Sustainability Consultation Group Report

November 2021

This report was produced under Project Ireland 2040 and the work of the CSG Innovation & Digital Adoption Sub Committee

Project Ireland 2040
Building Ireland's Future

1) PURPOSE OF THE REPORT:

This report has been prepared by the CSG Innovation & Digital Adoption Subgroup's – Sustainability Consultation Group to outline key research areas for disruptive and scalable innovation in sustainability, carbon reduction and climate action in the Irish Construction Industry, required to achieve to the objectives of the National Development Plan, The Climate Action Plan 2021 and Housing for All.

In particular the report focusses on research areas to ensure the ambition of increased construction activities over the next decade, addressing the vacant building stock in Ireland, retrofitting existing stock and providing new built to meet the targets of the National Development Plan. This includes a 50% increase of housing construction, and the deep energy renovation of 500,000 homes, as well as additional construction of schools, healthcare and infrastructure which all must be achieved within the national and sectoral carbon budget under the Climate Action Plan 2021.

As outlined in a recently published report by the Irish Green Building Council (https://www.igbc.ie/wp-content/uploads/2021/11/IGBC-PRELIMINARY-RECOMMENDATIONS-REPORT-11-11-2021.pdf and https://www.igbc.ie/wp-content/uploads/2021/11/21-IGBC-COP-report-v0.93-1.pdf) delivering the ambitions of National Development Plan and Housing for All with 'business as usual' will result in a failure to achieve the targets of the Climate Action Plan. The report in particular highlight the need to rapidly understand the whole-life carbon of the Irish built environment, support greater re-use of existing stock and reduce the embodied carbon of building products and materials.

The research areas also cover how to ensure the health and wellbeing of the Irish population whilst achieving these objectives, both now and in the future.

In addition to identifying required research and innovation to achieve these national objectives, the purpose of the report is to communicate current barriers to innovation facing the industry and how these might be addressed.

2) INTRODUCTION TO THE SUSTAINABILITY & CLIMATE ACTION CONSULTATION GROUP:

The **Sustainability & Climate Action Consultation Group** have been set up **under Action 2: *Explore and Mobilise Construction Innovation Funding***. The group consist of representatives from RIAI, Engineers Ireland, ACEI, SCSI, CIF, BMF, NSAI and the Irish Green Building Council.

Under Action 2 the following themes are being addressed of which item 3 and 4 has been of primary focus for the consultation group. Items 1 and 2 have already been addressed in a report published by the CSG Innovation & Digital Adoption Group in February 2021, and item 5 will be addressed following the conclusion of this report.

1. Identify suitable funding for innovation in the construction industry to respond to Ireland 2040, The Climate Action Plan and Housing for All
2. Develop a communication programme aimed at micro and small firms in the sector to raise awareness of available funding and how to access it (in cooperation with DPER)
3. **Identify disruptive and scalable innovation in sustainability, carbon reduction and climate action and link them to suitable funding streams**
4. **Establish pilot projects to obtain 'short term goals' and communicate positive outcomes**
5. Advocate the necessity for funding and current barriers to innovation

The purpose of the Sustainability & Climate Action Consultation Group has been to assist with the development of theme 3 and 4 under Action 2. To do so, the key purpose of the group is to:

1) **Act as a think tank** on disruptive innovation opportunities relating to sustainability and climate action in the built environment
2) **Build a library** of innovation opportunities
3) **Identify three suitable projects/year** responding to the ambitions of The National Development Plan Ireland 2040, Housing for All and the Climate Action Plan
4) **Assist in identifying barriers to innovation**

3) THE WORK OF THE CONSULTATION GROUP

The work of the consultation group has occurred over four workshops held between June and October. The focus of the workshops derived from a survey conducted under Action 2 in April 2021 to identify the biggest challenges of sustainability, carbon reduction and climate action currently facing the Irish design and construction sector, and how they can be addressed through research and disruptive, scalable innovation.

The survey asked 100 key stakeholders of their opinion on innovation required under the themes **Decarbonisation, Circular Built Environment, Climate Change Resilience and Social Value & Community Wellbeing.** The sustainability consultation group have used the initial outcome from this survey to develop the initial proposals for potential research/innovation projects that can have meaningful impact in the near future. For the full survey results please refer to: https://www.linkedin.com/posts/innovation-and-digital-adoption-for-construction-sector-group-csg_csg-priority-action-2-sustainability-survey

In addition to the survey results, the consultation group used the report on Available Funding produced under Action 2 in February 2021 to link potential innovation/research proposals to suitable funding streams. The list of available funding considered is outlined below:

	EI Innovation Vouchers	EI Innovation Partnership	Energy Resilience and the Built Environment Fund MPhil/PhD	Disruptive Technologies Innovation Fund (DTIF)	Horizon Europe 2021-2027	SEAI National Energy (RD&D) Funding	EPA Research Funding	Climate Action Fund/EU LIFE (CAF)
Themes	All	All	All	TBC	All	Decarbonization	All	All
Support	€5000 - €20,000	80% of cost up to €200,000	Funded PhD programme	Min. €1.5 million	Varies	€200,000 – 1,000,000	€100,000-600,000	Up to €1.5 million
Outcome	Product, process, service, business model	Product, process, service, business model	PhD in Flexibility & resilience, Technology, Comfort/Health & wellbeing	Large collaborative projects, technology-based with commercial impact (export) within 3-7 years	Varies – tender opportunities regularly posted	Industrial research or experimental development	Products, process and research	Varies – needs to relate to 6 key objectives of EU LIFE

Complexity to apply	Low	Low	Medium	High	High	Medium	Medium	High
Likelihood of success	High	High	unknown	Medium	Small	Medium	Medium	Medium
Other	Targeting SME's	Need to be registered EI client	Ends 2027	Next call will see targeted themes	At least three partners, international	University and public body	Specific topics for every call	Need to apply for co-funding

4) IDENTIFIED BARRIERS TO INNOVATION IN THE IRISH CONSTRUCTION SECTOR

The Sustainability & Climate Action Group acknowledge that there is plenty of research and innovation taking place in the Irish Construction Industry to address sustainability, both in academia and the private sector. However, they also acknowledge that there are existing barriers to utilize this existing knowledge and scale up innovation which could be addressed through the right support, particularly from the government and public sector.

