Political and regulatory uncertainty and risk relating to fairness in the UK energy and water sectors
How is this shaped and mediated by the politics of the 'disrupted' world?

The role of climate and the environment in terms of political and regulatory uncertainty and risk in the energy and water sectors

Background

Sustainability First's Fair for the Future Project is helping energy and water companies, policy makers and regulators better address the politics of fairness and the environment in the sectors. The project was kicked off in 2018 and will last until early 2021. It has two workstreams: achieving a deeper understanding of political and regulatory uncertainty and risk to deliver better social and environmental outcomes; and developing a 'Sustainable Licence to Operate' for companies in the sectors. This note concerns the first of these two workstreams. A key objective of this part of the project is to develop a more coherent, comprehensive and inclusive view of risk and uncertainty in the sectors.

As we experience technological, climatic and societal disruption, conventional approaches to factoring in risk and uncertainty are becoming increasingly challenged by changes to the following '**dynamic risk factors'**: climate and the environment; consumer lived experience; civil society, community groups and the public mood; and the media – particularly 'new' and social media.

This draft working note explores how problems with **climate and the environment** can escalate political and regulatory risk and uncertainty with regard to fairness, and how the sectors can better address these problems to reduce these risks.

This spring, we will pull a revised version of this working note together with those on the other 'dynamic risk factors' outlined above into a single Discussion Paper spelling out the common themes between these factors and the implications they have for companies, regulators, policy makers and communities. Taken together, these working notes raise deep questions about the capacity of current policy and regulatory arrangements to deliver social and environmental public interest outcomes in our disrupted world.

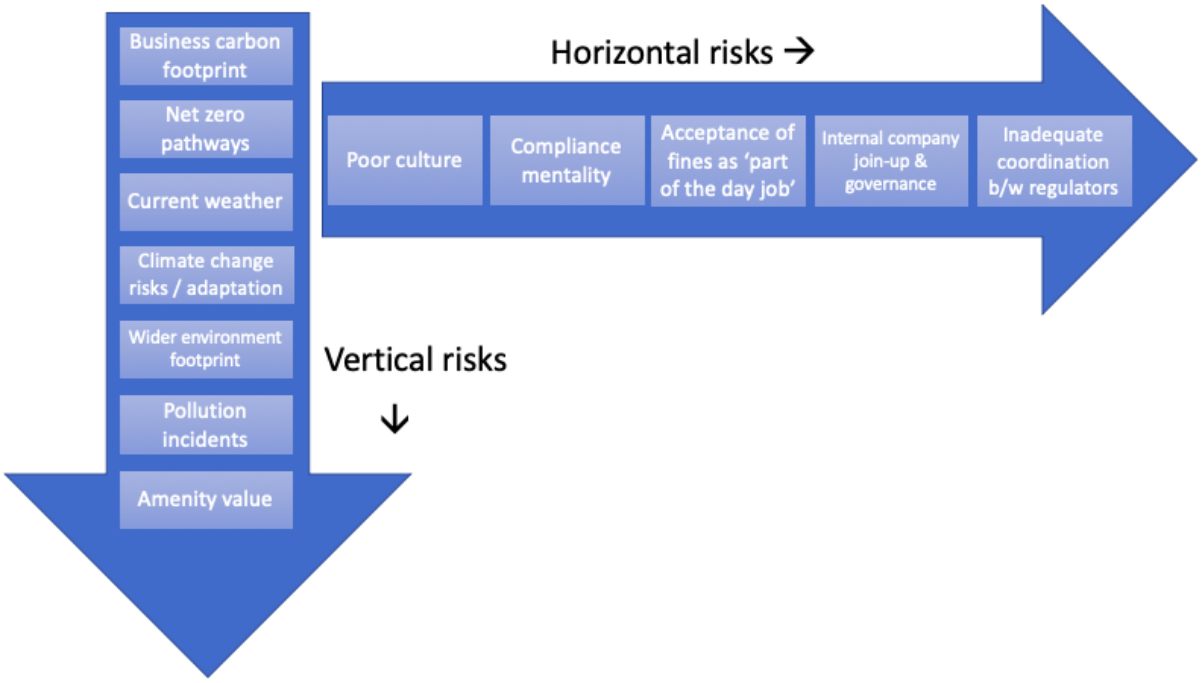
Executive summary and conclusions

This paper focuses on climate and environmental risks in the energy and water sectors and their interaction with political uncertainty and regulatory risk. Climate and environmental risks clearly overlap but are not always the same. They are in turn different to **sustainability**, which looks at environmental, social and economic health and wellbeing in the round, taking an integrated view of how to balance different outcomes.

