

A year of innovation exploration for net-zero in Scotland



2020
Virtual Conference
Review

SCOTLAND'S
COUNTDOWN to COP26

The Herald 
SEVEN DAYS

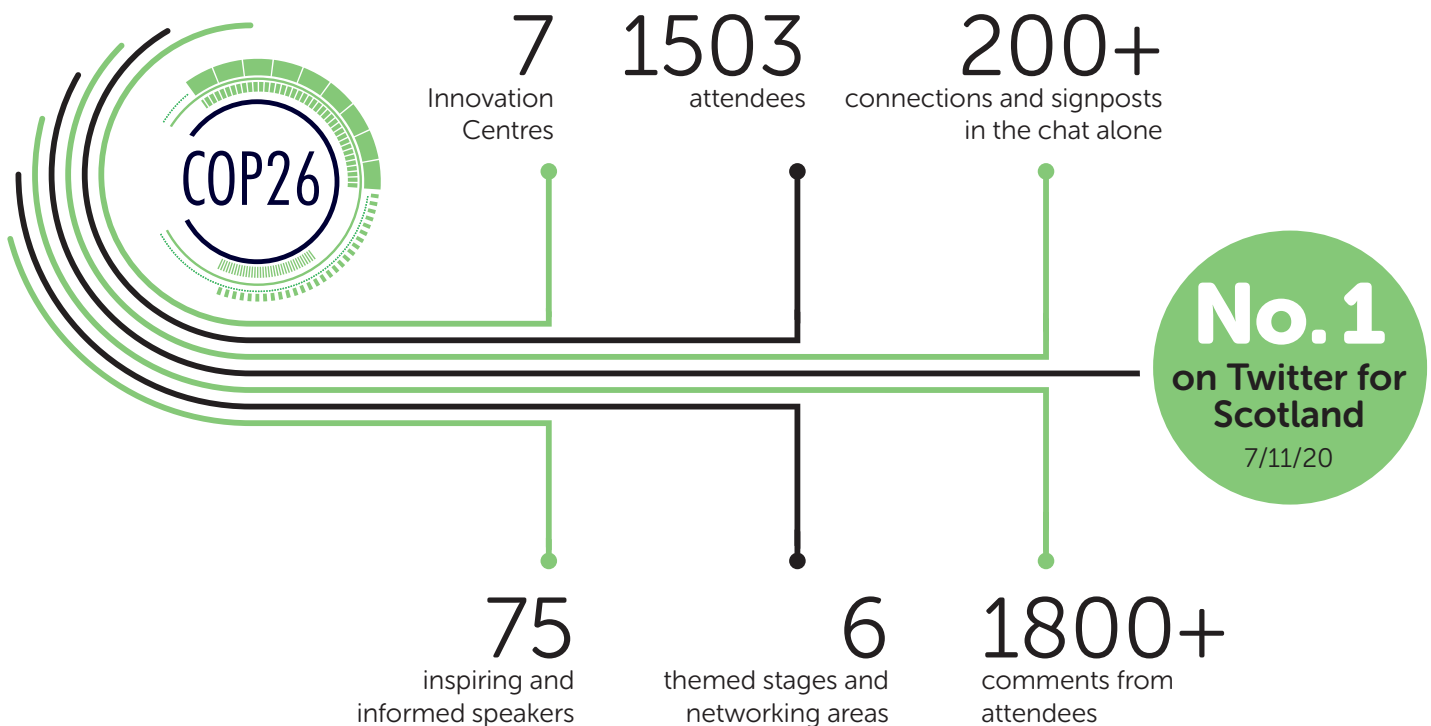
Innovation
Centres

Supported by the Scottish Funding Council,
Highlands and Islands Enterprise and
Scottish Enterprise.



“ Sometimes days come along that matter in history, and actually this is one of them.

Kate Raworth, Economist and Author



In, 2020, Scotland's 7 Innovation Centres joined forces with The Herald Media Group to start a year of conversation, collaboration and most of all, action, that will help Scotland reach net-zero targets. The Countdown to COP26 virtual conference held on 3 November 2020 discussed how to help Scotland to do two crucial things:

- Maximise the collaboration opportunities emerging from the event
- Help Scotland – and other nations – reach net-zero targets

This report distils the themes, messages, and highlights of that day, allowing us to set our course and stimulate activity towards November 2021 and beyond.

The day began with a plenary session looking at key opportunities. Six themed stages then ran concurrently to focus on specific sectors and areas of expertise and the day closed with all Innovation Centre Chief Executives and organisers discussing their next steps.

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KEY MESSAGES FROM THE DAY

“ Today’s event is about innovation and collaboration, and key to that is engagement. You could be one or two steps away from finding someone to collaborate with on the big issues.

Dr Martin Valenti, Scottish Enterprise

Over the course of the plenary and themed sessions, a number of key messages emerged, reiterated by different speakers from different sectors and backgrounds: industry, academia, public sector, and other stakeholders.

All these messages could help to steer our thinking as we prepare for COP and beyond.

- 1 What can people actually DO?** Some businesses and researchers already have their plans for tackling climate change; others want guidance on the practical actions and steps they can take – as individuals or as organisations. Speaker Councillor Susan Aitken, Leader of Glasgow City Council was helpful here. Her example of a project trialling energy-efficient heating in Glasgow’s tenements brought the climate change agenda to a relatable level.
- 2 The need to think beyond small-scale.** Speakers from Stephen Good (CSIC) to Peter Lacy (Accenture) to Colette Cohen (OGTC) pointed out that Scotland is good at research and innovation, but needs to do more on delivering, commercialising, scaling up, mainstreaming, manufacturing and exporting.
- 3 Behaviour change is critical.** This came up repeatedly, with differing views on whether it should be top-down (policy & legislation), bottom-up (engaging with communities), or both. In polling, individual behaviours and policy environment were seen as the key factors for achieving net-zero. A useful reminder on behaviour change came from an energy start-up: “If you want user adoption, your solution has to be at least as good as, or better than, what’s in the market right now.”

