THE GREEN GAS MANIFESTO

SCOTTISH PARLIAMENT ELECTIONS, MAY 2026

POWERING PROSPERITY: SCOTLAND'S BIOGAS OPPORTUNITY

ENERGY, ECONOMY, ENVIRONMENT, EMPLOYMENT

ADBA Anaerobic Digestion and Bioresources Association | THE ENERGY BEHIND THE AD REVOLUTION

EXECUTIVE SUMMARY

A National Biogas & Digestate Strategy for Scotland

Powering Brand Scotland - Delivering Net Zero, Energy Security, Food Resilience and Rural Prosperity

Anaerobic digestion (AD) and digestate represent one of Scotland's most powerful, scalable and cost-effective tools for delivering net zero, energy security, sustainable food production and rural economic development.

Biogas uniquely connects Scotland's farms, food systems, industries and communities in a circular economy that transforms organic residues into renewable energy, low carbon fertiliser and resilient soils.

Furthermore, it safeguards Brand Scotland's £16bn food and drink exports, £47bn manufacturing base and £11bn tourism economy, protecting producers from carbon border taxes while enhancing biodiversity and preserving Scotland's iconic rivers, lochs and landscapes.

This opportunity builds naturally on Scotland's strengths - a world-class farming and food sector, a proud brewing tradition, deep engineering expertise and a proven ability to incubate new technologies at scale.

Despite this strategic value, biogas and digestate remain underutilised and under-recognised within national policy. Scotland now requires a coherent, ambitious and integrated national strategy to unlock the full economic, environmental and social potential of AD.

This manifesto sets out a framework for action, structured around clear policy pillars and sector specific calls to action, designed to mobilise government, industry, finance and communities toward a shared national mission.

STRATEGIC VISION

Scotland will establish anaerobic digestion and digestate as core national infrastructure, delivering:

- **Secure, indigenous renewable energy**
- **Emissions reductions for Net Zero**
- **Sustainable and secure food and farming systems**
- **Improved soil health and climate resilience**
- **Circular economy leadership**
- **Long term rural prosperity.**

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The Case for Action

Biogas is uniquely positioned among renewable technologies to:

- provide dispatchable, controllable energy, supporting grid stability and energy security.
- deliver one of the highest carbon savings per pound invested of any low carbon technology.
- enable deep decarbonisation of heat, transport and industry, sectors otherwise hard to electrify.
- produce digestate, a strategic biofertiliser that restores soil health, reduces fertiliser imports and cuts agricultural emissions.

With rising geopolitical risk, volatile energy markets, fertiliser price shocks and accelerating climate impacts, Scotland must act now to secure domestic energy and nutrient resilience.

To provide certainty and ambition, Scotland should adopt the following indicative targets:

10 TWh/year of biomethane by 2040, supplying 25% of Scotland's gas demand.

50% reduction in synthetic fertiliser use, replacing 125,000 tonnes of imports, retaining £40 million annually in Scotland and cutting 250,000 tCO_2e - equivalent to 1 million return short-haul passenger journeys.

5 $MtCO_2e$/year of durable carbon removals from biogas upgrading by 2045, equivalent to planting 250 million trees.

£5 billion of private investment mobilised across biogas, carbon capture and advanced biorefining.

CORE POLICY PILLARS

1. Energy & Net Zero
2. Agriculture & Soil Health
3. Food Waste & Circular Economy
4. Biomethane Hubs, Industry & Infrastructure
5. Carbon Capture Storage & Utilisation
6. Jobs & Growth

By 2045, biogas and digestate will form part of an integrated national system linking agriculture, food and drink, waste management, industry and energy, delivering measurable benefits across climate, economy and society.

GROWTH & DELIVERY ACTIONS

Energy & Net Zero Strategy

Ask 1: ***Embed anaerobic digestion as a core pillar of Scotland's Net Zero and Energy Strategy, explicitly linking rural, industrial and municipal decarbonisation.***

Actions required

- Recognise AD as strategic national infrastructure.
- Establish a national biomethane deployment target for 2035 and 2045.
- Integrate AD fully into:
  - Heat decarbonisation plans
  - Gas grid future strategy
  - Industrial decarbonisation clusters, e.g Grangemouth regeneration
  - Local authority energy and climate strategies, e.g Creed Integrated Waste Management Facility in the Western Isles.

