

Narrative Future Energy Scenarios for the North of Tyne

Updated 13 December 2019

Claire Copeland
Claire.copeland@sussex.ac.uk



Contents:

1	Overview	3
2	Drivers for Change	3
3	Scenarios & Pathways	6
3.1	2x2 Matrix	6
3.2	Pathways	7
3.2.1	Fair Bare Minimum	7
3.2.2	Minimal Change	9
3.2.3	Just and Sustainable	11
3.2.4	Draconian Decarbonisation	13
	Figure 1: North of Tyne 2x2 Matrix	6
	Table 2: Summary of Scenario Features	6
	Table 3: Fair Bare Minimum Future Pathway	7
	Table 4: Minimal Change Future Pathway	9
	Table 5: Just and Sustainable Future Pathway	11

1 Overview

This document describes some possible narrative future scenarios for the North of Tyne energy system. These narratives have been developed taking a qualitative 2x2 matrix scenario approach, drawing on discussions at a structured workshop held in Newcastle on 5 July 2019 with North of Tyne stakeholders.

At the workshop there was an intentional pre-determined grouping of the attendees. The purpose of the grouping was to facilitate bringing out different perspectives, within a likely framing of potential futures for the North of Tyne energy system, rather than to debate opposing views. The likely framing for the North of Tyne region was based on; a review of the literature generally and relating to the region, current thinking in the decarbonisation of the energy system (especially around achieving “net zero” by 2050), and the previous Findhorn community case study. In running the workshop, there was the scope for flexibility should different drivers for change arise from the discussions.

Some introductory slides were presented to attendees to stimulate discussion. Included were the Findhorn initial stories to illustrate the scenario approach being taken, and also some information sourced about North of Tyne. Since the Findhorn community appears, at least on the face of it, very different to the North of Tyne region, it was not anticipated that presenting this case study would unduly influence the attendees.

2 Drivers for Change

The first step in the approach was to determine 2 key drivers for change in the North of Tyne energy system. The stakeholders were allocated to one of four groups, and each of these groups a topic area. The four areas were:

- Social
- Economic
- Environment
- Any

During discussion there were some interesting points raised and these are summarised below:

- Decarbonisation for many attendees was considered a given i.e. that it was definitely going to happen. This led to difficulties in considering futures where the decarbonisation currently legislated may not be achieved (even as quickly), or where the current legislation may be changed and weakened.
- Hard monetary cost was also seen as the dominant factor in achieving any change; *‘cost drives what is done’* to quote one attendee in the Economic grouping. What was also pointed out there is a *‘cost’* involved in not making changes as well. This led to discussions around the importance of the right messages getting through, though generally it was acknowledged that the cheaper it is the more (decarbonisation) that can be done.

A dominant theme arose during the course of the workshop and that is fairness and equity. This theme was present in discussions around who pays and who costs relate to, and also decarbonisation incentivisation frameworks that don't just reward the wealthy. An example of this was that those in rented accommodation can be restricted in their energy use and also in the implementation of devices such as batteries, when the landlord owns solar panels and wants to benefit the most from the Feed-in Tariff (FiT).

It was suggested that there should be a policy shift towards meeting minimum energy *needs* rather than focusing on minimum wage levels. This led some attendees to question how communication is handled and in particular the perception of who decarbonisation is for (who benefits?). There needs to be an improvement in equity and equitable outcomes, and it was further noted that equal does not necessarily mean equitable. Energy needs are not uniform - people are both living in different locations and also have individually different needs depending on age, employment, able-bodied or not etc. The "Just Energy Transition" means not leaving anyone behind (economically and socially). This is therefore not just about (wealth and services) distributional justice but also participatory justice. However, how can the participation of everyone be ensured?

It was pointed out that the young are now tending to obtain their information from internet tools and social media rather than TV programmes (the main source for older generations). In meeting communication needs therefore we should consider the different ways people obtain information (and act on it).

How the regional identity featured in discussions:

- Devolution deal: There is an opportunity to define a new identity for the North of Tyne specifically. This region is within the North East that has its own particular identity. A vision about the potential for the North of Tyne along with a regional identity can be a strong motivator for action e.g. Tees Valley airport (other examples were mentioned). This vision could be helpful in succeeding in achieving the energy transition and more swiftly.
- North of Tyne is home to a diverse landscape. There are very rural and urban areas, a large national park, and areas of designated scientific interest. This has led to pushing back on some deployment such as onshore wind (Northumberland). Hence there needs to be consultation on what a fair quota would be for the North of Tyne in meeting UK climate targets.
- There is complexity at the boundaries - people are crossing these boundaries to live and work and therefore careful consideration needed for attributing the level of decarbonisation to particular regions.

