

# SEDA

Scottish Ecological Design Association

## SEDA: 30 Years Strong



Amsterdam, August 11th, 1994

Fax.: 00 44 31 228 2188  
The Royal Incorporation  
of Architects in Scotland  
Att. Mr. Sebastian Tombs FRIAS ACIARB  
Deputy Secretary  
15, Rutland Square  
Edinburgh EH1 2BE  
Scotland

Scottish ecological design association (SEDA); LOGO

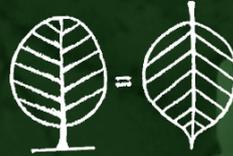
Dear Sebastian,  
The little emblem is  
ecological spirit.

Yes, that's all right. Glad  
to be Logo to be an  
I enclose the full context in

which the leaf-tree  
a house-city identifica-  
tions belong. It  
would be nice if you  
could use all three  
leaves in some publication  
so as to put the Logo  
in its original setting.  
There are three logo  
options

- 1) with the ring (grey)  
(binds them together  
as a unity)
- 2) without the ring
- 3) with or with the  
= sign

tree is  
leaf and leaf  
is tree - house is  
city and city is house  
- a tree is a tree but it  
is also a huge leaf - a  
leaf is a leaf, but it is  
also a tiny tree - a city  
is not a city unless it  
is also a huge house -  
a house is a house  
only if it is also  
a tiny city



say leaf - say tree  
say a few leaves still and  
many leaves soon - say leafless tree  
say heap of leaves - say this tree  
when I grow up and that tree when  
I was a child - say one tree, lots of  
trees, all sorts of trees, trees in the  
forest - say forest (hear: dark, lost,  
nest, fire, fairy, owl's hoot, toadstool,  
tiger, timber) - say orchard, apples  
apple pie - say fig tree - say fig leaf  
say NUTS! - say house - say  
city - say anything - but  
say PEOPLE!

3) without, tree and leaf form an analogy: ie the large next to the small  
a juxtapositioning - no more. but no identification part whole  
with, tree a leaf form a (unity) part whole as well as a poetic

I'm posting an accurate one by post  
- wish I was up there in the army north!  
rejoice  
Albo Byde

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*Summer 2021*

SEDA was formed in 1991. Our primary aim is to share knowledge, skills and experience of ecological design. SEDA is a network and links those seeking information and services with those providing them.

SEDA's membership comprises a large number of people involved, and with an interest in design, principally in Scotland. Members include academics, architects, artists, builders, planners, students, ecologists, landscape designers, materials suppliers, woodworkers, and many more whose work or interest involves design for a sustainable future.

SEDA is a charity and is run by a Board of Directors, who are elected at Annual General Meetings. The Board is advised by a voluntary Steering Group which meets 8 times a year for discussion and for planning the activities of the Association. All members are welcome to take part in these meetings. SEDA registered as a Company Limited by Guarantee in February 2011.

A SEDA membership is a great way to support ecological design in Scotland. As a member you will receive the SEDA Magazine for free, get discounted tickets to SEDA events, and have the opportunity to connect with a wide network of talented designers.

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## Editorial team

Nick Domminey, Viktoria Szilvas & Raina Armstrong

With thanks to all our contributors, sponsors, and supporters.

What do you think of this SEDA magazine and its new layout? Do you have any disagreements or something useful to add to the issues covered? Do you have an idea for an article? Drop us an email at [magazine@seda.org](mailto:magazine@seda.org)

Our upcoming events can be found throughout this issue.

## Contact us

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Cover image: SEDA

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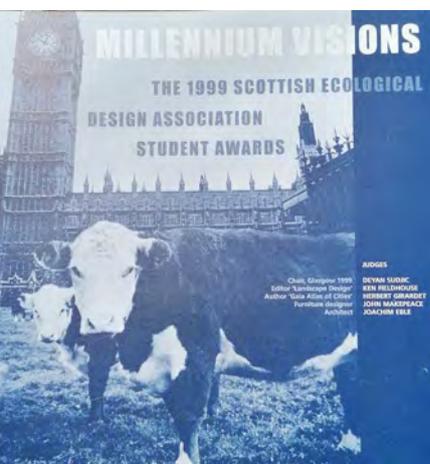
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# Editorial

Nick Domminney



SEDA is 30 years old. A founder, Sebastian Tombs, outlines its genesis in these pages. Our recent conference gave us the opportunity to consider: What have we done?; What are we doing?; and What are we going to do? See the three evenings' lively contributions in full on SEDA's website: [SEDA 30 Years Strong; A Decade to Make a Difference](#); and [Facing the Future](#). The online version of this edition also has separate links to a few of the video presentations, which are now such an important part of virtual conferences.

What have we done? One of SEDA's key contributions over the years are our much respected design guides, promoting good environmental practice in building construction. The co-author of the latest, Chris Morgan, explained how it covers the health effects of modern airtight construction ([HEMAC](#)). It is out soon. We also had contributions from IIED and the Hutton Institute outlining the extent of the ecological and climate crisis.

Doing? James and Amelia Daws' account of setting up Plastic Free Dunfermline was an inspiration. As was Vas Piyasena's [Lost Woods Project](#) and that of TV star and author, Kim Stoddart and her [Climate Change Garden](#). Tomas Gartner's German experience of [building biology \(Baubiology\)](#) explained how we can reduce the 90-95% of fossil fuel based and potentially toxic building materials. Lukas Hardt introduced the work of the Wellbeing Economy Alliance.

And what lies ahead? Gloria Lo reported SEDA's link-up with [Architects Climate Action Network \(ACAN\)](#) now and during COP26. Richard Atkins explained how SEDA is taking the outcomes from our enormously successful [Land Conversations](#) to the heart of the Scottish Government. Professor Sandy Halliday set the tone for SEDA Facing the Future with her Short History of Good Ideas. Among these are infinite growth on a finite planet

is an impossibility; war against nature is inevitably a war against ourselves; and everything must go somewhere.

The most disturbing and daunting contribution, which overshadowed the rest of the conference and perhaps also SEDA's remit henceforth, was by Howard Dryden of the [Global Oceanic Environmental Survey \(GOES\)](#) Foundation. His message will be familiar to those who have seen Stefan Jarl's Underkastelsen (The Subjection).

The 1950s saw an explosion of new chemical formulations in products, from pesticides to cosmetics. Over the last three decades the most harmful of these (Oxybenzone, Octinoxate, Octocrylene & Parabens), attached to and concentrated in microplastics, along with acidification from CO<sub>2</sub>e, have killed half of the oceans' plankton and corals. They will finish the job by 2045 at the present rate. These tiny plankton are at the bottom of the food chain so their contamination and loss transmits to all sea life. They also absorb much of the globe's current CO<sub>2</sub> emissions. Unless humanity ceases production of these killer chemicals and filters out the release of microplastics, Howard predicts the end of life in the oceans with consequent devastation to terrestrial life, including humanity.

The conference started and ended with an Action Challenge. Not surprisingly, GOES' presentation changed participants' priorities from "Global Heating, Biodiversity, Carbon and Health" at the start to "Health and Pollution" by the closing comments. Given the enormity of GOES' premise, we are keen to hear Howard's peer reviews but, meantime, we have collated extracts from the GOES website and their academic paper to illustrate his contention. SEDA is, above all, an ecological design association so how, and to what extent, we take on GOES' challenge is a vital consideration. ■

# SEDA's Seeds

Sebastian Tombs: SEDA founder and ex-RIAS Chief Executive and Dep. Secretary





SEDA began as a question: in the late 1980s, while I was the Deputy Secretary at the Royal Incorporation of Architects in Scotland (RIAS) to Charles McKean's ebullient Secretaryship, I was running the Practice Department whose role was to keep architects' businesses up to date with all aspects affecting their practice. Inspired by holistic thinkers such as Ian McHarg, Jane Jacobs and Rudolf Steiner, I was always on the lookout for initiatives and sources of information to share.

Howard Liddell was then in practice in Aberfeldy and I was equally impressed by his environmental, health and social / community-focused work as by his ecotourism initiatives. So in 1990/91, when I became aware that an Ecological Design Association had been set up in England by David Pearson, it was Howard I turned toward to ask whether Scotland should emulate this idea or consider joining forces.

Howard's answer was, as ever, very clear: "Set up a Scottish Association – affiliate to others, as appropriate – and ensure its remit is broad and inclusive, its structure regenerative (with a rotating Chair role, etc.), and that it is self-sustaining!"

So we did!

### SEDA Starts

The network of architects to which I had access (with Charles' blessing), combined with Howard's leadership and enthusiasm, soon led to expressions of interest, and the modest organised events demonstrated that this interest was genuine. SEDA's continuing fortunes and activities over the past 30 years have been a delight to watch.

I think, however, it is fair to say that it was always my hope that after a decade, SEDA might even become redundant, as everyone else should have caught up by the Millennium. Sadly - alarmingly, even - SEDA still needs its campaigning role; and it has taken the modern challenges of imminent global ecological collapse, to alert everyone to take this agenda as fundamental, and essential.

