The Essex Climate Action Commission (ECAC): Review of Impacts 2020-2024

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Executive Summary

The Essex Climate Action Commission (ECAC) was set up by Essex County Council in 2020, with 40 independent commissioners and a secretariat supported by the Council. The ECAC's comprehensive report, *Net Zero: Making Essex Carbon Neutral,* was published in 2021 with 100 recommendations. Annex A contains a list of all Commissioners.

These recommendations were unanimously approved and supported by all political parties in Essex County Council in November 2021, alongside publication of the Council's first comprehensive Climate Action Plan that set out responses to the recommendations. The ECAC has since been referenced in climate action plans across Essex, including by NHS bodies and by other local authorities. ECAC is one of 26 place-based county and city commissions in the UK.

The ECAC recommendations addressed nature and green infrastructure, energy, waste, buildings and planning, water, transport, community engagement, and transition to a just and greener economy. Substantial innovations, technologies, behavioural change and collaboration in organisations and communities will be required to achieve Net Zero by 2050.

I am delighted that Essex has made substantial progress over four years. The ECAC Net Zero target is in line with the UK government and IPCC targets, and with international guidance, which state that 80% of the transformation will have to come from absolute cuts in greenhouse gas emissions. There is both an urgency to achieve substantive progress and yet also a window of time to establish effective and publicly-supported low-carbon processes, institutions, strategies and behaviours.

This impact report details 64 major impacts of the ECAC since publication of its main report in 2021.

We are working with partners across the county to show that climate action is both about becoming carbon neutral, and about addressing inequality and social justice, and creating visions for new ways of living. Additional strategies and projects of significance for the county now include the

Transport East Transport Strategy (2023); the Essex Renewal Project (2023); the Essex Water Strategy (2024); the Essex Waste Strategy (later in 2024); the Local Nature Recovery Strategy (later in 2024).

The ECAC recommendations were guided by three key principles:

i. Universality: ensuring policies and innovations are relevant to all the people of Essex;
ii. Many paths and options being offered for moving towards low-carbon living and working, so that individuals and businesses are able to select those that suit them best;
iii. Ensuring new ideas and practices are multipurpose and can be shown clearly to improve lives, thus increasing public engagement.

Public opinion on support for climate action has moved substantially in the 2020s. The proportion of UK public concerned about climate change has now risen to between 60% and 80%, with 10%-15% of the population not concerned. A total of 64% of UK adults have now made 1-2 changes to their lifestyle to reduce carbon emissions; 21% have made no changes. The middle 60% of the population (between the 20% already committed to climate action and another 20% agnostic or skeptical) now represents a key climate majority: they say they wish to see appropriate and ambitious policies and wish to be guided to take action themselves.

Here I am summarising the major impacts of the response to the ECAC recommendations over four years. These are organised into eight themes: improvements to nature and green infrastructure, the energy transition; cutting and recycling waste; addressing water shortages; changing the built environment; more sustainable transport; building social capital in communities; and creating the greener economy by just transitions.

Major achievements in nature and green infrastructure include the establishment of a new Climate Focus Area by Essex County Council, working with District, Borough and City Councils alongside local communities. This CFA covers a third of the county (120,000 hectares of land, plus 11,000 hectares of estuary), and has seen new parish level nature recovery plans developed with residents, new farm clusters emerge and new investment plans of some £2.5m for regenerative farming and green infrastructure.

The Essex Forest Initiative has resulted in 400,000 trees being planted, and ECC has led best practice in installing approaches to natural flood management.

Under energy there have been 600 solar installations on residents' roofs via ECC's Solar Together program. EDF and the Clacton-based CB Heating have built a new heat pump installers training academy. ECC has supported the roll out of retrofit training and the uptake of community energy schemes by 15 community groups and 12 parishes.

Under buildings, Essex private developers have established a new Developers' Charter. This is the first in the country. The Essex Planning Officers Association has developed the Essex Net Zero Policy Position for Homes and Buildings, and ECC has worked with partners to publish new award-winning green infrastructure standards.

Similarly, ECC was ahead of the new national requirements for schools: all new school buildings have been Net Zero since 2021.

A large number of community climate and nature groups have been formed across the county, a carbon cutting app has been launched, and climate advice packs sent to businesses, schools, early years' settings, and residents.

The extensive work across Essex has been shortlisted for national and local government awards over three years and has won a number of plaudits.

Achieving net zero is an enormous challenge, requiring the greatest economic and social shifts since the industrial revolution. No wonder it is hard. Yet at the same time, a social tipping point appears to be close, with 60-80% of the public now supporting actions and policies to reduce the adverse effects on climate and nature.

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1. Place-Based Climate Action Commissions

A number of place-based climate action commissions in the UK are becoming effective innovation platforms, improving nature, creating green jobs and producing wider social and economic benefits through convening power and co-production.

These were inspired by an ESRC-funded project and network at the University of Leeds (PCAN), and by mid-2024 some 26 commissions had been established in cities, counties and sub-regions[1]. Commissioners are independent and voluntary, and are drawn from the public, private and voluntary sectors.

Each Commission provides a novel institutional architecture situated between national government and individuals in their communities. Such place-based decarbonisation in so-called super-places is acknowledged worldwide as playing a key role in demonstrating climate transitions, regardless of national politics. In the UK, this close engagement with the concerns and interests of the public within regions has ensured that opportunities for change are embedded in and emerge from the local social, economic and cultural norms and structures.

The Essex Climate Action Commission (ECAC) was established by Essex County Council in 2020. It produced a comprehensive 2021 report setting out multiple pathways for progress to net zero for the county of Essex by 2050: *Net Zero: Making Essex Carbon Neutral*[2]. This report set out more than 100 recommendations addressing nature and green infrastructure, energy, waste, buildings and planning, water, transport, community engagement, and transition to a just and greener economy.

All recommendations were adopted as a package by the cabinet of Essex County Council in November 2021, and endorsed unanimously by all political parties.

[1] See PCAN: https://pcancities.org.uk/. The 26 intermediate climate commissions are in Aberdeen, Belfast, Bradford, Bristol, Cambridgeshire & Peterborough, Cardiff, Cornwall, Croydon, Derry & Strabane, Doncaster, Edinburgh, Essex, Kirklees, Leeds, Lincoln, South & East Lincolnshire, Manchester, North-East, Northern Ireland, Norwich, Perth & Kinross, Southampton, Surrey, West Midlands, York, and Yorkshire & Humber.

[2] For more on the Essex Climate Action Commission, see https://www.essexclimate.org.uk/ and https://bit.ly/3wgHRY5

The ECAC has 40 independent commissioners and is supported by a secretariat provided by Essex County Council. The commissioners work across seven Special Interest Groups (SIGs), which address the major themes of the transition to net zero. In 2021, ECC also appointed the country's first Climate Czar (Councillor Peter Schwier). ECC has also set out a £250 million action plan to address the acknowledged wide range of recommendations.