The North of Tyne region has been hit hard by economic restructuring in the past. The collapse of the coal industry resulted in many facing long term unemployment and there was a reliance on the council providing the support that was needed. Austerity measures following the financial collapse in 2008, has meant that the funds available to councils to provide such support has had to be scaled back. This sense of top down governance within

the region has however continued, and it is worth noting that this may not be so strong in other regions of the UK.

A list of all the drivers for change mentioned within the workshop are shown in Table 1:

Table 1: Drivers for Change

Driver	Description
Cost & Affordability	Phrases used in relation to cost: ' <i>dominates the whole thing</i> ', ' <i>cost drives what gets done</i> '. Support for changes needed should be directed by those that need it and not be perceived as making the wealthy wealthier.
Equity or Fairness	Reflection of people living in different locations with a variety of lifestyles, commitments, abilities and resources means that the energy needs of individuals is diverse.
Activism	E.g. the success of the Extinction Rebellion, and how the young obtain their information.
Resistance to Change	Proposing changes as being better than currently (e.g. switch from coal to gas) can help overcome barriers. But there could be legacy issues for North of Tyne due to previous industrial change and impact that has had. Education can help encourage confidence to change.
Preservation	North of Tyne is home to some beautiful landscape and countryside and there is a concern how this could be impacted by renewable energy deployment. There is a trade-off here between natural capital and climate change mitigation.

The four groups were then combined into two groups to decide on a single driver each. Almost the entire room came up with a factor around equity and fairness even though strong opinions expressed about cost. This could be echoing recent political rhetoric, and also publications. Examples include the report by the IPPR on a 'Just Transition'¹, and by the Committee on Climate Change 'Net Zero' report², plus reflecting on the much reported fall in the cost of renewable technologies.

As mentioned above, it was noted that decarbonisation was not being put forward as a major driver. When prompting the room as to why, some attendees responded that they had taken this driver as a given. It was pointed out however, that this is a fundamental driver for change in the energy system and could be more or less depending on a whole host of factors. In other words, hitting climate targets may or may not be actually achieved on time.

Following the discussion with all attendees, it was agreed that the two key drivers to be used to form the 2x2 matrix for North of Tyne future energy scenarios would be: Decarbonisation, and Equity.

¹ <https://www.ippr.org/research/publications/a-just-transition>

² <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>

3 Scenarios & Pathways

3.1 2x2 Matrix

These two drivers for change form a 2x2 matrix that is then used to develop four scenarios, each scenario representing a quadrant of the matrix. Each of the four attendee groups were assigned quadrants to discuss how this scenario may evolve over time i.e. a “pathway”, and also a name for the scenario. Figure 1 shows the 2x2 matrix with names based on what was suggested, slightly edited to reflect the underlying theme of that future.

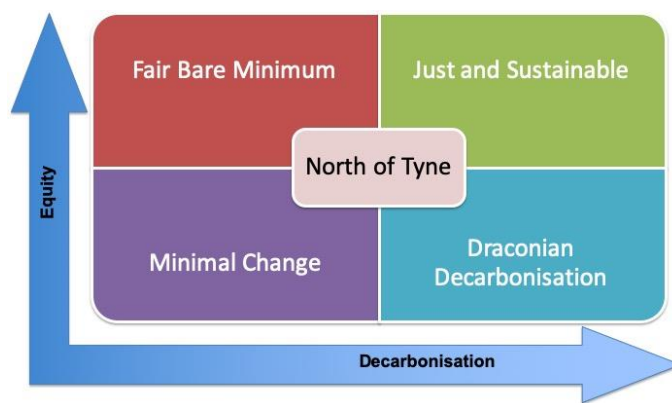


Figure 1: North of Tyne 2x2 Matrix

A summary of key features of each of these futures is shown in Table 2. A further description and pathway for each is provided in the sections that follow.