- 4 **Funding is a problem.** SME after SME praised the landscape in Scotland for early-stage support, but when it comes to reaching commercial demonstration and industrial scale, it's a struggle to fund individual projects or attract private and public investment and finance at a wider level. In the polling, finance was the most popular topic for a future event.
- 5 **Even wider collaboration is needed.** We heard large corporates such as Wood Group and Stagecoach saying they needed complementary expertise on climate change; Peter Lacy called for pre-competitive collaboration on infrastructure etc; and the Deep Branch protein project, which includes Sainsbury's, Drax, multiple universities and a fish feed producer, shows the extent of cross-sector engagement needed.
- 6 **We should design out waste,** rather than try to tackle waste problems after they have happened. Moving away from 'take, make, waste' value chains will require new business models and mindsets, but the financial opportunities are significant.
- 7 **Beware of selective thinking.** For example, on the Sustainable Industrial Processes stage, Professor Rebecca Lunn (University of Strathclyde) said that while electrification would reduce emissions, it would also require large-scale mining – itself a significant cause of emissions and resource utilisation. On the Energy stage, too, speakers warned against 'single-solution' approaches.
- 8 **Innovative solutions don't have to be new.** Celtic Renewables revived a fermentation technique over 100 years old; Smart Green Shipping is looking at wind to power ships; IBIoC and SAIC are revisiting seaweed cultivation. The Innovation Centres know that innovation can come from repurposing existing ideas or technologies.
- 9 **We can't just sit back.** Or as Ian Marchant, CEO of Dunelm Energy put it, "Everyone at this event has to think, what does beyond net-zero mean for my business, my organisation, my community?" DHI and PMS-IC currently include an impact statement of how they will contribute to Scotland's net-zero targets for each of their projects.
- 10 **Speak to the heart and the head.** There was positive response in the chat whenever Martin Valenti and others talked about hope, courage etc. Another moment that resonated strongly was Di Gilpin, CEO, Smart Shipping, painting a visual image of a 14m test rig moored on the Clyde outside COP26. Should we use an element of the emotional to galvanise change or 'sell' projects?

PLENARY SESSION



Hope mobilises, fear paralyses.

Dr Martin Valenti, Scottish Enterprise

The morning's plenary session opened with an introduction by Martin Valenti, Event Chair and Head of Climate Enterprise, Scottish Enterprise, focusing strongly on innovation, collaboration, ambition and optimism.

A discussion with three Innovation Centre CEOs – Paul Winstanley of CENSIS, Gillian Docherty of The Data Lab and Stephen Good of Construction Scotland Innovation Centre (CSIC) – then looked at the agenda and themes for the day, with all three CEOs emphasising the importance of delivery, practical actions and follow-up.

In the following sessions, speakers explored climate change solutions and opportunities on different levels: from global to nation to city to individual projects that could lay the groundwork for larger-scale change.

COP OPPORTUNITIES FOR SCOTLAND

**Kersti Berge, Scottish Government
Director of Energy and Climate Change**

Kersti helped to set out the context of the day, with a stocktake of the Scottish Government's actions and targets on climate change, and a call to action for everyone to help showcase Scotland's strengths on low-carbon innovation at COP26.

Her stand-out point – given that not everyone was aware of it – was that Scotland is not only committed to net-zero by 2045 but is committed to a Just Transition to net-zero.

Net-zero

The Scottish Government has set a target date for net-zero emissions of all greenhouse gases by 2045. This transition is to benefit the Scottish environment, people and prosperity.

Net-zero refers to achieving an overall balance between the amount of greenhouse gas emissions produced and the amount removed from the atmosphere. Net-zero can be achieved by reducing existing emissions and actively removing greenhouse gases.

<https://www.gov.scot/policies/climate-change/>

Just Transition

A net-zero economy that is fair for all.

Significant change is required to realise Scotland's net-zero ambitions and will necessitate structural shifts to the economy and our society. In 2018, the Scottish Government established the Just Transition Commission to explore what a successful transition to net-zero emissions would entail and address issues faced by groups of communities that may be adversely affected.

<https://www.gov.scot/groups/just-transition-commission/>

DOUGHNUT OPPORTUNITIES FOR SCOTLAND'S CITIES

**Kate Raworth, Economist and Author of
Doughnut Economics**

Kate explained doughnut economics, which looks to balance the needs of people with the planet's ecological resources. Attendees loved this session, with a deluge of comments on the chat about Kate being 'inspirational' and 'brilliant'.

There was a lot of detail about the model and her work with individual countries /cities, which can be found at the Doughnut Economics Action Lab. Key points for us in Scotland are:

- People engage with this model strongly because it gives a clear and coherent lens for assessing what we can / should do at nation, city and community level. NatureScot is using it, and one person asked whether it could be used at company level.
- Her question to the audience nicely encapsulated the model: "How can Glasgow be a home to thriving people in a thriving place while respecting the wellbeing of all people and the health of the whole planet?"

Want to take this further? Read [Kate Raworth, Seven Ways to Think Like a 21st Century Economist](#).