Climate and environmental risks play out in different ways across utilities. The **picture is not homogenous** and depends on the sector, where the company sits in the value chain, geography, their own risks and resources, etc. The working note begins by exploring this complex and very broad landscape, recognising that this has supply- and demand-side implications – many of which are outside a company's direct control but where the business can play a key role in informing, influencing and enabling others to take action.

The paper distinguishes between what we call 'vertical' risks, such as businesses' carbon footprint, water pollution from wastewater treatment and adapting to climate change, and 'horizontal' risks such as business culture/governance, lack of join-up across businesses and disconnects/gaps between regulators. It is clear that some of these are significantly more material than others.

Figure 1: Vertical and horizontal risks as they relate to climate and the environment



Source: Sustainability First

A theme of the whole Fair for the Future project has been that businesses can chose between a 'compliance /reactive' approach to sustainability and a proactive approach. In a disrupted world, where issues can and will go viral very quickly, there are a number of things which can help mitigate risk, many of which would form part of a move to a Sustainable Licence to Operate.

So mitigating environmental risk might entail**:**

- Understanding and addressing the **totality of environmental risks** – and where the company sits in the wider environmental eco-system.
- Forming **collaborations and partnerships** with third parties to share skills and expertise and to develop more 'joined-up' solutions to these problems.
- Using company expertise to help to **shape policy and regulatory frameworks and approaches** so that they are firmly focused on future climate and environmental challenges.
- **Innovation to develop new business models and approaches** to reduce climate and environmental impacts and to enable and facilitate others to reduce theirs (e.g. steps to facilitate flexibility in the electricity system, demand side measures in water and moves to develop more integrated and circular models of service delivery, etc).
- Improved use of **data and telemetry** (through predictive analytics, remote sensors and controls, etc.) to more proactively identify and manage environmental risks.
- **Transparent reporting** to identify risks and opportunities and priority areas for attention and to demonstrate what is being done to protect environmental interests. This is also

important for companies to be able to 'lead by example' (e.g. leakage reduction), helping all sides to better **value** services and encourage energy and water saving and efficiency. As well as reporting at a company level, environmental reports need to be joined-up, sector-wide and analysed. This is particularly important on carbon.

- **Scenario and adaptive planning** (against a range of scenarios) to help clarify interdependencies, critical paths, new opportunities, etc.
- **Proactive communications and deeper cultural change** to unlock the significant potential reputational benefits from being at the forefront of addressing climate and environmental challenges, for example through third party endorsement. This can also create the positive headroom for when problems occur (e.g. outages from storms) and the permissive environment to develop new environmental services, etc.

In what follows we look first at the vertical risks (with an annex that explores these further by energy and water sub-sector), and then the horizontal risks. We finally consider how these risks might be mitigated, including what a sustainable licence to operate might entail in the environmental sphere.

Vertical risks

1) Business carbon footprint – The direct contribution of energy and water company operations to climate change

Business carbon footprint (BCF) / greenhouse gas emissions are usually divided into three types: scope 1 – direct emissions; scope 2 – indirect emissions of carbon consumed and purchased by the emitter; and scope 3 – all indirect upstream and downstream emissions, not included in scope 2, that occur in the value chain of the reporting company.

There is clearly a spectrum of BCF impacts across the energy and water sectors ranging from fossil fuel-based generation, to gas networks carrying existing gas supplies through to electricity and gas networks carrying renewable energy – and on to water and wastewater networks where impacts are far more limited.