Our early efforts to draw other disciplines into membership were somewhat sporadic - so it is good to see continuing efforts to realise this key principle; cross-fertilising creativity in collegiate ways is one of the most likely ways to build enduring ecological solutions.

Thanks are therefore due to everyone who has contributed so generously to SEDA's work over three decades. It may be surprising that the period ahead may prove to be SEDA's chance to offer even more necessary guidance and networked learning than before. But when working into the unknowns of life up to 2050 and beyond, I would stress again the importance of seeking holistic solutions, and keeping these at the heart of SEDA's mission.

Our current global dilemmas are, in part at least, due to an unhealthy concentration on short-term, reductive thinking, in ever-narrower fields of focus. SEDA can help unlock the creative energies of the human spirit in seeking outcomes that meet, in a balanced way, our long-term social, economic and environmental needs and aspirations. ■

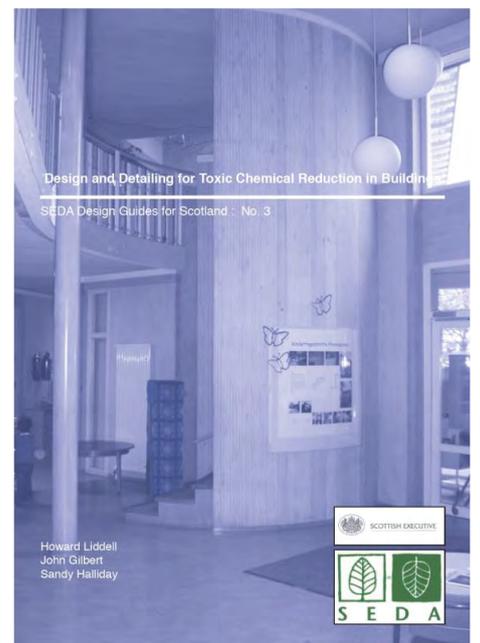
# The SEDA Design Guides: challenges, impacts & lessons...

Professor Fionn Stevenson

This short talk covered all four of the Design Guides produced by SEDA over the last 30 years. It examined the challenges we faced in getting them produced and, once they were in the public domain, the impact they have had and the lessons that can be learnt from this process.

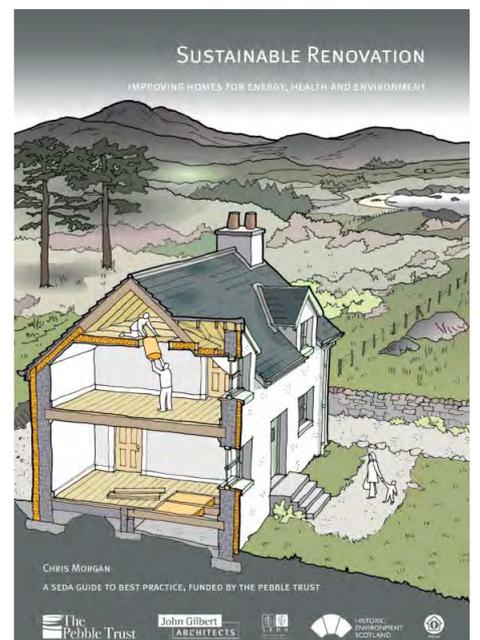
Chris Morgan came to SEDA in 2004 with an idea to produce 3 design guides based on areas that needed more research: deconstruction, airtightness and low toxicity. SEDA submitted a successful grant application to the Scottish Executive in 2004. The first 3 guides were published in fairly quick succession over a three-year period, against very onerous deadlines. In effect, the topic areas became progressively more complex, with the toxicity reduction guide proving to be the most complex of all. The process was exhausting for all concerned, and it was another decade before the fourth SEDA guide on Sustainable Renovation was published.

The four design guides have had many impacts. The Deconstruction and Airtightness Guides were cited as references in the Scottish Building Regulations and picked up in policy development by other NGOs and government agencies such as



Zero Waste Scotland. The earlier guides were incredibly useful for practitioners at the time in terms of detailing and sourcing, and still have currency today for the principles and explanations. The final guide on Renovation has cleverly avoided the pitfalls of dated detailing and specifications contained in the earlier guides, ensuring greater longevity. All the guides contain extensive research and are cited in other research publications and in some Schools of Architecture curricula.

Images: SEDA



## New Guides

The barriers, however, have been significant. The first three guides were ahead of their time and not seen as ‘realistic’ by policy makers and industry. Other major barriers for the earlier guides included the lack of any professional, institutional support and built environment regulations or standards to refer to in relation to the guides. Finally, there was resistance from the plastics industry against the third guide. This resulted in a legal threat which meant that a number of evidence sections had to be redacted in the final version. The fourth guide, however, has arrived ‘just in time’ particularly in light of the new PAS2035 standard on retrofit.

So what lessons can SEDA, and others wishing to publish guides like this, learn from the process we went through? When preparing future grants for guides it is important to pre-engage with policy makers to prepare the ground for policy development routes. The final guide did this by directly engaging with Historic Scotland. Developing strong institutional buy-in ahead of a bid to develop new guidance is recommended, embedding it within professional institution policy development. SEDA can develop a legacy strategy with a plan for the next set of guides over the next five years and identify possible funding strategies. There are at least four new guides needed right now: 1. Minimising Embodied Carbon Through Design 2. Maximizing Regenerative Design 3. Design on A Bioregional Basis for Scotland 4. Design for Resilience. So, what’s next? ■

## Design and Detailing for Airtightness

### SEDA Design Guides for Scotland : No. 2

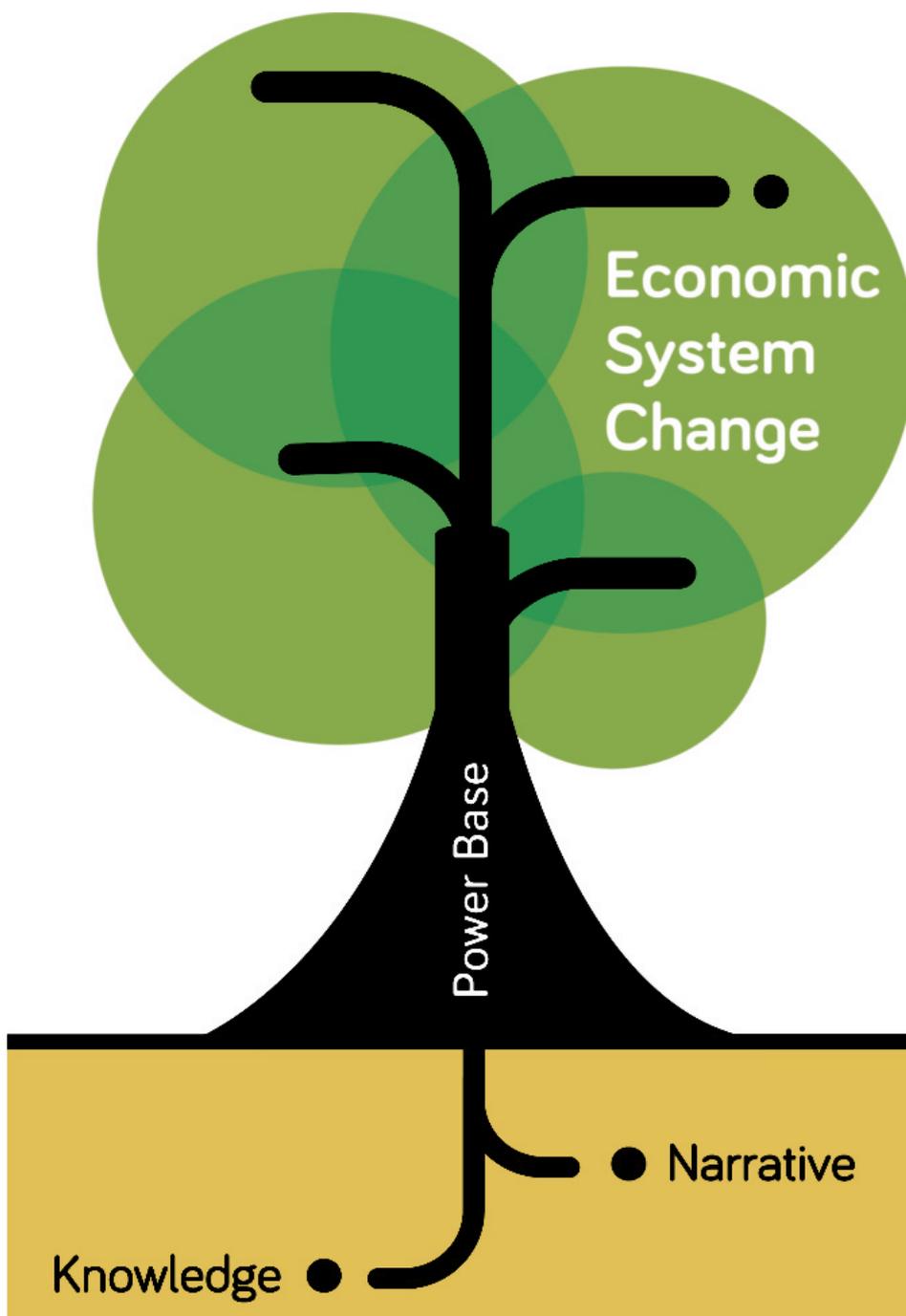


Chris Morgan



# Time For Action - How We Build a Wellbeing Economy

Dr Lukas Hardt, WEAll core team member and Associate



At the Wellbeing Economy Alliance ([WEAll](#)), we believe that the answer to ongoing environmental and community destruction is the transformation to a wellbeing economy: an economy designed to deliver wellbeing for both people and planet; which actively rebuilds natural systems rather than destroys them; in which businesses are purposeful rather than focused on short-term profits; and where incomes and wealth reflect all our contributions rather than the power concentrated in the hands of a few.