Table 2: Summary of Scenario Features

Fair Bare Minimum	Minimal Change	Just and Sustainable	Draconian Decarbonisation
<i>High Equity, Low Decarbonisation</i>	<i>Low Equity, Low Decarbonisation</i>	<i>High Equity, High Decarbonisation</i>	<i>Low Equity, High Decarbonisation</i>
<ul style="list-style-type: none"> • Regional prosperity • Carbon tax with waiver for poor • Rewilding 	<ul style="list-style-type: none"> • Capitalism persists and monetary driven basis for any decision making • Imports heavily relied on including for skills • Increased fuel poverty and inequality 	<ul style="list-style-type: none"> • Fairness is prioritised • Localised development autonomy including development of skills • Strong circular economy 	<ul style="list-style-type: none"> • Heavy carbon taxation - disproportionately impacting on the poor • Centralised energy - lots of nuclear power • CCS essential

3.2 Pathways

To facilitate discussion for how each of the scenarios would evolve through time (“pathway”) the Committee on Climate Change (CCC) ‘Net Zero – The UK’s contribution to stopping global warming’² transition illustration (Figure 6.1) was used as an example breakdown of factors relating to the energy system. The groups were provided sheets to populate for their assigned scenario with this breakdown and blank entries for 2020s, 2030s and 2040s.

3.2.1 Fair Bare Minimum

General description:

In this scenario there is an improvement in economic prosperity in the region and this affords people to have higher quality lives. This is driven by the success of the digitisation sector and results also in greater links with corporations around the globe. While there is increased prosperity in the region there is a focus on reducing inequality and particularly fuel poverty in the region. Fuel poverty is tackled by providing fuel bill help rather than incentivising energy efficiency improvements in buildings.

For transport there is a mixed mode in place so people have choice and therefore perceived as fair. There are grants for electric vehicles but these tend to benefit the wealthy and so progress on electrification is slow. Carbon tax is gradually introduced and in particular tax on flights. As flights are mainly for the wealthy this is perceived as fair but there are increased flights in and out of the region due to increased prosperity. There is both increased pressure on homes and transport generally as people seek to take up employment and either live in the region or travel from neighbouring ones. There is a tax on road fuels but with conditions in place to opt out if unable to avoid it so that this is also perceived as fair.

There is an element of rewilding as this is seen as equitable for all. Smart meters are rolled out extensively that facilitates more time of use tariffs successfully shifting demand so it is less “peaky”. This scenario is characterised by lots of behaviour change but little infrastructure change.

There is general apathy as to whether we can make a difference to climate change and people want to see the beautiful landscape of North of Tyne unchanged. Carbon capture and storage (CCS) in particular is seen as far too expensive and problematic to roll out. Decarbonisation is largely left to market mechanisms and therefore progresses slowly. The relatively favourable regime compared with elsewhere, gradually attracts energy intensive industries back to the region. There are tensions between land available for housing and industrial development and protecting the landscape. Some green belt land is gradually sold off for high end housing.

The pathway for this scenario is described in Table 3.

Table 3: Fair Bare Minimum Future Pathway

Area	2020s	2030s	2040s
Electricity	Little change – digitisation sector starts to grow leading to increased consumption, Smart meter roll out	Coal is cheaper than nuclear increased investment plus attracts range of jobs to area, there are some offshore wind farms built but little onshore, Smart meters rolled out to whole of region by end of this decade	Attracting energy intensive industry to region increases demand substantially - Smart meters mean demand less “peaky”
Heating & Cooking	Very little change, some trials of hydrogen in grid take place	20% hydrogen (from natural gas) is introduced to the grid, plus interest in UCG and CBM as well as shale gas in the region*	Natural gas still dominates – new sources for this from shale gas, UCG & CBM
Building Efficiency	New builds continue to have high efficiency but retrofit of existing seen as too expensive.	Increased prosperity puts pressure on land for new housing, most is for high end housing for the wealthy	Fuel bill support for those in poor thermally efficient homes
Road & Rail Transport	EV sales continue to grow but at a slower pace	Lack of investment in charging infrastructure and battery problems halts growth in EVs	Autonomous vehicles help reduce car emissions but not available to all
Aviation	Other airports crowded Newcastle seen as attractive alternative	Further growth in flights due to greater investment in the region – airport expansion	Further growth in flights, tax introduced
Shipping	Little change in this decade from currently	Prosperity drives more consumption and more imports arriving by ship Port of Tyne developed to accommodate this	Expansion of the Port of Tyne
Industry	Other countries affected by decarbonisation costs – UK starts to look relatively more attractive	More polluting companies return to UK and this region in particular for favourable tax regime	Lobbying by corporations to expand industrial development in the region successful
Agriculture	Little change to current practices	Some land diverted to schemes for environmental land management and improved prosperity helps pay farmers for this	Some switch to sourcing balanced diets with sustainable food chains
Land Use	Some rewilding takes place as seen as equitable in the long term		
Waste	Not much change	Port of Tyne enables lucrative exporting of waste	All waste is exported
Greenhouse Gas Removals	No investment – seen as too expensive	No investment – elsewhere develops the technology	
Infrastructure	Lowest cost upgrading system – fossil fuels permitted with some renewables	Investment in Port of Tyne to facilitate shipping to region, some EV, airport expansion	