CIRCULAR ECONOMY OPPORTUNITIES FOR SCOTLAND

Peter Lacy, Accenture, Chief Responsibility Officer and Global Sustainability Services Lead

This was another content-rich session from a compelling speaker, looking at the urgency of moving away from linear 'take, make, waste' value chains to circular economy policies.

Peter's work at Accenture focuses on the micro level, and there were three great points here:

- Managing waste isn't just about the traditional approach of recycling materials. It's about wasted capacity (e.g., assets standing idle), wasted lifecycles (with products discarded after first use), and wasted embedded value that could be eliminated by repurposing them.
- "We think there is a prize to 2030 of \$4.3 trillion for companies that can truly move the needle on circular economy."
- Both emerging & established firms can do this, with Winnow (food waste), AeroFarms, (vertical farming), AMP Robotics (recycling), Fairphone, Caterpillar, Scottish Power and BASF all mentioned.

Looking for more? Read [Peter Lacy, Jessica Long, Wesley Spindler, The Circular Economy Handbook](#)

IN CONVERSATION WITH COUNCILLOR SUSAN AITKEN

Susan, the Leader of Glasgow City Council, was very strong on relating COP26 and Just Transition to real-world Glasgow.

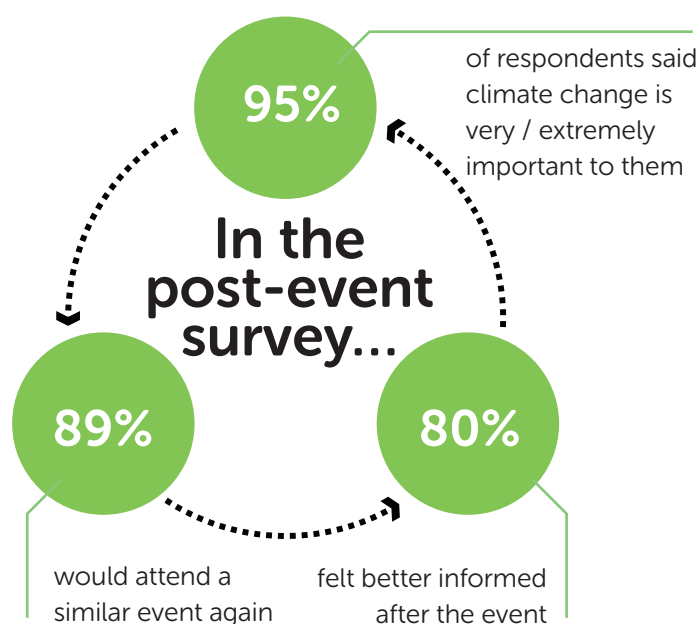
- COP 26: "I want Glasgow to be part of COP26 – that everyone goes away with a sense that we're forward-looking in terms of what we're doing on the decarbonisation agenda. But also the other way around: that Glaswegians get something out of the COP."
- Just Transition: "I would really like [vulnerable] communities to understand that we have worked with them and listened to them."
- Practical solutions: Projects like Glasgow's testbed for retrofitting tenements for energy-efficiency illustrate the opportunities for exploring how to mainstream emerging solutions.

THE GRAND CHALLENGE

Ian Marchant of Dunelm Energy, and former CEO of SSE

Having been at the 'doing' end of net-zero transition in various roles, Ian reminded the event of what Scotland has achieved on renewable energy production by thinking big.

As well as offering his view on what Scotland's emissions reduction focus should be – heating – he gave his personal three Cs for change: Collaboration, Creativity, Courage.



“Some ideas will fail, it doesn't matter. You need the numbers and we learn by our failures.”

Ian Marchant, Dunhelm Energy

STAGE 1: BUILT ENVIRONMENT

Hosted by CSIC – Construction Scotland Innovation Centre

CONSTRUCTION
SCOTLAND
INNOVATION
CENTRE



How do we build a connected ecosystem of changemakers prepared to do something?

Stephen Good, CSIC

The session kicked-off by looking at how we can 'reinvent and reimagine' our approach to the built environment and transform the way we build. It then progressed from THINKING about the issues to what's needed for DOING something about them.

Speakers and panellists came from across the ecosystem, from developers to regulators to SMEs to the future workforce, to discuss four key themes.

HOW WE THINK ABOUT OUR BUILT ENVIRONMENT

Approaches, projects and models discussed included Dubai's Sustainable City, the SNRG Courtyard template for energy-efficient neighbourhood design, and the HALO urban regeneration project on the former Diageo bottling site in Kilmarnock. Among the asks and recommendations were:

- Flatter, decentralised approaches to decision-making.
- "Town centre first, let the people be involved in the process" (Marie Macklin, HALO).
- "Regulators needs to be partners, they need to share the risk. SEPA can bring partners together to support innovation, talk to us about innovation" (Terry A'hearn, CEO of SEPA).
- "You need to learn from projects and countries wide and far – failures and successes – and work collaboratively." (Karim El-Jisr, Dubai Sustainable City)
- "Modern methods of construction are key to getting to net-zero - we need to supercharge innovation and industrialisation in construction" (Mark Farmer, CAST Consultants)

Meanwhile, in the chat

240+ comments

35+ resources shared and connections made

Some useful counterpoints, e.g.

Social housing is still dealing with various previous modern methods of construction and understandably may be reticent about going there again.

With timber and natural resources, how do we address fire performance, and hesitancy from some insurers, mortgage lenders and local authority building control departments?