## But how do we make this happen?

- **Knowledge:** sharing the wealth of knowledge that already exists on building a better economy.
- **Narratives:** crafting and telling new stories which show that a better economy is possible.
- **Power Bases:** building new power bases to embed the knowledge and narratives deeply into our institutions, laws and infrastructure.

WEAll's mission is to build such power bases by connecting and amplifying the voices of the inspiring organisations and individuals that are already working and speaking from the new paradigm.

Our combined individual actions will make economic systems change possible, as long as they are linked up and organised into power bases. The three parts of this tree (knowledge and narrative as roots, power bases as the trunk, and economic systems change as flourishing leaves) offer



opportunities for everyone to bring our skills and passions to the table.

### Life Stories

All of us have the authority to tell a different story, of what our economy could be, to our friends and neighbours and colleagues because the economy is embedded in our everyday lives. It is not a distant, abstract force that can only be understood by experts. The [Stories for Life](#) project provides an example for such a new story.

Equally, we all have some relevant knowledge for building a fairer and greener economy—quite literally in the case of SEDA and its members. At WEAll, we have been working on gathering and synthesising some of that [knowledge](#) on how to build a wellbeing economy, but there remain many gaps to fill.

Finally, we can all contribute to the building of new power bases by connecting with other like-minded organisations and individuals. It can be at our workplace; for example, by pushing the boundaries

and connecting with other like-minded businesses and organisations. It can be in our neighbourhood; for example, by joining a community development trust or lobbying local councils to adopt new economic models, such as [doughnut economics](#) or [community wealth building](#). It can be in Scotland and the wider UK; for example, by signing [petitions](#) and joining the campaign for a [just and green recovery](#).

If we get organised, all these things can make a difference. An inspiring example is provided by the community wealth building movement which presents a new, participatory model for creating and keeping wealth within local communities. Picked up by small group of engaged citizens in [Preston](#) and made into a success in their city, it has now been adopted by a number of local councils such as [North Ayrshire Council](#). The new Scottish Government has promised a supporting Community Wealth Building Act.

A wellbeing economy is there for the taking—if we are willing to build it. ■

# The Future of Life on Earth

Howard Dryden- Global Oceanic Environmental Survey Foundation (GOES)





Photographs from Howard Dryden  
Coral image - Shutterstock  
Logo - Global Oceanic Environmental Survey Foundation

Planktonic plants and animals at the base of the marine food chain make all life on Earth possible. Without them we would have no oxygen, carbon dioxide levels would be toxic and there would be no birds, whales or fish in the oceans.

Over the last 70 years (since the 1950s), more than 50% of all marine life, including plants and animals under 1 mm in size, have been lost from the world's oceans, and that decline is continuing at a rate of 1% year on year. Atmospheric carbon dioxide dissolves through the ocean surface to form carbonic acid. If there are fewer plants and animals to use this form of carbon, it will accelerate the ocean acidification process with the loss of more marine plants and animals.

A small increase in acidity caused by carbonic acid dissolves magnesium calcite and aragonite, mineral forms of calcium carbonate, upon which 50% of all remaining marine life, including plankton and coral reef, are composed. Over the next 25 years, pH will continue to drop from pH8.04 to pH7.95, and an estimated 80% to 90% of all marine life will be lost from the oceans compared to the 1940s.



## Net Zero is not enough

Even if the world achieves net zero by 2045, atmospheric carbon dioxide will still exceed 500ppm and ocean pH will still drop to pH7.95, it is inevitable. We must be clear that the current net zero carbon mitigation strategy will not stop the pH decline, nor the loss of most marine life. Given that the food supply for 3 billion people will be impacted, this will lead to regime change and migration.

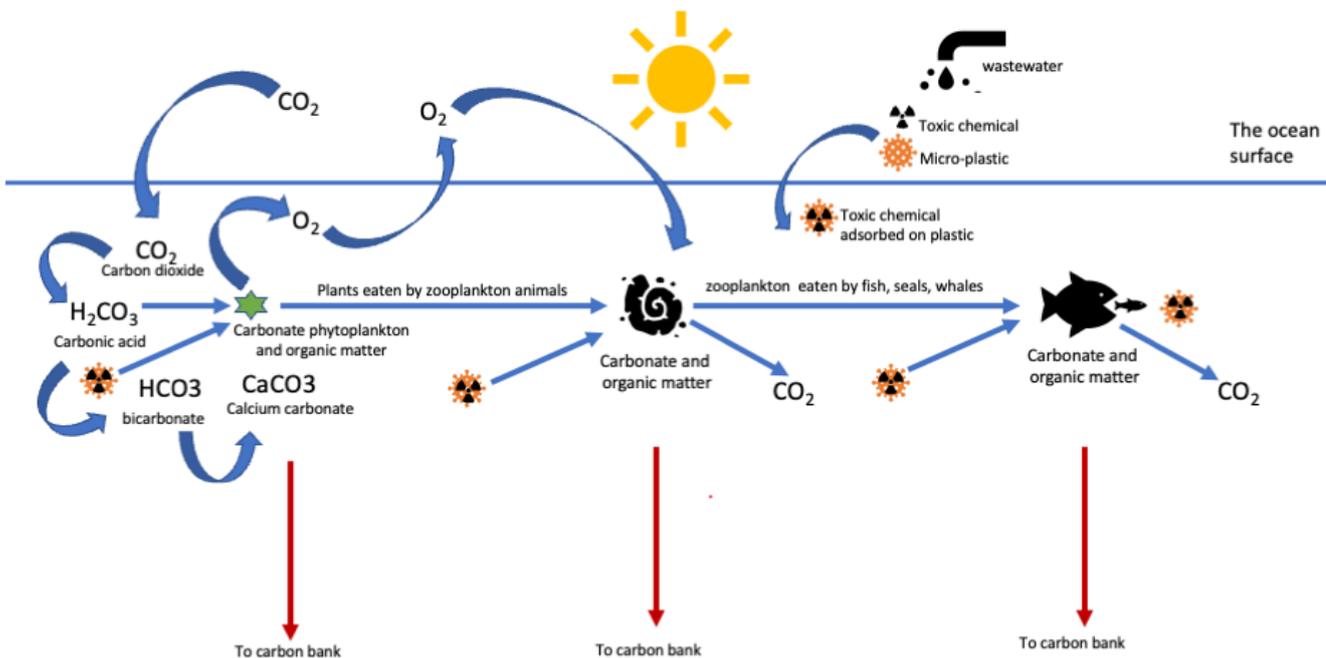
A pH drop will result in the loss of the life support system that makes Planet Earth habitable. As Covid19 has demonstrated, it is the little things that catch us out, and this seems to be the case as far as the GOES team can ascertain. The decline in ocean life has gone largely unnoticed because most of the plants and animals in the oceans are under 1 mm in size and are not closely

monitored. For example: Prochlorococcus, a cyanobacteria responsible for making 20% of our oxygen, was only discovered in 1985.

The findings which caused most alarm for the GOES team was that 30% of the oceans are categorised as having high nutrient concentrations, but zero or only low plant growth (HNLC zones) and that these areas are already equivalent to the entire surface area of land, and are growing. This is the opposite of what we should expect. Plants need nutrients and carbonic acid, and they should be flourishing. From the team's experience and numerous peer reviewed reports, aquatic ecotoxicology from toxic chemicals and plastic, is a plausible explanation from the huge loss of marine life.

Governments, regulators, industry and citizens have not been informed or alerted

<sup>[1]</sup> 'Lloyd-Smith and App - TOXIC THREATS TO HUMAN HEALTH AND MARINE LIFE.pdf'. Accessed: May 04, 2021. [Online]. Available at [ntn.org.au/wp-content/uploads/2018/10/ipen-ocean-pollutants-v2\\_1-en-web.pdf](http://ntn.org.au/wp-content/uploads/2018/10/ipen-ocean-pollutants-v2_1-en-web.pdf)  
All images from GOES Foundation



The Abyss the worlds primary carbon bank with toxic chemicals and plastic  
3 Giga tonnes year of carbon a year, if we had not killed 50% of marine life it could have been 6 Giga tonnes year

about this key mechanism for climate change – the impact of chemical and micro-plastic pollution on planktonic marine life and how its loss is now bringing us close to a tipping point, which spells disaster for the oceans and humanity.

