	Exports	58,529	65,808	65,569	71,045	73,064	68,307
Space Heaters	Imports	126,100	130,099	140,966	150,464	165,358	155,836
	Exports	30,221	31,490	32,277	40,711	47,546	56,944
Fan Systems	Imports	223,294	245,360	291,210	205,348	237,937	267,822
	Exports	151,261	143,119	129,268	84,271	106,124	140,883
Air Conditioning Equipment	Imports	534,282	518,087	585,067	663,142	659,164	652,275
	Exports	269,524	284,946	340,891	374,499	412,136	403,328
Air Purifying Equipment	Imports	82,949	78,450	97,383	104,833	128,375	153,039
	Exports	223,275	229,591	280,094	253,924	277,036	284,498
Meters	Imports	59,692	97,599	170,651	308,905	224,724	195,800
	Exports	76,447	73,939	68,224	65,336	41,624	26,422
Electrical Wires	Imports	1,573,631	1,555,575	1,722,019	1,927,463	1,902,786	1,849,576
	Exports	643,696	685,189	711,411	855,361	866,414	873,821

Circular Economy



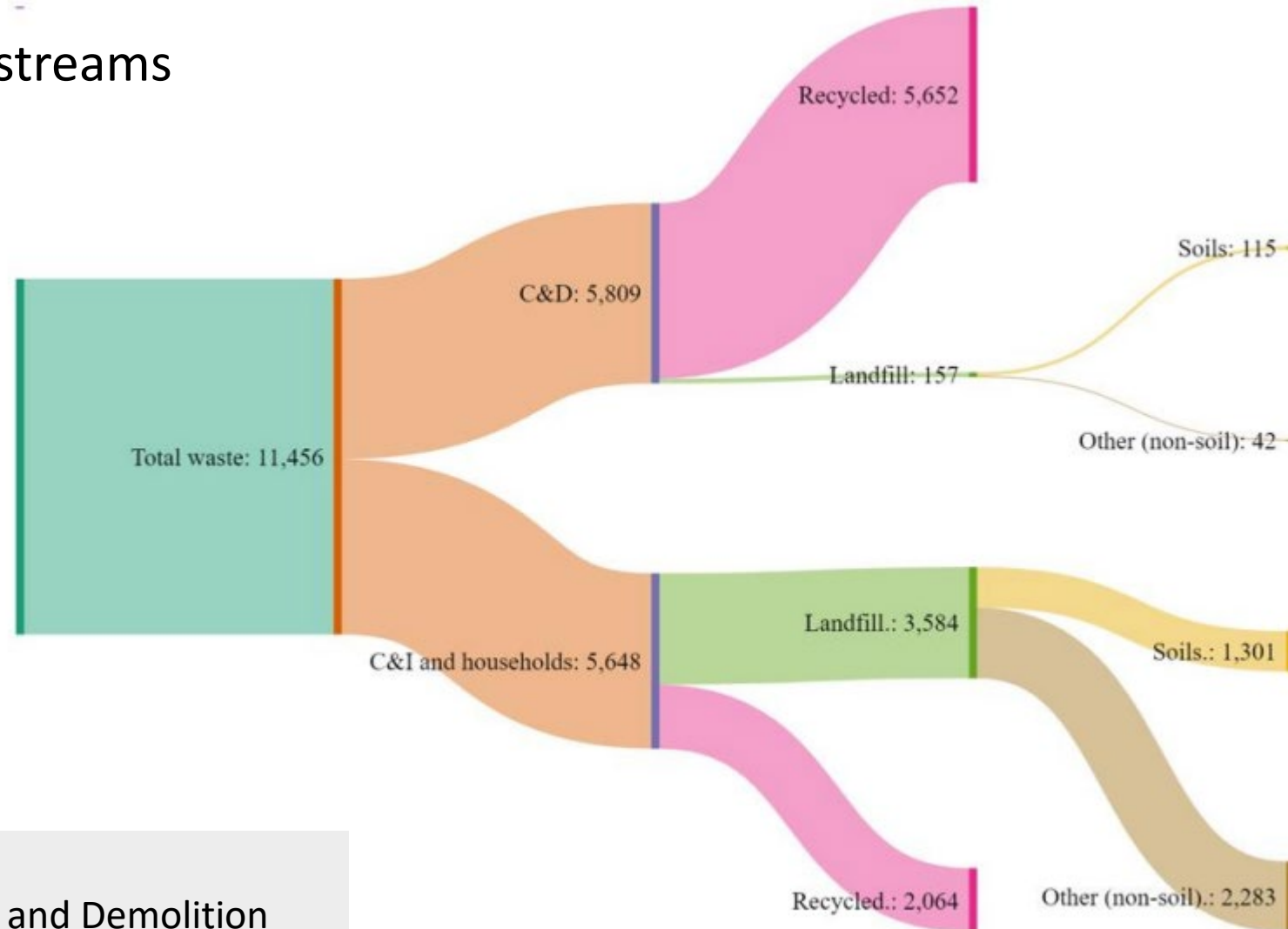
- Waste streams in Scotland



Circular Economy



- Tracking waste streams



KEY:

