



Abstract

A societal shift towards more environmentally sustainable systems is triggered by increases in the frequency and magnitude of natural disasters, the vulnerability of many job sectors, and worsening standards of living that are perceived to be connected to environmental degradation. Local green political networks and initiatives for change emerge, leading to strong support for regionalisation. New legislation stimulates green transitions in lifestyles and in the technology, economic and energy sectors. Policies are developed based on clear and well-enforced polluter pays legislation at all levels of production. Society becomes more egalitarian, with all individuals actively contributing to the sustainability agenda. A UK-wide green alliance is established across countries and delivers the policies and technologies that maximise sustainability. Collaboration domestically and internationally plays a key role in the green alliance, ensuring technologies, ideas and projects are shared to gain mutual benefits. By 2100, the UK becomes a fully functional circular economy.



Full narrative

Present to 2040

With a growing occurrence of natural disasters linked to anthropogenic pressures, and related awareness-raising and social media campaigns, public opinion increasingly recognises the importance of the environment and the role of sustainability. This gradually developing sustainability narrative focuses on the association between environmental degradation and threats to jobs and standards of living. Public perception of the importance of the environment for sustaining their own wellbeing grows as multiple media channels offer platforms to disseminate the sustainability narrative. This leads to widespread support for a move towards a more sustainable future.

With local political green networks emerging and active promotion of initiatives for change, substantial support for regionalisation arises. This leads to stronger and more autonomous local governments that are able to act rapidly and effectively to meet citizens' demands for a sustainable future, whilst also being held accountable. The wider public becomes actively engaged with this political process and people are empowered to transform their lifestyles. In rural communities, people work together to increase the protection of the environment in which they live, perceiving the landscape as part of their cultural heritage. In urban areas, people are motivated to minimise their negative environmental and societal impacts, and become more aware of the impacts of their consumer choices on agricultural practices in rural areas.

Enhanced societal collaboration, engagement and empowerment leads to increasing appreciation that sharing and redistribution of resources is beneficial for both individual and societal wellbeing. Society becomes more egalitarian, with the sustainability agenda being pushed forward by the whole of society, not just the privileged few. All individuals are galvanised to monitor their environmental footprint, account for their actions and actively contribute to the sustainability agenda. This results in changes to consumer behaviour that stimulate local shopping, trading and production, supported by taxes and subsidies from local and national governments.

New legislation integrates green development into lifestyle changes and across economic and energy sectors, facilitating a rapid development of green technologies. Policies are developed based on clear and well-enforced polluter pays legislation at all levels of production. For example, fossil fuels become heavily taxed, while greener foods and energy sources are promoted and made more affordable for all. Renewable energy sources are promoted, i.e. wind, solar and bioenergy, and to a lesser extent, tidal and wave energy. Incentives are given for innovation in green energy technology, which is developed with a strong focus on minimising environmental impact.

New legislation withdrawing inheritance tax relief on land ownership by the 2030s leads to land being sold more readily. This, in turn, leads to changes in land use investments, resulting in the breaking up of large blocks of land previously owned by a small number of individuals. Forest investment values increase due to a new tax system and due to new, well-designed investment and regulation schemes, as well as sustainability labelling. Collectively these processes induce diversification and resilience in forestry, with the introduction of new species that can adapt to future conditions. This results in an overall increase in the forestry sector in the UK.

Agricultural land area slightly decreases due to reductions in food waste, decreasing consumption of meat (particularly beef) and dairy, and hence reductions in demand for forage and grain used for livestock feed, and the success of sustainable intensification practices (including urban farming) and green agricultural technologies. The proportion of arable and horticulture slightly increases to satisfy consumer demand for plant-based, healthier and more sustainable diets whilst gradually limiting imports (i.e. more grains, fruit and vegetables are produced). Livestock production persists, but is primarily integrated in innovative mixed agricultural systems with a focus on high welfare animal products. Green technology and plant and animal breeding, urban hydroponics and GMOs are used to increase yields more sustainably, with a focus on climate resilience. This enables reductions in artificial fertilizer use from the 2020s onwards. Ownership issues around GMOs are resolved — GMOs are used to speed up traditional breeding techniques and not as a means for corporate monopolies (e.g. on herbicide resistant crops).

Unwanted side-effects and risks of GMOs are mitigated by research and use in highly controlled environments, e.g. urban farming.