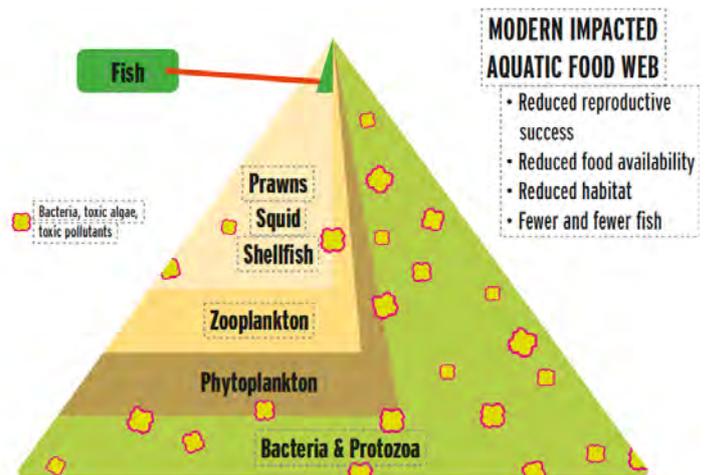
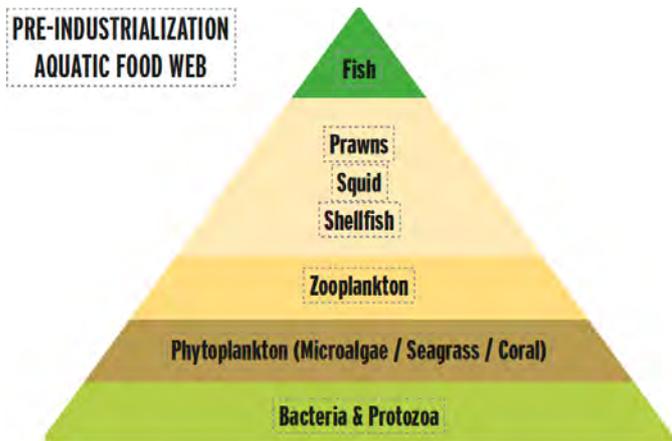
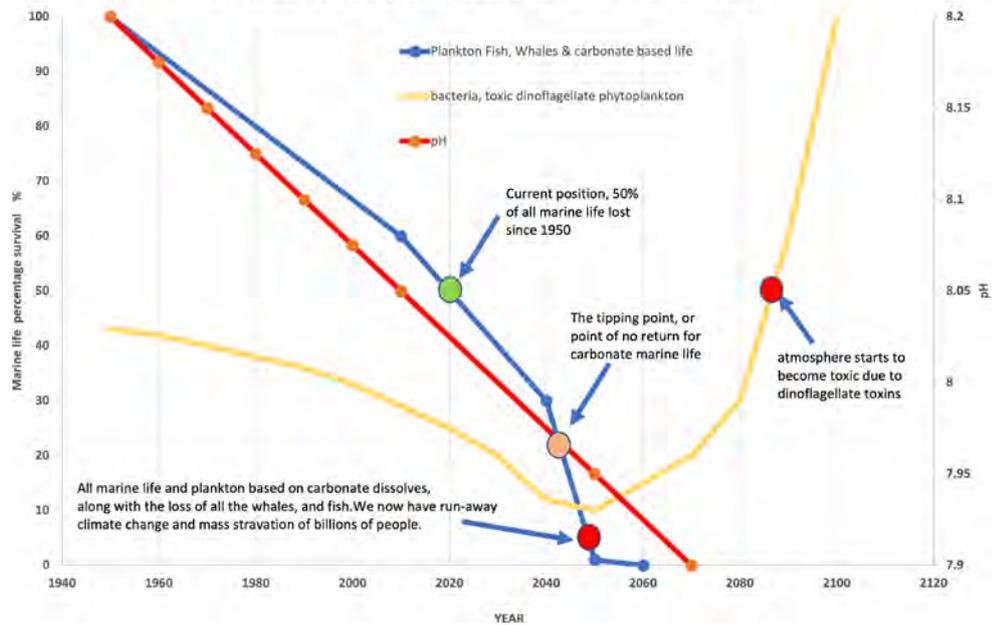
### Action?

<sup>[1]</sup> This is potentially a good news story, because the solution will be to eliminate pollution from plastic and toxic chemicals, and to develop green alternatives that do not harm the environment or humans. We still need to reduce carbon from the burning of fossil fuels, but the priority over the next 25 years should be to protect the oceans, because all life on earth depends upon marine life. We can live with climate change, but we cannot survive if we lose the oceans.

### Goes Foundation

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Fig 1. Carbonate based marine life survival against pH



# Plastic Free Dunfermline

James & Amelia Daws

Being lucky enough to grow up in a place like the UK, I was always shielded from the consequences of plastic consumption. At the age of nine my ignorance became complete shock and disgust when I watched the film 'a Plastic Ocean'.

This film opened my mind to realising that plastic pollution had become a catastrophic problem, affecting the natural world and humans, that could only end badly if no one did anything. After my dad and I had come to terms with the facts, we decided to act immediately, looking into ways our family could reduce our single use plastic.

One of the first steps we took was changing our plastic milk bottles to glass. This is a simple switch that can be done online. We also began buying loose fruit and veg from local greengrocers, as well as, making our own bread and cookies. Small changes like these were easy wins, however it became more difficult when we realised that some items do not have plastic-free alternatives. This included things like buying berries, grapes, granola bars and cereal. It was important to remember that we are striving for progress not perfection, so we do still have these items just not on a regular basis.

## Fridays For The Future

I became aware of the wider climate change crisis and began going to 'Fridays for Future' strikes in Edinburgh, and made my diet more plant-based. Many of my friends are aware of their responsibilities in regard to climate change and have chosen a plant-based diet too.

We wanted to share our new-found knowledge to help other people in Dunfermline, who were concerned about the plastic pollution crisis. My Dad came up with the idea of starting a local community group 'Plastic-Free Dunfermline', run by volunteers.

He was joined in his efforts by other people from Dunfermline and they began hosting events like film screenings, clothing upcycling workshops and litter picks. They devote much of their time to running a website [plasticfreedunfermline.org.uk](http://plasticfreedunfermline.org.uk), which provides a great resource to the people of Dunfermline who want to start or continue on their plastic free journey.

Raising awareness of plastic pollution to young people in Dunfermline is



**PLASTIC-FREE  
DUNFERMLINE**

one of the group's priorities. Eleven out of fifteen of the primary schools in Dunfermline are now working towards becoming 'Plastic-Free Schools' – an initiative run by national charity Surfers Against Sewage – because of Plastic-Free Dunfermline's efforts.

Plastic-Free Dunfermline supports the efforts of local businesses to reduce their plastic too. They have visited over 30 so far, passing on simple, effective tips that do not cost the Earth (pun intended).

It was great news when Dunfermline was awarded 'Plastic-Free Community' status in February this year by Surfers Against Sewage, because of the effort and commitment of its people, businesses, schools and community groups.

If you would like to support the group with their work, why not become a member at [plasticfreedunfermline.org.uk/join](http://plasticfreedunfermline.org.uk/join) ■



# Personal & Global Benefits from Growing & Gardens

Kim Stoddart on the importance of residential opportunities for connection with green spaces and growing post pandemic...

of the wellbeing solution moving forwards in communities, places of work and estates across the land.

As well as offering access to fresh, healthy food production and wellbeing benefits abound, such spaces also offer sustainability gain in the creation of wildlife corridors across towns and cities, helping to reverse biodiversity and species decline. Carbon capture in the ground through practices such as no dig and the use of ground cover are another significant benefit overall.

## Garden Organic

I have been involved in nature-friendly gardening projects through my own social enterprise and for national gardening charity, Garden Organic in Wales for the past few years. I have seen for myself the powerful, positive impact they can have in a relatively short space of time. Everyone involved post-pandemic stands to benefit for healthier lifestyles and healthier communities moving forward.

In the brewing, perfect storm of Brexit, climate change weather extremes and post-pandemic fallout, everyone ultimately should be able to have access to low-maintenance, sustainable growing spaces and areas, and not just through social prescribing. In the future, garden space and community growing areas should be a key consideration for developments.

Within existing developments and places of work there are still lots of ways of opening up opportunities for residents, as well as

factoring in green growing spaces within new builds. From the creation of community gardens, or the transformation of verges into edible growing spaces by way of containers to the innovative use of roof top space. Gardening clubs and mentoring through the creation of gardening champions in places of work and communities can help provide handholding and empowerment to create a sustainable growing legacy for the future.

Even in a tended container garden, a wide range of enticing edibles can be grown. Gardening organically (without the use of artificial chemicals or pesticides) lends itself better to a growing area for wellbeing for a myriad of reasons, not least of all that wider wildlife will be drawn in as a result and it is lower maintenance overall.