RETROFITTING

The scale of the challenge

80% of 2045's built environment already exists

£25 is the average cost of retrofitting a home to be zero carbon

One home needs to be retrofitted every 5 seconds for 25 years

Peter Rickaby, UK energy & sustainability consultant

An expert panel focused on the practical challenges and opportunities and brought home the scale of both. The 80% challenge set the scene (80% of 2045's built environment is already built and needs to be retrofitted for energy efficiency). It also looked at the role procurement, particularly public, plays in meeting this ambitious goal.

Key points on retrofitting:

- We have the knowledge and techniques to retrofit, but not at scale. We need to fill the skills gap.
- An infrastructure is needed for small companies, to learn and innovate on retrofitting. Suggestion of supporting small builders to retrofit their own homes – they will learn and then champion.
- Sharing best practice (and what doesn't work) in Scotland is essential, and should take account of regionality and diversity
- Procurement shouldn't just be about tenders – it's about adding value and leading, and we need to work collaboratively across Scotland to learn from each other.

CIRCULAR AND INDIGENOUS RESOURCES

This session heard the viewpoints of two highly esteemed industry experts Professor Sandy Halliday and sustainable architect Chris Morgan. The first part of this session looked at the need for a CIRCULAR APPROACH to resources. Some, though not all, thought mainstreaming of more sustainable construction would happen only with government intervention. The second part looked

at how we can use Scotland's own resources to create a sustainable environment. Key points:

- Ellen MacArthur Foundation report on Circular Economy in India shows possible benefits in construction
- Sustainable, local timber has a huge part to play, there is also scope to explore and scale innovative materials, such as biopolymers, mushrooms.
- With timber and natural resources, how do we address fire performance, and hesitancy from some insurers, mortgage lenders and local authority?
- We could use all materials that are currently landfilled, but need an infrastructure to access and manage them and get them into the supply chain.

SKILLS AND OUR FUTURE WORKFORCE

The final session confronted an issue that had punctuated every discussion on this stage: the new skills and competencies required. Representatives from industry, future workforce and skills provision gave their views, suggesting that we:

- Plan how to attract and retain new and diverse talent (e.g. digital skills).
- Invest in apprenticeships and hard skills, but also soft skills (e.g. problem solving and, for managers, how to lead a more diverse workforce).
- Get industry to understand and make better use of existing skills resources (e.g. CSIC and ENU's Built Environment Exchange).
- A strong people theme came through, in particular, the need to get communities, residents, supply chain and workforce (current and future) on board - how do we work together to do that?

THINKING POINTS AND NEXT STEPS

- With flatter decision-making and community involvement, who would drive change? Developers? Governments? Others?
- Much of this is in CSIC's court, but any models it develops – e.g. on driving multi-partner developments, involving communities, working with SEPA, and transforming skills – could be shared across the ICs programme.
- Partners such as CENSIS, The Data Lab and DHI will also have a role in these projects and models.

STAGE 2: ENERGY

Hosted by The Data Lab – Innovation Centre for Data and AI



“ You have to stop thinking about energy as being either oil or gas or renewables or tidal – it’s not any one of those things, it’s all of them together.”

Colette Cohen, OGTC

With energy at the heart of a Just Transition to net-zero, this stage focused on where the solutions could come from and how to accelerate them.

The answers? Policy clarity, skills development, supporting innovative SMEs, and better data, to name a few of the afternoon’s recurrent themes.

One other thing was clear from this session: there are huge opportunities for businesses and researchers here, with the OGTC’s net-zero Solutions Centre, the Power Networks Demonstration Centre, Offshore Renewable Energy Catapult and others offering support and funding to address grand challenges. But it’s a complicated landscape.

OIL, GAS AND WHAT COMES AFTER

Two speakers came from an oil and gas perspective: Darren Martin of Wood Group and Colette Cohen of OGTC. Darren focused largely on Wood’s own work, but two general points are worth noting:

- A decade ago, Wood Group was working about 95% on upstream oil and gas; now it’s about 35%. A sign of the times, but also evidence that big corporates can be agile.
- Technology is only part of the picture: data is critical. As well as offering insights to drive your operations, it provides investors with the metrics they want.

In an impressive and fluent session, Colette agreed with many others about the need for policy clarity, skills and collaboration, but two other points stand out because people sometimes overlook them:

- Oil and gas infrastructure and skills must be part of our thinking about Just Transition; for instance, we need solutions to electrify and repurpose oil and gas facilities (e.g. to blue and green hydrogen), and we need to train people for existing skills needs as well as new skills.
- In planning transition, we should ensure the UK supply chain is part of it. “We must be intentional about the UK content we desire – in design & manufacture, not just operations and maintenance.”

Energy in numbers

160

the number of Data Lab MSc students looking for their industry-focused Masters project for 2021. All offers welcome.

80m+

the funding available in UKRI's Driving the Electrical Revolution Challenge.

0

the number of businesses able to tackle climate change single-handedly – it's all about collaboration.

15+

the number of organisations who introduced themselves during the energy session alone.

ENERGY NETWORKS

Jacqueline Redmond did a session in her Power Networks Demonstration Centre (PNDC) role. Signposting some of the solutions gaps, she invited people to engage with the Centre:

- Emissions from power generation have diminished significantly over the past 20-30 years, but emissions from heat and transport less so.
- There are major challenges for energy network operators and owners, especially with the shift to distributed energy generation. We need solutions to drive e-mobility and decarbonise heat networks.

