Report

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Design for a Circular Economy

An Action Plan

ZERO WASTE SCOTLAND

pdr.

Design Council

Contents

Inspiring change for Scotland's resource economy

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1 Executive Summary

PDR, the International Design Research Centre at Cardiff Metropolitan University, and the Design Council, the UK Government's advisor on design, are pleased to present our recommendations for the action plan 'Design for a Circular Economy' to Zero Waste Scotland.

The challenge is to mainstream circular economy principles into existing education and policy interventions so that it is not seen as an add-on but an integral part of how companies think about design. For this to happen it's essential to build both capability in the design community as well as the appetite amongst business to stimulate innovation in the design and manufacture of products and packaging.

We have taken a design approach to this project by engaging a range of stakeholders across industry, the design sector, academia and public policy to jointly develop an action plan that is tangible, realistic and corresponds to market and policy needs. The action plan has been peer-reviewed to ensure it is evidence-base by representatives from Scottish Enterprise, Creative Scotland and Education Scotland, among others, to provide input during the process.

As part of the process, we created a stakeholder map 'Design for the Circular Economy' to provide a snapshot of design, industry and education initiatives in Scotland. The stakeholder map informed the selection of participants for interviews and workshops to provide insight from the design sector, enterprises, education and policy. During two workshops, a series of proposals were jointly developed with key stakeholder.

This work resulted in a long list of ideas which we have translated into a range of considerations for Zero Waste Scotland to instigate to lay the groundwork, build capability and create incentives. In the Design Council's experience, often our most powerful role is to act as an 'enabler' or convenor to bring together interested parties to work together using a design approach to solve societal problems. Therefore, to take a strategic approach to prioritising these actions we advise that focus is initially placed on acting as a catalyst of change by mobilising the networks across Scotland in the design community, higher education, business support and industry to share best practice and develop new projects across key industries. This network of enablers can then help take forward other potentially more resource intensive ideas in the action plan such as new awards or developing toolkits and educational materials.

In addition, Zero-Waste Scotland has the ability to influence existing policy levers such as the industrial sector strategies and design vouchers and in the longer-term achieving systemic change in how resources are used sustainably.

2 Introduction

Design is an approach to problem-solving that can be applied across the private and public sectors to drive innovation in products, services and society by putting people first[1]. More than three out of four decisions directly influencing materials selection and manufacturing processes are determined in the design phase[2] and over 80% of the ecological costs are determined before the product is even created[3]. As such, design, in terms of product and service development as well as managing the development process is fundamental for the circular economy. Therefore, the success of the circular economy requires business model innovation to realise value invested early in the design stage[4].

The circular economy represents an "upgrade" from the current 'normal' take-make-dispose linear economy in which society wastes huge amounts of material and value. The linear economic model is nearing its limits in a world of ever-scarcer resources alongside growing population and wealth; the circular economy represents an opportunity to buffer future materials price increases and volatility, reduce material costs and restore natural capital. Scotland has long been recognised as fertile ground for the development of a circular economy[5], and the evidence base for the benefits and the areas to focus on is strong. The Scottish Government has shown a desire to accelerate progress towards a more circular economy by 2050 through the actions put forward in 'Safeguarding Scotland's Resources'[6].

A 2014 scoping study of potential circular economy actions across Europe found that "insufficient skills and investment in circular product design and production which could facilitate greater re-use, remanufacture, repair and recycling" stands out as a key barrier to its increased uptake[7]. Without designers (be they in-house within companies or in design agencies), manufacturers and producers understanding and valuing the importance of circularity to the same extent as policy-makers, uptake will be stunted. However, there are opportunities for organisations like Zero Waste Scotland tounlock many issues that stand in the way of Scotland maximizing the benefits of the circular economy through increasing the role of design thinking as a tool across a wide swathe of the Scottish economy. Facilitating the engagement of the design community with circular economy concepts as well as altering the requirements of designers from business to account for the circular economy will significantly fast-track a systemic change to circular products and services in Scotland.

From February to April 2015, ZWS tasked PDR and the Design Council with developing an action plan 'Design for a Circular Economy'. Through interviews, workshops and a peer-review panel, a set of actions have been developed focusing on the themes of 1) business support and finance, 2) skills and education, 3) promotion and awareness and 4) policy and regulation. The actions range from integrating design for CE into Scottish Enterprise vouchers and mentoring programmes, nationwide competitions for primary and secondary school pupils and high profile engagement events to

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[1] Whicher, A., and Walters, A. (2014) 'Mapping Design for Innovation in Wales and Scotland', Report prepared for the Welsh Government and Scottish Enterprise, p.4.

[2] Valade-Amland S. (2011) 'Design for People, Profit, and Planet', Design Management Review, 22(1), p. 22.

[3] McBride M. (2011) Triple Bottom Line by Design: Leading as if Life Matters, Design Management Review, 22(1), p.12.

[4] Prenderville, C., Sanders, C., Sherry, J., and Costa, F. (2014) 'Circular Economy: Is it enough?' Report prepared for Welsh Government Waste Strategy Branch.

[5] Scotland and the Circular Economy (2013) Ellen MacArthur Foundation. Report prepared for Zero Waste Scotland and Scottish Enterprise.

[6] Natural Scotland (2013). 'Safeguarding Scotland's Resources – building a more efficient and circular economy'. Report prepared for the Scottish Government.

[7] European Commission (2014). Scoping study to identify potential circular economy actions, priority sectors, material flows and value chains. DOI: 10.2779/29525

advocating design for circularity within the European Commission. PDR, the Design Council and the peer-review panel will continue to support ZWS in implementing the actions.

3 Policy Context

Scotland's well-developed sustainable economic growth strategy[8], ambitious plans to achieve zero waste, the existence of industry-focussed enablers Zero Waste Scotland and Resource Efficient Scotland, and an early mover advantage from work carried out in food and drink, textiles and oil and gas decommissioning mean that Scotland is in ideal position to reap the rewards of encouraging design for a circular economy. European legislation to help eco-design become an enabler for such change has been forthcoming in recent years, although the policy landscape is somewhat disjointed, particularly given the hiatus placed on the Circular Economy Package in December 2014.

European measures to proliferate the use of design as a tool for circularity in a product, business, sector or service are seen as complex and costly. For example, the EU Ecolabel is voluntary and thus has a niche market, and is perceived as expensive to implement with varying impact on the actual sustainability of the product. The Eco-design Directive currently only relates to energy use, rather than materials, and is thus limited in its ability to bring about change towards a circular economy. Calls from bodies such as the European Environmental Bureau and the Product Sustainability Forum for the Eco-design Directive to include product design requirements for disassembly, reparability, recyclability and durability as part of the new Circular Economy Package are growing. Furthermore, the Roadmap to Resource Efficient Europe sets out a plan to expand the scope of the Eco-design Directive to nonenergy related products.

In order to provide the metrics that will enable the expansion of the Eco-design Directive, the Product (or Organisation) Environmental Footprint, is currently being developed. The European Commission is attempting to develop a *"common methodology on the quantitative assessment of environmental impacts of products throughout their life-cycle, in order to support the assessment of labelling of products"*.[9] Pilots for this initiative end in late 2016, upon which recommendations for its use in member states, companies, private organisations and the financial community will be made available. It is currently unclear how powerful the PEF/OEF will be as a tool, but it has the potential to change the landscape of how products are designed in many European sectors.

Similarly, developing policy around individual producer responsibility has the potential to fundamentally change manufacturer's approaches to product design by encouraging products that last longer. This can be achieved by legislating that producers are obligated to deal with their own products as waste, and are thus incentivised to optimise design for their corresponding end of life processes.

In parallel to the work on the EU's Integrated Product Policy composed of the Eco-design Directive, Energy Labelling Directive and Green Public Procurement, the European Commission has also developed an 'Action Plan for Design-driven Innovation', launched in 2013. The European Commission's action plan aims to accelerate the up-take of design in innovation policies at national, regional and local levels across Europe. The Design Action Plan states that:

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[8] The Scottish Government (2011). The Government Economic Strategy.