Kim Stoddart is the author of *The Climate Change Garden Book* and a national journalist writing for publications such as *The Guardian*, *Telegraph* and *Lancet*. She runs climate change courses, workshops and delivers training online and in person across the UK ([greenrocketcourses.com](http://greenrocketcourses.com)). She is also the Garden Organic representative for Wales. ■

All images from Kim Stoddart

After more than a year of multifarious lockdowns, social distancing from friends, family and peers, the green shoots of society tentatively opening up again has never felt so good. Yet, what it is opening up to exactly remains unclear as the economic storm clouds of gross national debt and potential mass unemployment gather and swirl.

Only one thing is certain as we emerge - after such a prolonged period of anxiety-laden, but necessary disconnect, with climate change extremes of weather ever present, we will crave and need connection like never before. We will need nurturing. We will need to be afforded the opportunity to develop resilience for the future - with all the uncertainties it now holds. We will need access to gardening and green spaces as part

# B+ve: Green Prozac – More Than Just a Walk in the Park

Professor Sandy Halliday MCIBSE CEng FWES HonFRIAS HonFRIBA

Sebastian Tombs opened the 2021 SEDA conference with a plea for holism. SEDA has never been a single issue organisation unless the single issue was recognising resource effectiveness, health and well-being, pollution, equity, community and biodiversity and more as interconnected - probably in ways outwith our ken. I share - with many of SEDA's founders - a conviction that the problems we face did not arise from a single cause and cannot be solved by a single solution. Divergent thinking, intelligently applied, is our route to good ecological design.

SEDA's earliest events were on Earth, Air, Fire, Water, Ether, EMF's, Timber (how difficult was it to build the Bourne House and Simple Minds Studio when timber was not a credible building material in Scotland!), Timber treatments, Moisture management, Low Carbon – Straw and Earth Buildings. The event that epitomises SEDA's holistic approach for me was [Looking for Vital Building Syndrome](#) – a strong reminder to those documenting Sick Building Syndrome. SEDA embraced not just how to design healthily but the social context of what we design for, with humour and fun. Importantly these events were intended to challenge dogma. They suited my ambitions to create change in a world dogged with inertia. Lest we forget, [they have also impacted enormously on design.](#)

By inertia I mean that I read about a predicted climate change of 2.2°C by 2020 in [Building Biology in Colour Vol.5 - 50 years](#)

ago! I didn't go on climate strike because I presumed we were going to solve it. Over the years it has become evident that there are reasons why some people ignore the science – they simply don't process consequences.

**Summed up by Ian McHarg,**  
 “Man is a blind, witless, anthropocentric clod who leaves lesions upon the earth.”

The inertia is unrelenting. I have a lecture called a “short history of good ideas” that comprises of brilliant truisms that have emerged over the last 60 years. They offer a foundation for genuine progress but each ‘A’ class thought has been ignored in favour of ‘D’ or ‘E’ class missed opportunities.

Combating inertia led Howard and I to found Gaia Group and allow research to input to design, to evaluate, disseminate, teach and capacity build. My most recent work pursuing sustainable innovation provides a perspective on how SEDA can be positive about the future.

I recently undertook [Research](#) on resource efficient housing and recalled the strange nature of this transactional relationship – whereby a vested interest gives you money to provide them with an answer that they want. This is the difficult place in which I started my engineering career. Not giving the answers people wanted made life hard.



Message 1:

### **Grenfell wasn't an exception... it is the rule.**

I recently worked with Outpost on Design of Homes to 2030. Our 96% plant based housing concept, based on generosity and community, reached the finals only to be labelled audacious by the judges.

Message 2:

### **The judges have no idea of the urgency.**

I've undertaken post occupancy evaluation of innovative solar air conditioning/dynamic insulation/ low allergy housing and passive house projects. Valid work I believe, but I cannot any longer sanction a three-year wait to highlight the already well-recognised performance gap in 'normal' practice.

Message 3:

### **It's time for proof of concept. Design for Performance not design for compliance.**

Dissemination – A recent column in the RIAS Quarterly (do read) ponders the "green recovery" from COVID19 and why tree-planting, retrofit, green prozac and investment in low carbon infrastructure are now seen as worthy ways to spend money.

Message 4:

### **The quality of our placemaking has never seemed as important.**

Recent teaching includes a 4-part course to 1st year students based on the Sustainable Construction Book.

Message 5 (was in my brief):

### **"Get them before everyone else gets their hands on them."**

Capacity Building increasingly involves working with those new to climate emergency and extinction concerns. That I am able to advise in this 'theatre of the willing' gives me huge satisfaction. Any progress is heartening... but what I find is troubling...

Message 6:

### **Many designers know so very little about the issues and don't comprehend the extent of change required.**

We do know there is appetite for change. After all, the size of the carthorse is a response to the inefficiency of the cart. Inertia has created a powerful impetus for change on numerous fronts.

Awareness of Green Prozac.

Shell has been told to stop blagging it.

There is no chance of non-disruptive change and de-growth is likely to be the least disruptive option.

Many more

Images from GAIA

1. Infinite growth on a finite planet is an impossibility.
2. There is only one earth.
3. War against nature is inevitably a war against ourselves.
4. Everything must go somewhere.
5. There are limits to growth .....but no limits to development.
6. If we suspect a problem we should talk it up and not talk it down.
7. You don't put solar panels on a HGV.
8. You can give a life time guarantee for every piece of technology that you don't install.
9. Any issue ought to be handled by the smallest, lowest, or least centralised authority capable of addressing it effectively.
10. All production should be Socially Useful Production
11. Growth Economics are unsustainable.
12. Gross National Happiness is more important than GNP.

There is already a vast amount of information on how to build better buildings and make better places but the solutions are not all technical. They are social, cultural and ethical. SEDA has the breadth to address these issues and to promote 'A' class thinking.

SEDA is in fact a very precious thing to be +ve about. We must continue to speak intelligently and knowledgeably to

clients, teachers, designers, builders, policy makers and others as they now begin to take these very serious issues seriously. SEDA can continue to demonstrate the value of honest partnerships. We have experience to offer and collective skills. We didn't need a pandemic to recognise our rights and responsibilities are at the forefront of offering positive responses and hope. There is an immense role for SEDA. Prepare to be needed. ■

# A new vision for land use in Scotland: Six Conversations

Gail Halvorsen: architect





The Danes eat ten times more legumes, and half the amount of meat, than the Scots do. This was one of the more startling statistics that was cited during “A new vision for land use in Scotland: Six Conversations”. Over 300 people signed up to watch the conversations that took place every Monday in March and ended just after Easter.

Surprisingly, almost every expert that I invited to speak, from the wide variety of fields covered in the Conversations, accepted with enthusiasm. In fact I had to turn some away. Members of each panel took ownership of their topic well in advance of their Conversation. Out of their normal silos, mixing with practitioners and academics from other disciplines, some welcome blue sky thinking was stimulated. That was the essence of the conversations. Typically, as co-organiser of the events, I did not include the artists in these pre-meetings but retrospectively, having seen the importance of their contributions, I wish I had.

Each conversation was book-ended with pieces by Karine Polwart and Su-A Lee amongst other musicians, and divided by interludes, one of which was a live reading of poetry. Despite a few technical glitches with the quality of the visuals (now corrected on the recordings on our [website](#)) the involvement of the artists added a human dimension to the conversations, which far exceeded my expectations. In future, I will try to involve artists in as many SEDA events as possible. So artists – more pieces about the built environment please!

*Continued on page 22*

## Practical Proposals

Speakers were asked to come up with practical proposals to take their ideas forward and feed into our report (more below). Passion and provocation were the order of the day. Being unaffiliated with any sector in rural Scotland ensured SEDA was a non-partisan host and was possibly the reason we attracted such a range of speakers.

In Conversation 2: Soil and Growth, molecular ecologist Dr Pete Ianetta of the James Hutton Institute called for a food system plan in which the value chains for sustainable products are transparent and easily understood. This would involve the accountancy, and possibly certification, of all food products. Agroecological solutions would benefit from this. The attraction of this proposal is that it addresses several of the problems facing us at present – over consumption, pollution, health, climate change and biodiversity.

Dr Mads Fischer-Moller, professor of food policy at SRUC, Scotland's Rural College, has been advising Nordic governments on food policy for years and revealed the statistic at the start of this article. He also pointed out that 74% of the arable land in Scotland is used to grow cattle feed, and a further 12% goes towards the drinks industry, but only 4% is used for human consumption. Mads said these percentages need to be reversed, with 86% being used for human consumption. He and Pete both believe more needs to be done to encourage people to eat healthily, starting with the very young. One way of doing this was put forward by Andrew Whitley, founder of Bread Matters, who proposes that every primary school cultivates its own wheat, harvests it, mills it and finally makes bread from it. "They will learn that food, when grown carefully in the fields around them, has the power to keep body and soul together".