WATER

John Jones of SEM Energy Ltd presented on their system to reduce water waste and enhance oil recovery. The session focused on SEM itself, but did flag up the challenges and opportunities around water usage:

- 90% of global power generation is water-intensive, and less wasteful processes are needed.
- Water technologies have huge export potential (e.g. Middle East) and also cross-sectoral opportunities, e.g. agriculture, aquaculture and distilling in SEM's case.

THE SME LANDSCAPE

Three start-ups (sHYp, ZoeX Power, Ignition) working with OGTC and other parts of the innovation ecosystem in Scotland debated the opportunities in the energy space. We heard that:

- Two came here from other countries to start their business. Scotland is open to different technologies, from hydrogen to tidal, and offers great support from the ICs, OGTC, SE, ONE etc.
- SMEs in Scotland and UK need better access to private sector finance - it's expensive to get energy technologies to the point where they are proven and commercially viable.
- Scotland is not big enough to change the world alone; two panellists saw it as a great place to prove their technology, but were fixed firmly on the export potential.

THINKING POINTS AND NEXT STEPS

- How can we help SMEs with access and connections to private sector finance?
- How do we keep ambitious SMEs in Scotland – so they export, rather than fly the nest?
- Can we do anything further to link businesses and researchers to OGTC, PNDC, UKRI etc?

STAGE 3: HEALTH AND WELLBEING

Hosted by the Digital Health & Care Innovation Centre (DHI) and Precision Medicine Scotland Innovation Centre (PMS-IC)



“ It’s important to remember that climate change probably creates a greater threat to human health and survival across the world than Coronavirus.

Prof George Crooks, DHI

Conversations about healthcare sustainability usually focus on human and financial resources and resilience, not the environment. Yet healthcare accounts for around 4.5% of global emissions, and these emissions also impact health – in Scotland, for example, through air quality.

So, what should we do in healthcare to support net-zero targets? Service delivery, technology, behaviours and manufacturing processes were all discussed on this stage.

THE DHI SESSIONS

George Crooks and John Jeans discussed how developing digital tools and services to support health and wellbeing could deliver positive environmental impacts, as well as social and economic impacts - as the acceleration of digital delivery of services during the Covid-19 pandemic has shown:

- From 1 Mar-30 Sept 2020, 430,000 NHS consultations were delivered remotely in Scotland. This equated to 12 million miles of travel saved.
- Using home devices for digital monitoring and diagnostics will also reduce the need for specialist equipment and single-use plastics in hospitals.

Meanwhile, in the chat

65 comments

9 signposts to connections and resources

Glimpses into some of the issues that innovators need to think about – healthcare-specific but with wider resonance too.

Understanding the ‘leading edge’ of where only humans can add value is critical to the future design of optimal digitally-led and enabled services and care.

The policy ambitions are essential but will only be realised by mobilising staff and managers at all levels across hospitals, community and primary care.

THE PMS / CMAC / MMIC SESSIONS

Clive Badman, University of Strathclyde, talked about reducing the environmental impact of manufacturing, with the Glasgow region now home to two leading-edge initiatives:

- EPSRC Continuous Manufacturing and Advanced Crystallisation Hub (CMAC): co-created with University of Strathclyde and industry to address key manufacturing challenges and skills needs.
- Medicines Manufacturing Innovation Centre (MMIC): multi-partner facility that aims to develop disruptive, digitally driven technologies to be proved at scale.

The session was specialised, but there are clearly wide-ranging potential benefits: quality and cost of medicines, speed of production, improved patient outcomes, inward investment and export opportunities, as well as reduced waste and carbon emissions.

THE NHS SESSIONS

NHS Scotland has:

- 1500 buildings
- 1.4 million procedures a year
- 50,000 tonnes waste a year
- 340,000 tonnes CO₂e from buildings alone

Therefore, in 2019, NHS Scotland CEOs endorsed six high-level climate change commitments, covering supply chain to governance to estate. Speakers from NHS National Services Scotland (NSS) described some of the work being done to achieve these commitments.

Sustainable procurement: With 60% of NHS carbon footprint associated with goods and services (NHS England modelling), NHS Scotland measures on supply chain include a sustainable procurement model and collaborations with, e.g., Sustainable Healthcare Coalition, CivTech, Zero Waste Scotland.

Technology-enabled care: Using NSS digital services and cloud for, e.g., Covid contact tracing reduced the need to increase the property footprint or spend on new devices and infrastructure.

The outdoor estate: The Greenspace Demonstration Project worked with health boards to improve the estate, plant trees and gardens, enhance biodiversity, and promote wellbeing and active travel.

Fleet management: NHS Scotland will use a national fleet management system and phased transition to e-vehicles to reduce cost and emissions.

THINKING POINTS AND NEXT STEPS

- To help embed environmental impacts in healthcare agendas, all new digital health and social projects in DHI will include an impact statement of how they will positively contribute towards the Scottish Government's net-zero targets. Are other ICs doing this?
- Clear opportunities for other ICs to collaborate with DHI and PMS-IC on healthcare and NHS estate projects, involving data, sensors, IoT etc.

STAGE 4: SUSTAINABLE INDUSTRIAL PROCESSES

Hosted by IBioIC – Industrial Biotechnology Innovation Centre



“ We must consider circularism in everything we do if we're to make an impact

Mark Bustard, IBioIC

In the opening session, Ian Archer of IBioIC explained that industrial biotechnology is not a sector in its own right, but a foundation for the bioeconomy. The afternoon's sessions therefore illustrated the touchpoints with sectors that have heavy climate change impacts: energy, chemicals and construction.