[9] Council of the European Union (2010). Council conclusions on sustainable materials management and sustainable production and consumption: key contribution to a resource-efficient Europe

'A more systematic use of design as a tool for user-centred and market-driven innovation in all sectors of the economy, complementary to R&D, would improve European competitiveness.'[10]

The Design Action Plan adopts a broad definition of design as an approach to problem-solving in both the private and public sectors. Nevertheless, the Design Action Plan does not specifically mention eco-design, sustainable design or the circular economy. As such, there is an opportunity to engage with the Innovation Policy for Growth Unit with the European Commission Directorate General Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) citing Scotland as an example of good practice. The European Commission are making efforts to be eco-design and design aware, but the route to effective European eco-design and design capabilities is not clear, which is understandable as the eco-design and design stakeholders in Europe are not communicating a coherent message. To implement the Design Action Plan, the Commission have established an Interservice Group composed of Commission officials from different Directorate Generals. However, there is no representative advocacy a sustainable product design or eco-design agenda within the steering group. Furthermore, the Design Council is leading the main implementation mechanism of the Design Action Plan, the Design for Europe Platform, a network of partners raising awareness of and building capacity for design-driven innovation in enterprise, the public sector and policy-making. There is an opportunity for ZWS to champion the circular economy within the design for innovation policy agenda in the European Commission.

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[10] European Commission (2013) 'Implementing an Action Plan for Design-Driven Innovation' Staff Working Document SWD(2013)380, Brussels, 23.09.13, p.4.

4 Method

Between February and April 2015, PDR and the Design Council instigated a design-led approach to developing the action plan 'Design for a Circular Economy' with ZWS. By closely involving the beneficiaries – those upon whom the action plan will impact – we were able to construct a shared understanding of user needs and jointly develop targeted actions. To develop the action plan, the following approach was adopted:

- Conducting a stakeholder mapping of industry, design and education initiatives.

- Interviewing enterprises, design agencies and other stakeholders.

- Hosting two workshops to jointly develop proposals with key stakeholders.

- Establishing a peer-review panel to review the action plan and champion its implementation.

The purpose of the stakeholder mapping was to perform a stock-taking of current industry, design and education initiatives such as business support programmes, design promotion activities and skills development opportunities. This was not only an opportunity to identify interviewees and workshop participants but also to capitalise on existing infrastructure.

To gather insight, semi-structured interviews were conducted with four enterprises, five design agencies and eight stakeholders representing policy, academia and skills development. The 17 interviews enabled an assessment of the barriers and opportunities of design for a circular economy in terms of the supply and demand in Scotland. The interviewees are listed in the appendices.

On 26 March in Glasgow and 27 March in Edinburgh, a range of stakeholders from industry, the design sector, academia, government and third sector were involved in two workshops. The workshops explored the actors and initiatives in the stakeholder map to identify barriers and opportunities to design for circularity in terms of four action areas: 1) business support and finance, 2) skills and education, 3) promotion and awareness and 4) policy and regulation. Based on the strengths and weaknesses, the 28 participants were involved in a co-development process to jointly develop a series of actions.

Based on the interviews and workshops, the actions were refined into a shorter list of tangible and realistic proposals that directly responded to market and policy needs. The revised list of action was submitted to a peer-review panel for scrutiny. The purpose of the peer-review panel was not only to provide a robust screening procedure but also to create a cohort of engaged stakeholders who could support ZWS in implementing the proposals.

5 Action Plan

5.1 Overview

Through engagement with a wide variety of stakeholders in Scotland, it has become clear that the role of ZWS in this arena should be to act as a facilitator for change towards circular design thinking across a wide range of the economy, rather than prescribing action in focussed sectors. In the short term, the greatest scope for change in the way products and services are designed in Scotland lies in niche manufacturing across a wide range of sectors, which are prioritised below. In the medium to

long term the biggest opportunities for Scotland lay in producing bolder, more forward-thinking designers through the education system, and lobbying for the right European policy landscape for designers and business leaders who understand the importance of designing for a circular economy to be able to be commercially successful.

It is not prudent to isolate individual product lines given the wide variety of the Scottish economy and the dominance of small, niche, enterprises, but rather to encourage as many industries as possible to explore how they can redesign their products and services in an interconnected manner, something which is almost universally applicable. This is especially apparent as there is no 'one size fits all' fix for installing circular design thinking in a business; it is the act of exploring the possibilities for the company through engagement with ZWS's networks that uncovers potential value, which can then be exploited through the mechanisms described in the actions below.

However, it *is* prudent to begin where the opportunities are greatest, and thus we support the earliest efforts begin placed in the strong, sizeable, design *and* manufacturing communities in textiles, food and drink and oil and gas decommissioning. It is suggested that the next sectors/areas to be targeted should be the chemicals and life sciences, packaging, technology and engineering, and the wider energy sector. The Ellen MacArthur Foundation's analysis that complex medium-lived products are a 'sweet spot' for circularity is sound, and it is the manufacture of these products, regardless of sector, that should be focussed upon. Each of these sectors corresponds with one or more of the identified priority materials (Section 5.2).

The most challenging aspect of executing this action plan will be achieving significant buy-in from SMEs and design agencies, who can understandably struggle to commit valuable time and energy to something outside its core day-to-day interests. It is therefore crucial that best practice case studies from on-going projects in textiles, food and drink and oil and gas decommissioning is made available and relevant to businesses in other sectors as soon as possible. International case studies from each sector should be used in discourse with Scottish companies and design agencies. It should be considered that change often occurs through 'enablers' within industries and companies who show particular enthusiasm for enacting change. Identifying, and giving a platform to, such enablers is crucial in proliferating circular design thinking throughout substantial areas of the Scottish economy.

The following actions have been concluded upon following an extensive engagement exercise with Scottish industrialists, designers, academics, policy-makers, educators and advocacy groups, as well as the use of our own expertise in the subject area. The actions are divided into four thematic areas:

- **Business support and funding.**

- **Skills, education and research.**

- **Promotion and awareness.**

- **Policy and regulation.**

Furthermore, the actions are of three 'types', which can go some way to influencing prioritisation within the ZWS Design team. They are:

- **Groundwork** – prerequisite actions for the successful implementation of further actions.

- **Instigating change** – actions that can have immediate influence on the extent to which circular design thinking is employed in Scotland.

- **Systemic change** – actions that enable circular design thinking to be embedded within the Scottish economy over a longer timeframe.

5.2 Priority Materials

Participants in this exercise were generally unable to provide expertise on particular material flows that should be focussed on but there is no reason to expect that a deviation from those commonly regarded in the literature would be useful. As such, using design thinking to improve the circular use of the following products could be prioritised[11]:

- **Agricultural products and waste** and associated food and drink industry manufactured materials are of great importance given their scale of production, expected price volatility, rising demand and importance to the Scottish economy.

- **Phosphorous**, already a priority through the work carried out in the recovery of resources from water and/or waste water at ZWS through the Hydro Nation initiative, is a particular concern given concerns over global supply. There is great scope for systems thinking to be incorporated into the management of phosphorous in Scotland.

- **Metals**, although a loose term for materials with very different characteristics, are generally an obvious target for circular economy design given their high environmental impact and rising costs. The ability to design-in the recovery of critical raw materials (e.g. indium, cobalt, heavy rare earths) from products and services should be given particular attention given the increased resilience to the Scottish economy this would invoke[12]. Based on a study into this issue in Wales, much of the opportunity in designing for critical raw materials recovery is likely to lay in the electronics and ICT, aerospace, metal manufacturing and electrical equipment manufacturing sectors.[12]

- **Plastics** are a concern chiefly due to the durability of the waste streams and the costs of petroleum, from which it is most frequently derived. Historically a focus of 'end-of-pipe' solutions centred on recycling; a movement towards tackling plastic waste through intervening in the design stage is important to make sure plastics are able to be re-used or biodegrade into a resource. **Chemical and compounds** are closely linked with the plastics industry.

- **Wood and paper** have specialist issues regarding ink contamination and purity at end of life that can be addressed during the design stage of products.

- **Textiles**, although not always found to be of prime importance in the literature, is of particular importance to Scotland given the strength of its industry. Important issues regarding the

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[11] European Commission (2014). Scoping study to identify potential circular economy actions, priority sectors, material flows and value chains. DOI: 10.2779/29525 [12] SNIFFER (2011). Raw materials critical to the Scottish economy.

[12] Harris, C.N.P., Sanders, C., Harfield, P. (2014). Mapping Critical Resources for Wales. Report prepared for the Welsh Government.

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quality of fibres at the end of a first 'life' of textiles should be tackled using design thinking as a tool, as is being evidenced in the Textiles and Apparel Fund.

Despite these priorities, it is stressed that simply focussing on individual materials is not complementary to whole systems thinking and should not form the basis of action, but could rather be included in analysis of the success of actions.