The role of the ECAC is to monitor and drive implementation of these recommendations across greater Essex by i) advising on priorities for direction; ii) reviewing and evaluating progress towards net zero; iii) supporting the adoption of climate positive policies and practices at all levels of local authorities in the region; iv) facilitating collective action across the county; and v) encouraging public engagement with residents, businesses, schools, communities, third sector organisations and other institutions of Essex.

This impact report details 64 major impacts of the ECAC since publication of its main report in 2021.

2. How Public Opinion on Net Zero is Changing in the UK

Recent research on negative tipping points has identified a growing risk of sudden and unexpected changes occurring to climate and nature systems before 2050. These include the potential collapse of the Gulf Stream, death of tropical coral reefs, abrupt melting of the Arctic permafrost and mountain glaciers, the end of Arctic summer sea-ice, permanent shifts in the Sahelian and Indian monsoons, losses to the Greenland and West Antarctic ice sheets. If such sudden ruptures did occur, it would be difficult to find a way to return to prior system states.

At the same time, many also recognise the potential for positive social tipping points, where small initial perturbations again can lead to large regime shifts[3]. Unprecedented changes in paradigms and worldviews are now needed to produce the collective action and new social norms that would cascade across whole countries and economies[4]. Interestingly, public opinion seems to be moving fast in the UK and elsewhere.

Here it is important to consider both public opinion and public engagement. Public opinion refers to what people think, and is typically measured by opinion polls and surveys. Public engagement refers to how people interact to develop, adapt and adopt ideas, solutions and technologies, and is thus focused on actions and behaviours. Each influences the other: how we think can shape readiness to adopt new habits; equally, new policies and technologies can cause new behaviours that lead to changes in the way we think. Climate change is becoming experiential: through their own actions the beliefs of people are changing.

Favourable public opinion towards climate and nature is not a necessary prerequisite for action, but it helps. Unfavourable opinion is hard to overcome, especially when in the form of organised opposition. Evidence suggests there is a division of public opinion into three groups within populations. This we call the 20-60-20 model. It is also clear that there are social thresholds and

[3] See https://global-tipping-points.org/; and Lenton T M and colleagues (eds). (2023). *The Global Tipping Points Report 2023*. University of Exeter, Exeter

[4] See blog post at Academy of Social Sciences: Pretty J (2023). Using Hope to Inspire Action: https://bit.ly/3wyufav

tipping points which, when passed, result in whole system change. Not all public groups need to be engaged before such abrupt changes.

But first, what does public opinion data say? Evidence is now showing that public opinion in richer countries has been changing fast (see Table 1 note for references). The proportion of the population believing climate change is happening and is caused by human action has risen in the past ten years: in China, Germany, UK and USA from the 40%-60% range rising to 60%-75% (Table 1). For other countries (Ireland, Italy, Norway, Poland), recent (2023) data also suggests a range of 61%-82% for the proportion of the population who believe climate change is caused by human activity. The proportion of public who do not believe in climate change or actively oppose actions generally varies from 5% to 14%.

In the UK, there is support amongst all voters, in all age groups, and across all four countries. The lowest support is amongst individuals with more than £100,000 income. The public say they are optimistic about the benefits of Net Zero policies and like to hear that progress is being made. Most people in the UK obtain their information on climate change from linear TV news and programming.

There is also high support for co-benefits of climate and nature action amongst the public. These actions tend to do more than one job: they are multipurpose, and this is increasingly recognised by the public. Between 53-76% of the UK public cite co-benefits of climate action as being important, such as reduced air pollution and reduced personal travel costs from increased adoption of BEVs (battery electric vehicles). Priorities mentioned by the public include warmer homes that are cheaper to heat, improved energy security, improved air quality and health, reduced inequalities, easier connections with nature, reduced risks of flooding, stronger communities, and job creation.

Some 60-70% of people also support BEV and heat pump subsidies, frequent flier levies, environmental pricing, low-traffic neighbourhoods, and provision of plant-based food options. Climate worry and fairness remain the most widely expressed concerns. There is greater support for policies if they address immediate problems perceived by the public (e.g. congestion, pollution) and have clear benefits for society.

Public opinion now shows high support for Net Zero and related climate policies, especially when they are non-coercive and offer multiple choices and pathways involving subsidies, financial support, information, and support for local organisations. Across six countries of Europe, 50% of people say they know what they need to do, but 42% do not know and would like advice.

In the UK, 8% of adults have made many changes to their lifestyles, and an additional 64% have made 1-2 changes.

We turn now to engagement priorities and come back to the 20-60-20 model. In economics, the 80-20 Pareto Rule suggests that market tipping points occur once 80% of people or institutions have adopted a new practice (technology, behaviour). Another way of looking at this is that once you get to 80%, you do not need to worry about the remaining 20%. In the IPCC's Race to Zero campaign, this guideline is used for targets: members must sign up to 80% absolute reductions in emissions, with only a maximum of 20% coming from carbon sequestration and removal commitments. There were 11,000 member regions, mayoralties, cities and major businesses signed-up by mid-2024.

As indicated above, public opinion regarding the existence of climate change and its causes is approaching the 70%-80% mark. This is not sufficient, though, to cause social tipping points. These

will only come about when opinions and attitudes are translated into active behaviours and expressed choices.

Across countries, adoption of low-carbon options within sectors rarely exceeds 20% (with some exceptions, such as whole country adoption of domestic renewable energy, or subsidised BEVs in Norway). In readiness for actions regarding climate, the first 20% of the public are already committed, understand the climate crisis and are probably taking some action (this includes the so-called radical flank). The last 20% comprise agnostics, deniers and delayers, some of whom are visible and loud, and could lead to backlash movements. The middle 60% is now being called the climate majority: they understand something is wrong with climate and weather, but do not yet know what they are able to do.

This is the 20-60-20 heuristic (rule of thumb). The first 20% of the public understand and are taking action; the final 20% can be assumed to have to change after social tipping points are passed. It is the middle 60% who will now determine the pace of change of climate actions. And this in turn will be shaped by the types of public engagement deployed, and the range of options offered to the public.

Annex B contains a table that summarises well-known ecological, social and technological regime shifts. Some have been fast, others slow. Some systems are still at the early stage but have hope of expansion, and others of significance that remain at a low of 0-5% adoption. Some countries are more advanced than others.

It is evident that social tipping points are being reached or passed on a number of key targets, innovations and technologies relating to climate action and Net Zero. This could make local action easier and faster. However, personal transformations are hard. We're in a tight spot – now what next? Something is about to change. Yet we have never been here before. We are in the dark forest, at our darkest hour, and there does not seem to be an obvious path.