Changes to legislation make long-term planning of land management more feasible, enabling farmers to implement long-term greenhouse gas mitigation options, e.g. agroforestry or on-farm woodland. Multiple types of land use are implemented in combination, e.g. companion planting for crops, high welfare meat in forests, and wind energy generation in hedge lines. As part of the sustainability agenda, farmers move to more welfare and conservation-oriented mindsets, ensuring that agricultural land is managed in a biodiversity-friendly manner. In addition, land abandoned by agriculture is either converted to semi-natural habitat and nature reserves, or allowed to transition towards rewilding.

Water demand and use drastically decrease as a result of environmental awareness and governance established in the 2020s and 2030s. Practices enabling water savings include rainwater harvesting, more efficient water use by consumers and industry, re-use of greywater, metering and wider adoption of composting/waterless toilets.

Several flagship green cities are developed by 2040, showcasing how cities, while densely populated, can become cleaner and more sustainable. Strict building regulations are well-enforced, leading to better energy efficiency and lower energy and maintenance costs. All homes are fitted with smart meters to monitor environmental footprints, enabling benchmarking of footprints for buildings, neighbourhoods and entire cities and reinforcing reductions in resource use and waste. A shift to home-working becomes widespread. The population growth rate starts to decrease.

The transport infrastructure is redesigned to favour public transport, e.g. roads are gradually repurposed into public transport modes such as high-speed train lines. Public transport becomes integrated, convenient and quicker than driving, motivating people to use it more frequently. Fuelled by successful green changes in transport and energy systems, together with environmental education, a strong change in consumer and business attitudes increases competition — leading to a “green race”.

A collaborative global political landscape allows countries to cooperate to optimise sustainable lifestyles. This enables the UK to reduce its environmental footprint in other countries, e.g. through importing solely sustainably produced products. Increases in ethically minded businesses and consumption also enable the UK to make more efficient use of its own resources, rather than importing products over long distances. Excessive national production is either re-used or traded. This is seen by the 2030s in food production and consumption, whilst timber imports reduce more slowly due to the timescales involved in establishing sustainable timber production within the UK. Best sustainable practices, including internalising the full costs for water use, pesticides, fertilizers and pressures on land use, are shared with other countries through knowledge transfer schemes.

2040 to 2070

By 2040 the governance of the UK is highly devolved to the four constituent countries and to regions and cities within each country. After an initial period of competition during which each of the four countries of the UK (and regions within them) push to dominate in the “green race”, the UK countries realise that collaboration is key and share technologies, ideas and projects to gain mutual benefits, leading to the formation of a green alliance. At all levels, a positive collaborative environment dominates economic and societal development. The UK-wide green alliance is established across countries and regions, and delivers policies and technologies that maximise sustainability. This leads to green growth.

The availability of ‘green’ goods increases further and their costs are reduced. Together with increasing societal understanding of the environmental and social impacts of certain goods, this further encourages sustainable consumer attitudes. Regions across the UK begin to specialise in a specific economic or natural resource sector and trade between local regions is promoted. The range of climate and soil types across the UK to some extent dictates this specialisation. R&D is key for the development of novel climate-resilient crops.

Although the transition to new agricultural crops is risky and demanding for farmers, this is facilitated by forward-looking insurance schemes and improved monitoring and modelling of the environment and climate. Risks are further spread through the establishment of cooperatives.

A wellbeing economy gradually develops, prioritising human welfare and shifting the focus from short-term to long-term gain, as societal appreciation for the importance of nature in underpinning human wellbeing grows. Less focus is ascribed to monetary values and personal wealth, while more emphasis is given to what is better for society as a whole. Prosperity becomes defined by issues other than economic growth, with GDP being replaced by novel indicators that capture an inclusive notion of wealth and prosperity (including natural resources).

Both environmental and human health improve because of the sustainability focus of an effective multi-level governance system that is participatory, learning-based and transparent, empowering individual and community action. Strong steps are taken to address domestic poverty in all forms. The population growth rate continues to decrease. The proportion of older people increases as a result of slowing population growth, healthy lifestyles and accessible healthcare.

The changes to legislation in the 2020s and 2030s produce clear environmental benefits by mid-century. Further development of nature protection legislation and enforcement, as well as effective implementation of the polluter pays principle, leads to biodiversity loss being reversed by the 2050s. Semi-natural habitats in both the lowlands and uplands are being effectively restored. Reductions in artificial fertilizer use are accelerated and reach zero usage by 2070. The health of soils and water bodies has been considerably improved across all of the UK over a similar timeframe. Air pollution improves dramatically due to both domestic policies as well as international cooperation.