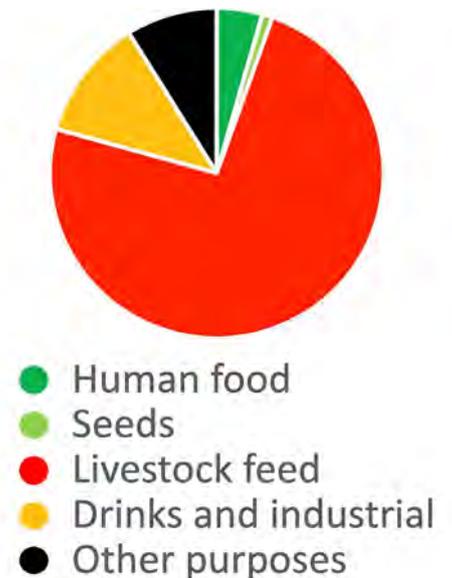
## Land Report

Richard Atkins (SEDA) and David McCracken (SRUC) have finished writing the report to be presented to the Scottish parliament. The bulk of the report is a summary of what was said in all six conversations. The most interesting part, however, is the conclusion which is made up of eight recommendations. Richard and Davy have successfully selected ones that represent the range of topics discussed. As was the spirit of the conversations themselves, these eight points reflect the interdisciplinary approach needed to transform our landscape. But how do we ensure the report makes people sit up and listen? Many excellent reports are gathering dust or have just instigated more talk. We need action. The conversations were a great success but they were just the beginning. Unfortunately, affecting policy change takes time.

Experts in their respective fields will tell you the evidence has been there for years. We need joined-up thinking by some courageous policymakers. Tackling biodiversity loss on its own won't work. Tackling food security on its own won't work. Tackling the health crisis or the climate emergency on their own won't work. All these things are interconnected and need to be looked at in a coherent way. These issues require fundamental changes in the way we think about the land, not just tinkering around the edges. It will take a bold government to push through some of the seismic shifts necessary.

Image Credits.

## Arable land use, Scotland



## SEDA Land

David Seel, co-organiser of the Six Conversations, and I always wanted the conversations to continue after the conference itself and have looked at various platforms on which this can be done. We now intend to launch SEDA Land – a lobbying group for the recommendations in the report or, possibly, more urgent land-related issues if and when they arise. We will be speaking to civil servants in the Scottish Government about working alongside them and inviting our speakers and others with knowledge of land use & land-related issues to help us work on individual initiatives.

Change does not happen overnight but the momentum harnessed by the conversations, the new Scottish government, COP15, COP26, Brexit, Covid and the Regional Land Use Partnerships all make this the ideal time to take our ideas forward. Let's hope the recently re-elected Scottish Government will rise to the challenge.

Someone said, they were feeling at a loss now the Conversations were over, and wondered what they were going to do on Monday evenings. The answer is obvious - join SEDA Land and start eating those legumes!

## The Planetary Health Plate



#foodcanfixit #EATLancet



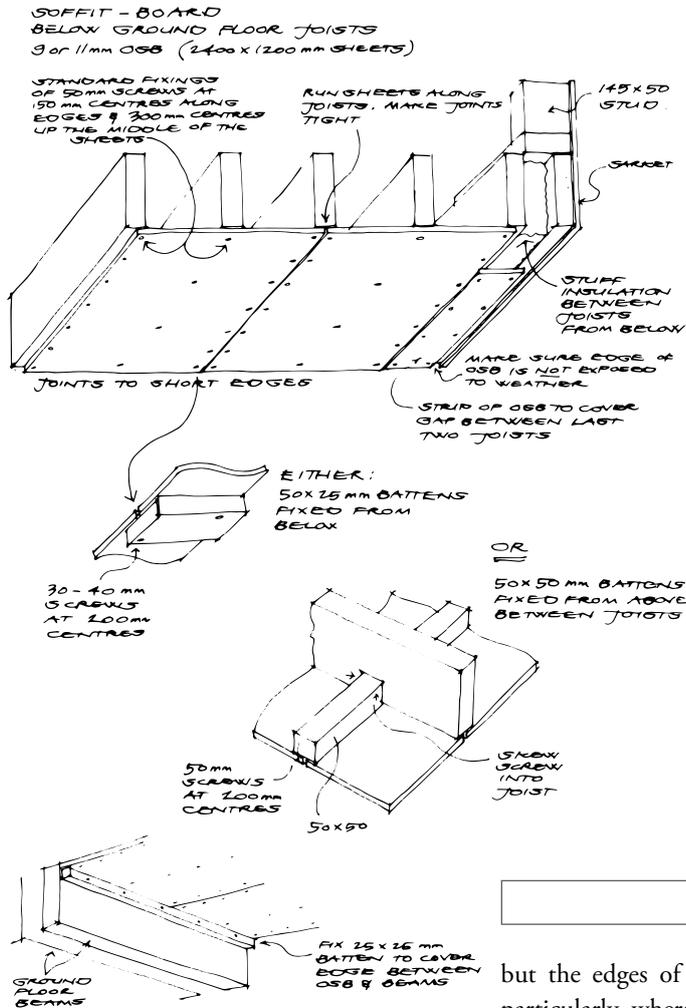
### SEDA Land's eight recommendations to the Scottish Government

- Healthy Food Strategy
- Agroecology Strategy
- Strengthened Land Rights and Responsibilities Statements (LRRS)
- Climate Change Analysis (CIC) Certificates
- Coordinated Infrastructure Investment
- Sustainable Place Making & Mending Strategy
- A Sustainable Business Innovation Fund (BSIF)
- Education ■

# Giroscope Self Build, Hull

Duncan Roberts





The walls and roof are now insulated with Warmcel & the floors with sheep’s wool. The exteriors of the houses are currently having their final render coats applied.

With the insulation in place, but before the final interior finishes are applied, it seemed like the ideal time to have the airtightness of the construction preliminarily tested. A specialist consultant, Ryedale, was identified based in Malton, 40 miles north of Hull. The proprietor, Nick Greenhalgh, turned out to be a graduate of the old Hull School of Architecture and a happy tea break was spent reminiscing over shared associates.

The results of the test were however, not so cheery. The target figure was 3 air changes per hour, this being a consistent result on previous self-builds & therefore something we hoped Gyroscope would match. The result in all three houses was around 8 ach & everyone felt suitably dispirited as a result.

The smoke streaming from the generator soon identified the problem area - not around the doors or windows, nor the incoming service penetrations -

but the edges of the underfloor soffit, particularly where the boards didn’t quite meet the beams supporting the floor joists. The detail shows a batten screwed in place to cover this joint whereas the reality was an imperfect abutment with a matching gap in the subfloor above.

So, the task remains to crawl under the houses and apply the necessary remedial coverstrips and get the whole job tested again nearer completion. ■



# Designing Anew From Old: The Remake Project

Evie Spiridon

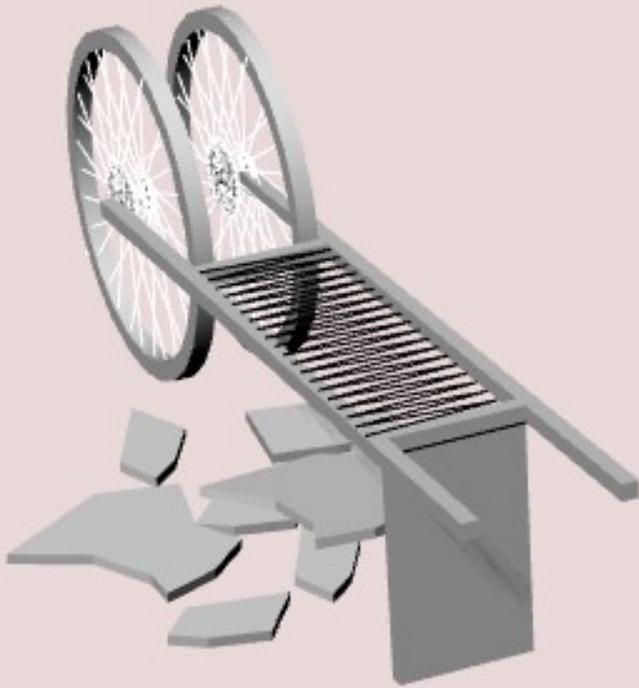


Image Credits: Evie Spiridon

In September 2019, I was entering my fifth and final year of architecture school. There is an expectation that your final year thesis will be a summation of all you have learned, your take on the profession thus far. Across my year group there was an emerging theme among many students' final year projects: sustainability. In particular, the reuse of existing materials. The current curriculum was not satisfying the students' interests enough and it seemed many students were looking further for sustainable solutions to go alongside their education.

## Architecture Fringe

Myself, and three other graduates (Danica Mijonic, Karina Armanda Kuznecova and Rasita Artemjeva) began to plan a series of events to provide alternative means of learning for other students. We planned both: an online event that was held during the ArchiFringe festival, and a live build workshop. Both, to promote reuse within design.

The online event consisted of a talk with guest speakers, who each had their own experience using reclaimed materials, in both: large and small scale projects. Following this, we then hosted an online workshop with architecture students. We provided them with digitally modelled components that acted as 'reclaimed materials' and gave them a series of tasks. "Using the reclaimed components provided, design something to do with the topic of 'dinner'". The aim was



# Covid: A Student's Tale

Wiktoria Pelczynska



For the past year we have encountered an economical situation that no one could have foreseen and amongst the groups worst affected are students.