We now need stories with hope, and then to find a way to use these to create greater and more effective agency to address the great crises of these times[5]. Story is rarely only about data, evidence, sales figures and graphs. It is about the challenges people face, how we feel and how we succeed. A good story contains emotion, shows how to overcome adversity, how to incorporate responsibility to others and the planet.

A good story for an organisation centres on how their ideas improve lives. Good stories are always about engagement with the public: audiences, readers, listeners, members and customers.

An organisation succeeds when it tells a story not about itself, but how it is guiding people to make the world a better place. How it is, in short, improving lives. These are important principles for the ECAC and institutions of Essex.

[5] For more on story, see The Climate Chronicles by Jules Pretty at https://julespretty.com/; Using Story for Transformation: https://bit.ly/4aVLL8a; and Blog post on ClimateCultures website: The Next Dawn of Everything: https://bit.ly/3w5v3n6

Table 1. Summary of public opinion data from 8 countries, 2020s

Location	Date and references	Measures of public opinion		
		Proportion believing climate change is happening	**Proportion believing climate change is human-caused**	**Proportion who do not believe in climate change and/or are opposed to action**
China	2016 (Liu, 2023)	79%	74%	
USA	2022 (El-Armali & Rahimian, 2024)	72%	59%	
UK	2013 (Ipsos-Mori, 2023)	60%		34%
	2023 (Ipsos-Mori, 2023)	77%		5%
	2023 (ONS, 2023)	72%		7-11%
	2024 (YouGov, 2024)	66%		10%
	2023 (ECIU/IEMA, 2023)	73% (of Conservative party voters)		19% (of Conservative party voters)
	2023 (Onward/Public First, 2023)	56%		13%
		Proportion believing climate change is already causing damage in own country		
Six European countries (Germany, Ireland, Italy, Norway, Poland, UK)	2023 (KCL, 2023)	62%	74%	16%
Germany	2023 (KCL, 2023)	64%	72%	18%
Ireland		65%	81%	11%
Italy		70%	82%	10%
Norway		46%	61%	24%
Poland		66%	76%	16%
UK		60%	72%	17%

Sources: Summary of recent polls reported and analysed in these references from 2023 to mid-2024:

Drews S, Savin I, Van Den Bergh JC and Villamayor-Tomás S. (2022). Climate concern and policy acceptance before and after COVID-19. *Ecological Economics*, *199*, p.107507.; ECIU. (2023). Public embarrassed by politicians that renege on climate pledges. At: https://eciu.net/analysis/polling-cards/public-embarrassed-by-politicians-that-renege-on-climate-pledges;El Armali J and Rahimian M. (2024). Public climate change agreement and GHG emissions in the US. *International Review of Applied Economics*, pp.1-7.; IEMA. (2023). UK public remains supportive of net-zero target. Institute of Environmental Management & Assessment. At: https://www.iema.net/articles/uk-public-remains-supportive-of-net-zero-target; Ipsos. (2023). Political Monitor. One in four Britons think climate change is out of control. At: https://www.ipsos.com/en-uk/one-four-britons-think-climate-change-out-control; Jennings N and Paterson P. (2023). How do UK citizens perceive the co-benefits of climate action? Grantham Institute and PCAN Report. DOI: https://doi.org/10.25561/106595; KCL. 2023. *Public Perceptions on Climate Change*. Perita: Policy, Expertise and Trust. The Policy Unit. Kings College London. At: https://www.kcl.ac.uk/policy-institute; Levi S, Wolf I, Sommer S and Howe PD. (2023). Local support of climate change policies in Germany over time. *Environmental Research Letters*, *18*(6), p.064046; Liu JC-E (2023) Public opinion on climate change in China—Evidence from two national surveys. *PLOS Clim* 2(2): e0000065; ONS. (2023): Public opinions and social trends, Great Britain: 15-26 November Bulletin 2023. At: https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing/bulletins/ ; Poortinga W, Whitmarsh L, Steentjes K, Gray E, Thompson S and Brisley R. (2023). Factors and framing effects in support for net zero policies in the United Kingdom. *Frontiers in Psychology*, *14*, p.1287188; Public First. (2023). *Hotting Up. How we get to net zero in a way that brings people with us*. At: https://www.publicfirst.co.uk/public-first-polling-on-net-zero-for-onward.html and https://www.ukonward.com/reports/hotting-up/ ; YouGov. (2024). At: https://yougov.co.uk/topics/politics/explore/issue/Climate_change

3. New Regional Strategies Developed and Launched

The ECAC set one overarching target: the achievement of net zero for the county by 2050. This is in line with the UK government and IPCC targets, and will require a large number of new processes, policies, technologies and behaviour changes. Globally, the IPCC through the Race to Zero project has set targets of 80% for absolute reductions in emissions (from the current 56 Gt CO_2eq to approximately 11 Gt), with the remaining 20% expected to come from carbon removals (largely by land and sea ecosystems).

Measures of impact on emissions are thus critical. Nonetheless, it is also important that appropriate strategies are in place to guide the institutions and individuals of Essex, and to shape financial decisions. A strategy on its own does not, of course, guarantee impacts, but it is often a pre-requisite to fast action.

The ECAC's own 2021 report with 100 recommendations is one example of an important statement of policy and targets that is already guiding local action and impact.

Additional strategies and projects of significance for the county include:

- The Transport East Transport Strategy (2023);
- The Essex Renewal Project (2023);
- The Essex Water Strategy (2024);
- The Essex Waste Strategy (later in 2024);
- The Essex Cycling Strategy (later in 2024)
- The Local Nature Recovery Strategy (later in 2024).

4. Key Impacts of the ECAC

4.1 Improvements to Nature and Green Infrastructure

Essex has a nature crisis as well as a climate crisis. Over the last century, large areas of meadow, hedgerow, fresh and saltwater marsh, orchard, and woodland, together with associated wildlife, have been lost, primarily due to intensification of agriculture and growth of cities, towns and villages. Essex has one of the lowest proportions of land area under trees in the UK and many local species could suffer extinction. In making its recommendations, the ECAC deliberately targeted land use measures that address both the nature and climate crises.

We are already locally feeling the effects of climate change including water stress, extreme heat, increased risk of flooding and subsidence, soil loss and coastal erosion. The creation of natural green infrastructure is designed to help use land to mitigate these risks, whether through increasing shade cover, absorbing intense rainfall, storing water for when it is needed most and retaining soil. Green infrastructure is essential if we are to adapt to the changing climate and build our resilience as a county.