* UCG = Underground Coal Gasification, CBM = Coal Bed Methane

3.2.2 Minimal Change

In this scenario the current economic paradigm persists and the profit incentive approach drives the economy and the energy sector. Costs and benefits of any change are considered only in monetary terms. This means that societal and environmental costs and benefits are only met if it is deemed financially advantageous to do so. Therefore decarbonisation of the energy system needs strong policy levers. Due to the powerful lobbying by corporations of leaders there is little appetite for such levers to be implemented nationally and regionally.

As a result there is only slow progress made in decarbonisation. Any progress in decarbonisation is due to the relative costs of renewable and non-renewable technologies. Due to the unwillingness to invest renewable technologies are largely been developed overseas, and results in further consolidation of the UK's post-industrial economy.

The local skill base is diminished, leading to the best employment opportunities being given temporarily to workers outside the UK. Employment for locals is low skilled and precarious depending on the profitability of the corporations.

Imports are heavily relied upon not only for the employee skill base but in all areas of day to day life and that includes the energy system. More interconnectors with Europe are planned and this in turn helps to decarbonise the energy system to some extent. Gas is still heavily relied on for heating. Carbon Capture & Storage (CCS) is extremely slow to get off the ground due to a lack of incentive to experiment in the UK since corporations want assurances they can profit first.

A shift away from petrol and diesel cars occurs but only because global manufacturers have stopped producing them. This leads to a need to roll out EV infrastructure but only where profits can be made for investors. A significant proportion of society in the region cannot afford EVs.

The pathway for this scenario is described in Table 4.

Table 4: Minimal Change Future Pathway

Area	2020s	2030s	2040s
Electricity	The progress towards decarbonisation stalls through lack of investment as overseas develop renewable technologies	Competitive renewable technologies imported from elsewhere but it is patchy	Limited decarbonised electricity mainly due to CCS not getting off the ground fast enough
Heating & Cooking	Lack of policies to incentivise decarbonised heat means little change	In some wealthy areas community district heating projects such as gas becomes more expensive due to shrinking markets and need to import	Extensive shale gas exploitation needed to support those areas not able to switch to now more competitive heating systems
Building Efficiency	Improving energy efficiency of housing stock slow and patchy	Only the wealthy can afford to improve energy efficiency	High rates of fuel poverty

North of Tyne Energy System: Narrative Scenarios

Area	2020s	2030s	2040s
Road & Rail Transport	Fuel price increases. End of 2 car family ownership.	Labour force becomes increasing immobile due to cost of travel. Reinforces scaling back of public transport.	Public transport minimal. Most use road transport with often very old and unsafe vehicles due to necessity. Rail travel is attractive to the rich as a result and with ticket prices to match.
Aviation	Reliance on industry to innovate. No significant change.	Fuel efficient planes and practices are imported from implementations overseas as reduces costs for domestic airlines (and therefore increase profits)	Flying tickets unattainable by most.
Shipping	Increase in shipping. Importing more.	Some fuel efficiency drive due to costs	Minimal reduction in total emissions compared with currently
Industry	Investment in clean technologies happening elsewhere – industries look to relocate overseas	Only the dirtiest industries and manufacturing companies remaining	Even those industries remaining struggle to maintain competitiveness
Agriculture	Continue with existing farming methods	Increase consumption of fertiliser and pesticides. New crops and practices. More vegan/vegetarians from financial necessity. Meat/poultry/fish for the wealthy.	Agricultural land suffering yields due to over exploitation. Increased food imports with lower standards than domestic production.
Land Use	Some attempts to improve efficiency of land use and some reforestation	Expand housing on green belt areas because some existing houses uninhabitable. Some reforestation continues.	Due to necessity deforestation takes place to meet some emissions reductions.
Waste	Some improved recycling facilities but lack of investment in the technologies	Due to costs to process waste sent abroad. Some energy from waste facilities.	Increasing energy from waste plants deployed in poorer areas.
Greenhouse Gas Removals	No significant tree planting.	CCS very slow to get off the ground – reliance on development overseas	Minimal greenhouse gas removals
Infrastructure	Expand and reinforce but no innovation	Mainly maintenance of existing minimal attempts at efficiency improvements	Patchy deployment of smart technologies
Other (specify)	Slow down in decarbonisation	Dramatic increase in inequality	Civil unrest common place

3.2.3 Just and Sustainable

In this scenario the transition of the economy to a decarbonised one, that meets the Paris Agreement by 2050, also prioritises fairness. In other words, more vulnerable members of society in the region are supported and not penalised or left behind in the transition. Policies are developed with all of society in mind to bring about fairness and equity.