2) Pathways to net zero

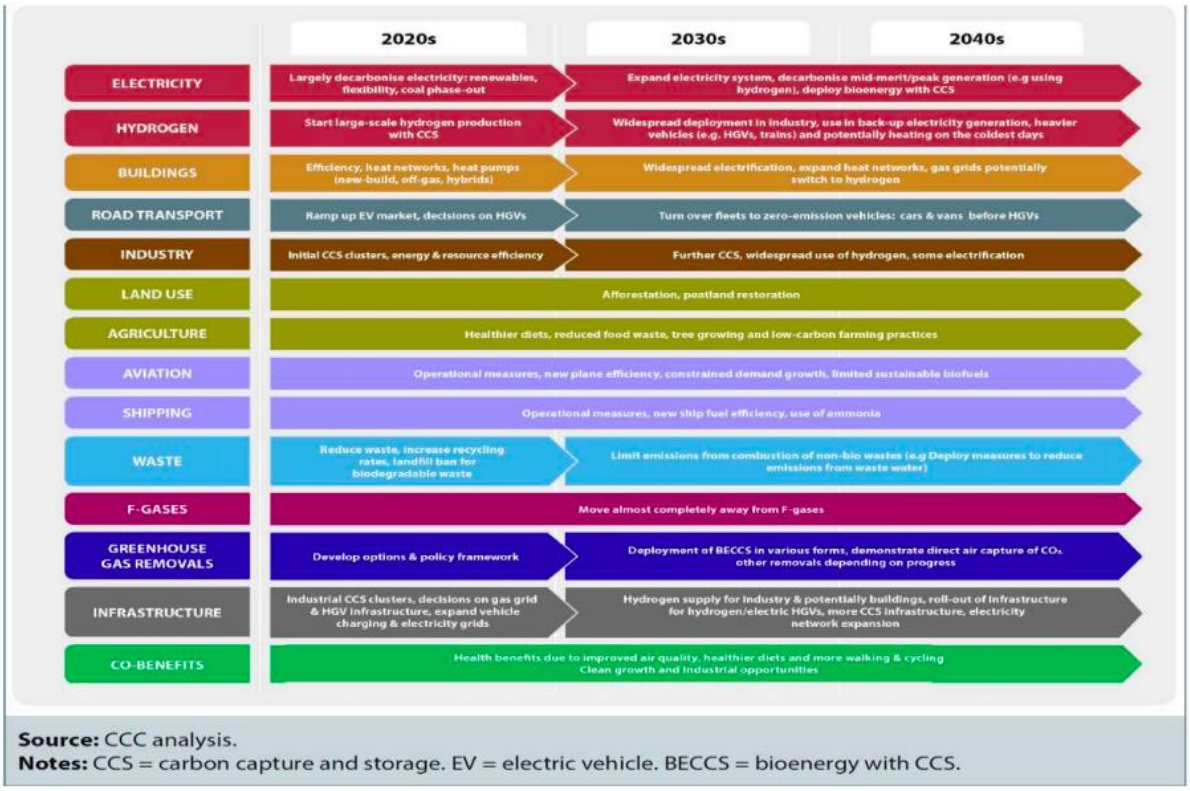
For energy companies in particular there are major challenges from the national implications of the 2050 (2045 in Scotland) net zero aspiration. These have been summarised as:

- Decarbonisation of electricity: the move to renewable generation; local solutions including storage, and options for peak supply and security of supply
- Decarbonisation of transport: the move to electric and other low carbon vehicles (it is for example not clear that electricity is the optimal fuel for HGVs or for parts of the rail and aviation sectors);
- Decarbonisation of heat with natural gas being replaced by either greener gas (biomethane, etc.), electricity or hydrogen.

All the above can be supported by demand management, and by techniques such as carbon sequestration.

Figure 2 provides an overview of the impact the net zero commitment will have across the economy to 2050. It is clear that this will have far reaching implications for the electricity and gas systems.

Figure 2: Overview of the impact of the net zero commitment across the economy



Source: Ofgem Flexibility Workshop (6 November 2019), based on Committee on Climate Change (CCC) analysis

3) Weather impacts, and the exacerbation of these from a changing climate

The latest climate projections (UKCP18) were released in late 2018 – the first major update for almost a decade. As the Met Office's UKCP18 tool kit[1] illustrates, although more extreme weather is predicted, it is not easy to simply summarise the projections as they vary: a) by emissions scenario; b) by high/medium/low probability; and c) by impact – e.g. mean winter, summer temperature, max winter, summer temperature, sea level rise, mean winter, summer rainfall, etc.

However, despite the challenge of predicting impacts, relative to previous estimates, it is now predicted that sea level rise will be rather higher (with associated impacts on coastal communities and infrastructure and those near tidal rivers such as the Thames and Humber), and winters will be wetter. Summers, though drier, will see stronger episodes of 'summer convective rainfall' – extreme thunderstorms.

In other fora (e.g. the Environment Agency's new flood strategy/long term investment strategy), forecasters are now adopting the 'high' scenario for climate change (equivalent to 4 degrees average temperature rise) as closer to central than the previous 'medium' scenario (2 degrees).

[1] https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/land-projection-maps

The last UK climate risk assessment rated risks from drought, floods and heat as the top three 'underprepared' risks.[2] That assessment is being updated this year, but the National Infrastructure Commission's work suggests that these remain the biggest threats.