Outcomes

- Secure, indigenous energy supply.
- Grid stability and resilience.
- Accelerated and affordable Net Zero delivery
- Rural economic regeneration.

SCOTLAND'S BIOGAS POTENTIAL

~ 30 TWh/year.

12 x current production.

~15-20,000 jobs (direct + allied) - total potential jobs in Scotland from full-scale deployment.

~60% of current gas demand.

~7% reduction in GHG emissions - one of the highest carbon savings per £ invested of any technology by over 50% - equivalent to decarbonising the heat from 1 million homes.

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Agriculture, Soil Health & Nutrients

Ask 2: ***Formally recognise digestate as a certified biofertiliser within Scottish nutrient management and soil health policy.***

Actions required

- Classify properly treated digestate as a biofertiliser and soil improver, not waste.
- Integrate digestate into:
  - Future agricultural support schemes
  - Carbon farming incentives
  - Soil health and regenerative farming standards.
- Establish a Scottish Digestate Quality Certification Scheme aligned with PAS110+.

Outcomes

- Reduced fertiliser imports.
- Lower farm input costs.
- Improved soil health and resilience.
- Increased food security.

CASE STUDY: BALFEARN, HADDINGTON, SCOTLAND

Haddington Farm operates a closed-loop system, integrating a 44kW slurry-fed anaerobic digestion (AD) plant alongside existing 50kW wind and 50kW solar installations.

The AD system rapidly became the primary energy source, generating in just three weeks the equivalent of the farm's annual solar output. Combined, these technologies now enable the farm to achieve 100% energy self-sufficiency, with 90% of energy supplied by AD.

This integrated approach maximises the value of on-farm resources, significantly reduces carbon emissions and enhances energy security, demonstrating the powerful role of AD in delivering resilient, low-carbon farming systems.

SECTOR FOCUS: Small On-Farm AD & Rural Resilience

Ask 3: ***Introduce a £50 million fund to provide low or zero-cost loans for farms install Small On-Farm AD systems, supporting Scotland's agricultural emissions and energy goals.***

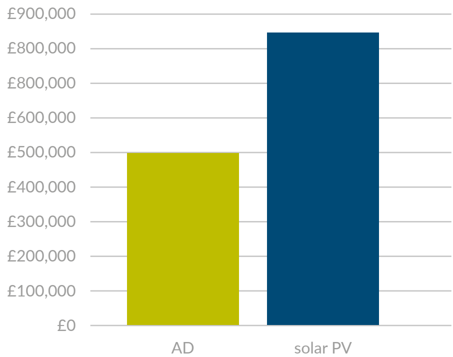
Scotland's 180,000 dairy cattle produce around 2.9 million tonnes of manure each year, releasing 63,000 tonnes of methane - equal to 1.5 million tonnes of CO_2e - equal to 1.5 million return transatlantic flights. Per head, it is the country's most carbon intensive sector.[1]

Incentivising farms with over 130 cattle to install Small On-Farm AD (SOFAD) systems could:

- Cut 500,000 tonnes of CO_2e per year (processing just 30% of manures, 10% of total agricultural GHG emissions)
- Provide renewable heat and power for farm operations
- Reduce diesel use by fuelling tractors and vehicles with biomethane

A £50 million annual fund could support 100 deployments per year, creating a wave of low-carbon, energy-independent farms. At current prices (~£80/MWh), a 200-head dairy farm could save over £100,000/year on energy, repaying investment in under seven years.

Cost for onsite power need for a typical 200 head dairy farm from AD vs Solar PV



By contrast, a solar array delivering similar energy would need a hectare of land and cost £850k–£1.05m, without night-time generation or the added benefits of manure management. Both technologies have a role, but SOFAD delivers energy and emissions savings directly from agricultural waste, tackling climate and farm economics together.

On-farm machinery is responsible for 5-10% (0.4-0.75 $MtCO_2e$) of the sector's GHG emissions. Biomethane offers the highest short-term emission reduction potential, of 77%.