5.3 Table of Suggested Actions

Table 5.1 12 actions for Zero Waste Scotland to install design as a central component of progress to a circular economy in Scotland

Thematic area	ID	Type	Action	Proposed Outputs	Stakeholders	Measure
Business Support and Funding	1	Groundwork	**Build capacity in design for a circular economy among business support advisors**	Provide online support materials and train business advisors in Scottish Enterprise, Highlands and Islands Enterprise, Business Gateway, Resource Efficient Scotland, local authorities and Interface in designing for circularity.	Scottish Enterprise, Highlands, Islands Enterprise, Business Gateway, Resource Efficient Scotland, local authorities, Interface.	50 business support advisors in 2015. 50 business support advisors in 2016.
Business Support and Funding	2	Ground work	**Develop an online toolkit for the design community, industry and business support personnel**	Continually developed, open source, repository for circular design / eco-design toolkits on ZWS website. Resource uses best practice from global literature on eco-design, and also informs a number of other training and educational actions (i.e. actions 1, 5, 6B).	All providers of open source toolkits (e.g. OVAM, Ellen MacArthur Foundation, WeAllDesign, Eco-design Centre, TU Delft)	Continually developed toolkit online and accessed regularly by stakeholders from the Design for a Circular Economy network and businesses.

Business Support and Funding	3	Instigating change	**Promote circular economy within design vouchers**	Promote design for circularity within the Scottish Enterprise 'By Design Vouchers' and 'Design Mentor' programmes and engage with Highlands and Islands Enterprise to extend the vouchers to these areas. Examine the feasibility of establishing an in-depth intervention programme such as 'Design Mentor' or 'Better by Design'.	Scottish Enterprise, Highlands, Islands Enterprise & Business Gateway	40 enterprises accessing By Design Vouchers for circular economy in 2015. 10 enterprises accessing Design Mentor support in 2015. Evidence of businesses developing briefs for designers (in house or external) built around circular business models.
Business Support and Funding	4	Instigating change	**Develop tangible working links between design/art/sustainable engineering researchers in Higher Education Institutions and Small and Medium Sized Enterprises**	A) Grants for companies to fund a doctoral or post-doctoral researcher in design/arts/engineering etc. to engage on systems thinking and bring fresh creative perspectives into the building. Islands Enterprise, B) Knowledge Transfer Partnerships Scottish between Higher Education Institution Design Manufacturing departments and business in Scotland. Advisory Service, West/East of Scotland Knowledge Transfer Partnership Centres, Interface, Skills Development Scotland	Higher Education Institutions, Scottish Funding Council, Scottish Enterprise, Highlands and	(A) 10 grants (£500 - £1000) for small Scottish companies to work with early stage researchers in design Higher Education Institutios in Scotland (or in UK if limited availability). (B) 2 Knowledge Transfer Partnerships (or a similar instrument developed for this purpose) between Scottish Higher Education Institutions and small Scottish Companies
Skills, Education and Research	5	Instigating change	**Develop educational materials for cross university use and increased importance of sustainability in Scottish design undergraduate degrees**	Develop a set of materials or guidelines that encourage undergraduate designers to consider lifecycle thinking and sustainability as a core aspect of all their projects, and a key criterion for assessment. Undergraduate design courses become cross-curricular and interact better with Scottish industry.	Higher Education Institutions, Scottish Funding Council.	Engage leaders in all design Higher Education Institutions in Scotland. Gather best practice from elsewhere (e.g. University of Falmouth). Assess feasibility of developing uniform materials on eco-design / design for circular economy to plant into existing design courses.

Skills, Education and Research	6	Systemic Change	**Embed circular design thinking in the primary and secondary education system**	Three-pronged approach to building momentum in the Scottish primary and secondary education system: A) Embed design for circular economy in pilot schools B) Continuous professional development for teachers C) Schools competition.	Education Scotland, local authorities	A) Embed in 25 pilot schools by summer 2016. B) Continuous professional development for 20 teachers, starting with 'teardown' workshop C) Engagement from 10 schools (including pilot schools)
Promotion and Awareness	7	Groundwork	**Facilitate a network to foster design for a circular economy in Scotland**	Bring together key 'enablers' in the design community, higher education, education support, policy and industry and foster links between them through creative events. Use these connections as the basis of developing new pilot projects in key industries.	(See action description in Section 5.3)	6 cross-sectoral/discipline network events per year, each with a progressively larger and more varied attendance. Measures linked to success of other actions (e.g. amount of connections created leading to circular design projects).
Promotion and Awareness	8	Instigating change	**Integrate design for circular economy into awards criteria**	A 'Design for a Circular Economy' award within existing design awards such as Lighthouse Design Impact Awards and Scottish Design Awards.	Lighthouse, Scottish Design Awards, VIBEs	1 high profile 'Design for a Circular Economy' award per year.

Promotion and Awareness	9	Systemic Change	**Assess potential for a Scottish product/service ecolabel that encourages sustainable design**	Assess international best practice in labelling Assess benefits of Scottish label Identify pilot industry Market research Report on feasibility.	European Commission, Scottish Government, retailers, market analysers, existing labels	Feasibility report on a Scottish ecolabel. Plan for pilot in a relevant sector if deemed feasible.
Policy and Regulation	10	Systemic Change	**Identify the key legislative barriers to, and opportunities for, circular design in Scotland**	Understanding of legal position developed. Identification of best practice of transposing EU eco-design and procurement legislation into national law. Opportunities assessment. Proposed actions on product standards, public procurement warranties and repair manuals	European Commission, Scottish Government.	Input into report on opportunities for Scotland to 'normalise' circular product design by removing key legislative barriers and exploit upcoming opportunities as an early mover.
Policy and Regulation	11	Instigating change	**Engage with European Commission to position Scottish examples as best practice in design for a circular economy in Europe**	Engage with the Innovation Policy for Growth Unit as well as the Sustainable Industrial Policy Unit within DG GROW to promote Scottish initiatives as examples of best practice and provide input for working documents, policy initiatives and funding calls on design and innovation.	European Commission, Scottish Government	Design for a circular economy features within European Commission working documents, initiatives and funding calls.
Policy and Regulation	12	Instigating change	**Encourage the inclusion of eco-design/design for a circular economy in sector action strategies**	Whole life cycle design considered in all relevant sector strategies including the upcoming creative industries strategy proposed by the Creative Industries Partnership Group led by Creative Scotland.	Scottish Enterprise, sector leadership organisations (e.g. Food and Drink Scotland, Chemicals Science Scotland). Creative Industries Partnership Group.	1) Sector leadership organisations engaged in network. 2) Opportunities for circular design thinking detailed in sector literature. 3) Evidence of increased activity in circular economy design in sectors targeted.

5.4 Business Support and Funding

Interviewees and workshop participants frequently cited business support and funding as a prime motivator for increasing business and designer's engagement in design for a circular economy. Although grants and mentoring were highlighted as a priority, all designers and enterprises interviewed stressed the need for low levels of bureaucracy. Support for designers to move towards circular design thinking also featured strongly. It was also felt that both business advisors and designers would benefit from set of resources to promote circular design to SME clients.

According to designers:

"If it's not in the client brief, I won't be hiring specialist expertise to integrate circular economy considerations into the product development process."

"There are so many funding programmes to help businesses grow but there are no programmes with a specific emphasis on design for the circular economy as a priority."

"The circular economy has huge potential for growth and jobs but the focus appears to be on waste reduction not on entrepreneurship and innovation."

"Small pots of design funding are good for removing the initial risk of commissioning design expertise but tend to limit design projects to the low hanging fruits such as branding. They need to be followed up by a more strategic programme making a larger design intervention and encouraging an overarching approach to design-driven innovation."

"There is a need to promote the case studies on the financial benefits and business models to create an economic rationale for designing for circularity."

"I would access the vouchers to start a conversation with clients and enable an SME to understand where design for circularity could strategically add value to their firm. But the administration has to be simple and the release of funds has to be fast because these are usually the blockages."

"We need easily accessible information on the value of design to the circular economy to use with our SME clients."

According to businesses:

"Currently, a company must have a self-driven desire to change towards circular design thinking, if vouchers are made available to them they have an incentive that can kick-start a much longer process of change."

"Design in terms of new product development is heavily dependent on manufacture. Where does this happen? What processes are being used? What materials are being used and why? There are potentially other materials that would perform better in a sustainable way."