There was a strong focus on the industry opportunities, primarily on the offer of sustainable manufacturing for the future, featuring businesses at different stages of growth talking about support, barriers and lessons learnt.

BUILDING BIO-BASED SUPPLY CHAINS IN SCOTLAND

Ian Archer opened the session for IBioIC and set the scene around the industrial biotechnology offer to industry.

- Scotland is strong at research in this sphere, but more needs to happen in terms of knowledge transfer beyond proof of concept and pilot scale, scaling up to demonstrator scale and beyond to full scale manufacturing. Various initiatives and bids are underway to address this, including a Strength in Places bid.
- If we are serious about sustainable manufacturing, we should be looking to locally sourced feedstocks, that can be domestically sourced in Scotland. IBioIC is working with a cross sector group of leading figures across the agricultural industry to reintroduce sugar beet in Scotland as a feedstock for the chemical industry.

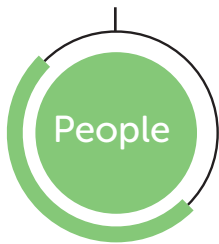
BREAKING THE ENERGY MOULD: NON-TRADITIONAL CHEMICAL SOURCES

Two well-known Scottish producers of biofuels and other products – Argent Energy and Celtic Renewables – told their own stories of taking research to commercial-scale operations. In order to showcase how industrial biotechnology can be applied using non-traditional sources such as waste fats (Argent) and whisky co-products (Celtic Renewables), the companies shared their own stories on what their journey had been like. Key takeaways included:

- Argent: Electrification is very much the buzz word for now, but diesel will continue for 15-20 years, and we need to use biodiesel to contribute to decarbonisation. Argent's plant was originally designed for cooking oil. When that became too expensive, Argent pivoted to waste fats – a good example of adapting research to commercial realities.
- Celtic Renewables uses science first developed in the 19th century, and have taken this approach to deal with prominent issues associated with the waste hierarchy. Innovation doesn't always involve ideas that are entirely new.

Five essentials for growing an innovation business

The most important thing in your business. Don't try to go it alone.

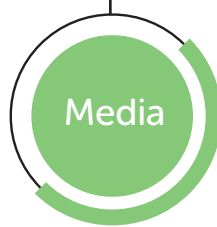


Get the public to buy into your idea; it can help attract partners, funders, investors.



If you can't employ the people, partnerships are crucial.

Building a commercial demonstrator (and, later, achieving industrial scale) is capital-intensive. There will be dark days and many funding rounds, but the previous steps will help.



When strong organisations endorse you, people can believe in you.



Prof Martin Tangey, OBE (Celtic Renewables) included this advice for start-ups

CONSTRUCTION

The remaining sessions on this stage focused on construction. IndiNature is a start-up looking to produce renewable insulation and construction materials from fast-growing hemp, while Professor Rebecca Lunn is working on a project to use bacteria to turn soil into rock.

Both echoed points made on the Built Environment stage:

- Construction impacts are twofold: you have emissions from both construction processes (e.g. materials, transportation, construction itself), and building operations (e.g. energy usage).
- Current reliance on cement and steel is unsustainable.

- Sustainable industrial processes require new linkages across the ecosystem – in Rebecca Lunn's case, that sees a civil engineer working with IBioIC on creating a bacteria supply chain.

THINKING POINTS AND NEXT STEPS

The big picture questions arising on this stage were echoed across the other stages at the conference:

- How do we take solutions and technologies to the large industrial scale, and keep manufacturing in Scotland?
- How do we help start-ups 'bridge the innovation gap', in terms of commercialising research and raising finance?

IBioIC in numbers

100

IBioIC will soon welcome its 100th PhD student

39%

39% of global energy related emissions come from building operation and construction

105+

105+ audience engagements and 11+ connections made on this stage

£1.25m

in resources to stimulate growth of the bioeconomy.

170%

IBioIC has helped the growth of industrial biotechnology associated turnover in Scotland from £189 million in 2012 to £747 million in 2019, representing a growth of over 170%.



There's a big opportunity for the UK to take a leading role in a global, low-carbon civil engineering industry

Rebecca Lunn, University of Strathclyde

STAGE 5: SUSTAINABLE FOOD FROM LAND AND SEA

Hosted by SAIC – Sustainable Aquaculture Innovation Centre



Food production presents massive issues but also presents the solution. Sustainable food systems can help green recovery, inclusive growth and economic and social progress – and they can sequester carbon too.

William Clark, Zero Waste Scotland

Food production is responsible for about 28% of global emissions, and some say it will overtake the energy sector to become the largest cause of climate change. In addition, there are challenges around biodiversity, food safety, food (in)security and poverty, and the sustainability of rural economies.

Kicking off the afternoon's exploration of the key themes, challenges and possible solutions was a panel discussion, featuring experts from industry, research and retail. Three points worth noting:

- Food systems are complex. Innovation and change are needed along the entire value chain – from livestock husbandry to resource utilisation to transportation to consumer behaviour.
- Coordination, both upstream and downstream and sideways, is essential –between industry and academic, between sectors (e.g. food production and technology), and between government, businesses and the public (e.g. using policy and legislation to promote change).
- If we get this right, there are significant opportunities to create high-value rural businesses and export Scottish expertise for global good.

And what can make a difference?

Genetics, vaccines, animal feed, data, sensors, novel proteins, insects, bioenergy, e-vehicles, and mechanisms for helping small, time-pressed producers get on board with radical change – according to the panel.