Land use, nature and green infrastructure have been a major focus for climate action in Essex. Key impacts include:

i. The first Climate Focus Area (CFA) in the UK was created by ECC to pilot accelerated climate action. Located within the River Blackwater and River Colne catchment areas, the CFA covers nearly a third of the county (120,000 hectares of land plus 11,000 ha of estuary). Activities within the CFA include a series of workshops run by ECAC Commissioner Professor Peter Hobson from Writtle University College and attended by individuals from 40 organisations; participatory processes at parish level leading to Nature Plans for the parishes of Stisted, Tiptree and Wivenhoe, and the creation of farm cluster (see below.) One of the most significant impacts of establishing the CFA is the increased focus that partners have put in their work in this area, including significant research and project delivery.

ii. The Local Nature Partnership, chaired by ECAC Commissioner Dr Simon Lyster was established in 2022 and is currently helping develop the Local Nature Recovery Strategy which ECC is responsible for creating. This is due to be launched in December 2024. The LNP targets are as follows:

a. 50% of farmland under sustainable farming by 2030;
b. Increase in green infrastructure from 14% of area to 25% by 2030;
c. 1 in 4 people of Essex taking action for wildlife;
d. Local access to high quality green space for all people of Essex.

iii. Three active Farm Clusters have been set up with funding from ECC, the Environment Agency, Essex and Suffolk Water and Anglian Water. These bring together farmers and landowners to collaborate on sustainable farming, climate resilience and nature recovery. The North Essex Farm Cluster for River Colne and Blackwater has membership covering 18,000 hectares and includes 4 farmers.

iv. Award-winning Green Infrastructure Standards were developed by ECC working with stakeholders from across the county and published in 2022. The standards set out practical guidance to housing developers for the protection, enhancement, creation, and management of Green Infrastructure in Essex.

v. ECC's Essex Forest Initiative has planted 414,000 trees and 51 km of hedgerows in four years, along with creating 75 hectares of new woodland. The 3,500 urban trees planted are supported by the Forestry Commission's Urban Tree Challenge Fund and Local Authority Treescape Fund. EFI now has two working tree nurseries and has attracted funding to establish Essex Orchards.

vi. Natural Flood Management schemes introduced including the release of beavers at Spains Hall (supported by ECC, the Environment Agency, Essex and Suffolk Rivers Trust, Atkins and Essex Wildlife Trust). The ECC Capital Flood team have built numerous leaky dams in upstream watershed areas near Wivenhoe, Harlow and Thaxted.

vii. Roadside SUDs (sustainable drainage systems) features, also known as Rain Gardens, have been established in Canvey Island and Brentwood, focusing on green solutions rather than engineering with funding from ECC and Anglian Water.

viii. The Essex Net Zero Innovative Futures Project, led by ECC, identified nature-based projects at four pilot estates and produced investment cases for the opportunities identified. These amount to a total of 500 hectares of habitat enhancement and/or creation including woodlands, grasslands, sustainable land stewardship practices and wetlands. The cumulative investment needed across three of the estates is £2.5 million. This project has created a template for other landowners in Essex to follow.

4.2 The Energy Transition

Energy provides heat and electricity for homes and places of work, and powers transport. A long-standing reliance on fossil fuels (coal, gas and oil) has resulted in energy generation being responsible for 21% of the UK's greenhouse gas emissions. Good progress has been made in recent years to decarbonise – reducing greenhouse gas emissions from electricity supply by phasing out the remaining coal-fired power stations and growing the solar and offshore wind industries. What is needed now is to reduce greenhouse gas emissions from energy to net zero as quickly as possible. This can be achieved by decreasing energy consumption through improving energy efficiency of buildings, changing behaviours and embracing cleaner and renewable energy technology.

In the International Energy Agency Net Zero Roadmap published in 2023[6], it was concluded there have been worldwide "extremely positive developments, notably rapid progress of clean energy technologies, such as solar PV and EVs, backed by significant policy efforts." Globally, the IEA believes strong growth in clean energy means the world can deliver fossil fuel emission cuts of 35% by 2030. The IEA also say, we have the tools to go much faster, and that there is now a need for "a fierce urgency of the now."

The energy transition has been a major focus of climate work in Essex. Key impacts include:

i. ECC, the District, Borough and City councils have worked together to unlock a total of more than £50 million in government grants for domestic retrofit since 2021. Families with an income of under £30k per annum and who live in a cold home (EPC D or below) can obtain grants of up to £10k for insulation and new heating systems.

ii. Award-winning work on Community Energy: ECC is now working with 15 emerging and established Community Energy Groups and 12 Parish Councils, to support community-led energy projects (approx. 900 households involved). Community energy groups include the Tollesbury Climate Partnership, Sustainable Danbury, Saffron Waldon Community Energy, Community Energy Colchester.

[6] IEA (International Energy Agency). 2023. *Net Zero Roadmap. A Global Pathway to Keep the 1.5°C Goal in Reach*. IEA, Paris. At www.iea.org

iii. A whole-village approach for decarbonising heat and power is being piloted by Littlebury in Uttlesford, with support from Uttlesford District Council, and promoted by the community energy group in Maldon.

iv. ECC is developing "community power stations" with two communities in Essex – Colne Valley and Manningtree – through Innovate UK funding. This will include installation of solar and PV battery across a joined-up network of several hundred domestic and commercial roofs in both locations.

v. Solar Together Essex (an ECC-led group-buy scheme for solar panels) has delivered 2,280 Solar PV installs on roofs in Essex since 2018 (generation capacity of 8.4 MW). This will avoid over 1,980 tonnes of CO_2eq annually (49,506 tonnes of CO_2eq across the 25-year system lifetime). There have been 5,669 registrations for the scheme in 2024.

vi. ECC has installed solar panels at 31 schools in Essex with a combined generation capacity of 1.05 GW.

vii. Essex Highways have installed 30,200 LED streetlamps, reducing both total regional energy consumption and running costs (with 2000 remaining to be converted).

viii. Large Scale Renewables: consent granted for Longfield Solar Farm, which will produce energy to power 96,000 homes per year, making it the largest operational solar park in the UK.

ix. The Northern Gateway Heat Network innovative flagship project being developed by Colchester Amphora Energy Ltd in partnership with Colchester City Council (CCC.) The scheme will provide low carbon heat to 200 houses, 450 flats, 35,000m² of office space and 9,000m² of healthcare facilities.

4.3 Cutting and Recycling Waste

Nearly 650,000 tonnes of household waste are collected each year by councils in Essex, with more being picked up by commercial waste companies from businesses and industry. The average Essex household throws away almost one tonne of waste each year, which is more than most other parts of the country. Although we are recycling more than ever, with around 50% of household waste being reused, composted, or recycled into new products, progress has slowed over the past decade and there are still some recyclables that are thrown away in general rubbish.