The egalitarian economy is strongly orientated towards local development and maximising secure employment. Devolved administrations ensure that local communities’ voices are heard in development of the region and by appropriately balancing financial and environmental pressures.

There is an immediate focus and programme of action on education and skills training so that communities benefit from employment in the decarbonised economy. There is a surge in community energy projects facilitated and incentivised by the devolved administrations. Examples include collective community ownership of renewable technologies and minimal corporate ownership except for the largest scale projects such as district heating. Regulations ensure that vulnerable members of communities are also able to partake in the benefits of such schemes. Time of use (TOU) tariffs are tempered by measures to protect those less able to pay.

Local banks are established to further ensure local issues are incorporated in financial decision making. There is a strong circular economy and as much recycling and repurposing as possible is undertaken locally or at least within GB.

The rebalancing of decisions made by corporate entities in the above way restores consumers’ levels of trust, and corporations are no longer perceived as only interested in (monetary) profiteering. This, along with an education programme, enables the decarbonisation path to happen at a faster pace than predicted and the UK is upheld, and the North of Tyne region in particular, as a model example for the rest of the world to follow in mitigating dangerous climate change.

The pathway for this scenario is illustrated in Table 5.

Table 5: Just and Sustainable Future Pathway

Area	2020s	2030s	2040s
Electricity	Community energy schemes, subsidies, incentives, equity R&D	Industry and Transport energy efficiency and automation R&D + Deployment	Deployment. Zero marginal cost generation by 2050
Heating & Cooking	District Heating schemes deployed; industrial / nuclear waste heat and large CHPs	Hydrogen (H ₂) blending with natural gas	By 2050 CCS and low carbon fuels
Building Efficiency	Building Regulations become stricter incentivising higher	Insulation, PV and retrofit / flexible	By 2050 thermal efficiency of housing has reduced demand to minimum possible levels

North of Tyne Energy System: Narrative Scenarios

Area	2020s	2030s	2040s
Road & Rail Transport	efficiency in both new and existing build	Schemes to incentivize particularly for landlords	
	Road: Infrastructure for electric vehicles (EVs) a priority, along with cycle ways for safe and practical cycling in place of car use. Hydrogen fuel cell buses rolled out.	Road: Substantial shifts to EVs, public transport and cycling Rail: H ₂ trains begin to be rolled out	Road: H ₂ buses / electric bikes EV for passenger vehicles, H ₂ for freight Rail: all H ₂ trains General: Remove stigma of public transport. Make affordable. Essential travel only.
Aviation	Rail: Refit/extend metro & feasibility study of H ₂ trains		
	Map & understand. Alternative fuels investigated	New usage patterns and strong incentives to switch away from aviation use for recreational purposes	Flights are mainly for business purposes but due to localized economy this also is much reduced.
Shipping	Map & understand. Alternative fuels investigated	Incentivise a shift away from fossil fuels both for domestic shipping and imports	Low carbon technologies apply in shipping and localized economies ensure that imports are minimised
Industry	Import & export complexities need to be understood and accounted for. CCS	Carbon capture and storage (CCS) begins to be implemented. Sensible more local production. Sustainable responsible consumption.	Industrial processes fully decarbonised. Strong circular economy.
Agriculture	Import & export complexities need to be understood and accounted for. Environmental Land Management System (ELMS) compulsory membership.	Renewable energy is implemented in agricultural practices taking account of land capacity and type. Removal of planning barriers. Building efficiency improvements.	Agriculture more arable crops and renewable energy capture/conversion on suitable quality land – wind, solar and bioenergy. Renewable energy incorporated on grazing land.
	Land Use	Reforestation and rewilding	Reforestation and rewilding
Waste	Waste reduction is incentivised.	Establishment of recycling and repurposing through incentives. Any hard to recycle waste is sent to energy from waste facility used for both electricity and district heating.	Recycling and repurposing becomes commonplace for almost all waste.
	Greenhouse Gas Removals	Reforestation/afforestation? Limited. CCS. High capture.	Medium capture. CCS.
Infrastructure	EV charging infrastructure roll out	Infrastructure to maximise energy efficiency all sectors targeted.	“Smart” technologies and grids rolled out everywhere in homes and across cities

Area	2020s	2030s	2040s
Other (specify)	Education. Understanding. R&D. Early devolution. Funding. New Business models. Medium spend.	Partial Circular Economy. Energy system automation. High spend. Medium devolution.	Strong circular economy. High Devolution. CSR. Medium to low spend. Optimised mix. Flexibility. High levels of trust. Reduced funding directed for equity.