Water demand and use are maintained at very low levels. By the 2050s, large increases in water use efficiency mean that there is minimal waste water discharge.

The use of water for agricultural irrigation is a challenge, as demand for water from the agricultural sector increases. This is addressed differently in different UK countries (depending on local climate and environmental conditions) through further water saving technologies, switching to crops or varieties that require less water, rainwater harvesting and other rural development strategies.

Lessons learnt from the first flagship green cities are transferred to other cities, leading to all cities becoming more sustainable and carbon neutral by 2070. Sustainable practices flourish such as free public transport and incentives for low-mileage transport. In rural areas, the use of autonomous vehicles is implemented. By 2070, all energy is derived from renewable resources with bioenergy being sourced from crop, industry, domestic and forestry waste rather than growing specific bioenergy crops.

2070 to 2100

The UK joins international agreements and organisations that aim to eliminate transboundary effects of consumption, production and trade in ensuring global sustainable economic development. As a part of such agreements, the UK collaborates with other countries to reduce exported impacts on the environment and provides support to developing countries to enable them to become fully engaged in cooperation around the green alliance. The UK re-enters a progressive and expanded European Union. International development is further boosted by European and Commonwealth international agreements on the free movement of people to foster the exchange of sustainability ideas, knowledge and practices. Free movement encourages migratory flows but as the European/Commonwealth countries are relatively equally attractive to migrants, this results in near zero net migration and a stable overall UK population level between 2070 and 2100.

The focus on enhancing sustainability through sustainable production and consumption combined with recycling of any waste products continues to grow throughout the 2070s and 2080s, such that by 2100 the UK becomes a fully functional circular economy. Decentralised decision-making within multi-level structures that pay attention to local opportunities and needs are well established, participatory and transparent. Legislation and community strategies promote integrated and sustainable resource management that addresses water, energy, food, land use and biodiversity holistically, to create synergies and alleviate trade-offs. Food waste and other waste are reduced to an absolute minimum and recycled where possible. Novel indicators are used to assess the success of the circular economy instead of GDP. Poverty is eliminated. Privately-held vehicles no longer exist; being replaced by urban public transport in the cities and by autonomously-delivered vehicles ("cars on order") in rural areas.

Country specificities in relation to the full narrative

The following paragraphs build on the main narrative, emphasising differences of each UK country from the full narrative or providing specific regional examples. They should be read in conjunction with the main narrative.

England

The UK moves to a form of federal governance system, with an English Government being created with devolved powers similar to those in Scotland, Wales and Northern Ireland. Within England, decision-making also becomes progressively devolved to regional and local administrations. Governance is increasingly participatory, with citizen assemblies becoming the primary devolved decision-making mode.

Societal values and decisions are initially market-driven, but start changing slowly over time. This is initiated by popular pressure from green and liberal urban populations, not top-down from the English government. The role of consumer choices and public opinion becomes very strong, linked to, for example, the preference of the urban population for sustainable food.

Partnerships form between urban and rural groups (e.g. through crowd-funding initiatives), increasing the recognition of both communities and breaking down barriers between them, so they better understand how each works and how they can help and support each other. Urban communities help rural communities by paying more for food-related products and rural communities help urban areas by providing better quality food. This drives agro-technological change, facilitating sustainable intensification (e.g. through precision agriculture, crop breeding, etc) that improves agricultural productivity and efficiency. Multifunctional land uses are promoted (e.g. agroforestry, solar farms) and agricultural subsidies move to payments for public goods.

In the green race and green alliance, England has diverse interests across the sustainability agenda and across its regions. In addition to innovation in agro-technology, a strong focus is on green energy technology (e.g. Cornish geothermal) and alternative energy technologies (e.g. longer-term carriers for electricity such as ammonia and hydrogen). Different regions focus on making their traditional and specialist industries and sectors more sustainable over time. Regions also value their cultural heritage, which is increasingly emphasised as powers become further devolved to regional and local levels.

Wales

Wales strongly promotes participative and consultative governance, giving power to local-scale decision-making processes. Local decision-making is at the heart of ways of working and stakeholder discussions take place on multiple topics, including infrastructure and transport.