1 Decarbonisation of Scottish Agriculture

Food Waste & Circular Economy

Ask 4: ***Prioritise anaerobic digestion as the preferred treatment route for food and organic wastes.***

Actions required

- Work with the AD industry to ensure sensible regulation regarding food and industrial wastes and enable responsible valorisation rather than disposal.
- Deliver effective, not punitive, permitting - proportionate, risk-based regulation that encourages sustainable AD.
- Valorise digestate - treat it as a certified biofertiliser, not a waste.

Outcomes

- Maximum carbon abatement.
- Energy recovery from unavoidable waste.
- Nutrient recycling.
- Landfill and incineration avoidance.

SECTOR FOCUS: Distilleries & Food Processors

Scotland's food and drink industries generate vast volumes of organic residues - from distilleries' draff and pot ale, to food processors' starches, peels, and spent grains. Anaerobic digestion (AD) offers a proven route to valorise these by-products, turning them into renewable heat, power, and biomethane that can fuel distilleries, homes and local transport.

CASE STUDY: TAMBOWIE BIOGAS PLANT, GLASGOW, SCOTLAND

Operating since 2018, this AD plant transforms 70,000 t/year of distillery by-products into renewable electricity and nutrient-rich digestate. It enables local distilleries to recycle waste into energy, advancing sustainability targets in Scotland's important whisky and agri-food industries.

- **Energy Generation:** 8,000 MWh of renewable electricity per year.
- **Homes Powered:** c.3,000.
- **Carbon Savings:** 2,500 tonnes per year.

Planned 2026 expansion will increase treatment to 170,000 t/year, producing 60 GWh of biomethane for the national gas grid, enough to heat 5,000 homes.

Biomethane Hubs

Ask 5: ***Encourage DESNZ and Westminster to extend and stabilise biomethane incentive schemes and grid access arrangements within the UK ETS and gas decarbonisation framework.***

Actions required

- Streamline planning and permitting for large-scale AD as strategic low-carbon infrastructure under the Fourth National Planning Framework.
- Reform SEPA's approach - move from restrictive to enabling regulation for waste and co-product valorisation, in line with circular economy principles.
- Integrate biomethane into:
  - Industrial fuel switching strategies
  - Heavy transport decarbonisation plans
  - Green hydrogen blending pathways.

Outcomes

- Industrial emissions reduction.
- Energy security: Reduces dependence on imported gas.
- Efficient waste use: Processes mixed organic streams from agriculture, industry and councils.
- Low-carbon transport fuel: Powers HGVs, buses, and public fleets.
- Anchor for greenhouse gas removals (GGR) and carbon capture and utilisation (CCU) (See Carbon Capture).

SECTOR FOCUS: Large-scale AD sites

Biomethane can be used to decarbonise homes, heavy transport, shipping and industrial heat, sectors that are harder to electrify. Large-scale facilities provide a predictable, high-volume source of renewable energy, which can be used as baseload or dispatchable power and complement Scotland's increasing electricity generation from wind and hydro, enhancing overall energy system resilience.

One plant can heat thousands of homes, fuel hundreds of buses and support the local economy - all at once.

CASE STUDY: THE ENERGEN AD PLANT (ADCS*), CUMBERNAULD

Bio Capital's Energen plant processes 120,000 tonnes of food waste annually - enough to service around 500,000 households - diverting it from landfill and cutting 74,000 tCO_2e/year, equivalent to removing 50,000 cars from the road.

The facility generates enough renewable energy to power 18,000 Scottish homes each year and produces over 100,000 tonnes of nutrient-rich biofertiliser, supporting sustainable agriculture.

Biogas' integration with local waste services and energy users demonstrates how these biomethane hubs can underpin regional circular economies, keeping value in Scotland.

*Anaerobic Digestion Certification Scheme (ADCS)

ADCS UK

ADCS accreditation is the mark of efficiency, best practice and professionalism in AD operation, testament to an operator's commitment to continuous improvement and adherence to best practices. It demonstrates that the AD is plant managed by a responsible operator, ensuring that employees, customers, regulators, insurance companies and neighbours are confident in the management of their local AD plant.