Amongst the current key barriers to innovation in the Irish Construction Sector the group listed:

- Lack of leadership from the public sector, particularly in acknowledging and awarding innovation in public procurement.
- Current planning system, legislation and building regulations do not currently advocate for innovation nor create a level playing field for novel and sustainable solutions. The industry requests stricter legislation, particularly on demolition practice and embodied carbon of construction, to assist the demand for more sustainable and innovative solutions.
- Difficulties to scale up innovation due to lack of demand and economy of scale – this could change through the public sector being the source for this demand.
- Available funding opportunities are too small – there is a need for significant, focused, and long-term funding on decarbonizing the Irish Construction Sector to meet national objectives.
- Available funding often focusses on export – Ireland is in need of a Domestic Investment Fund for local innovation and manufacturing of sustainable products for the construction industry.
- The fragmented nature of the industry – the many disciplines and types of construction is currently a barrier to innovation but can be an enabler through cross-industry collaboration
- Current research and innovation is slow due to lack of transparency of what has already been done – there is a need for a central repository for greater efficiencies and collaboration which could be done through the proposed Construction Technology Centre under Action 4
- The cyclical nature of the industry makes investing in research and innovation less enticing – the government, through construction demand favouring innovative solutions, could assist in creating a more stable industry
- The industry lacks a culture of mentorship to encourage innovation and personal growth – currently it is difficult to retain people

5) IDENTIFIED RESEARCH AND INNOVATION PROPOSALS FROM THE SUSTAINABILITY & CLIMATE ACTION CONSULTATION GROUP TO ACHIEVE THE OBJECTIVES OF THE NATIONAL DEVELOPMENT PLAN, THE CLIMATE ACTION PLAN AND HOUSING FOR ALL:

The following list of research and innovation proposals have been put forward by the Sustainability & Climate Action Consultation Group as key opportunities to achieve the objectives of the National Development Plan, The Climate Action Plan and Housing for All.

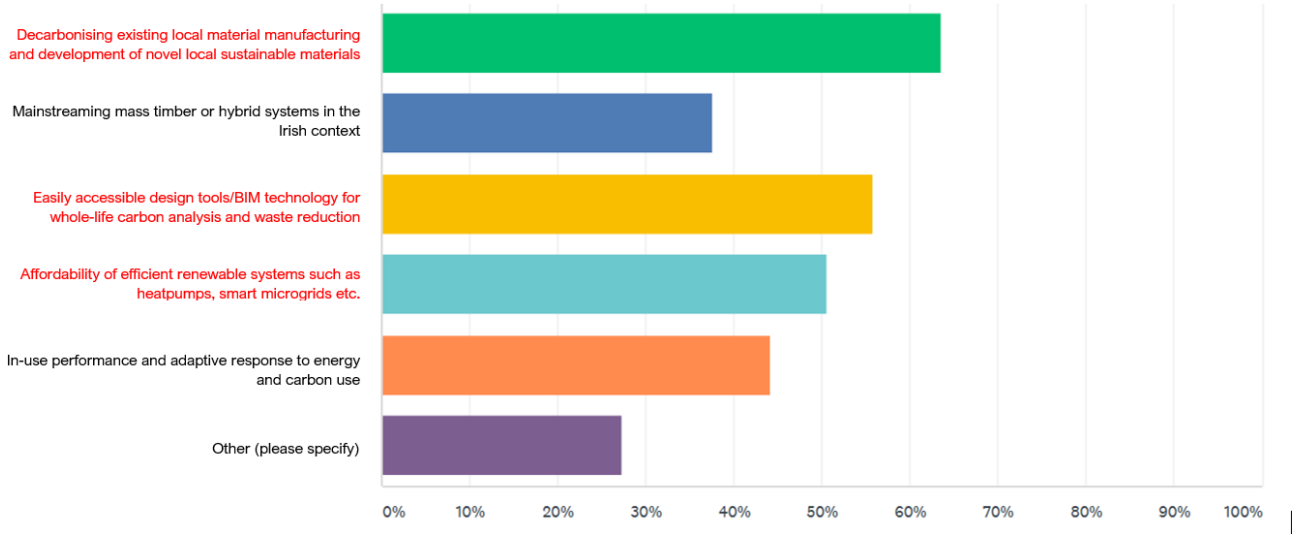
The proposals are divided according to the four themes outlined in the stakeholder survey. However, it should be noted that many of the proposals could, and should, stretch across themes to ensure a holistic approach to sustainability is considered when planning and constructing our future built environment.

5.1 DECARBONISATION:

Under this theme the group looked at proposals of innovation relating to the built environment that will support the ambitions of The Climate Action Plan to reduce the sector's green house gas emissions with 50-60% from 2018 emissions and the national target to reduce by 7% annually, and become climate neutral by 2050 whilst delivering on the objectives under the National Development Plan and Housing for All Policy. **Proposals focus on zero and low-carbon solutions to reduce carbon** in planning, design, manufacturing and operation. Reduction through retrofit, re-use and circular principles will be covered under the theme Circular Built Environment.