Societal values are focused on altruism and public wellbeing. The Welsh language and culture become increasingly important. Sense of place represents a primary motivation for sustainable approaches, with the landscape being perceived as a part of Welsh culture. There is a strong willingness to pay and invest in the intangibles of the environment and the existence value of nature. Care for the environment, including a strong emphasis on recycling, is a dominant cultural driver, enabling Wales to rapidly transition to a circular economy. Electric vehicles and autonomous cars become mainstream, with car ownership becoming increasingly scarce.

Population density remains highest in the south of Wales (along the M4 corridor) and, to a lesser extent, in the north of Wales (along the A55). Land use is planned on the sub-regional level, nested within an overall land use strategy for Wales. This involves a mix of land-sparing and land-sharing strategies and multi-purpose land management. The agricultural sector is subsidised for sustaining biodiversity, capturing carbon, and providing other public goods. This maintains a thriving agricultural sector in the Welsh uplands. Furthermore, it promotes nature restoration (e.g. of peatland and natural peatbogs) and the farmer's role as a steward of nature. Decreasing agricultural waste becomes a major focus of agricultural policy, as opposed to increasing production.

As foreign travel and tourism declines, Welsh tourism grows due to locals and citizens from England spending their holidays in nearby regions. The importance of some sectors declines, such as the aviation sector in northeast Wales, but the transition away from such industries is carefully managed to minimise impacts on societal well-being. The energy sector sees a huge push for renewables. As the governance of energy generation devolves, offshore renewable energy generation (wave and tidal power generation) is promoted by the Welsh government, while respecting designated conservation areas. Local energy schemes become popular, such as micro hydro-power plants and wind farms. There is a push towards community schemes of natural resource use, with high community involvement, local sustainable development of resources and local benefits. This plays to the Welsh view of community importance.

In the green race and green alliance, the priority for Wales lies in technologies that facilitate the sustainable management of resources and non-profit, legislation-driven and equal distribution of resources (e.g. water). Technologies for the generation and storage of renewable energy are promoted.

Scotland

Scottish governance becomes based on public consultations and citizens fora, leading to a transition to an increasingly decentralised government with extensive collaboration at all levels and a strong focus on accountability. All Scottish residents are provided with broadband internet, which further promotes community empowerment and bottom-up decision-making. It also makes homeworking possible and increases the levels of access to information for all residents of Scotland.

Societal values are primarily altruistic and socialist. Scottish language and culture are increasingly revived, but in a manner that ensures that all individuals (no matter their country of origin) feel part of Scottish society. Social justice becomes a key term. The number of poor people decreases slowly and a large middle class is the driver of the economy.

Sense of place serves as a strong motivation for sustainable approaches and landscape represents an important part of the culture. Landscapes are diverse and land use is multifunctional. Sustainable Scottish tourism grows and the Right to Roam is implemented, whilst sites of significance for global biodiversity are strongly protected. Growing your own food becomes increasingly popular.

There is a strong urbanisation pressure in the Central Belt and the population gradually moves eastwards. In the green race and green alliance, Scotland specialises in the generation of renewable energy (wave power, tidal power, hydropower, heat from wastewater plants, etc.) and implements a decarbonised electricity grid.

Scotland also has strong interests in IT, life sciences, green technology and finance. Additional income is generated by the Scottish government from the selling of excess natural resources (such as water), with profits being used to ensure the well-being of its population, regardless of their social status, and to invest in innovation and other sustainable investments.

Scotland develops strong independent links with many other countries. It establishes healthy trade relationships with other countries, as well as helps poorer countries to develop sustainable economies and improved public health related to its leading role in innovation in renewable energy grids, information and communications technology, and life sciences. Scotland also promotes platforms to exchange experiences related to rewilding and protecting nature reserves as well as those living in/alongside them.

Urban areas see increases in services, with a strong focus on green industry and energy. In terms of energy sources, there is investment in hydrogen (both nationally and from international investors) as well as renewables. While a certain reluctance to onshore wind energy remains, offshore wind and solar energy production are strongly prioritised.