I graduated from my part 1 in architecture last summer, with an optimistic mind to gain insightful experience within a practice. The reality, however, was very different for me and a number of fellow students. I discovered that positions, which were previously offered to recent graduates, were now going to part 2 students, due to a lack of work load in architectural firms.

After continuous searching I decided to use this time in a meaningful way rather than chasing positions that were being offered to more senior students. So, I became involved in a self-conducted architectural project, signed up for COP26 volunteering and gained additional training in the sustainability sector.



## #RSUDC21

Being involved in an architectural competition such as #RSUDC21 was a great way to keep up with skills and university contacts. Myself and 3 other students from the Mackintosh School of Architecture, Glasgow, have worked on a design for 100 sustainable homes in England, which complied with Net Zero guidelines. It was great opportunity for all of us to get involved with people across the UK from the comfort of our own homes.

We had weekly meetings, however, our spirit as a design team, working together, was limited by our computer screens. A big part of collaboration within a design team is the feeling of all sitting at one table, sketching over endless bits of paper and exchanging ideas which grow from dynamic discussions. So, I think it is safe to say, the experience of being a Year Out in Practice student during Covid was challenging, however, I have definitely learned a lot about the importance of self-motivation.

Image Credits: Wiktoria Pelczynska & #RSUDC21.

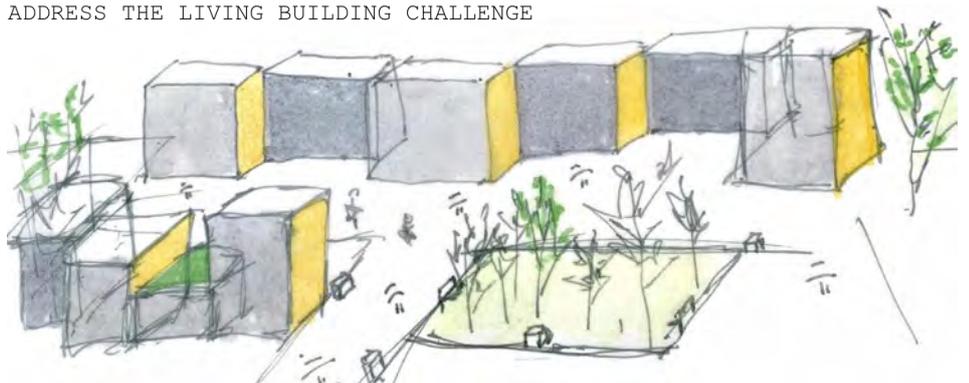
A residential unit designed for the present and future.



### CONCEPT

MAXIMISE ENERGY EFFICIENCY  
 ADDRESS FUEL POVERTY  
 IMPLEMENT SMART CITY INFRASTRUCTURE  
 MIXED USE  
 9X6M

ADDRESS THE LIVING BUILDING CHALLENGE



#RSUDC21

# A New Way of Doing Business

Peter McCafferty Circular Economy Business Support Framework Manager & Anna Graham, Textile Analyst  
Zero Waste Scotland



Talk about the circular economy (CE) for long and it can be difficult to avoid straying into abstract technical concepts & high-level chat about systemic change. Translating that into something meaningful, however, for the person on the street or the average small business can often still be a challenge. Whilst the concept is gaining traction, much of the language remains opaque. The trick is to meaningfully hook the concepts onto something directly relevant to the businesses, customers and individuals who actually have to deliver and adapt to the change.

During these difficult and challenging times, when the priority for many businesses is survival, it's understandable that no one is really interested in discussing high level & abstract technical concepts. Many of the principles of CE models, however, are extremely relatable to the challenges businesses are currently facing in terms of uncertainty and supply chain disruption; CE models are essentially about incorporating greater resilience and sustainability in order to de-risk uncertainty, whether that comes in the form of resource availability, climate change or a pandemic. From a customer interface point of view, CE models should be designed to streamline processes and experiences such that the CE way of thinking becomes easier, more attractive and affordable, than the traditional linear alternative. This experience and personalisation also generates the lock-in and customer retention that benefits business, whilst at the back-end these models offer the potential for much smarter and more effective use & reuse of Earth's finite resources.

Servitisation is perhaps the ultimate CE model – taking a product which is traditionally sold on a point of sale transaction basis and somehow converting it into a use orientated model much more akin to a service. Clothing, tech, entertainment, grooming and even food are all potential candidates for this type of model, and the rise in market for subscription boxes is testament to this. It's worth noting, however, that a subscription model isn't automatically a CE one. Without a proactive commitment to sustainability and a back-end model supporting a reduction in material use whilst capturing and retaining the value of those assets & materials in the field, subscription models may actually increase consumption. This is why conscious design and innovation are so important.

The worldwide fashion industry highlights the scale of the challenge, more perhaps than any other industry, not least because the textiles industry remains one of the worst offenders for environmental impact. Clothing production approximately doubled worldwide between 2000 and

2015, outpacing GDP growth during that period. The advent of fast fashion, bringing 52 seasons to the high street, has created a culture where clothing is viewed as a commodity; bought cheaply, used a few times and then discarded. Major brands operate a model of pile them high and sell them cheap, often ending up with billions of pounds of unsold stock at the end of year.

Service models for clothing could offer a real solution to stemming the flow of clothing through our system, but the model is not as straightforward as it may appear. Whilst traditional rental models work well, they tend to offer a more ad-hoc solution and for a limited range of high value items. Niche online subscription models offering affordable clothing bundles – designed seasonally, for example - offer a potential solution but because of varying tastes and trends and sizing, any company wishing to move into this type of model will require significant inventory as well as sophisticated stock management, storage, logistics, laundry and insurance. Furthermore, design becomes important as do material choices; clothing suitable for rental tends to be clothing made to last, and clothing made to last tends to be more expensive and less accessible than in our current high-street model.

Online subscription models offering affordable clothing bundles are gaining market share, but one wonders if their target market sits firmly amongst affluent and engaged Guardian readers, and not within low-income households up & down the country where budgets are already squeezed. How can we therefore also ensure that brand owners and retailers shift to a more sustainable model offering a range of solutions for their customer base while also moving away from the pile them high, sell them cheap model?

Ultimately it comes down to cost... For existing companies, transitioning to a CE model set-up may be more manageable than for new entrants, but as they move away from a sales driven model to a fee driven model, scale and continuity of revenue becomes much more important.

Income smoothing is attractive for a lot of companies but where manufacturing costs are significant or products are high value, shifting away from an up-front payment is often challenging. Again though, this is an opportunity to innovate in how such models are funded. We already have the government backed Green Investment Bank but there is a strong argument for a specific Circular Investment Bank that understands the risk and nuance of CE models and is prepared to fund CE start-ups. The returns on such an investment are likely to be attractive as environmentally sustainable models become more commercially sustainable in the face of dwindling resources, price shocks and increasing disruption to global supply chains.

Coronavirus and lockdown may already have done more to change the way we shop, buy and consume in a relatively short period than the threat of climate change. What's interesting is what this might mean experientially, in how open to change and new models customers have become. The key, though is to make sure that these new experiences are not just superficial changes, enabling continued consumption and disposal, but that they empower customers to access products and services more sustainably, making smarter choices and providing the connectivity that allows the avoidance of waste, instead channelling resources and materials back into the value chain. A circular economy must be designed around people to be accessible and attractive in order to become mainstream and create a system that allows everyone to be circular in different ways depending on their lifestyle. ■

# Solar Pump-Priming & Hybridism:

Embodied Carbon, Life Cycle Assessment & Recycling - SEDA Solar 2021 Spring/Summer Seminar Season

Glo Lo & Colin Porteous



p.34 Butterfly diagram showing the life cycle of a c-Si PV module from the extraction of raw materials to EoL management-C.Farrell, pie chart Breakdown of Heat from SG 'Draft Heat in Buildings Strategy' p.32 LCA Talk Image

Solar collectors considered as externally visible fixed appliances or active mechanisms may be compared with all the internal energy-consuming paraphernalia of everyday life from toasters to boilers. Narrowing to the current quest to decarbonise, we have governmental pressure to replace gas boilers with electric heat pumps – one mechanism for another and both with considerable embodied energy and other caveats.

Much UK electricity is still generated by gas, paradoxically at considerably lower efficiency than using it directly for thermal heat. Any heat pump's viability in replacing gas boilers lies in further increasing proportional renewable generation, plus a high Coefficient of Performance (COP – effectively its efficiency, e.g. 4 denoting 400%). The latter points to ground-source, or water-source heat pumps (e.g. John Gilbert's pioneering projects in Shettlestone and Fife) that are significantly dearer than air-source ones, especially in the UK. A subsidy similar to the Feed In Tariff (FIT) used to launch market uptake of PV would seem a requisite to literally pump-prime us up to the level of near EU neighbours; better still if on-site generation of renewable electricity can at least match the heat pump's annual load.

A heat pump signifies the need for storing water unlike a gas combi-boiler. For individual applications we might use it for incidental heat gain as with appliances such as washing machines. This leads to the issue of zoning for passive solar gain while not competing with that from appliances.