Managing Essex's recycling and waste has an impact on the climate and local environments. With changing lifestyles and expected population growth, it is likely that the amount of waste created will increase unless action is taken. The greatest impacts for the environment come from reducing the amount of waste generated, reusing and repairing more, and recycling as much as possible.

To address this challenge, the Essex Waste Partnership, which comprises the 12 district, Borough and City councils together with Essex County Council, has developed a joint draft Waste Strategy for Essex for the period to 2050. The draft strategy is founded on the principles of the Circular Economy and the Waste Hierarchy. Following an extensive public consultation which demonstrated good levels of support for the strategy proposals, a final version is in development and each partnership council will take decisions on adopting the strategy in 2024.

The ambitious strategy sets a clear vision and stretching targets that will have clear impacts on the climate transition for Essex:

i. Accessible recycling services for all by 2026;
ii. 65% minimum waste reuse, recycling and composting target by 2035, with an ambition to achieve 70%
iii. Stopping using landfill by 2030;
iv. Cutting the amount of residual waste by 50% by 2042.

In support, a number of further actions have been taken. Essex County Council is investing in a £2.4 million programme that seeks to understand how to achieve a step change in waste reduction and recycling. An intervention designed to increase the proportion of food waste recycled has been

rolled out to around 375,00 households and early results are showing around a 20% increase in food waste recycling, exceeding the 10% target set.

A flexible-plastic recycling pilot is being delivered in Maldon to test operational approaches to collecting this difficult material to ensure all councils have a flexible plastic service by 2027. A new waste disposal tender was formally issued which aims to stop using landfill from 2028, 2 years ahead of the Waste Strategy for Essex target.

4.4 Addressing Water Shortages

Essex is a water-stressed area. The ECAC recognises that access to fresh water is a critical challenge for the driest part of the UK. The two reservoirs of Abberton and Hanningfield are key assets for both water and wildlife, and already rely on long-distance water transfers by river and pipeline from the Fens and Lincolnshire. Just 60% of the drinking water consumed in Essex comes from the county itself.

With climate change, plus the need to restore, protect and enhance the natural environment, the situation can be expected to worsen in coming years: by 2050 the East of England will experience a public water supply shortage of around 730 million litres of water per day. On top of this, Essex water quality is below the national average.

In 2024, Essex became the first county in the UK to publish a Water Strategy**.** The strategy was developed by ECC in partnership with Water Resources East, water companies, regulators, farmers, environmental groups, and other interested parties. It outlines the current and future water issues facing Essex.

The Water Strategy makes 30 recommendations on the best approaches i) to save water; ii) to support land use change and increase natural green infrastructure; iii) to develop new water supplies. We will report on the implementation of these recommendations in future impact reports.

Alongside the strategy, the council has worked in partnership with the Young Essex Assembly to create the Essex Water – Your Future online explorer. This tool includes videos explaining the water challenges in Essex and solutions suggested in the Essex Water Strategy.

4.5 Changing the Built Environment

Each year, some 17% of greenhouse gases are created in the UK by buildings, including homes, industrial and commercial property, hospitals, and schools. The greenhouse gases emitted from buildings are mainly the result of burning fossil fuels (gas and oil) for heating. Buildings are a significant contributor to the climate crisis. In Essex, there are 600,000 homes, 85% of which were built before the introduction of standards for energy and insulation performance. The built environment has been a major focus for climate action.

Key impacts include:

i. In 2022, the Essex Developers Group agreed a Climate Action Charter, the first of its kind in the country. This sets out the role of developers in helping to deliver net zero in Essex.

ii. Net Zero housing policy and viability evidence, commissioned by ECC, has been published in the Essex Design Guide. Research shows that a Passivhaus style Net Zero home reduces energy use down to 2-10 kWh from 40-50 kWh per m^2 per year. This amounts to a cut in energy use and costs for householders of 80-95%, thereby eradicating fuel poverty in homes built to this standard. The Essex Planning Officers Association is working with all the local authorities across Greater Essex to support the ambition to have climate resilient and better performance new build planning policies.

iii. A new ECC Climate and Planning Unit (CAPU) was set up in 2022 to formulate and drive the development of Net Zero housing policy and development, and to provide support to District Councils and house builders to be able to deliver these healthier, warmer Net Zero homes.

iv. The work of the CAPU team has supported two draft Local Plans (Uttlesford and Chelmsford) and the Chelmsford and Tendring/Colchester Borders Garden Communities in relation to the new home building standards. This equates to around 25,000 new homes being planned to be built to a net zero carbon in operation standard.

v. ECAC's target for all new schools commissioned from 2022 to be net zero has been met. All new schools in Essex which require planning permission are now Net Zero in operation.

vi. Uttlesford District Council and Chelmsford City Council have adopted the new Planning Policy Position for Net Zero Carbon Homes and Buildings in Greater Essex, which was commissioned by ECAC and led by ECC on behalf of all the Greater Essex Local Authorities.

vii. Impacts on the retrofit of the public estate include:

a. ECC has completed 24 solar installations on core estates and 32 solar installations in schools, and double glazing in 12 core estate buildings and 17 schools.

b. Full heat decarbonisation projects (e.g. heat pumps, solar, LED lighting) have been completed at 11 core sites including the Essex Records Office, Goodman House, and Great Notley Country Park and at 3 schools.

c. Colchester City Council has retrofitted its main office building at Rowan House; this is expected to save an estimated 140 tonnes of CO_2eq per year, contributing significantly towards the council's aims to achieve carbon neutrality by 2030.

d. Mid and South Essex NHS Foundation Trust has completed works at Broomfield and Basildon hospitals to improve energy efficiency, lower bills and reduce annual carbon emissions by 2,421 tonnes.

viii. ECC has launched the Stamp It Out campaign, calling on the government to abolish stamp duty on new net zero homes. This would make buying a Net Zero home cheaper than buying a standard home, driving demand in the market. This campaign is supported at a regional level by the East of England LGA, and by the ECAC Commissioners including Catherine Cameron of Agulhas who presented on the campaign at the PCAN conference in June 2023.

4.6 More Sustainable Transport

Transport is responsible for 27% of greenhouse gas emissions in the UK. Many current forms of transport are also a major source of toxic air pollution, notably nitrogen oxides and particulate matter, which damage both human health and the environment. The cars, vans and lorries on roads are an integral part of daily lives but are increasing air and noise pollution (with ill-health impacts on the public), and contributing to the climate crisis.

The ECAC recognises the need to challenge the status quo and find new, sustainable, and less harmful ways for transport systems to operate for all people. These transitions will include more public transport options, more options and infrastructure for active travel by cycling and walking, and more support for electric vehicles.