"We are actively pursuing getting into art and design departments in universities to get new perspectives on our products and services in order to drive down waste. Mechanisms for doing so such as awards and small grants would help us enormously"

"By-products are currently exported – can we design new products in Scotland that make use of the material?"

According to academics:

"*Knowledge transfer is crucial. It takes more than a meeting to embed change in a business, innovative designers must be embedded within the fabric of the company*"

1. Build capacity for designing for circularity among business support advisors

This action is focused on up-skilling the personnel 'on the ground' who deal with SME development in Scotland and is especially important as it is the clearest conduit for increasing business engagement in designing for a circular economy. ZWS can facilitate this by establishing a task force of key stakeholders, making resources available online to business advisors and providing training to them (see Action 2). In order to scope out the provisions for online materials, online training and hands-on training, a task force should be established with key stakeholders in business support providers. This task force should be convened with representatives of the Scottish Enterprise Innovation Support Team (including innovation and sustainability specialists), Highlands and Islands Enterprise, Resource Efficient Scotland, Business Gateway and Interface to examine the needs of business support mentors.

Based on interviews, there is demand for online resources and online training materials. It is crucial to have resources with Scottish case studies on designing for a circular economy available to business advisors as well as online training materials for those who may not be able to attend face-to-face training sessions. The outcomes of the already on-going workstreams in textiles (Textiles and Apparel Fund), oil and gas decommissioning (RSA) and food and drink (Ricardo AEA) should be prioritised for providing the initial best practice case studies. According to Scottish Enterprise, there is low take-up of some existing design programmes because business advisors do not direct SME clients to these programmes. In addition to online training opportunities, a series of hands-on training sessions could be provided to Scottish Enterprise innovation and sustainability specialists as well as business advisors in Highlands and Islands Enterprise, Business Gateway, local authorities, chambers of commerce and Interface. These training sessions could be provided through existing creative bodies in Scotland, or through a tendered contract to an external body. As a proposed target, 50 business advisors could be training in 2015 and a further 50 in 2016.

2. Online toolkit for design community, industry and business support personnel

An online toolkit has already being highlighted as part of the Scottish Programme Plan, and its rapid development is merited. However, the physical engagement of the design community within the wider cross-discipline network (see Action 7) is crucial in embedding systemic change within Scottish designers. As with Higher Education Institutions (HEIs) and industry, uncovering leadership and best practice (particularly individuals who can act as enablers for other designers) is key in bringing about transformational change. Without this aspect, the online resource could potentially be 'lost' as designers may attend a launch event and then go back to business as usual as their clients ask for products/systems that reinforce the linear economy. The online tools should be open source, and can form the basis of training that is provided to business support personnel (Action 1) and as continual professional development (CPD) for teachers (Action 6B). The tools can simply be a collation of current best practice[13], and/or can be developed with the express purpose of engaging with Scottish stakeholders (especially if Action 5 is taken forward). It should be remembered that successfully designing for a circular economy is necessarily dependent on understanding of circular business models, and particularly selling a service rather than a product. Therefore, existing work on circular business models by ZWS should be incorporated into the toolkit. This is a groundwork action that must be in place in order for other actions to be successful.

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[13] Toolkits in this area include those produced by the Ellen MacArthur Foundation; CircularEconomy Toolkit (Accenture, Centre for Industrial Sustainability); We All Design; Osterwalder and Pigneur's 'Business Model Generation and the Business Model Canvas' (2010).

3. Design for Circular Economy vouchers

Build on Scottish Enterprise's existing innovation voucher system and the successful delivery of the Textiles and Apparel Fund by specifically promoting design for circular economy in the wider Scottish economy within the 'By Design Vouchers' programme. From May 2015, By Design Vouchers will be available through Scottish Enterprise aimed at businesses not account managed by Scottish Enterprise where up to £5,000 will be available with an intervention rate of 75%. As part of the light touch, online application form the businesses will submit the quote from a design agency for branding, packaging, product design or service design expertise. The programme will be financed for three years and it is anticipated that around 10 to 15 enterprises a month might access funding based on similar programmes. The circular economy is not specifically highlighted within the design vouchers and as such there is an opportunity for ZWS to provide advice to Scottish Enterprise on how to effectively integrate CE into the criteria.

Action should be taken to stimulate demand for By Design Vouchers among enterprises as well as the supply of quality design for circularity expertise among the professional design sector. For example, this could involve engaging with the list of 'rostered' design agencies already approved by Scottish Enterprise public procurement procedures. At present By Design Vouchers are not available through Highlands and Islands Enterprise and therefore there is an opportunity to also engage with Highlands and Islands Enterprise to explore the feasibility of extending the Scottish Enterprise voucher system to these areas. The By Design Vouchers form part of efforts to develop a pipeline for enterprises looking for further support. Companies could then access the 'Design Mentor' programme where a more interventionist approach is taken by Scottish Enterprise innovation specialists to apply design thinking to the innovation process at a value of £30,000.

There is an opportunity for ZWS to enhance take-up of the Design Mentor programme to provide more in-depth support to selected businesses. Alternatively, there is also an opportunity for ZWS to directly finance follow on projects. For example, the Better by Design programme was funded by the Big Lottery and delivered by Taylor Haig taking 15 companies through a two year process at a value of £50,000 each. A similar model could be adopted where a cohort of 10 enterprises are mentored through a one year process at a value of £20,000. This could be tendered out for external delivery. This would provide ZWS with 10 in-depth examples of design for circular economy case studies.

4. Develop tangible working links between design/art/sustainable engineering researchers in HEIs and SMEs.

Exploiting new ideas from young designers, artists and sustainable engineers in universities can be achieved through two mechanisms:

(A) Develop a stream of funding for entrepreneurs/ micros /small companies to interact with HEIs through doctoral and post-doctoral researchers. Small grants for micro, very small and small companies/manufacturers to interact with an individual at Scottish HEIs is a tangible way of increasing knowledge transfer between academia and business. This is particularly relevant to early-stage design, art and sustainable engineering academics, such as doctoral and post-doctoral researchers, who may be able to provide a fresh perspective on how a product or service can be designed for

circularity in industry using creative solutions. A slightly different approach is to fund circular design competitions in universities that address the needs of an SME.

By providing small (£500 - £1000) grants to small companies (or researchers if a competition is run) that otherwise would not have the means to employ outside of key technical areas, many of the barriers to circular design can be lifted. Larger companies should be encouraged to provide small grants to explore circular design expertise in Scottish HEIs through academic routes themselves by means of successful case studies. An example of this approach being pursued has been identified in the development of this document through engagement with industry, and the process can be facilitated through the ZWS design for a circular economy network (see Action 7). The advantage of such small grants is that there is little commitment required on the part of the industrial partner, but they are able to access knowledge, ideas and perspectives they otherwise would not be able to source.

(B) Provision of funding for, and/or facilitation of, knowledge transfer partnerships (KTPs) between design universities and niche manufacturing SMEs. Alongside the smaller grants detailed above, larger arrangements can be put together between design/art/sustainable engineering HEIs, manufacturers and design agencies, especially where there has been found to be considerable scope for upscaling in Action 4(A). ZWS could take a coordination role to link up Scottish HEIs with manufacturers and designers, thus increasing the amount of interconnected knowledge transfer and design-led innovation in Scottish SMEs

5.5 Skills, Education and Research

It goes without saying that everything possible should be done to encourage circular design thinking in Scotland's existing economy and design community in order to achieve national policy goals on waste and innovation. However, the largest opportunities for systemic change in Scotland lay in the next generation of designers, thinkers, industry leaders and academics. Young people currently in the primary, secondary and tertiary education systems must leave with an understanding that the western throwaway society is not sustainable in an environmental, social or commercial sense. The following actions are designed to ensure that next generation of Scottish designers see real sustainability as normal when interacting with clients, that the next generation of Scottish industry leaders do not think of sustainability as a necessary annoyance but a central pillar of resilient business, and that the next generation of Scottish academics lead in progressive design thinking.

According to designers:

"Some design graduates have to almost be retrained to be able to operate in a commercial environment and understand what materials can be used in different processes."

"There's a need to not only train design students in business acumen and sustainability considerations but also to train business students in design for sustainability."

"Architects have to undertake certified continuous professional development to practice but product designers do not have to undertake CPD on reuse, remanufacture and the circular economy. There is a skills gap."