Outcomes from the initial survey:

Q3
Under the heading DECARBONISATION, what areas of research do you think are most important to achieve disruptive innovation in the construction sector for sustainability and climate action? (select three)



Research/Innovation proposals by the Sustainability & Climate Action Consultation Group:

Item	Topic	Description	Reasoning	Related Policy Objectives*

1.	**Whole-life carbon calculation of typical Irish construction practice and existing Irish building stock.**	Use exiting carbon calculator tools such as EC3/OneClick to determine whole-life carbon (embodied and operational) specific to the Irish built environment to be used for design & planning and set Irish baselines. a. Incorporate Irish averages of materials performance and available EPD's b. Analyse average of current Irish construction across various typologies to establish baseline c. Develop template to analyse and compare carbon of existing buildings proposed for demolition/alterations compared to new built by Local Authorities d. Build database of carbon related to existing built environment in Local Authorities. e. Formally report carbon calculations in a INSPIRE compatible way	A standard method and tool to calculate whole-life carbon is crucial for future legislation of the same. Likewise there is currently no baseline data for typical Irish Construction to be used to set future legislation or planning guidelines. Similar tools and baseline data have successfully been developed and used for planning in Belgium, Germany and Denmark. IGBC is underway to develop a baseline tool with Irish standard construction systems which would be used for the research.	NPOBJ13 NPOBJ52 NPOBJ54 HfAOBJ21 CAP 54 CAP 192 CAP 193
2.	**Cement decarbonization**	Research on how to accelerate the decarbonization of cement a. Research extent of potential for clinker substitution b. Assess raw material potential in fine grained C&D waste streams c. Research other potentials to decarbonize the cement industry	Cement is currently one of the greatest contributors to carbon emissions, however will continue to be a necessary resource for future construction hence the importance to decarbonize the industry rapidly. The current strategy for decarbonization of cement in the Climate Action Bill relates to alternative fuels – this will not achieve a significant reduction in industrial emissions.	NP OBJ56 HfA OBJ21 HfAOBJ23.12 CAP 54 CAP 191
3.	**Overcome barriers for low-embodied carbon materials – such as timber solutions, hemp, natural fibre insulation etc.**	Full scope research to understand and overcome potential barriers for low-carbon materials. a. Review fire regulations b. Review standards c. Structural assessment d. Durability assessment e. Offsite potential f. Regulatory system review g. Policy review to encourage use of low-carbon materials	There is a current lack of full-scale research on overcoming the barriers to scaling up the use of low-carbon material solutions. A holistic research is required to build confidence amongst regulators, planners, insurance companies and the market. Other countries/city's with stricter regulations (for example NY) have in recent years changed its building regulations to accommodate more extensive use of innovative materials such as timber in construction. The UK Government published a report in October 2021 supporting timber construction of all low-rise projects at scale A testing centre is needed in Ireland which is not a Technology Centre and DHLGH needs to amend standards towards acceptance of EU standards.	NP OBJ53 HfA OBJ21 HfA OBJ16 CAP 54 CAP 191 CAP 194

4.	**Detailed carbon modelling of National Development Plan (NDP)**	Research on the embodied and operation carbon impact related to all proposed construction, renovation and infrastructure according to the NDP. a. Outline carbon impact with current standards b. Outline potential reduction strategies including re-use of existing building stock and reduced embodied carbon of new construction	Initial studies from IGBC and UCD are indicating that Ireland will miss its proposed carbon targets if the ambitions of the NDP are delivered with the same standards used today. A detailed study is required to understand what is required to prevent this.	NP OBJ13 NP OBJ 54 HfA OBJ21 CAP 54 CAP 192 CAP 193 CAP 188
5.	**Building decarbonization into public procurement**	Research on how to build decarbonization into procurement including: a. Promoting building re-use of existing buildings b. Promoting modularization/offsite construction c. Use of low-carbon materials	Current procurement practice inhibits innovation in building re-use and the scaling up of low-carbon materials and MMC. Public procurement should drive demand for more sustainable solutions.	NP OBJ56 NP OBJ54 HfA OBJ19 HfA OBJ20 HfA OBJ21 HfA OBJ23 CAP 54 CAP 55 CAP 176 CAP 195 CAP191
6.	**Overcome barriers for MMOC at scale for new built and retrofit**	Full scope research to scale up MMOC in Ireland. a. Life-Cycle Analysis of traditional vs Off-site to create baseline database and demonstrate benefits of MMOC b. Development of prototypes for MMOC using different materials and levels of off-site manufacturing c. Analysis of off-site opportunities for retrofit a. Pilot projects showcasing alternatives and benefits	There is a need for better overview of available MMOC technologies and the benefits they offer to support them being adopted at greater scale both for new built and retrofit. This can reduce carbon, waste and cost whilst increasing productivity.	NP OBJ56 HfA OBJ16 HfA OBJ21 HfA OBJ23 HfA OBJ25 CAP 54 CAP191 CAP194 CAP 411
7.	**Research development of new national industry of low-embodied carbon construction materials**	Identify best sectors for development of low-carbon materials in Ireland. Carry out a focused investment ready business plan for these sectors as initial areas of research with a long-term view to develop a national industry of low-carbon materials. a. Technical feasibility of what type of material can be produced b. Economic feasibility of product c. Policy research on supporting investment success d. Delivery – structure of investment d.	There is currently a lack of locally produced sustainable materials in Ireland. Low-carbon materials are being imported from abroad. Potential to build on existing or past successes of semi state companies such as Coillte and Bord Na Mona in developing vertically integrated manufacturing from nationally or privately owned natural resources.	NP OBJ32 NP OBJ 53 HfA OBJ16 HfA OBJ21 HfA OBJ25 CAP54 CAP191
8.	**Whole-life carbon impact of zoning in development plans**	Research on whole-life carbon associated with zoning decisions: a. Ground conditions b. Infrastructure requirements c. Densities d. Height e. Car parking requirements f. Commuter patterns of users	There is currently no comprehensive study on the impact on whole-life carbon emissions caused by different zoning decisions. This should be factored into planning and zoning of land in development plans.	NP OBJ13 NP OBJ33 NP OBJ52 NP OBJ 53 NP OBJ 54 HfA OBJ21 CAP 54
9.	**Feasibility for efficient renewable energy systems for different**	Full scale study of the suitability, affordability and efficiency of heat pumps, district heating and solar PV's for different housing typologies.	There is need for guidance on what systems is most suitable for particular types of developments to ensure environmental performance, cost efficiency and future proofing for changes and technological advancements.	HfA OBJ16 HfA OBJ21 HfA OBJ23 HfA OBJ26 CAP 54