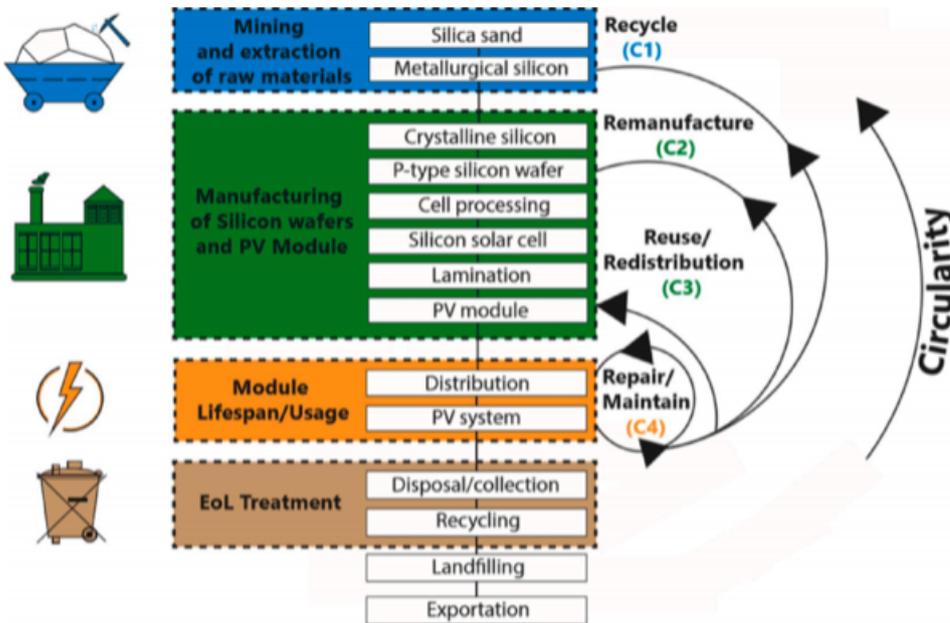
In turn, an active advantage of a heat pump is reversibility, offering potential radiant cooling, as well as warming, say in the form of embedded water coils within plaster, better still clay plaster; if heat pumps are communal, there is multiple tenement-retrofit potential in Scotland's urban territory. Shared laundering would offer another good site for both heat pump and its water storage.

Given this context, the on-site generation of electricity to match the demand for either direct use as well as heat pump load could well rely on solar PVs. The question is whether these panels would stand up to whole life carbon calculations; their production, longevity and ultimate recyclability or end of life processes; whether their lifetime output would balance the environmental cost.

### SEDA Solar in May

Dr Richard Atkins, a practising architect and former SEDA Chair led off May's event with 'CO<sub>2</sub>(e) + Resources'. He summarised his long interest in sustainable environmental architecture, including its social and financial aspects (his PhD topic), with RIAS involvement, working with the Scottish Government's Building Standards Division (BSD) 'Section 6 (Energy) Working Group', and so on – e.g. involvement in a community wind farm.

Richard cited useful guidelines for photovoltaic (PV) generation: 1kWp (p for peak), roughly equating to 4 panels, and yielding some 864kWh annually; at current prices, with a relatively short payback of 4.5 years. He also quoted the 2019 mean UK carbon emissions value for all sources of electrical generation of 0.256kgCO<sub>2</sub>/kWh, and compared this with Scotland's remarkably low mean 2017 value, <10% of the UK average at 0.024kgCO<sub>2</sub>/kWh. Such low discretely-analysed, nationally-devolved emissions are comparable with some European countries such as Lithuania, Sweden and Austria, and reflect Scotland's high proportion of wind generation in its renewable mix (only 0.005kgCO<sub>2</sub>/



kWh), coupled with low-carbon nuclear (say 0.09-0.14kgCO<sub>2</sub>/kWh) in the non-renewable mix (note: coal-fired generation at Cockenzie closed 2013 and Lochgannet 2016). However, highlighting a downside without a nuclear bung or bang we hope, Richard informed that Scotland's entire energy load including heat and transport was still 78% fossil-fuel based.

And, although PV is zero-emissions in use, embodied carbon/energy must be evaluated, not to mention toxicity issues. On the other hand, there are embodied benefits – economic and social, where we have to 'follow the money'!

The next speaker, Dr Emmanuel Shittu of Swansea University, addressed the Life Cycle Assessment (LCA) of solar panels (PV) and battery storage from material extraction onwards – his goal an inventory with impact assessment, citing ISO 14040 (1997) and 14044 (2006), the international standards for LCA. He confirmed that although crystalline PV dominates the market at present, he predicted that Perovskite would gain a significant share by 2040. The key challenge was how to improve the life cycle environmental impact of the cells themselves,

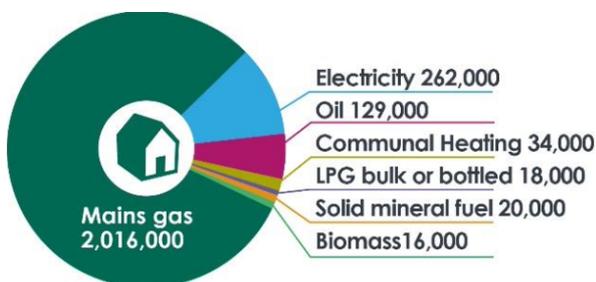
a significant proportion, including assembly, transport etc. He projected an energy payback time of some 4.5 years and an overall manufacturing improvement of 45%, this very dependent on future energy mix in China. He concluded that LCA is a good tool.

Finally, Charlie Farrell, a PhD student from Queens University, Belfast, tackled the problematic topic of recycling normal poly- and mono-crystalline PV panels. Having flagged the accepted ‘end-of-life’ definition of when output is <80% of that intended, which Charlie challenged, and the options of re-use versus discard, he went on to inform us that the trickiest material to recycle within a panel’s make-up is the EVA encapsulant. Since it is essentially a hydrocarbon, however, it is possible to employ pyrolysis to recover energy, with only some 1% of residual weight left after delamination. This area of research clearly trumps the discard option. Charlie concluded with mention of the ‘butterfly’ diagram and ecological circularity. [Note: Edward Norton Lorenz’s 1963 ‘butterfly effect’ is a model for chaos theory; but eco-diagrams of today indicate a twinned circularity evoking a butterfly-like appearance.]

The seminar closed with a vibrant Q&A session, and of course a strong vote of thanks to all three speakers for their excellent contributions.

The solstice seminar, 21<sup>st</sup> June, entitled Active and Passive Storage, had a line up as follows: Dr Manuela de Castro (Maria Manuela Marinho de Castro), formerly of the Mackintosh Environmental Architecture Research Unit (MEARU) at The Glasgow School of Art, on ‘Thermal Storage in Buildings’; Chris Roberts, the Microgeneration Certification Scheme (MCS), on ‘MIS 3012 – The Battery Standard’; and Dr Wolf Gerrit Früh, Heriot Watt University, on ‘Effective Utilisation of Solar Energy’.

This will be reviewed in the next edition of the SEDA magazine. ■





## SEDA at 30

Catherine Cosgrove - SEDA Chairperson

Looking back on the 30 years of SEDA's history, it's been interesting to compare what has and hasn't changed in that time. At this year's conference we heard from some of SEDA's founders and original members, the ideals behind why it was founded and some of our early successes. The reasons why they formed SEDA are still relevant and we do seem to be having many of the same conversations today. What has changed during those 30 years is that the evidence of climate change is more obvious and is having a daily effect on how we live. There's now more widespread interest in how our actions are affecting the environment and many more people are coming to SEDA to find information.

This year, as well as increasing our membership numbers, our website has received more than 13,000 visitors from 39 countries. Our Land Conversations series had more than 1,250 attendees and 500 online views of the recordings. SEDA has generated a wealth of knowledge over our 30-year history and our challenge is how we can share this information more widely.

With this year's conference we wanted to provide a platform for issues that we think are going to be important over the next ten years. We invited a range of speakers who are taking positive action in lots of different ways to help our environment and in doing so are inspiring more people to do the same. More information and their contact details are in this issue, if you want to support them.

Image Credit: Austin-Smith:Lord

### Action

At the end of the conference, we asked you to make a public commitment to take action on something that would have a positive impact on the environment. Big or small, the size wasn't significant. The important thing is to do something, take action, make a difference. Thank you to those of you who have been in touch volunteering to help out at SEDA. We'll definitely be taking up your offer.

Of all the speakers at our conference, Dr Howard Dryden made the biggest impact. When we found out about his work with the GOES Foundation, we knew this was something more people needed to hear about. That pollution in our watercourses and oceans is killing marine life isn't a surprise, but that we'll soon reach a tipping point when it collapses, is shocking. It can be stopped relatively easily, which should allow marine life to recover, if enough people take action now to stop the pollution at source. We can all stop using products that contain the chemicals causing this pollution, all we need is the knowledge to look for them in what we buy. Since the conference many of you have shared the link to his website and films. This has been picked up by many other environmental organisations and is generating a lot of interest.

Working together, over our 30 years, we've made a difference. We have less than 20 years, along with the millions who want change, to make a transformation. ■