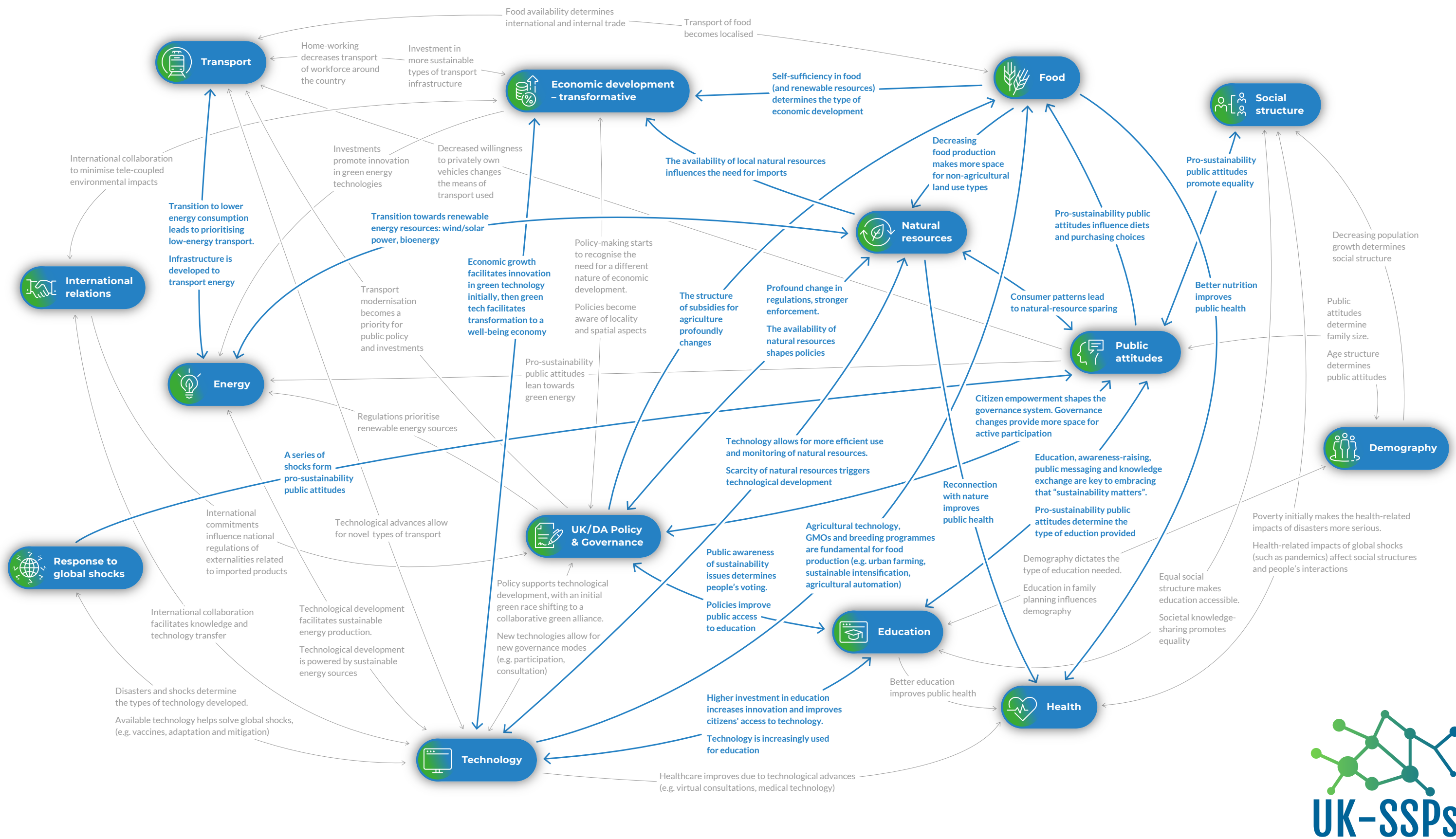
Northern Ireland

All political parties in Northern Ireland gradually move towards sustainability. This is initially pushed by strong public opinion in favour of a sustainability agenda from Belfast, and the Derry and Strabane regions. Rural communities progressively buy-in to this agenda through communication, education and involvement, particularly in agricultural policy, which provides subsidies for farming communities to deliver public goods and protect habitats and cultural landscapes. Agriculture remains a large and significant industry in Northern Ireland, with a localisation agenda supporting localised sustainable production and local markets.

Northern Ireland strengthens its relationships with the Republic of Ireland, becoming increasingly autonomous while maintaining strong links with the rest of the UK. Interdependency with the Republic of Ireland is particularly strong in agriculture, as farmers in border regions operate across the border, farming in Northern Ireland but processing their products in the Republic of Ireland. This trend gradually moves to an all-Ireland economy.

System diagram visualising the interrelationships between drivers

System diagram animation available to view at:
<https://youtu.be/jScao8Gnfbw>



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Project team

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