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Carbon Capture, Utilisation & Storage (CCUS)

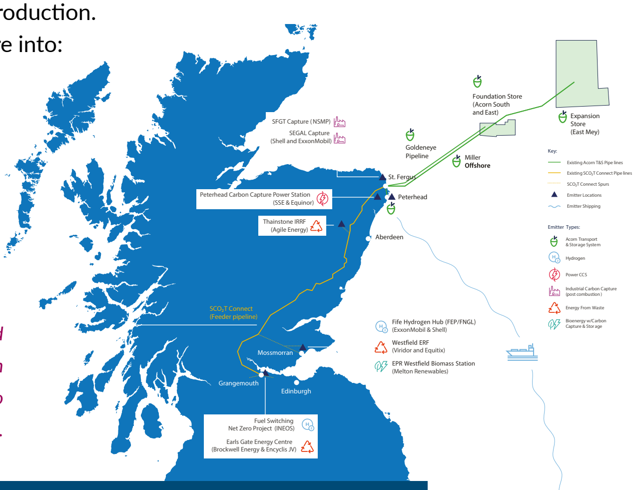
Ask 6: *Recognise biogenic carbon capture and utilisation as a strategic national infrastructure priority.*

Actions required

- Formally recognise biogenic CO_2 as a strategic national resource for fuels, chemicals and removals.
- Establish a National Biogenic CO_2 Strategy linking anaerobic digestion to greenhouse gas removals (GGR), synthetic fuel and chemical production.
- Integrate biogenic CO_2 capture into:
  - Scotland's Energy Strategy
  - GGR and Industrial decarbonisation programmes
  - SAF and synthetic fuels policy.
  - Hydrogen Action Plan.

Outcomes

- Clear national direction and policy alignment.
- Accelerated industrial deployment.
- Early-mover advantage in SAF and e-fuels.
- Global leadership positioning.



The Acorn project, a carbon capture and storage and hydrogen loop, runs from Grangemouth to Peterhead and on to the North Sea.

CASE STUDY: GREENHOUSE GAS REMOVALS (GGR)

South of Scotland Enterprise regional development agency has invested £1m in Dumfries-based the Carbon Removers, a company specialising in biogenic carbon removals from biogas and brewing, ahead of a planned funding round in support of the company's ambition to become a £1bn business and to remove 1 million tonnes of CO_2 annually by 2030.

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SECTOR FOCUS: GGR & CCUS

Biogenic carbon capture represents one of Scotland's most powerful yet underutilised climate and industrial opportunities. When captured, upgraded and utilised, this CO_2 becomes a strategic feedstock for sustainable aviation fuel (SAF), synthetic fuels, green chemicals and permanent greenhouse gas removals.

Biogenic CO_2 capture from biogas upgrading to biomethane can deliver GGR at under £130/tonne, half the cost of wood fired Power BECCS (bioenergy with carbon capture and storage).

By combining biogenic CO_2 with Scotland's abundant renewable electricity and hydrogen production potential, Scotland can establish itself as a global leader in circular carbon fuels, climate-positive manufacturing and durable carbon removals. Scotland has established a need for 5-10Mt of CO_2 removals per year in 2050, AD could supply up to 4Mt of this.

CASE STUDY: CCU

Carbon Capture Scotland delivers end-to-end carbon removal, including capture, liquefaction, transport and sequestration of biogenic CO_2. In 2024, the company announced major partnerships with Whyte & Mackay to capture biogenic CO_2 from distilleries and with green investor Iona Capital to capture biogenic CO_2 from biomethane plants.

Anaerobic digestion (AD) features as one of the nine recommended options that could form an industrial cluster featuring multiple waste to energy technologies at Grangemouth. Examples of these potential synergies include utilising the biogenic CO_2 from AD to create e-fuels.

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Jobs & Growth

Ask 7: ***Unlock long-term investment through stable market mechanisms for biomethane and greenhouse gas removal.***