3.2.4 Draconian Decarbonisation

Under this scenario high levels of decarbonisation are achieved but with poor levels of well-being and high inequality. The current monetary system persists with recouping costs for decarbonisation falling disproportionately on the poorer members of the community.

To achieve high levels of decarbonisation strong restrictions from central government and devolved regions on activities and energy technology deployment are in place. The energy system is predominantly a centralised system and tightly under government control.

The protection of the green belt is weakened, and this has led to a dramatic increase in onshore wind development as well as more housing being built for predominantly the affluent. Housing is under mandatory energy efficiency improvement ratings and this has led to landlords passing on costs to those renting. Fuel poverty increases as the poor and more vulnerable members of society struggling to meet the higher housing costs.

Low carbon investments in the region are mainly from global corporations who recruit skilled employment mainly from overseas. Limited skills training undertaken within the region leading to many in insecure employment.

The pathway for this scenario is illustrated in Table 6.

Table 6: Draconian Decarbonisation Future Pathway

Area	2020s	2030s	2040s
Electricity	Interconnectors – more are planned. Green belt weakened – rise in planning for onshore wind. Coal phased out and new nuclear build underway	Onshore wind farms begin operation. Interconnectors to Europe build commences.	By end of decade import more than generate. New nuclear plant in the region build complete and generation. Unit cost increases.
Heating & Cooking	Strong incentives for homes to switch from gas where possible. On gas grid hydrogen 20%.	Community heating projects commence such as biomass boiler and district heating. Tends to be affluent areas.	More communal housing for those in fuel poverty.
Building Efficiency	Tough household efficiency targets are	Passivhaus mandatory requirement – expensive!	High inequality: Wealthy have

North of Tyne Energy System: Narrative Scenarios

Area	2020s	2030s	2040s
Road & Rail Transport	implemented. Phase in with fines for not achieving in next decade.	Housing costs sky rocket – increase in fuel poverty	comfortable eco homes, but poor and vulnerable struggle - milder winters and fuel bill help dependent.
	Measures for facilitating increased cycling – more cycleways costs recouped by a bike “license”. Unequal access to safe transport infrastructure	Autonomous vehicles introduced but High Cost so Low Access	Diverse range of travel options for those that can afford it. Can inhibit taking employment for some.
Aviation	Incentives introduced for all airports to use biofuels. Flight prices rise.	Competition in the region for land to grow crops for fuel for lucrative flights and onshore wind farms and housing helped by green belt relaxation	Newcastle airport expansion falters – due to flight prices deemed too high for most and land competition issues
Shipping	Incentives introduced for low carbon – (renewable) ammonia fuel cells most promising	Shipping becomes more expensive passed on to cost of goods impacting trade	Increased local production ammonia – new industry for region
Industry	Carbon restrictions phase out coal in region and rise in unemployment with lack of retraining (cost).	Digitisation sector and wind farms on and off shore strong in region. No circular economy.	Skilled work going to overseas due to lack of retraining. Resentment with the locals.
Agriculture	Incentives to decarbonise and restrictions on livestock farming	Lobbying by farmers where there is aggressive land grab by wind farms due to lucrative incentives	Farming in region contracts. Some grow biocrops for fuel as more lucrative than arable, some introduce biocrops in arable crop rotations.
Land Use	Relaxation of green belt means development on this land.	Meeting rewilding and reforestation targets in conflict with onshore wind development	Fall short of targets – more lucrative to build wind farms and ecohousing.
Waste	Waste collection rates go up as more exported	Some households struggle with rates – increased fly tipping	Costs of dealing with fly tipping add to bills
Greenhouse Gas Removals	Government bypass local opposition to develop CCS infrastructure in the region	Carbon storage sites disproportionately high number in region – local resentment	Some Direct Air Capture in order to meet targets
Infrastructure	Transport – cycleways. CCS	Interconnectors/district heating. CCS	Communal living schemes. CCS & DAC