According to businesses:

"Action for producing Scottish designers and business leaders who understand the importance of a circular economy needs to be firmly routed in the primary and secondary education systems, otherwise it is too late"

"Relying on business advisors to change a company to incorporate circular design thinking is extremely difficult, it is much easier to do so at an early stage as young businesses spin out of research institutions"

"As a business we get loads of new ideas through educating! We go in to schools and businesses and have design undergraduates do projects with us"

According to educators:

"We are aiming to make sustainable design a core cross-cutting subject in craft, design technology, business and geography in secondary schools"

5. Educational materials for cross-university use and increased importance of sustainability in Scottish design undergraduate degrees

Working with leaders of design HEIs in Scotland, already identified as part of the Design for a Circular Economy network, the feasibility of developing materials on sustainable design for use across relevant undergraduate degrees in Scotland should be ascertained. There is currently one 'pathway' within the University of Strathclyde's Sustainable Engineering MSc that directly tackles sustainable product design, and none at undergraduate level. Working with leaders from the seven HEIs in Scotland that offer a design undergraduate degree, sustainable design, including lifecycle thinking, should be made a central criterion of every design degree from Scotland, rather than an additional aspect. Crossdisciplinary learning for designers with engineers, material scientists and business students should be encouraged. Best practice in this area can be found at the University of Falmouth, where a Sustainable Product Design BA is offered with cross-disciplinary learning and a broad range of industry links are fostered through compulsory live projects with businesses as part of the learning process.

Achieving this goal would result in a generation of designers who have the skills to offer circular design thinking to clients, and therefore more likely to be able to convince organisations that lifecycle thinking can be beneficial to them, respond to new circular business model-orientated briefs from business, and instil a circular design mentality in business when employed in-house. Furthering the materials developed for the design courses to engineering and business degrees should be a secondary step.

6. Embed circular design thinking in the primary and secondary education system

Preparing future generations of designers and industry leaders for a future in which circularity is embedded in design thinking should start now with a structured and concerted effort to engage schools in the subject. Making sustainability a matriculation criterion in all design, technology and engineering projects throughout education enables a generation of young Scottish designers to design for circularity as a 'norm'. A combination of three approaches can help build momentum in the Scottish primary and secondary education system:

(A)   Bring design for a circular economy into pilot schools system. Work with the 25 signed up pilot schools[14] to embed circular economy and systems thinking into design/technology curricula as

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[14] Currently signed-up for the pilot schools programme are clusters (secondary schools and their ~5 primary feeder primaries) in Fife (2 clusters), Glasgow, South Ayrshire and North Ayrshire.

a core component. Sustainability should be developed as a core criterion in all design and technology projects, with opportunities created for working with local businesses and design agencies (in a similar way to that achieved by Skills Development Scotland in STEM subjects). This process should be continually developed across the pilot schools, alongside Education Scotland, in a similar manner to the STEM improvement document. The overall aim of the ZWS work in pilot schools should be to increase knowledge, understanding and awareness of sustainable design.

(B) **Continual Professional Development for teachers.** A series of CPD events for teachers in 'design for a circular economy' should be presented before the beginning of the academic year. Targeting a small but enthusiastic group of teachers across design, technology and engineering subjects (potentially within pilot schools) for a primer at the beginning of the 2015/16 academic year is a realistic target. Follow on CPD materials can be made available to the teachers as the year progresses.

(C) **Schools design for a circular economy competition**. The design for a circular economy competition should learn from other initiatives such as 'Game on Scotland' and 'UK Rock Challenge', which champion inclusion and 'awards for all' (i.e. every school achieves through involvement in the competition). The competition would use the momentum gained from increased teacher understanding through CPD and increased student engagement in the pilot schools to its advantage, making success in its first year more realistic. It is likely that primary schools will have the greatest engagement, so the competition should be geared to accommodate young learners by using simple examples (e.g. compostable packaging, furniture designed for disassembly).

5.6 Promotion and Awareness

'Getting the right people around the table', increasing the 'interconnected' nature of conversations about circular design, and joining up 'designers, industry and academics' were frequently repeated sentiments throughout the engagement process. A strong, well-managed and expanding network was seen as vital to the proliferation of design for a circular economy in key sectors. Increasing awareness through tangible case studies and trusted awards initiatives were also recurring themes.

According to designers:

"For start-ups, spin-offs and entrepreneurs with a good idea, access to a network with strong case studies of how circular design can be used to make a commercially viable product or service is crucial"

According to businesses:

"We have at least two SMEs in our supply chain who have a waste they want to do something with but need a fresh perspective to find solutions"

"Improving engagement with sustainable design in SMEs is a real challenge. I don't see much in terms of case studies that say to an SME: "this is why you should change""

"Companies that 'get it' tend to have had positive experiences with using design as a solution to waste issues – the net needs to widen to bring in more businesses"

"Face to face events are really important but it's also vital to have tools and materials available online"

"Ecolabels work if they are curated and maintained in the right manner, and are not faceless. They must add something to a cultural change in industry"

"A 'Sustainably Made in Scotland' label has the potential to add something more for Scottish industry than European-level labels due to the strong national identity, but accreditation must not be a laborious process"

"The transformation of the Scottish construction sector from a hugely wasteful one to a sustainability focussed one shows that strong sector strategies and leadership can bring about real change"

According to academics:

"We've found that SMEs need more help to change towards circular design thinking than larger companies, facilitating that is crucial"

"Whole systems approaches are necessary – getting policy makers, businesses, academics, end users, systems designers, service designers, eco-designers and materials scientists around the table together is vital for change to occur"

7. Facilitate network to foster design for a circular economy in Scotland

Use the process to develop this action plan, as well as on-going work in the area in Scotland (Oil and Gas Decomissioning, Textiles, Food and Drink pilot, Design in Action etc.) to identify key 'enablers' in the design community, higher education, education support, and policy-making, as well as the key industries outlined earlier and the financial and the resource recovery/waste industries. In particular, business leaders with a genuine desire to develop their sustainability credentials can act as a conduit through which to engage with more and more areas of the Scottish economy (e.g. examples found in Devro, Vegware, Blue Marmalade, MakLAB etc.).

A strong, if small, nucleus of interested parties is more likely to begin the process of embedding circular thinking in the design community and key industries that have a potential to be more circular such as food and drink, textiles, high value manufacturing, oil and gas decommissioning, life sciences, chemicals, aerospace and energy. Without a strong and organised network of individuals pushing the concepts of designing for a circular economy, many of the further actions identified here will be extremely challenging to complete successfully, and thus this should be considered a 'groundwork' action. The process of forming such a network has already been begun through the RSA's Great Recovery event in Edinburgh in February 2015.

The expansion of the network will require concrete examples of best practice where designing for a circular economy has uncovered business advantages and designers have successfully considered eco-design when interacting with a client. It is crucial that such best practice is collated as soon as possible and is communicated in a way that showcases the cross-sectoral nature of designing for a circular economy. Early adopters already involved in the development of this plan, or with previous interaction with ZWS more widely, can be targeted for providing such best practice, potentially through projects with academia (see Action 4) and the design community (Action 2).

The network should aim to engage and include:

- Leaders in all HEI design courses (Edinburgh Napier University; Glasgow School of Art; University of Dundee; University of Edinburgh; University of Glasgow; University of Strathclyde; University of the West of Scotland; Abertay University; Glasgow Caledonian University).

- Members of all gateways to SMEs (Scottish Enterprise; Highlands and Islands Enterprise; Business Gateway; local authorities).

- Business leaders from a range of micro, small, medium and large companies across food and drink, textiles, high value manufacturing, oil and gas decommissioning, life sciences, chemicals and energy).

- Leaders from (at least) all design houses on the Scottish Enterprise list, and specialist designers focussed on the above sectors.

- Service design leaders.

- Leaders from existing design for circular economy initiatives (scoping the potential for nutrient recovery from anaerobic digestion, developing approaches for the recovery of resources from water/wastewater).

- Materials scientists, eco-designers, anthropologists, marketers and business experts from HEIs and research and training organisations.

- Leaders from the waste / resource recovery industry.

- Personnel from all relevant national-scale policy organisations (e.g. Scottish Enterprise; Highlands and Islands Enterprise; Resource Efficient Scotland; Keep Scotland Beautiful; Scottish Development International; Skills Development Scotland; Education Scotland; Scottish Funding Council).

- Sectoral leadership organisations (e.g. Scotland Food and Drink; Chemicals Science Scotland; Architecture and Design Scotland) and sector-based societies and associations (e.g. Scottish Textile and Leather Association; Scottish Ecological Design Association).