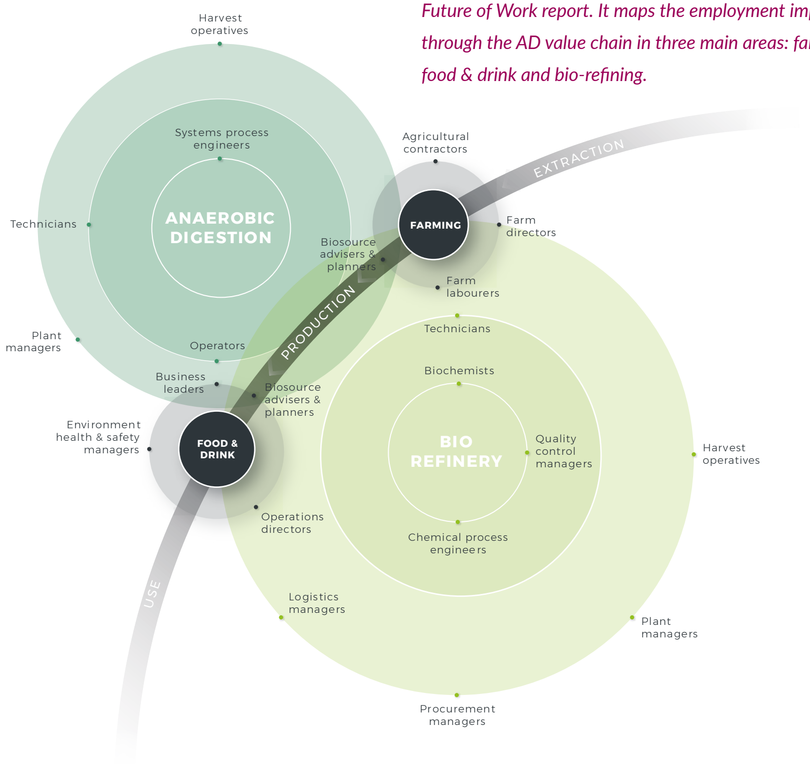
Actions required

- Provide long-term offtake contracts and co-investment schemes.
- Align Scottish National Investment Bank, UK Infrastructure Bank, and Scottish Enterprise around AD and GGR deployment.

Outcomes

- Lower financing costs.
- Accelerated deployment.
- Private capital mobilisation.
- Creation of high-quality green jobs.

This image illustrates the direct and allied jobs created across sectors by the development of an anaerobic digestion (AD) plant, based on the Zero Waste Scotland, Future of Work report. It maps the employment impact through the AD value chain in three main areas: farming, food & drink and bio-refining.



Ask 8: *Establish biogas, biogenic carbon capture and synthetic fuels as cornerstone industries for Scotland's green jobs and economic growth strategy.*

Actions required

- Develop a National Biogas, Carbon Capture & Synthetic Fuels Skills Programme aligned with:
  - Further and higher education
  - Apprenticeships
  - Reskilling of oil & gas and industrial workers.
- Create regional green growth zones around:
  - AD hubs
  - Biogenic CO_2 capture clusters
  - SAF and synthetic fuel production sites.
- Prioritise domestic supply chains for:
  - Plant construction
  - Process engineering
  - Fabrication
  - Operations & maintenance.
- Mobilise public investment to crowd-in private capital and accelerate early deployment.

Outcomes

- Large-scale green job creation, direct and allied
- Expanded rural employment in engineering, construction and technical operations, creating skilled manual and technical jobs.
- Growth of specialist advisory and bioresource mapping roles, requiring strong data, coordination and systems integration skills.
- Transformation of farm and food-sector roles, building expertise in resource optimisation.

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CONCLUSION

Scotland's Circular Future

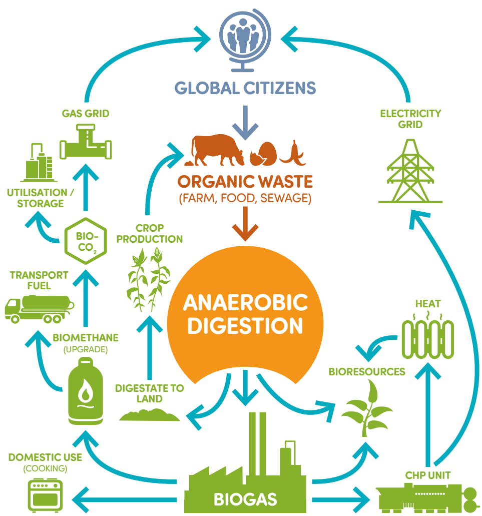
Anaerobic digestion is not a niche renewable technology. It is a strategic national asset capable of transforming Scotland's energy system, agricultural resilience and economic prosperity.

With decisive leadership and coordinated policy action, Scotland can become a global leader in circular bioenergy and regenerative nutrient systems, delivering tangible benefits for communities, farmers, businesses and future generations.