	housing typologies	a. Whole-life carbon assessment of different systems for different typologies b. Life-cycle cost assessment g. Future proofing for future technological advancements		CAP 176 CAP 182 CAP 184 CAP 186
10.	**Carbon optimal study for retrofit**	Research on whole-life carbon optional study for retrofit of different building typologies. a. Analysis of whole-life carbon for deep and shallow retrofit for different typologies in the Irish context at building scale c. Multi-benefit renovation rating system to analyse whole-life carbon for retrofit at wider scale – to include future life-span, location etc.	The current approach to retrofit according to the NDP and Climate Action Plan does not consider the embodied carbon impact of retrofit. Furthermore, the current approach does not consider other factors influencing the suitability of retrofit including potential lifespan of building, location, use and contribution to local community. There is a potential to develop a rating system factoring these in to direct finances to more beneficial retrofit projects.	NP OBJ6 NP OBJ54 HfA OBJ12 HfA OBJ16 HfA OBJ 19 HfA OBJ20 HfA OBJ21 HfA OBJ23.12 CAP 54 CAP 58 CAP 179

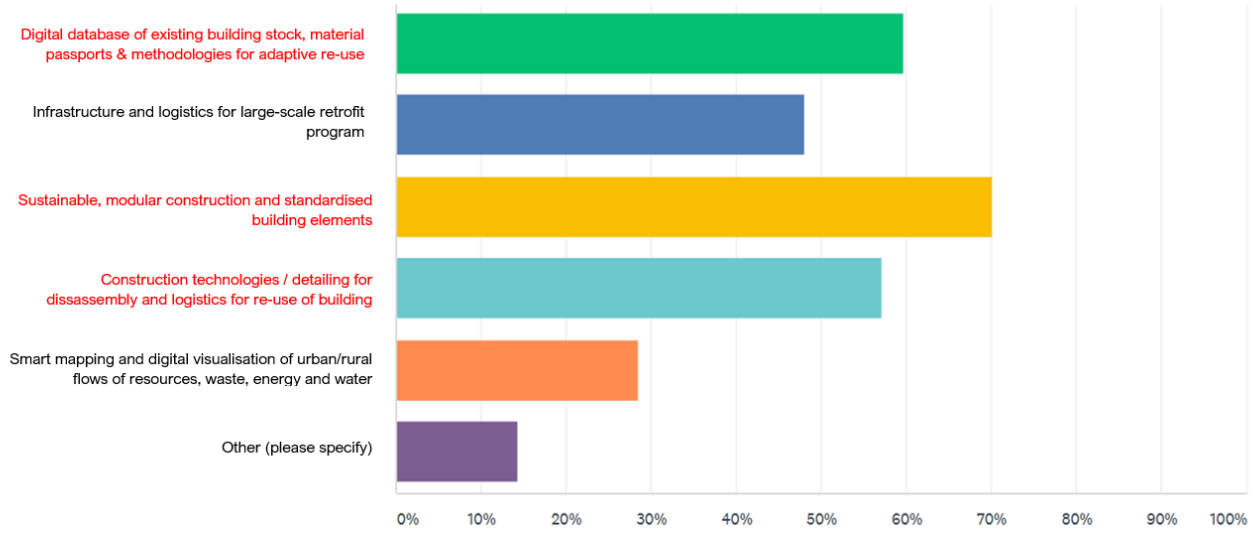
*Full overview of policy objectives are listed in the appendix

2.2 CIRCULAR BUILT ENVIRONMENT:

Under this theme the group looked at proposals of innovation relating to the built environment that will support the ambitions of Ireland's Climate Action Plan to reduce the sector's green house gas emissions with 50-60% from 2018 emissions and retrofit 500,000 homes to BER B2 by 2030. The proposals also consider Ireland's Circular Economy Strategy as well as the EU's Circular Economy Action Plan to significantly reduce the use of raw materials. **Proposals focus on resource and material efficiencies** in the planning, design, manufacturing and operation of the built environment.

Outcomes from the initial survey:

Q4
Under the heading CIRCULAR BUILT ENVIRONMENT, what areas of research do you think are most important to achieve disruptive innovation in the construction sector for sustainability and climate action (select three)



Research/Innovation proposals by the Sustainability & Climate Action Consultation Group:

Item	Topic	Description	Reasoning	Related Policy Objectives*
1.	**Standardising Existing Asset/Pre-Demolition Assessment**	Build digitalised methodology to assess re-use/recycling potential of different building elements and materials in existing buildings a. Build on forthcoming EN 17680 Standard and assessment conducted by Limerick City & County Council b. Map entire value chain for re-use skills/logistics/supply/ regulatory framework c. Review of potential carbon saving and financial value of re-use/recycling	A methodology to assess the whole value-chain and potential for re-use/recycling of building elements, including the logistics of it, is required as a starting point to allow further research in the field of circular construction.	NP OBJ6 NP OBJ35 NP OBJ56 HfA OBJ20 HfA OBJ21 HfA OBJ23.12 CAP 54 CAP 195 CAP 411
2.	**Research on potential for adaptive re-use of buildings and building elements**	Study on re-usability potential for different building typologies (existing and new built) a. Review of adaptive re-use of different existing building typologies (office to residential etc) and requirements to allow future re-use of new built b. Review of re-use potential of building elements in existing buildings and requirements to increase potential in new built projects. c. Develop guidance on designing for re-use d. Technical and financial feasibility of re-use including review of standards to allow re-use at scale. e. Planning laws to be modified to allow for change of use	The Irish Construction Industry is currently struggling to move past 'recycling' as a goal for the circular economy. There is a great potential to shift to 're-use' and save greater amounts of carbon and costs. This will require a full study on what the potentials are to re-use existing buildings, but also how we should design and build for future re-use. In particular there needs to be research on benefits of changing the use of buildings to also allow greater access to funding for such activities.	NP OBJ6 NP OBJ35 NP OBJ56 HfA OBJ16 HfA OBJ20 HfA OBJ21 HfA OBJ23.12 CAP 54 CAP 195 CAP 411
3.	**Material and Maintenance / Renovation Passport**	Research digitalised methodologies to track materials in buildings and their forthcoming maintenance/renovation requirements. a. Potential for BIM to be used in planning to track materials and future maintenance of new built b. Potential to build library of existing building stock's renovation needs at Local Authority level	Material passports will be critical in the future to enable re-use of buildings. The understanding of required maintenance and retrofit of existing building stock will assist in increasing buildings life span.	NP OBJ6 NP OBJ54 HfA OBJ16 HfA OBJ20 HfA OBJ21 HfA OBJ23.12 CAP 54 CAP 223 CAP 411
4.	**National quality assurance scheme for secondary aggregates**	Investigate opportunities for crushed concrete as secondary aggregated to be recycled back into concrete and other construction products. a. Technical and feasibility research on recycling C&D waste as secondary aggregates b. Identify suitable governance and standards to ensure quality and environmental impact– independently certified	Similar research has been conducted on EU level for precast concrete (SeRamCo) but not yet taken up/implemented in Ireland. EPA had a recent call on crushed concrete with research that could be built upon and further developed.	NP OBJ56 HfA OBJ16 HfA OBJ21 HfA OBJ23.11 HfA OBJ23.12 CAP 54 CAP 191 CAP 195 CAP 411
5.	**Structural material efficiencies**	Review of current national practice on specification of material and development of guidance for design efficiencies to reduce material use in structural elements – particularly of steel and concrete. a. Research on potential for structural efficiencies to reduce embodied carbon – including potential for alterative technologies such as 3D printing	Numerous reports suggest that current practice is resulting in over-engineered buildings with higher embodied carbon than necessary. Material efficiencies will contribute to lower cost and lower carbon emissions. NSAI's renewed standards are not adequately adopted in industry.	NP OBJ54 HfA OBJ16 HfA OBJ20 HfA OBJ21 HfA OBJ23 CAP 54 CAP 195 CAP 411

		b. Review national practice and potentially engage professional practice committees b. Digital library of Material Efficiency Guidelines and NSAI Accredited construction details for high performing buildings.		
6.	**Planning and design efficiency to reduce total carbon (not only CO2/m2)**	Research on the cumulative carbon impact of resource inefficiencies in design and planning. a) Research on the impact of growing average dwelling sizes on the cumulative embodied carbon of the building stock. b) Research on the 'right sizing' of new homes	The size of new homes will significantly impact the related embodied carbon of the welling. Research is required on how to plan for the 'right size' of new built and re-use the existing stock.	NP OBJ33 NP OBJ52 NP OBJ54 HfA OBJ16 HfA OBJ20 HfA OBJ21 HfA OBJ23 CAP 54 CAP 411
7.	**Mapping resource flows in the economy to foster 'industrial symbiosis'**	Research on existing resource flows in the Irish economy and potential to 'close loops' through industrial symbiosis. a. Potential for waste of one sector to become resource for another b. Potential for straw waste from agriculture to produce low-carbon construction materials c. Technical & feasibility studies on delivery d. Resource mapping to link into national database such as GeoHive	Moving to a circular economy requires us to look at the entire system of resources. There is great potential to make better use of resources with cross-sectoral collaboration and research. This can also assist in achieving a 'just transition' when addressing climate change.	NP OBJ32 NP OBJ56 HfA OBJ16 HfA OBJ20 HfA OBJ21 HfA OBJ 23.12 CAP 54 CAP 384 CAP 411
8.	**Complete Ireland's vacancy register and potential for it to be used to meet the NDP targets**	Detailed research into the existing vacant building stock in Ireland to speed up the National Vacant Housing Reuse Strategy. a. Research on barriers for councils to complete the vacancy register b. Research on potential for national library of vacant site c. Research on potential of vacant site to be used for the NDP housing targets and benefits in terms of carbon savings.	Ireland has one of Europe's highest percentages of vacancy in its building stock. Previous strategies have failed in completing a detailed vacancy register which is urgently needed to understand how these existing building might be used to meet the NDP targets in a carbon efficient way.	NP OBJ6 NP OBJ32 NP OBJ35 NP OBJ56 HfA OBJ4 HfA OBJ19 HfA OBJ20 HfA OBJ21 HfA OBJ 23.12 CAP 54 CAP 223 CAP 224
9.	**Standardising retrofit**	Research into opportunities to standardise retrofit of Ireland's existing building stock: a. Potential for off-site manufacturing of certain elements b. Potential to standardise heatpumps c. Potential to use economy of scale to make retrofit cheaper	The broad variety of Irish housing typologies makes retrofit at scale difficult. Research and innovation is required to overcome this in similar ways done in Netherlands and UK.	NP OBJ6 NP OBJ56 HfA OBJ4 HfA OBJ19 HfA OBJ20 HfA OBJ21 HfA OBJ 23.12 CAP 54 CAP 224