- Leaders from design-based industry initiatives such as the Sustainable Clothing Action Plan and the Electricals Sustainable Action Plan.

- Leaders of significant and related Scottish events during the course of the timeframe of the action plan (e.g. Dundee – City of Design; Glasgow's Year of Green 2015; 2015 – Year of Scottish Food and Drink; 2016 Year of Innovation; Design and Architecture).

- Other organisations from the network map (e.g. Melting Pot; Saltire Foundation; Design in Action; VIBES Awards; Innovation Centres Scotland; V&A Museum of Design Dundee; Creative Dundee; Glasgow etc.; CeeD etc.).

ZWS's leadership of the network should aim to achieve:

- Events that enable the collaborative development of creative, design-led approaches to achieving circular products and services in Scotland.

- Increased Scottish representation in European funding bids relating to design for a circular economy (Horizon 2020, Interreg etc.)

- Take-up of opportunities highlighted in the action plan (e.g. design vouchers, design HEI/industry collaboration).

- Businesses developing briefs for designers centred on circular business models.

- Increased proportion of Scottish design agencies and business support personnel up-skilled in design for a circular economy.

- Increased prominence of Scotland as a leader in design for a circular economy through dissemination at international events.

- Inclusion of circular economy design and life cycle thinking in Scottish sector strategy documents (Action 12).

ZWS should aim to produce a series of 'masterclasses' as part of the network that take inspiration from the Design in Action chiasma events and the previous RSA Great Recovery events. The aims of these workshops should be to showcase best practice and provide a 'melting pot' of ideas and innovations. Furthermore, exploring the potential of bringing international best practice into Scotland by hosting a 'Design for Europe' event would be beneficial to increasing industrial confidence in design as a creative tool for solving complex sustainability problems.

8. Design for circular economy awards

ZWS should seek to become involved in the existing design awards structure by sponsoring (and potentially judging) a new award within a successful design award initiative such as the Lighthouse Design Impact Awards or the Scottish Design Awards. This approach alleviates the risks involved with setting up a new award, and increases the chance of design house participation through the prestige of the award. This in turns increases the likelihood of the design community actively suggesting eco-design approaches to clients as they see successful designs winning awards from bodies they know and trust. The Lighthouse has expressed interest in this idea as part of the development of this action plan. The OVAM Eco-design awards serves as a useful example of how to implement this action.

Alternatively, (or complementarily) ZWS should assess the possibility of championing design agencies that develop whole life cycle solutions through the VIBES Environmental Business Awards, which ZWS already supports. This would enable the business population involved in the awards to see the added value of design as a creative solution to waste issues.

9. Assess potential for a Scottish product/service ecolabel that encourages sustainable design

There are currently 89 ecolabels in use in the UK[15], ranging from the voluntary EU Ecolabel scheme aimed at encouraging businesses to sell products 'kinder to the environment', to the Forest Stewardship Council, On-Pack Recycling Label and CarbonNeutral. Most labels are voluntary, some are product/sector specific (e.g. Compostability Mark of European Bioplastics), whilst others are broader in scope (e.g. EcoLogo). There are currently no labels designed specifically for products designed in Scotland, but there is an analogous system in the Scottish building sector, where sustainability labels are required of new buildings in Scotland under the Building (Scotland) Act of 2010. Furthermore, 'der Blaue Engel' (The Blue Angel) has been facilitating sustainable design in a wide array of sectors in Germany since 1978.

It is possible that a label that signifies 'Sustainably Made in Scotland' may resonate with businesses, designers and consumers in industries that are typically associated with Scotland (e.g. textiles, food and drink). Such a label would enable Scottish manufacturers to gain an 'early mover' advantage as European legislation on eco-design moves from focusing on energy use to incorporate material use. A

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[15] http://www.ecolabelindex.com/ecolabels/?st=country,gb

ZWS Design for a Circular Economy report on the feasibility of a Scottish ecolabel based on circular design thinking would need to include:

- A review of existing relevant ecolabels (der Blaue Engel, EcoLogo, EU Ecolabel, Bluedesign standard for textile) – their strengths, weaknesses and resultant uptake.

- Designation of who should be responsible for verifying the label (i.e. should that be ZWS).

- The component aspects of accreditation to the label (e.g. packaging materials, transparent information, design for disassembly/take-back/sale of service, life cycle impacts of product/service).

- The cost of accreditation to the business, and how that affects uptake.

- Market research on potential value of the label to businesses (including engagement with end users).

5.7 Policy and Regulation

Design is an important voice in the movement towards circular economy-friendly policy and regulations that enable niche opportunities to become a widespread, systemic change in the way products and services are made and used in Scotland. It was felt that although policy for a circular economy is very well developed in Scotland, there were still barriers to companies designing products with the whole life cycle in mind, and that ZWS should make sure Scottish success stories are seen as best practice on a European level.

According to designers:

"There are many examples of design for a circular economy in Scotland but they need to be promoted in government and policy circles. Scotland could be a benchmark for good practices in Europe."

"Legislation and regulation is both a positive and a negative. Where designers are ahead of the curve

we can capture niche markets but where we are behind regulation becomes a drain on resources."

According to industry:

"Sector leadership bodies have a responsibility to drive change towards sustainable design within their networks"

10. Identify the key legislative barriers to, and opportunities for, circular design in Scotland

It is recommended that a thorough examination of the legislative barriers to design (both of products and services) for a circular economy across the key sectors is carried out. Furthermore, a scoping of where Scotland could be in an advantageous advantage as an early mover against incoming EU legislation would outline long-term, systemic opportunities for Scottish industry and design. This work should be carried out alongside other aspects of the ZWS evidence programme and the Scottish Government (i.e. the long-term success of design for a circular economy in Scotland is dependent on overcoming legislative barriers beyond the designer or individual company, so the design team should play an active role in a wider assessment). The resulting report would tackle issues such as:

- Legislation (UK, Scotland and the transposition of EU law) restricting increased sustainable public sector procurement. This will involve working with the ZWS 'Sustainable Procurement in Scotland' team to identify areas in which products designed for circularity could feasibly be sourced from Scotland (e.g. brief Scottish companies and designers to consider circular designs by leasing furniture, packaging etc., or contractors selling a service rather than a product).

- Feasibility of voluntary extended producer responsibility (EPR) schemes in niche Scottish manufacturing industries. EPR promotes the integration of environmental costs associated with goods throughout their life cycles in the market price of products and thus encourages eco-design.[16]

- Review Scottish laws and accreditations that hinder repair due to high cost.

- Feasibility of standards on product standards, warranties and open-source repair manuals

- Feasibility of packaging standards for full recoverability in Scotland.

- Investigate accreditation systems for recycled components and products (to feed into Action 9)

11. Engage with European Commission to position Scottish examples as best practice in design for a circular economy in Europe

The European Commission has a role to play in stimulating demand for circular design among SMEs. There are an increasing number of eco-design and design-related policies at EU level including Eco-design Directive (2009), Eco- Innovation Action Plan (2011) and Design-driven Innovation Action Plan (2013). However, many of these policies appear to be completely disconnected to complementary policy agendas. ZWS could play a role in ensuring that the European Commission has a joined up approach to design, innovation and the circular economy through examples of good practice in Scotland. To implement the Action Plan for Design-driven Innovation the Innovation Policy for Growth Unit within DG Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) has set up an Interservice Group with representatives from different units within different Directorate Generals. There is no representative for sustainable design. There is an opportunity to engage with the Interservice Group and propose a European Commission representative for sustainable product design to ensure that design for circularity features within future EU design-related initiatives, working documents and funding calls. This would be an opportunity to demonstrate how Scotland is an early adopter of circular design and promote Scottish initiatives to the Commission. The main implementation mechanism of the Design-driven Innovation Action Plan is the Design for Europe initiative led by the Design Council. Design for Europe is a web platform and programme of events across Europe to raise awareness of and demand for design-driven innovation. ZWS could propose a series of case studies to promote Scottish examples as best practice in design for a circular economy in Europe and engage with the Design Council to present such case studies and experiences at pan-European events. There is also an opportunity to engage with the EU funded Smart Specialisation Strategy Platform (S3) to connect design and circular economy to regional economic development policies. The European Commission has tasked every region in Europe to develop a Smart Specialisation Strategy identifying priority sectors. Many regions will identify the advanced manufacturing and creative industries sectors. The ZWS design team could play an advocacy role in raising awareness of what design for circularity can achieve for regional economic development.