Meanwhile, in the chat

263 chat comments from the audience

16+ resources shared and connections

We saw in action how contested the food sector can be, with debates about land use, fish farming, animal feeds, local food production, and much else besides.

NOVEL FOOD PRODUCTION

Two sessions illustrated the new partnerships and approaches needed to drive change.

1. Rethinking how we produce: Peter Rowe of Deep Branch Biotechnology introduced a project seeking to capture CO₂ from bioenergy generation and convert it into protein for animal feed. The 10 partners include Drax, English and Scottish universities, SAIC and Sainsbury's, covering every element of the value chain from CO₂ capture to commercialisation and consumer attitudes.
2. Rethinking how we consume: William Clark of Zero Waste Scotland looked at new options for producing and consuming protein, including microalgae, insects and mushrooms. He too said it was critical to engage stakeholders along the entire supply chain – from how we treat the soil to how we manage waste.

The first two sessions were big-picture, looking at how we can 'reinvent and reimagine' our approach to the built environment and transform the way we build.

Approaches, projects and models discussed included Dubai's Sustainable City, the SNRG Courtyard template for energy-efficient neighbourhood design, and the HALO urban regeneration project on the former Diageo bottling site in Kilmarnock. Among the asks and recommendations were:

- Flatter, decentralised approaches to decision-making.
- "Town centre first, let the people be involved in the process" (Marie Macklin, HALO).
- "Regulators needs to be partners, they need to share the risk. SEPA can bring partners together to support innovation, talk to us about innovation" (Terry A'hearn, CEO of SEPA).

AN OLD IDEA REVISITED: SEAWEED

Michele Stanley, of the Scottish Association for Marine Science (SAMS), talked through her research on seaweed cultivation:

- Coastal communities have long known the value of seaweed as food, fertiliser and for other uses; now SAMS is revisiting this, as an opportunity to capture CO₂ from the oceans. Possible markets for seaweed include food, cosmetics, pharmaceuticals, chemicals and bioenergy.
- The SAMS project illustrates some of the 21st-century issues determining whether a seaweed industry is environmentally, economically and socially sustainable: disease management, carrying capacity, co-existence with other marine users, infrastructure and social licence.

DIGITISING THE FOOD SECTOR

The food and drink sector often struggles with technology skills gaps, and technology companies are often unaware of the opportunities in the sector. Allan Cannon of R3-IOT showed how his own company sees growth opportunities on land and at sea:

- Data and digitalisation have a key role in sustainable food production – helping farmers to monitor environmental data, animal health and resource use, in order to boost efficiency and productivity.
- Poor rural digital connectivity has been a barrier to technology adoption; however, R3 are using satellite technology to fill connectivity gaps.

THINKING POINTS AND NEXT STEPS

- How do we make better connections between technology businesses and sectors such as food and drink?
- Given the interest on all stages in how to change consumer behaviour, it was interesting to see Sainsbury's involvement in the Deep Branch project: is there scope to involve retailers, with their knowledge of consumers, in other IC collaborations too?

STAGE 6: TRANSPORT

Hosted by CENSIS, the Innovation Centre for sensing, imaging and Internet of Things (IoT)



Technology is the tip of the iceberg – there's so much sitting below that.

Claire Haigh, Greener Journeys

Transport makes a significant contribution to global greenhouse gas (GHG) emissions; it's also an area where many people are resistant to change. Technology transformation is happening apace but, as this session showed, there's so much more to think about: policy, legislation, infrastructure, pricing, and how to change hearts and minds.

The session covered the whole spectrum of transport from commercial shipping to public transport and active travel; the role of digital solutions and data; and how we drive culture change and a Just Transition that doesn't exclude, e.g., rural areas.

URBAN AND ROAD TRANSPORT

Topping and tailing this stage were Transport for Edinburgh and Stagecoach, with both showing:

- how they are cutting emissions through new vehicle standards, electrification etc.
- that change comes from a complex mix of (1) legislation / policy, (2) technology and standards, (3) travel patterns (e.g. post-Covid behaviour on working from home, and using public transport), and (4) internal change (e.g. driver training to improve fuel efficiency & safety).

Stagecoach also talked about its CAVFORTH project, trialling the use of autonomous buses going between Edinburgh Park and Fife, over the Forth Road Bridge, in 2021:

- The trial will test, among other things, whether AVs can reduce fuel usage and operating costs.
- Like many other projects mentioned at the event, it involves a multi-partner collaboration, in this case the service provider, the manufacturer, an innovative SME, and different universities.

DRIVING CHANGE THROUGH DIGITAL

An animated panel session, involving Fuse Mobility, Chargetrip and IBM raised many interesting points. Key takeaways were:

- Digitally-enabled solutions, sharing data and building collaborative platforms can help us to use technologies and assets more efficiently; make more informed choices; and ease / accelerate the consumer transition from traditional mobility to e-mobility.
- Doing this 'right' requires us to think about reliability of data, data privacy vs the creation of value from sharing it (e.g. privacy is often used as an excuse not to share); and standards – for compatibility, validity, aggregation from different sources, governance etc.
- The panel's visions for the future included "complete end-to-end integrated transport solutions underpinned by data – so everyone can plan a journey and make informed decisions on a dynamic basis", and "a future where shared mobility and electrification are the norm".