Transport East (a partnership of local transport authorities and operators in the eastern region) launched the Transport Strategy in February 2023, with an ambitious target for the region to meet Net Zero transport by 2040, ahead of the government target. The strategy commits to twelve goals that support residents in Essex to 'Avoid, shift and improve' their journeys: avoiding the need to travel, shifting to more sustainable modes and making existing modes of transport more efficient.

Key impacts of the ECAC over four years are separated into categories for Active Travel, Electrification of Transport, Bus and Rail, and Air Pollution.

<u>Active Travel: Cycling and Walking</u>

i. Essex County Council has secured £18 million of government Active Travel Funding to fund new cycling and walking routes, behaviour change activities, Healthy School Streets and walkable neighbourhoods.

ii. Over £360,000 of funding delivered in Cycle Grants to local community groups promoting and enabling cycling, of which around £30K supported under-represented groups.

iii. ECC has produced a new cycling strategy for Essex setting out a clear vision to see more people, of all abilities, ages and background, cycling in Essex more safely and more frequently. It focuses on six key outcomes designed to get more people safely out and about on their bikes, ditching the car for shorter journeys. The strategy is currently out for public consultation and will be finalised later in 2024.

iv. Essex Pedal Power is an ECC community cycling project launched in Clacton and Jaywick in 2021, and subsequently in Colchester, Harwich/Dovercourt and Basildon. It has given out some 2,000 free bikes, and recipients have travelled around 250,000 km, saving 29,061 tonnes of carbon.

v. The delivery of 27,707 Bikeability courses to children, 635 courses for adults and 83 courses for families, building skills on how to ride a bike safely and confidently.

vi. We have created Local Cycling and Walking Infrastructure Plans (LCWIPs) for nearly every district, helping us design a whole-county strategic cycling network, and get external funding.

vii. ECC's Sustainable Transport team launched the walking and nature app GoJauntly, which is a pocket-sized encyclopaedia of over a hundred carefully chosen urban walks. Over 239 million steps have been walked during three separate steps challenges since 2022 with estimated carbon savings of 61,916kg by people walking instead of driving.

Bus and Rail

viii. Together with First Bus, ECC have secured £4.8 million from the Department for Transport's Zero Emission Bus Regional Areas (ZEBRA) 2 scheme for a fleet of 55 electric buses in Basildon. First Bus is also investing £25.8 million into the scheme. This will also be spent upgrading the Basildon bus depot.

ix. ECC launched DigiGo, an electric shared public transport service which offers on-demand or pre-bookable travel in parts of Essex in April 2022. It transported over 41,000 passengers in 2023/24 (a growth of 210% on 2022/23). The service has been so successful that it will now run until at least March 2026; with the option of further extensions thereafter. Feasibility studies have also been commissioned for further DigiGo schemes in other rural areas.

x. 15 Community Rail train events, encouraging residents to take the train rather than the car to enjoy coastal and rural environments.

xi. In October 2021, ECC produced its Bus Service Improvement Plan to develop an attractive, sustainable, affordable bus network offering a realistic alternative to car use for as many people as possible.

Electrification of Transport

xii. ECC produced the Essex Electric Vehicle Charge Point Strategy in 2023. This sets out the vision and strategy to guide private sector delivery of charging infrastructure in Essex.

xiii. ECC also commissioned a charge point operator, Qwello, to install some 70 on-street charge points, ahead of a wholescale roll out of 8,000 public charging sockets by 2033, with approximately 4500 public charging sockets delivered by 2030. This will be funded by Qwello and £236,000 of funding the team secured via the On-street Residential Charging Point Fund.

xiv. ECC secured £720,000 of funding from the Office of Zero Emission Vehicles (OZEV) to expand the capability of the Electric Vehicle Strategy and Infrastructure team. The team has also reached stage two of the Local Electric Vehicle Infrastructure Fund (LEVI) where we have been invited to submit a business plan by mid July 2024 for an allocation of £8.4 million to rollout low-powered residential electric vehicle charging points.

xv. Two charging forecourts established at Braintree (Gridserve: 2020) and Colchester (FastNed: 2023), bringing larger scale rapid charging to Essex.

xvi. ECC E-scooter trials have been underway since 2020 in Colchester and 2021 in Chelmsford and Basildon. Some 2.6 million trips were recorded by May 2024, and these have been shown to have reduced car use at all three locations.

xvii. At the end of 2023 Essex had 13,821 registered zero emission Battery Electric Vehicles (BEVs) and 10,233 Plug-in Hybrid Electric Vehicles (PHEVs), estimated to be rising to 50k by 2025 and 220k by 2030. Around 70% of car and van carbon dioxide emissions could be saved by 2040 through switching to EVs (on average 2 tonnes per vehicle per year). BEVs also cut emissions of nitrogen and sulphur oxides, known to have negative health impacts on children and adults.

Air Pollution

xviii. Funded the Theatre in Education theatre group who have visited 126 primary schools reaching approximately 6,781 pupils to deliver interactive performances on Air Quality and what children can do, with their parents, in their local communities.

xix. We launched the new Essex Air website to improve awareness of air pollution and what individuals can do to make a difference. Our Air Quality Improvement Strategy is expected to launch this autumn.

4.7 Building Social Capital in Communities

The recommendations in the ECAC report were designed to be embraced by all people and organisations of Essex, including all local authorities (Essex County Council, parish, town, city, district, and borough councils); the NHS, police, and fire services; universities and colleges; schools; industry and businesses, landowners and farmers; community and charity groups, and residents and visitors.

ECAC recognises that progress towards net zero requires national and well as local action. We have set out how Essex can lead by example and stakeholders across the county have already been pledging what they are going to do to tackle this climate crisis. A critical part of the success in the achievement of Net Zero in Essex centres on the actions by the 1.4 million residents of Essex.

New technologies, practices and behaviours are always easier to adopt when these are set within the social context and local groups, where trust, obligations and reciprocity increase capacity to innovate and adapt. This is what is called social capital.

Key actions taken and supported by the ECAC include:

i. Appointment of the country's first Climate Czar (County Councillor Peter Schwier) by Essex County Council. The Climate Czar has been a regular visitor to communities and climate improvement projects across Essex in the past three years.

ii. Climate advice packs for residents, businesses and schools were developed and launched by ECC in 2022, then updated in 2024. An Early Years advice pack was launched in 2023 and a new Easy Read version was developed in 2024. A relaunch event took place in May 2024.

iii. The Climate Action Challenge Fund was launched by ECC, with £500k of awards made to 42 community groups.

iv. The Carbon Cutting Essex app was launched by ECC in 2023, with over 1000 downloads and registrations made by mid-2024. The app is designed to help people in Essex reduce their carbon footprint through awareness-raising, challenges and competitions.

v. A Carbon Literacy training package was developed by ECC, and 387 ECC employees and members have been trained and received carbon literacy accreditation. ECC launched an employee Climate Network which now has over 200 members.

vi. Biannual climate conferences have been held by Peter Schwier on Sustainable Transport, Retrofit, Nature Recovery and Water. These have each attracted an audience of over 100 delegates.