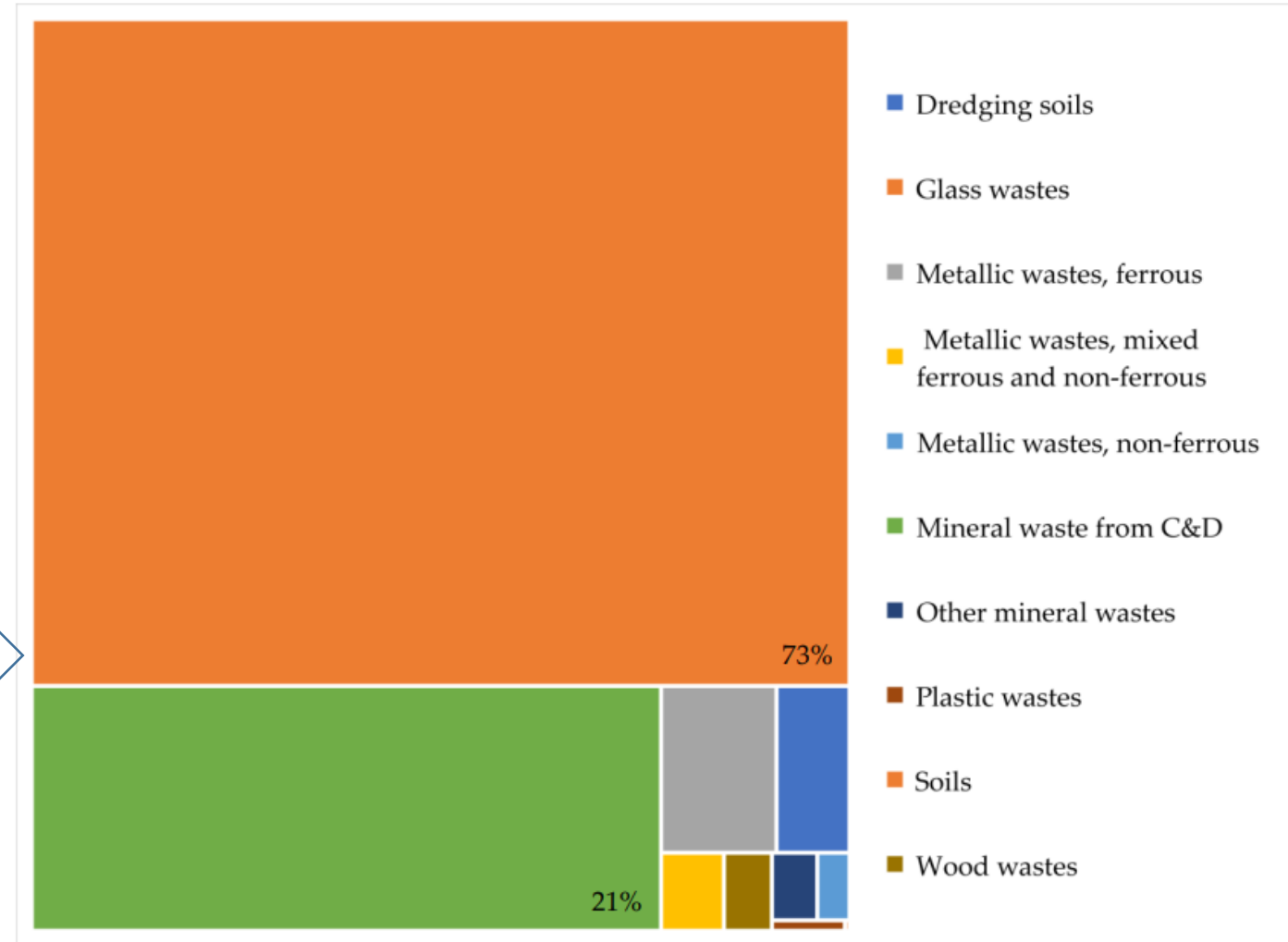
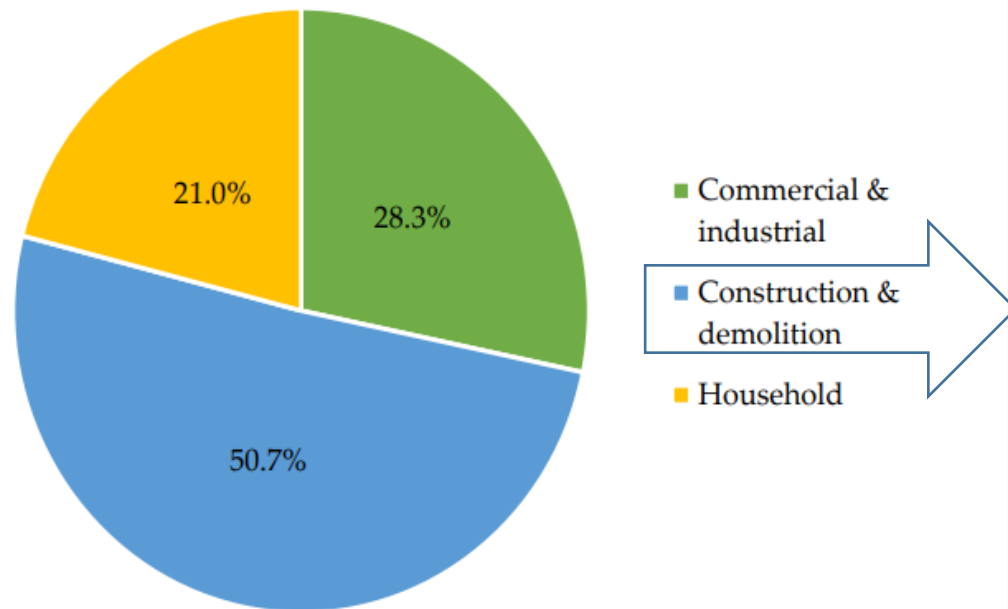
C&D = Construction and Demolition