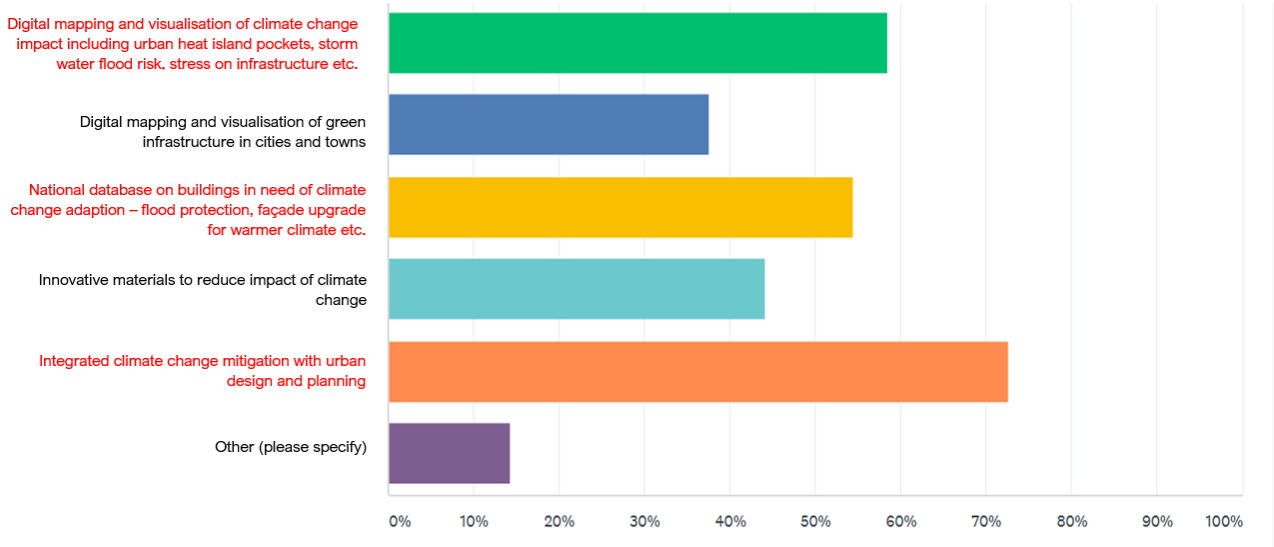
*Full overview of policy objectives are listed in the appendix

2.3 CLIMATE CHANGE RESILIENCE:

Under this theme the group sought proposals of innovation relating to the built environment that will support the ambitions of Ireland 2040 and Ireland's Climate Action Plan to ensure Climate Adaptation of the built environment to protect human health and wellbeing. **The proposals focus on strategies for environmentally and socially sustainable mitigation of climate change impact.**

Outcomes from the initial survey:

Q5
Under the heading CLIMATE CHANGE RESILIENCE, what areas of research do you think are most important to achieve disruptive innovation in the construction sector for sustainability and climate action? (select three)



Research/Innovation proposals by the Sustainability & Climate Action Consultation Group:

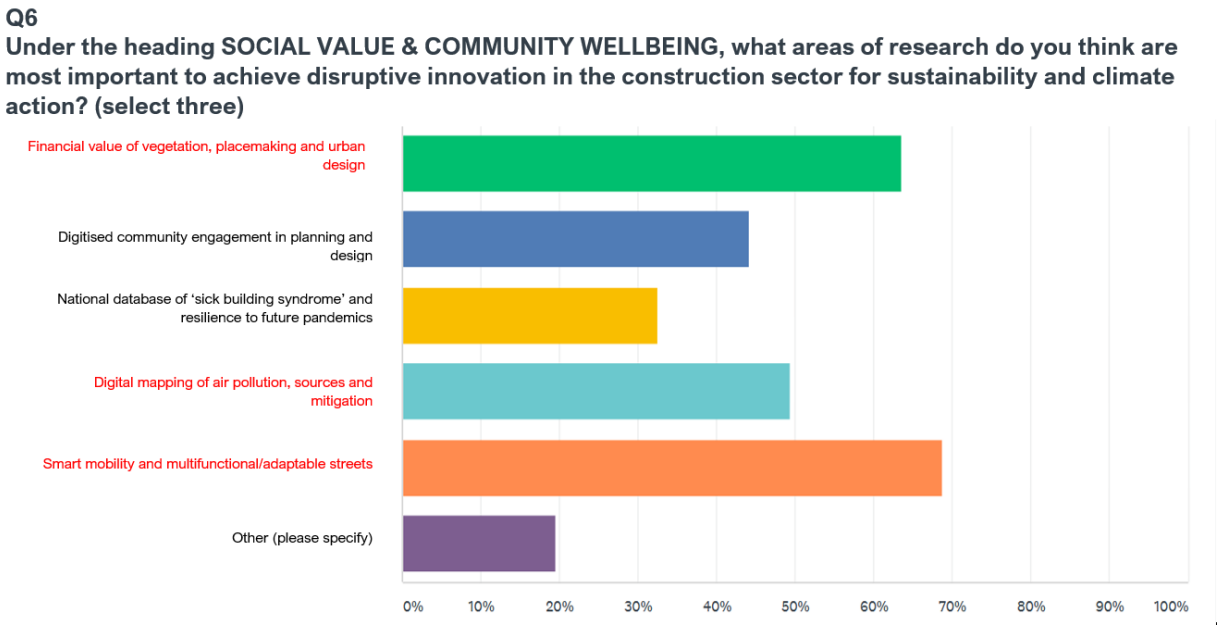
Item	Topic	Description	Reasoning	Related Policy Objectives*
1.	**Step by Step programme to measure, manage and report adaptation and mitigation of climate change impact with confidence**	Develop a digital National Geospatial Hub as single source for spatial data sets and review of planned development. To contain: a. Finalised national land use character assessment b. Met Eirann geospecific weather conditions c. LA and OPW input on floods and other environmental impacts d. Planning authorities list of new/proposed development e. Reporting on climate change impact f. Opportunity to test proposed development areas in future scenarios	A digital one-stop shop, as per the ISNPIRE Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007, to analyse current and future environmental data impacting development is required for a holistic approach to climate resilience.	NP OBJ6 NP OBJ13 NP OBJ33 NP OBJ52 NP OBJ53 NP OBJ54 HfA OBJ12 HfA OBJ13 HfA OBJ26 CAP 59 CAP 197 CAP 200
2.	**Simple system for proposed development to be analysed**	Develop a simple digital tool using the datasets from the geospatial hub to analyse risk and opportunities for proposed developments. Amongst areas to be analysed: a. Whole-life carbon	With the planning system being digitalised there is opportunity to leverage this and develop a tool to analyse proposed developments in a virtual context.	NP OBJ6 NP OBJ13 NP OBJ33 NP OBJ52 NP OBJ53