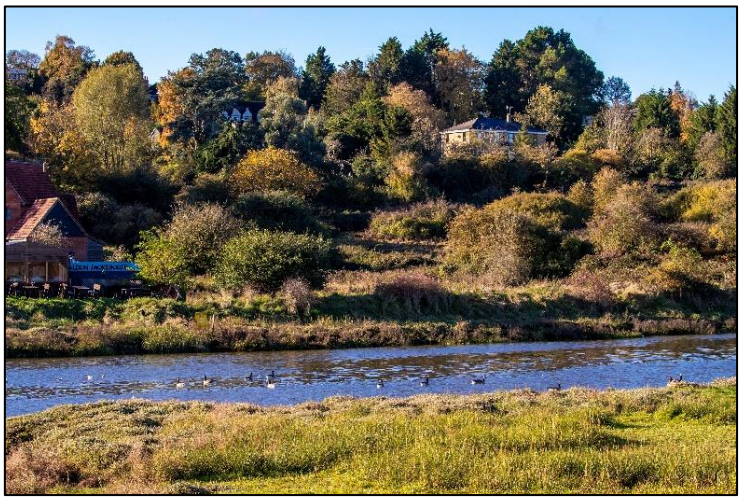
vii. The Chair of ECAC has given 70 talks in two years to local groups in Essex and the wider region, helping to promote the formation of dedicated climate action or nature groups and/or the adoption of climate action by existing parish councils in 50 communities.

Awards for Climate Action in Essex

Climate action across Essex has been shortlisted eight times over 2022-24 for UK local government awards (the MJ awards; the Edie sustainability awards; the LGC Local Government Chronicle awards), winning two.

ECC won Transport / Fleet Management Project of the Year (2023) and Best Transport Decarbonisation Project (2024). It was shortlisted for these awards: Leadership in responding to the Climate Emergency (twice), Future Places category, Community Involvement, Climate response, Net Zero Homes category, Future places category and Net Zero category.

4.8 Creating the Greener Economy through Just Transitions



In the UK, the statutory Climate Change Committee reported to government in 2023 that green choices result in more jobs, reduce emissions, and reduce household costs, thus creating more affordable housing.

The World Bank and World Economic Forum are two multilateral institutions that now subscribe to the principles of greener and more sustainable approaches for the economy.

The World Bank has recently called for inclusive green growth, clean growth and the elimination of harmful fossil-fuel subsidies[7]. It reviewed evidence from 830 sustainable development projects and found 76% with win-win economy-environment outcomes: if human health improved, this benefitted the economy; if pollution decreased and/or ceased, this increased natural and physical assets and created more jobs. This "cleaner production" resulted in economic growth with environmental co-benefits.

The World Economic Forum (WEF) called in 2022 and 2023 for increased investment in *green new deals* to speed the transitions to net zero[8]. The WEF have said that climate and nature loss is business loss, and nature-positive approaches will create new opportunities. The WEF estimates that greener economies could by 2030 have created US$10 trillion in value worldwide, with the generation of 395 million new jobs. However, this will only happen in countries, businesses, cities and regions that have put in place supportive policies.

Circular economies (CEs) are beginning to deliver greener economies. CEs are being promoted by the EU and several national governments: China, Finland, France, Japan, Netherlands, Sweden, the UK. Finland is gaining €2-5 billion per year for the national economy through implementation of CEs. An assessment of more than 350 CE projects found increases in job creation with reductions in carbon emissions. The Circular Impact Project (CIP) assessed a further 750 CE

[7] See World Bank (2012). *Environment Strategy 2012-2022. A Green, Clean and Resilient World for All*. Washington DC; World Bank. (2023). *Detox Development: Repurpose Environmentally-Harmful Subsidies*. Washington DC

[8] See https://www.weforum.org/: World Economic Forum. (2020). The Future of Nature and Business. WEF. (2021). Nature-Positive, Net Zero and Equitable; WEF (20232). (2023). *Industrial Clusters for Net Zero*; WEF (2023). *Mission 2070. The Green New Deal for India*.; WEF. (2023). *Living Longer, Living Better*.

worldwide, and concluded they increased GDP by 2% and job creation by 1.6%, whilst reducing carbon emissions by 25%.

The B Corp movement (Benefit Corporation) prioritises social and environmental purpose in 7900 member companies with a workforce of 720,000 in 93 countries[9]. B Corps build commitment, not just profits, and focus on creating goods rather than just on not creating bads. B Corps have been shown to have a positive impact on their own culture and on engagement with public and policy, and have been shown to have higher revenue growth than other companies in their sectors.

The ECAC has been promoting just transitions to greener economies in order to boost the local economy and create jobs whilst cutting carbon emissions. The aim is to ensure the transitions benefit all people of Essex. Highlights include:

i. ECC unlocked funding for retrofit training delivered by the Retrofit Academy in Harlow and Tendring. More than 240 individuals were trained in 2022, with further funding for 2023 for 50 retrofit training courses in Basildon, Colchester, and Castle Point (Canvey Island). This has received two awards: ADEPT Presidents Award - Delivering Green Growth and UK Unlock Net Zero - Collaboration of the Year Knowledge building and research.

ii. CB Heating, based in Clacton, has set up a Heat Pump Installer Network (HPIN) Training Academy in 2022. This dedicated training facility is one of the largest of its kind in the UK and aims to train up to 4,000 heat pump installers each year. The government's Microgeneration Certification Scheme (MCS) indicates that there are only 5000 installers currently in the whole of the UK.

iii. ECC created the Net Zero Innovation Network chaired by ECAC Commissioner Victoria Hills. NZIN is a group of local organisations working to maximise sustainable innovation in Essex. The network includes small to medium sized enterprises (SMEs), academic partners, public sector bodies and large businesses and energy providers. The Task and Finish Groups work on bespoke projects, helping to accelerate the county's net-zero ambitions. NZIN also supports two PhD researchers at UCL working on Net Zero Innovation and the Just Transition to a green economy.

iv. ECC secured £100,000 from the first round of the UK Community Renewal Fund, and will establish a new electric vehicle (EV) centre at Harlow College, to upskill 50 automotive technicians in the next two years.

v. ECC launched the Green Entrepreneurs programme, now in its second year. It is designed to support new and novice green entrepreneurs with structured workshops and learning and an opportunity to pitch for £5k of seed funding.