C&I = Commercial and Industrial

Circular Economy

- Waste streams in Scotland
- Construction 50.7%

However...

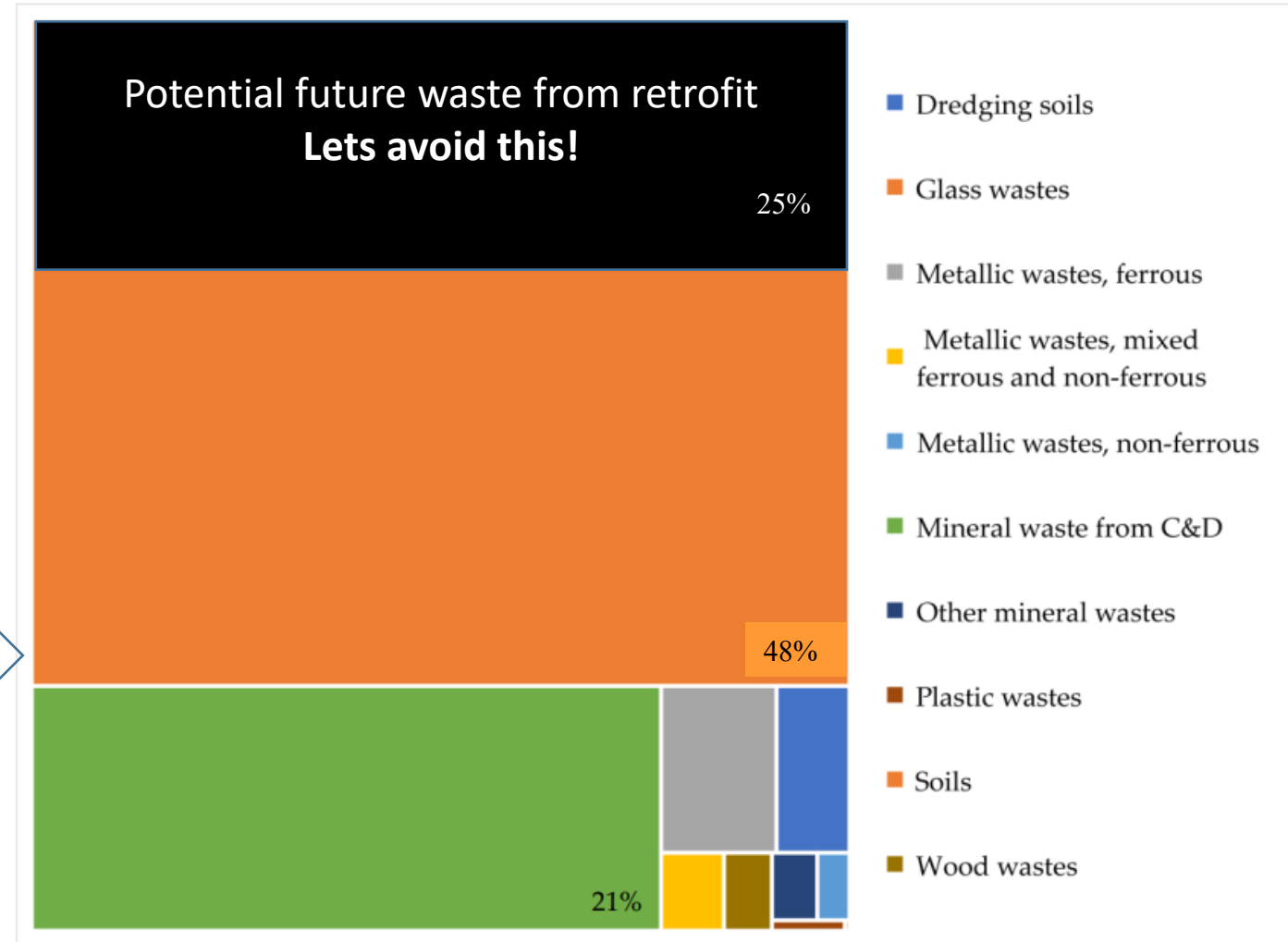
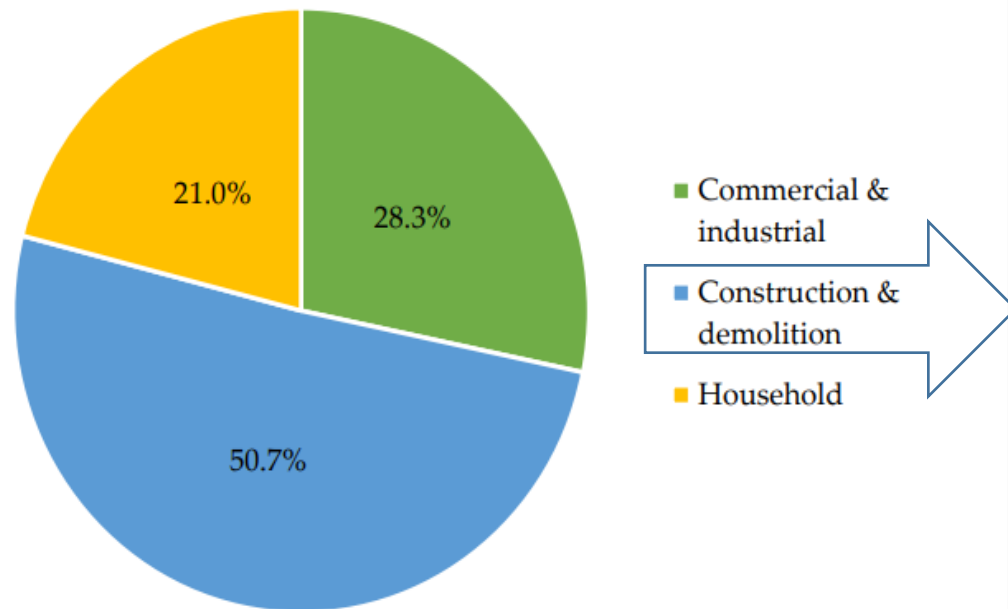


**Lets reduce waste from retrofit, & recycle,
& re-use as it all helps reduce carbon
emissions**

Circular Economy

- Waste streams in Scotland
- Construction 50.7%

However...



**Lets reduce waste from retrofit, & recycle,
& re-use as it all helps reduce carbon
emissions**

Y(OUR) Waste:

- What waste management plans have you got in place
- Should the name be changed? - to 'What waste reduction and recycling management plans' have you got in place
- Avoid mixed waste skips
- Sort waste first
- Do your product suppliers have a take back policy on offcuts – **if not why not?**

SUMMARY



- Importance of DATA – evidenced based approaches
- Significance of innovation – pathways to entry
- Supply chain development – skills and carbon
- Quality & Quantity – society expects
- Waste reductions – lets have the best recycling and minimal waste of any sector



#AsOne

#AsOneRetrofit



THE UNIVERSITY of EDINBURGH
School of Engineering

End of presentation

Prof Sean Smith BSc PhD FIOA FRSA FHEA HonFRIAS

Chair of Future Construction, School of Engineering
Director – Centre for Future Infrastructure
Edinburgh Futures Institute
University of Edinburgh

Email: sean.smith@ed.ac.uk



Prof Sean Smith



LinkedIn



THE UNIVERSITY of EDINBURGH
Edinburgh Futures Institute