	in its context for planning	b. Daylight/Sunlight of public realm c. Urban heat Island Effect d. Flood impact e. Suitable Renewable Energy Systems g. Soil conditions impact on embodied carbon	Similar approach is taken in Singapore (planning applicant submit BIM model) and London (3D model submitted) amongst others.	NP OBJ54 HfA OBJ12 HfA OBJ13 HfA OBJ16 HfA OBJ26 CAP 59 CAP 197 CAP 200
3.	**All County, and subsequent Local Area Plans to include robust, evidence-based social-cost-benefit analysis, economic appraisals, and post evaluations.**	Research comparing different planning models including a hierarchical framework that embodies sustainable land management and prudent planning. a. Research framework to analyse valid reasons for different types of developments based on socio-economic aspects. b. Research on implementing Town Centre First approach in planning.	County/Local Area Development Plans should not merely zone. All zoning should have a hierarchical framework considering social-cost-benefits, economic appraisal and the environment. It is important that no new greenfield development is permitted without compelling reason where there are already used plots more suited to development. Socio-economic appraisals for all developments should accompany each planning application.	NP OBJ4 NP OBJ6 NP OBJ33 CAP 224

2.4 SOCIAL VALUE & COMMUNITY WELLBEING:

Under this theme the group sought proposals of innovation relating to the built environment that will ensure social value and community wellbeing is enhanced through the realisation of Ireland 2040, Housing for All and Ireland's Climate Action Plan. Proposals focus on protecting human health and wellbeing, support local economies and increase community engagement.

Outcomes from the initial survey:



Research/Innovation proposals by the Sustainability & Climate Action Consultation Group:

Item	Topic	Description	Reasoning	Related Policy Objectives
1.	**Research on successful models for community driven planning processes**	Review local and international best practice examples of community driven planning processes. a. Creation of digital tools for better communication and participation b. Implementation plan for greater community participation in Local Authorities – including necessary interfaces for delivery	Digitalisation opens up a great opportunity for greater community engagement in planning. Many cities are using digital models to test scenarios and proposed developments with input from residents. (e.g Vancover)	NP OBJ4 NP OBJ6 NP OBJ13 NP OBJ32 HfA OBJ4 HfA OBJ6 HfA OBJ13 HfA OBJ22
2.	**Encourage biodiversity in the built environment**	Research into introducing a 'green area ratio' for proposed development in Irish planning. a. Health/cost benefit analysis of increased biodiversity in Irish towns and cities. b. Site specific scoring system for various ecological solutions c. Potential implementation strategy for planning	'Green Area Ratio' or 'Biotope Factor' is used as a measure to encourage enhanced ecosystems in towns and cities across many European cities (e.g Malmo, Berlin, London). Introducing a green area ration requirement in Irish planning would encourage healthier and more resilient communities.	NP OBJ4 NP OBJ52 HfA OBJ13 HfA OBJ22 CAP 377 CAP 390
3.	**Social and Environmental Post-Occupancy Evaluation Methodology for Public Buildings and Projects**	Research on suitable, cost efficient methodology to conduct post-occupancy evaluation (POE) of all public buildings and projects capturing their social and environmental performance. a. POE of both existing and new built assets. b. Data to be collated and used as 'lessons learnt' for future projects.	POE in public buildings is currently only conducted for operational energy. With plans to delivery a significant amount of housing and other important public projects under Ireland 2040 and Housing for All there is a necessity to put in place a system for capturing the in-use performance of these projects and their contribution to community health & wellbeing.	NP OBJ4 NP OBJ6 NP OBJ13 HfA OBJ16 HfA OBJ21 HfA OBJ22 CAP 54 CAP 196
4.	**Collation of successful, liveable and sustainable Irish and European Towns and Cities**	Research into a small, selected group of Irish and European towns to understand the factors that make them successful in terms of urban planning and development approaches. a. Review of a number of towns and cities covering both urban planning/development and governance/funding. b. Identification of key take aways for future of Irish towns and cities	A cohesive overview of successful approaches to sustainable development can assist the delivery of Ireland 2040 and Housing for All with a focus on protecting human health and wellbeing in an environmentally and financially sustainable manner.	NP OBJ4 NP OBJ6 NP OBJ13 HfA OBJ16 HfA OBJ21 HfA OBJ22 CAP 296
5.	**Economic and financial analysis tools for social interventions in towns and cities.**	Research the development of tools for effective analysis of social and financial value of interventions in planning such as: a. Preservation of heritage and cultural assets b. Enhanced public realm c. Planting in urban areas d. Reduced car traffic	Similar tools have been successfully developed in the UK (RIBA Social Value Toolkit) and could be adopted to Irish context to showcase financial benefits of social interventions to local authorities.	NP OBJ4 NP OBJ13 HfA OBJ 4 HfA OBJ6 HfA OBJ16 HfA OBJ21 HfA OBJ22

*Full overview of policy objectives are listed in the appendix

5) CONCLUSIONS

The proposals in this report is just a start of immediate research and innovation required to meet the objectives of the National Development Plan, The Climate Action Plan and Housing for All.

Following this report, the Sustainability & Climate Action Consultation Group will search for, and reach out to, potential research/innovation partners for these proposals and encourage them to apply for funding under suitable streams. We welcome everyone who are interested in any of the topics to reach out to us.

The group will share the findings of this report with other suitable stakeholders such as the newly established Retrofit Taskforce and relevant government departments.

The group will also continue to meet and discuss the other actions under the CSG Innovation & Digital Adoption Sub-Group to ensure sustainability and climate action is adequately integrated.