[9] B Corp Movement: https://www.bcorporation.net/en-us/

vi. Great Start: A green business support and accreditation scheme, to support businesses in starting or continuing to make tangible steps towards their sustainability plan (launching 2024).

vii. We Rise: is a peer-to-peer youth movement set up with the support of ECAC, ECC and other local partners on Canvey to help support young people between the ages of 16-24. The group aims to support the future generation into employment opportunities in the green economy. The group will be piloting a Green Digital Tech Programme this Summer 2024 with Decrypthut, aiming to broaden the horizons of young people looking for sustainable employment in a net zero world.

viii. ECAC commissioners and ECC officers are working with The Retrofit Academy CIC to create the first national training course for non-domestic retrofit buildings under PAS2038 standard. A total of 30 individuals in Essex to be supported in first cohort fully funded (due January 2025).

5. Conclusions

Place-based commissions in the UK are showing that climate action is both about becoming carbon neutral by developing and adopting low-carbon technologies, and about addressing inequality, social justice, behaviour change, volunteering and sharing, and creating visions for new ways of living. Their common aim has been to be universal in scope, addressing improvements in the lives of all the people living within their counties, regions or cities.

The ECAC has made substantial progress in four years. It has set a target of 2050 for the whole county to be net zero, and in line with international guidance 80% will have to come from absolute cuts in greenhouse gas emissions. There is both urgency to achieve substantive progress and yet also a window of time to establish effective low-carbon processes, institutions, strategies and new behaviours.

This impact report has detailed 64 major impacts of the ECAC since publication of its main report in 2021, plus the launch of several regional and county-wide strategies to guide future policy and practice.

The ECAC will continue to be shaped by these key principles:

i. Universality: policies and innovations that are relevant to all the people of Essex;
ii. Many paths and options offered for moving towards low-carbon living and working, so that individuals and businesses are able to select those that suit them best;
iii. Ensuring new ideas and practices are multipurpose and can be shown clearly to improve lives, thus increasing public engagement.

Achieving net zero is still an enormous challenge, requiring the greatest shifts since the industrial revolution. No wonder it is hard. Yet at the same time, a social tipping point appears to be closer, with 60-80% of the UK public now supporting actions and policies on the climate.

Annex A: ECAC Commissioners

For more details on each Commissioner, see: https://www.essexclimate.org.uk/our-commissioners

Prof. Jules Pretty (Chair)
Cllr James Abbott
Prof Jillian Anable
Matt Butcher
Catherine Cameron
Julia Crear
Cllr Peter Davey
Ian Davidson
Richard Davidson
Ellie (Co-chair young person)
Sarah Gill
Cllr Ivan Henderson
Heather Hilburn
Victoria Hills
Prof. Peter Hobson
Prof. Aled Jones
Cllr David King
John Lippe
Cllr Sue Lissimore
Dr Simon Lyster
Dr Laura Mansell-Thomas
Prof. Jacqueline McGlade
Robert Mitchell
Right Revd Roger Morris
Mark Nowers
Prajwal Pandey (Co-chair young person)
Dr Adam Read
Dr Jo Roberts
Yarema Ronish
Adam Scott
Ellis Shelton
Jonathan Stephenson
Jerry Stokes
Cllr Paul Thorogood
Prof. Graham Underwood
Simon Walsh
Cllr Holly Whitbread
Rob Wise
Rich Yates
Dr Poone Yazdanpanah

Annex B. Regime Shifts and Nationally Transformed Systems

Systems in transition (>80% adoption within systems or regions)	**Early stages and growing (<20% adoption)**	**Slow or low (0-5% adoption)**
Renewable energy generation (14 countries now at over 95% of domestic electricity use), 2010 to 2023	Electric vehicles (85% of all vehicles in Norway; 50% of new sales in UK; 22% in EU)	Retrofitting and insulating existing housing stock (named as priority in many countries but implementation unfunded/low)
Rural social capital (8 million farmer and women's groups worldwide), 2000 to 2020	Sustainable and regenerative agriculture expansion (worldwide to 29% farms and 9% of area, 2000-2020)	Air-, ground- and water-source heat pump installation: at end of 2023, UK 0.5% of homes; Belgium, Germany 1.4-1.6%; Norway 30%, Finland 24%, Sweden 22%, Estonia 17% and Denmark 10%
Seat belt legislation (Europe and North America, 1980s)	Vegetarian diets (30% of young people in UK; cultural legacy and traditions of 500 million people in India)	Regime shift in food supply and behaviours resulting in fast growth in obesity and type 2 diabetes, but no country has reduced incidence once it increased, 1990-2023
Smoking bans in public places (Europe and North America, 2005 onwards)	Carbon removal by soils through sustainable and regenerative agriculture and rewilding	Continued increase in other non-communicable diseases (NCDs) of affluence (mental ill-health, cancers, cardiovascular disease) but low shift in services, behaviours and choices
Ban of lead additives in petrol/gas, mid-1980s	Expansion of tree cover in Sahel through farmer managed natural regeneration to 10 Mha, over 2000-2020 (50% land coverage in Niger)	Fish capture management and regulation, plus marine protected areas, that clearly lead to increases fish stocks and catches
Smart phone development and uptake (Motorola, Nokia and Blackberry had 97% of world market in 2007, the date of first iPhone release; in 5 years, their market share had fallen to 3%)	Plant-based milk adoption (40% households in US; 93% in Germany)	Elimination of air pollution of cities and rural areas from vehicles
Switch from film to digital cameras, combined with consumers no longer paying to print photographs	Analogue meat (cell culture and precise fermentation: developed, awaiting large scale regulatory approvals)	Electrification of commercial planes ("eviation")
Horse to internal combustion engine (95%:5% in 1905 in Europe and USA; by 1925 5%:95%)	Green hydrogen economies (hydrogen generated by renewables, not fossil fuels)	Internationally legally binding agreement to end marine plastics pollution being developed with bans on single use plastics in place in EU
	Sustainable construction methods and regulations for all new buildings	Autonomous driving vehicles and systems
	Electrify-everything economies (to allow renewable electricity generation to benefit all sectors of economies)	Rewilding of land and sea ecosystems (33 UK projects increased per ha rural jobs by +50%)
	Designation of land and sea systems as protected areas (PA): 200,000 PAs on 15% of world area	Elimination of all fossil fuel extraction and use

Source: J Pretty, C Cameron, H Hilburn, S Lyster, J McGlade, Y Ronesh et al (and 23 other authors) (2024). "How the Concept Regenerative Good Growth Could Help Increase Public and Policy Engagement and Speed Transitions to Net Zero and Nature Recovery" (forthcoming).