Anaerobic digestion connects Scotland's farms, factories, communities and climate ambitions into a single circular solution. Scotland's circular future is about maximising value from all organic resources:

- Farms turning waste into energy and fertiliser
- Distilleries and food processors closing loops
- Councils valorising food waste
- Bio-CO_2 and digestate fully utilised in industry and agriculture.

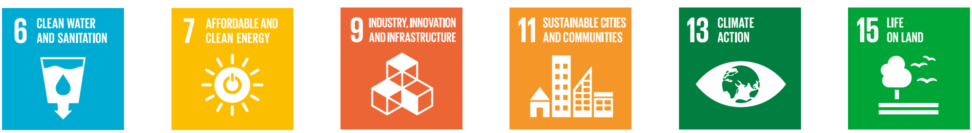
Biogas at the Heart of the Circular Economy



Organic wastes (farm, food, sewage) recycled through biogas digesters can be converted into a variety of energy carriers and biofuels, nutrient-rich organic biofertiliser and increasingly novel materials, through further biorefining.

Systems change is now demanded: 'transformation and system transitions in energy; land, ocean, coastal and freshwater ecosystems; urban, rural and infrastructure; and industry and society.' (IPCC, AR6).

The IPCC report refers frequently to a 'circular economy, a circular bioeconomy, a circular nutrient economy, a circular waste-based economy, circular cities'. The UN has called the systems change required a $32 trillion investment opportunity.



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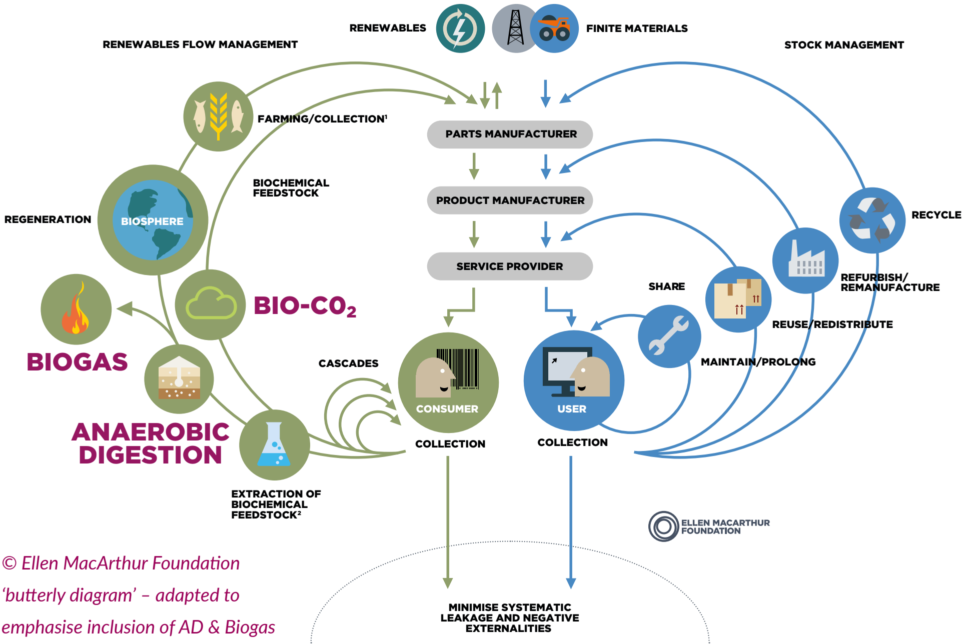
AD in the Biocycle of the Circular Economy



© Ellen MacArthur Foundation 'butterly diagram' – adapted to emphasise inclusion of AD & Biogas

The 'butterfly diagram' shows the two principal cycles of the circular economy – the technical cycle (blue) and the biological cycle (green).

In the technical cycle, products are kept in circulation in the economy through reuse, repair, remanufacture and recycling. In this way, materials are kept in use and never become waste.

In the biological cycle, the nutrients from biodegradable materials are returned to the Earth, explicitly 'through processes like composting or anaerobic digestion'. This allows the land to regenerate so the cycle can continue.

Increasingly the cycles merge – with biochemical feedstocks enabling the 'renewable' manufacture of advanced chemicals and materials currently produced by finite resources on the technical side.

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