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[16] A number of voluntary extended producer responsibility schemes operate in France (PV, agricultural supplies, ink cartridges, mobile homes).

12. Encourage the inclusion of eco-design/design for circular economy in sector strategic plans and events

There is a clear opportunity as part of the work with the Creative Industries Partnership Group led by Creative Scotland to make design for circularity a cornerstone of the upcoming creative industries strategy. The consultation process for the strategy will begin in the second part of 2015 and design is set to be a priority. Design for the circular economy may not be highlighted without input and support from ZWS.

As important as it is that the design community is able to 'push' for more circular design thinking with their clients, in reality it is the openness of the business client to the idea that defines its success. Actions such as the design for a circular economy network encourage a 'pull' from industry, but in the short to medium term the penetration of such a network into the SME community in key sectors and product lines is likely to be low. Encouraging sector representatives to include circular design thinking in their communications with the business population and external documents, such as sector strategic plans, is a sensible way of ZWS facilitating an increased 'pull' from industry.

Currently, there are fleeting mentions of whole-life design thinking in the plans, although there are some areas of progress. The Chemicals Sector Strategic Plan encourages the business community to "develop and manufacture innovative low carbon life-cycle solutions" and "[use] sustainable design and [adopt] a product lifecycle approach", whilst the Technology and Engineering Sector's 'A Framework For Action' highlights how businesses should aim for "efficient use of resources" when designing to produce a "minimal lifetime carbon footprint and easy recyclability". Best practice can be found in the construction industry document "Building for the Future", where the competitive advantages of sustainable construction design are outlined, and actions for increasing the role of whole-lifecycle building design are suggested (e.g. the development of sustainable construction component products and education of customers on the benefits of sustainable construction).

However, it is unclear the extent to which the sentiments expressed in the strategic plans filter through to SMEs, so engagement with sector bodies, leadership organisations and authors of the reports in order to gauge their influence on SMEs is an important first step. Following that, embedding the relevant personnel in the design for a circular economy network should be sought, before an action plan for ensuring that circular economy design is incorporated into strategic plans is drawn up. Inclusion with the design for a circular economy network will also ensure the importance of cross-sectoral learning is brought into the strategic plans, thus filtering down into sector-specific networks. Finally, presenting case studies of design being used to drive circularity within the sector (or in an equivalent sector elsewhere in the world) should be presented at sector-specific events organised by the sector leadership organisations. Such organisations in areas with potential for circular economy design include Scotland Food and Drink, Textiles Scotland, Chemical Sciences Scotland and the Scottish Manufacturing Advisory Service.
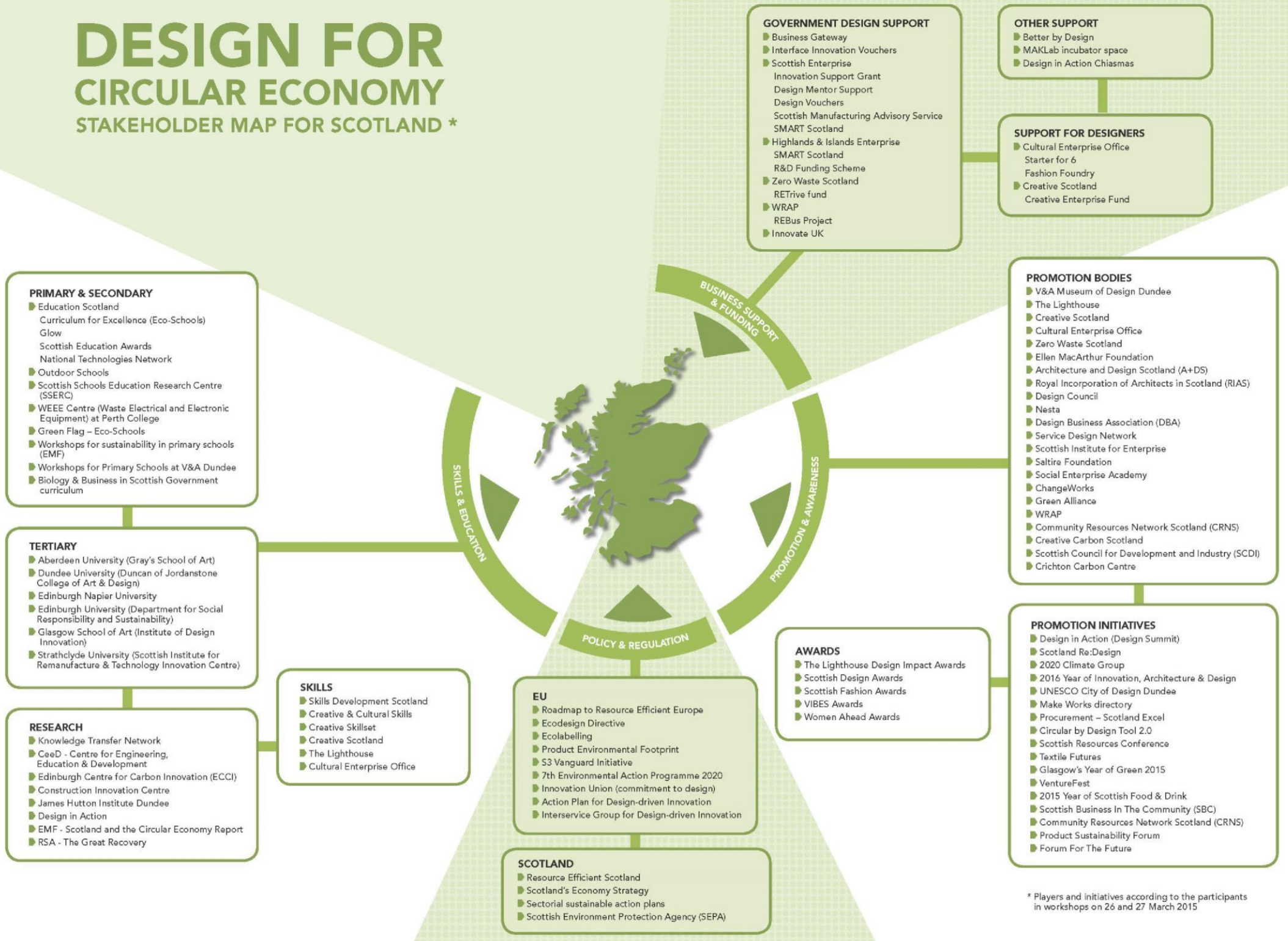
6 Appendices

6.1 Design for a Circular Economy Stakeholder Map

The stakeholder map was compiled based on desk research as well as an exercise in the two Design for Circularity Workshops held on 26 March in Glasgow and the 27 March in Edinburgh

DESIGN FOR
CIRCULAR ECONOMY
STAKEHOLDER MAP FOR SCOTLAND *

GOVERNMENT DESIGN SUPPORT
- Business Gateway
- Interface Innovation Vouchers
- Scottish Enterprise
  - Innovation Support Grant
  - Design Mentor Support
  - Design Vouchers
  - Scottish Manufacturing Advisory Service
  - SMART Scotland
- Highlands & Islands Enterprise
  - SMART Scotland
  - R&D Funding Scheme
- Zero Waste Scotland
  - RETrive fund
- WRAP
  - REBus Project
- Innovate UK

OTHER SUPPORT
- Better by Design
- MAKLab incubator space
- Design in Action Chiasmas

SUPPORT FOR DESIGNERS
- Cultural Enterprise Office
  - Starter for 6
  - Fashion Foundry
- Creative Scotland
  - Creative Enterprise Fund

PROMOTION BODIES
- V&A Museum of Design Dundee
- The Lighthouse
- Creative Scotland
- Cultural Enterprise Office
- Zero Waste Scotland
- Ellen MacArthur Foundation
- Architecture and Design Scotland (A+DS)
- Royal Incorporation of Architects in Scotland (RIAS)
- Design Council
- Nesta
- Design Business Association (DBA)
- Service Design Network
- Scottish Institute for Enterprise
- Saltire Foundation
- Social Enterprise Academy
- ChangeWorks
- Green Alliance
- WRAP
- Community Resources Network Scotland (CRNS)
- Creative Carbon Scotland
- Scottish Council for Development and Industry (SCDI)
- Crichton Carbon Centre