Transport in numbers

£3.8bn

by 2035 - the business opportunity according to Smart Green Shipping (retrofitting and building new ships)

£55m

bus ticket types in the UK – one reason why consumers need transport data platforms

1m

barrels a day – the reduction in global oil demand as a result of EVs usage

198

engagements in the chat

20+

connections, introductions and resources shared

DRIVING CHANGE THROUGH CULTURE AND BEHAVIOUR SHIFT

A second panel session involved thinkers on future mobility, Mobility as a Service (Maas), sustainable travel and rural mobility discussing how to reduce the need for travel, and how to reduce emissions and (private) vehicular dominance when travel is necessary. Key points raised were:

- We have the technology for MaaS but have to think about digital access and about the services and infrastructure being there – especially in rural areas.
- Deterrents to active travel: safety, pavements in rural areas, information about routes.
- Price signals, e.g. public transport, road pricing.
- How to sustain Covid-19 interest in active travel when traffic rising again.
- Issues post-Covid – affordability of fuel-efficient cars, risk of fallback and social inequality.

Policy and legislation were seen as essential to address the issues. Throughout this session, there was much engagement on the chat (from buses in Brechin to bigger points about future car ownership).

FLAGSHIPS OF THE FUTURE

A very different perspective on transport came from Di Gilpin of Smart Green Shipping, which is working on a whole-systems solution for reducing emissions from commercial shipping.

- 90% of everything we consume is moved by sea at some point during its lifecycle, and shipping's

carbon emissions are about the same as those from Germany or other industrialised countries.

- Key elements of the solution include retrofitting existing ships; and using windpower and hydrogen to transition to 100% renewable-powered shipping.
- Next step is a commercial demonstrator to engage investors and ship operators /owners
- The team wants to put a test rig outside COP26 – “a very visible 14m symbol of hope and ingenuity and capability in dealing with this hard-to-decarbonise sector”, in a place that used to be pre-eminent in shipbuilding. Attendees in the chat loved this idea and the linkages with the Clyde.

THINKING POINTS AND NEXT STEPS

The issues coming up on the transport stage, and from the chat during sessions, overlapped with other stages and suggest some common themes that ICs could thinking about collectively and/ or in future events:

- Behavioural change: does it come from top-down policy and legislation or from other approaches?
- Game-changing projects will often involve partners who don't yet know each other. How do the ICs leverage their strengths here?
- How do we facilitate access to private-sector finance for commercial-scale projects?
- How do we connect and facilitate more multi-partner projects like CAVFORTH, and how do we ensure that Scotland is a testbed of choice for similar projects?

CLOSING SESSION

The closing session was chaired by Dr Poonam Malik (Board member, Scottish Enterprise) with the CEOs of the seven ICs. She did a superb job of summing up the day and the key questions it raised:

- The need for practical actions and steps – what can citizens and businesses do? And how can ICs and others help them?
- Can we use the changes from Covid to make long-term change?
- How can ICs support the move to whole-system innovation?

The IC CEOs in turn gave some excellent answers. One quote from each of them helps to sum up their own stages, the day overall and their thoughts on what happens next.



The critical thing that ICs have is NETWORKS – we're all incredibly well connected with government and public sector and industry and academia and other partners.

Stephen Good, CSIC



We will continue to look for cross-IC collaborations, and also think about incorporating climate change in every project.

Marian McNeil, PMS-IC



I'd love to see knowledge hubs set up to transfer the knowledge from one IC to another – or from one food production sector to another.

Heather Jones, SAIC





The cross-IC working is for us a huge opportunity, and we will continue. Another thing we want to do is grow and develop indigenous sustainable supply chains.

Mark Bustard, IBioIC



There is a significant opportunity to look at binding public and private investment to innovation, and there's more to be done on that.

Paul Winstanley, CENSIS



[In getting citizens to act individually or collectively] one thing that is really important is engaging with our youth, and getting them more involved in events like today, the programme for the future, and programmes that inspire them.

Gillian Docherty, The Data Lab



We are very fortunate in Scotland – we have developed safe spaces to bring all the actors together – from government through to broader public sector – with industry, with academia, with our citizens, to innovate. That sets us apart.

George Crooks, DHI



FINAL POLLING

Countdown to COP 26 - Virtual Conference November 2020

During the day, attendees were invited to answer seven polling questions. Final results showed that:

99%

of respondents think **collaboration** is essential in tackling climate change.

82%

think **innovation** is essential

Only

13%

think it is very likely Scotland **will meet** its 2045 net-zero targets;

82%

think it is **likely but not easy**

Individual behaviours

29%

and **policy environment**

26%

were the factors thought most important for achieving net-zero and Just Transition

Asked who has primary **responsibility** for **reducing carbon pollution**, a majority

56%

said government

Topics seen as most useful for a 2021 event were: financing our **net-zero future**

24%

public & private sector collaboration

17%

rethinking land use for net-zero

11%

and education

10%

COLLABORATING TO REACH NET-ZERO TARGETS

To discuss ideas and innovations to help Scotland reach net-zero targets, please reach out to our Innovation Centres.

CENSIS – Innovation Centre for sensing, imaging and IoT

Accelerating business growth using sensing, imaging and IoT technologies

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CSIC - Construction Scotland Innovation Centre

Innovation is defined as “change that unlocks new value”

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DHI - Digital Health & Care Innovation Centre

Innovating in digital

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IBIO - Industrial Biotechnology Innovation Centre

From concept to adoption, enabling bio-based growth

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PMS-IC - Precision Medicine Scotland Innovation Centre

Enabling the development of new products and services for a global market

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SAIC - Sustainable Aquaculture Innovation Centre

Industry success through research partnerships

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The Data Lab - Scotland's Innovation Centre for data and AI.

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SCOTLAND'S COUNTDOWN *to* COP26



The Herald 
SEVEN DAYS


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