If you are interested in a research topic or have other suggestions please contact Action Leaders David Browne (RIAI) and Karolina Backman (RIAI) with the emails below:

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APPENDIX: SUSTAINABILITY & CLIMATE ACTION CONSULTATION GROUP:

Construction Sector Organisation	Name	Organisation or Company
RIAI	David Browne	RKD
	Karolina Backman	RKD
	Asiling Kehoe	SISK
Engineers Ireland	Susan McGarry	Ecocem
	Fergal Timlin	Mid-West National Roads Design office
	Emma McKendrick	AECOM
	Brian Cassidy	Cork City Council
ACEI	Warren Phelan	RPS
	Frances O'Kelly	Roughan & O'Donovan
	Cian Desmond	Gavin & Doherty Geosolutions
SCSI	Sarah Sherlock	Murphy Surveys
	Gary Comerford	Linesight
CIF	Tadgh Lucey	BAM Civil Ltd
	Jo-Ann Garbutt	Mercury Engineering
BMF	Brian Gilmore	Cement Manufacturers Ireland
NSAI	Sean Balfe	NSAI
Irish Green Building Council	Pat Barry	Irish Green Building Council

APPENDIX: FULL LIST OF RELEVANT OBJECTIVES

National Policy Framework Ireland 2040:

OBJ 4. Ensure the creation of attractive, liveable, well designed, high quality urban places that are home to diverse and integrated communities that enjoy a high quality of life and wellbeing.

OBJ 6. Regenerate and rejuvenate cities, towns and villages of all types and scale as environmental assets

OBJ 13. In urban areas, planning and related standards will be based on performance criteria

OBJ 32. To target the delivery of 550 000 additional households to 2040

OBJ 33. Prioritise the provision of new homes at locations that can support sustainable development and at an appropriate scale of provision relative to location

OBJ 35. Increase residential density in settlements through a range of measures including reductions in vacancies, re-use of existing buildings and infill development schemes.

OBJ 52. The planning system will be responsive to our national environmental challenges and sure that development occurs in environmental limits

OBJ 53. Support the circular and bio economy including in particular through greater efficiency in land management, greater use of renewable resources

OBJ 54. Reduce our carbon footprint by integrating climate action into the planning system in support of national targets for climate policy mitigation and adaptation objectives, as well as targets for greenhouse gas emissions

OBJ 56. Sustainably manage waste generation, invest in different types of waste treatment and support circular economy principles prioritising prevention, reuse, recycling and recovery to support a healthy environment, economy and society.

Housing for All Objectives:

OBJ 4. Increase social housing delivery

OBJ 6. Increase and improve housing options for older people

OBJ 12. Deliver a new approach to active land management

OBJ 13. Improve the functioning of the planning system

OBJ 16. Improve Sector Innovation and Attractiveness

OBJ 19. Address Vacancy in housing

OBJ 20. Make more efficient use of existing housing stock

OBJ 21. Drive environmental sustainability in our housing stock

OBJ 22. Drive social sustainability and foster sustainable communities

OBJ 23. Drive economic sustainability and reduce Construction Costs (23.5 and 23.9 in particular)

OBJ 23.11 Reduce C&D waste and associated costs through demonstration projects

OBJ 23.12 Reduce demand for virgin raw materials and support re-use

OBJ 25. Drive compliance and standards through regulatory reform

OBJ 26. Support Critical Infrastructure Development

Climate Action Plan 2021:

ACTION 54 Develop a strategy to achieve at least a 51% reduction in GHG emissions and a 50% improvement in public sector energy efficiency by 2030

ACTION 55 Expand the successful public sector energy efficiency monitoring and reporting programme to incorporate GHG emissions reduction

ACTION 58 Support the retrofit of public sector buildings

ACTION 59 Mandate the inclusion of green criteria in all procurements using public funds, introducing requirements on a phased basis and providing appropriate support to procurers

ACTION 62 Set a trajectory for commencing and implementing a deep energy retrofit programme for education sectors

ACTION 176 Carry out research to inform the development of options, policies and measures to decarbonise the heating and cooling sectors to 2050

ACTION 177 Develop proposals to achieve complete phase out of fossil fuel heating throughout our building stock in line with our climate neutrality objective

ACTION 179 Develop an approach to retrofit commercial buildings

ACTION 182 Conduct appropriate research to inform and support the growth and development of district heating in Ireland

ACTION 184 Ensure national, regional and local planning frameworks encourage and facilitate the development of district heating where appropriate to facilitating compact urban development

ACTION 186 Assess the viability of district heating systems within higher density urban/periurban developments through a demonstration project

ACTION 188 Undertake regulatory review of cost optimal performance requirements for Part L (Conservation of Fuel and Energy) of the Building Regulations

ACTION 191 Work with industry stakeholders to increase the use of low carbon materials, taking into account international best practice

ACTION 192 Develop an embodied carbon Building Rating calculation methodology

ACTION 193 Support the development of a tool for early design stage comparative analysis of embodied carbon in typical Irish construction typologies

ACTION 194 Design and construct two exemplar public sector buildings using alternative construction techniques and materials, and monitor their performance

ACTION 195 Pilot project to assess the adaptive re-use potential of existing traditionally built structures as residential accommodation

ACTION 196 Evaluate potential for further emissions savings through changing consumer behaviour to lower household heat demand

ACTION 197 Develop specific climate maps and data for use in building design to enhance resilience in support of climate change adaptation

ACTION 198 Assess and monitor climate impacts on heritage sites and identify threatened heritage sites

ACTION 200 Build public awareness of the risks of climate change (in general and for heritage) and of efforts to mitigate it and adapt to it

ACTION 223 Enhance the collection and monitoring of retrofit activity data delivered with Government support

ACTION 224 Enhance the capacity of local authorities to deliver their retrofit programme according to budgets allocated

ACTION 296 Review further linkages between accessibility and climate action

ACTION 377 Build on the commitments made under the National Biodiversity Action Plan 2017-2021

ACTION 384 Conduct research and engage on how to support climate just transition in agriculture

ACTION 390 Engage stakeholders in all sectors to protect biodiversity in order to increase resilience to climate change

ACTION 411 Reduce demand for virgin raw materials and support re-use, by keeping material out of waste streams