BUSINESS SUPPORT & FUNDING

SKILLS & EDUCATION

PROMOTION & AWARENESS

POLICY & REGULATION

PRIMARY & SECONDARY
- Education Scotland
  - Curriculum for Excellence (Eco-Schools)
  - Glow
  - Scottish Education Awards
  - National Technologies Network
- Outdoor Schools
- Scottish Schools Education Research Centre (SSERC)
- WEEE Centre (Waste Electrical and Electronic Equipment) at Perth College
- Green Flag – Eco-Schools
- Workshops for sustainability in primary schools (EMF)
- Workshops for Primary Schools at V&A Dundee
- Biology & Business in Scottish Government curriculum

TERTIARY
- Aberdeen University (Gray's School of Art)
- Dundee University (Duncan of Jordanstone College of Art & Design)
- Edinburgh Napier University
- Edinburgh University (Department for Social Responsibility and Sustainability)
- Glasgow School of Art (Institute of Design Innovation)
- Strathclyde University (Scottish Institute for Remanufacture & Technology Innovation Centre)

RESEARCH
- Knowledge Transfer Network
- CeeD - Centre for Engineering, Education & Development
- Edinburgh Centre for Carbon Innovation (ECCI)
- Construction Innovation Centre
- James Hutton Institute Dundee
- Design in Action
- EMF - Scotland and the Circular Economy Report
- RSA - The Great Recovery

SKILLS
- Skills Development Scotland
- Creative & Cultural Skills
- Creative Skillset
- Creative Scotland
- The Lighthouse
- Cultural Enterprise Office

EU
- Roadmap to Resource Efficient Europe
- Ecodesign Directive
- Ecolabelling
- Product Environmental Footprint
- S3 Vanguard Initiative
- 7th Environmental Action Programme 2020
- Innovation Union (commitment to design)
- Action Plan for Design-driven Innovation
- Interservice Group for Design-driven Innovation

AWARDS
- The Lighthouse Design Impact Awards
- Scottish Design Awards
- Scottish Fashion Awards
- VIBES Awards
- Women Ahead Awards

PROMOTION INITIATIVES
- Design in Action (Design Summit)
- Scotland Re:Design
- 2020 Climate Group
- 2016 Year of Innovation, Architecture & Design
- UNESCO City of Design Dundee
- Make Works directory
- Procurement – Scotland Excel
- Circular by Design Tool 2.0
- Scottish Resources Conference
- Textile Futures
- Glasgow's Year of Green 2015
- VentureFest
- 2015 Year of Scottish Food & Drink
- Scottish Business In The Community (SBC)
- Community Resources Network Scotland (CRNS)
- Product Sustainability Forum
- Forum For The Future

SCOTLAND
- Resource Efficient Scotland
- Scotland's Economy Strategy
- Sectorial sustainable action plans
- Scottish Environment Protection Agency (SEPA)

* Players and initiatives according to the participants in workshops on 26 and 27 March 2015

6.2 List of Interviewees

To ensure a robust candidate selection criteria for interview, an initial stakeholder mapping was conducted with the peer-review panel to ensure representation from the design sector, industry, public sector and education. From the range of expertise among panel members, it was possible to create an appropriate list of individuals from personal contacts. It was initially anticipated that a larger number of individuals representing industry would be interviewed but many leads declined interview.

	Category	Organisation	Name	Interview date
1.	Design	Taylor Haig	Lynne Wardle	24.04.15
2.	Design	DPT Urban Design	David Thompson	24.04.15
3.	Design	Blue Marmalade	Trent Jennings	27.04.15
4.	Design	Snook	Sarah Drummond	28.04.15
5.	Design	Studio Bof	Rachel Simmonds	30.04.15
6.	Industry	Vegware	Claudia Menting	11.03.15
7.	Industry	Mackie Automatic Transmissions	John Mackie	10.03.15
8.	Industry	Devro	Gordon Paul	22.04.15
9.	Industry	MAKLab	Richard Clifford	30.04.15
10.	Public Sector	Creative Scotland	Helena Ward	24.04.15
11.	Public Sector	Perth and Kinross Council	Vivien Milford	11.03.15
12.	Public Sector	Scottish Enterprise (Design and Innovation)	Alison Tennant	23.03.15
13.	Public Sector	Scottish Enterprise (Sustainability)	Ewan Mearns	18.03.15
14.	Education	Skills Development Scotland	David Martin	05.02.15
15.	Education	Education Scotland	Kirsty McFaul	21.04.15

	Category	Organisation	Name	Date
16.	Education	University of Dundee, DJCAD	Mel Woods	12.03.15
17.	Education	University of Dundee, DJCAD	Jen Baillie	12.03.15

Table 6.1 List of Interviewees

6.3 List of Workshop Participants

Again the participant selection criteria was based on the initial stakeholder mapping to ensure representation across the design community, enterprises, business support, design promotion, education, research and third sector.

	Category	Organisation	Name	Workshop
1.	Design	The Lighthouse	Ian Elder	26.03.15, Glasgow
2.	Design	Taylor Haig	Lorri Smyth	27.03.15, Edinburgh
3.	Industry	MAKlab	Richard Clifford	26.03.15, Glasgow
4.	Industry	Re-Tek	Kevin Culligan	26.03.15, Glasgow
5.	Industry	RMC William Consulting	Dr Robert C McWilliam	27.03.15, Edinburgh
6.	Industry	MAKlab	Alan Rochead	26.03.15, Glasgow
7.	Industry	Power of Youth	Alex Scott-Tonge	27.03.15, Edinburgh
8.	Industry	Vegware	Thomas Stanley	27.03.15, Edinburgh
9.	Third Sector	Scotland's 2020 Climate Group	Victoria Barby	27.03.15, Edinburgh
10.	Third Sector	Waste Wise	Arleen Sinclair	27.03.15, Edinburgh
11.	Third Sector	Creative Scotland	Helena Ward	26.03.15, Glasgow
12.	Policy	Scottish Enterprise	Ewan Mearns	26.03.15, Glasgow
13.	Policy	Perth and Kinross Council	Vivien Milford	26.03.15, Glasgow
14.	Policy	Scottish Enterprise	Alison Tennant	26.03.15, Glasgow
15.	Policy	SEPA	Lorna Walker	26.03.15, Glasgow

16.	Education	University of Strathclyde	Colin Andrews	26.03.15, Glasgow
17.	Education	University of Dundee, DJCAD	Jen Baillie	26.03.15, Glasgow
18.	Education	Massey University	Anna Brown	27.03.15, Edinburgh
19.	Education	Robert Gordon University	Chris Fremantle	27.03.15, Edinburgh
20.	Education	GSA, Institute of Design Innovation	Ian Grout	26.03.15, Glasgow
21.	Education	University of Dundee, DJCAD	Rebecca Lindsay	26.03.15, Glasgow
22.	Education	Education Scotland	Kirsty McFaul	26.03.15, Glasgow
23.	Education	Robert Gordon University	Dr Melehat Nil Gulari	27.03.15, Edinburgh
24.	Facilitator	ZWS	Maurice Golden	26.03.15, Glasgow
25.	Facilitator	ZWS	Leah Gourley	Both
26.	Facilitator	PDR	Dr Christopher Harris	Both
27.	Facilitator	Design Council	Colum Lowe	Both
28.	Facilitator	PDR	Anna Whicher	Both

Table 6.2 List of Participants at the Glasgow (26.03.15) and Edinburgh (27.03.15) Workshops

6.4 List of Peer-Review Panel Members

The peer-review panel members provided guidance and acted as a sounding board for the proposals. The purpose of the peer-review panel was not only to steer the project but also to act as a support group for ZWS to implement the actions.

	Category	Organisation	Name
1.	Design	Snook	Sarah Drummond
2.	Design	Taylor Haig	Lynne Wardle
3.	Industry	MAKlab	Richard Clifford
4.	Industry	Vegware	Claudia Menting
5.	Third Sector	Scotland's 2020 Climate Group	Victoria Barby
6.	Third Sector	Creative Scotland	Helena Ward
7.	Policy	Scottish Enterprise	Alison Tennant
8.	Education	University of Dundee, DJCAD	Jen Baillie & Mel Woods
9.	Education	Education Scotland	Kirsty McFaul
10.	Education	RSA	Jamie Cooke

Table 6.2 Peer-Review Panel Members

6.5 Acknowledgements

PDR and the Design Council would like to thank all the interviewees, workshop participants and panel members for their valuable input as well as ZWS for their support.

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- Dr Christopher Harris, PDR / Eco-design Centre
- Ms Anna Whicher, PDR

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❑ Ms Annabella Coldrick	Design Council
❑ Dr John Mathers	Design Council

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