For utilities, these risks impact in a number of ways:

- For water companies, there is a direct and growing risk from drought;
- For energy generation companies, this poses an indirect risk (availability of water for cooling);
- Flooding can affect both energy and water companies – and both face the risk from sites which need to be near water courses/the sea for their operation. The 2007 floods were a dramatic illustration of this. Furthermore, even when sites are protected, floods can close access – thus necessitating shutdown of substations for example.
- Sea level rise and tidal surge impacts on coastal infrastructure including access. Although nuclear power stations, which are usually located by the coast, are well protected, high sea level rise scenarios could have impacts even here.
- Increased and more intense thunderstorms pose a risk to energy (e.g. the National Grid ESO outage on 9 August 2019[3]) – and the resulting power surges/interruptions can knock out water treatment works (as seen in the St Jude's day storm);
- High winds are a risk to electricity transmission networks, and to some sources of supply (e.g. they can knock out wind power).

4) Wider environmental risks – from day-to-day utility operation

Energy supply/distribution and the provision of heat/cooling and mains water/sewage treatment is the principle role of energy and water companies. Day to day operations can (1) involve the creation of environmental disbenefit (e.g. air pollution, heat into water, point source discharges from wastewater treatment, water abstraction from vulnerable habitats) but (2) in some cases ameliorate environmental impacts (e.g. nitrate and phosphate removal from sewage).

5) **Incident management – Major reputational risks**

Environmental risks can never be entirely removed, but how incidents are managed is crucial to reduce knock-on political and regulatory impacts. Single-issue/local pressure groups can both accentuate and help mitigate risks in this area. This means that some environmental impacts have a potential reputational impact beyond a dispassionate analysis of the consequences. These can also lead to within-company and cross-sector contagion. Examples can include some pollution incidents (including from wastewater) and undergrounding of powerlines in Areas of Outstanding Natural Beauty. Companies learning from each other's problems so that incidents do not reoccur and disruption to all parties is limited is an important mitigation.

6) Amenity value – The impact of energy and water company operations in terms of enabling others to enjoy the natural world

[2] https://www.theccc.org.uk/publication/progress-in-preparing-for-climate-change-2019-progress-report-to-parliament/

[3] https://www.nationalgrideso.com/information-about-great-britains-energy-system-and-electricity-system-operator-eso

Although of a different order of magnitude to climate risks, the amenity value of energy and water sector activities should not be underestimated (e.g. reservoirs and rivers for recreation as a positive, and the amenity disbenefits of overhead powerlines). To some extent, being able to 'do their bit' in connecting people with nature is important if the sectors are going to build public support to value energy and water services and to live more sustainably in their day-to-day lives – and to be willing to pay for the investments that are needed to meet net zero and other environmental commitments.[4]

How are these vertical environmental and climate risks changing?

The energy and water sectors have always had an environmental impact. However, the risk here is clearly escalating, most notably, but not exclusively, on carbon. This is clearly driven by emerging **scientific evidence on the impact of carbon emissions and biodiversity and habitat loss.** However, **public expectations are also changing** (particularly, but not exclusively, amongst millennials and young people) around how this should be handled (e.g. school climate strikes, Extinction Rebellion activism, reactions to global crises such as the burning of the Amazon, etc.).

The climate and environmental **tipping points** here are difficult to gauge – in part due to the complexity of ecosystems and our lack of understanding of feedback loops, etc. The associated political risk is also difficult to assess, particularly in the context of the need for global change (witness the recent frustrations around lack of progress in COP25 in Madrid) and a brutal and often 'post-truth' political environment where evidenced is not always valued. However, frustration over inaction can lead to more inventive remedies being put forward – such as **giving natural assets (e.g. rivers or lakes) legal rights of their own** (as in Canada with the Lake Eerie Bill of Rights).[5]

Policy frameworks are struggling to keep up with the pace of change on decarbonisation. This is leading to hotly contested debates around the pace of change needed to reach net zero, the importance of investing ahead of need to keep the pathways to decarbonisation open, how to balance interests between current and future generations in this regard, making judgement calls between how to address both mitigation and adaptation, etc. Economic regulatory frameworks are now starting to consider these factors but there are questions as to how far decisions which can have significant distributional impacts should be left to independent regulators rather than being made by democratically elected politicians.

The UK's environmental frameworks and standards post-Brexit are also relevant here – particularly for the water sector. This adds a significant degree of uncertainty – but also opportunity – to current challenges. Managing equivalence with EU law post-Brexit and enabling companies in the UK to build on existing standards will be important. The proposed Environment Bill also contains proposals for new targets building on existing standards, and for a new independent environment regulator to hold government and others to account. There are some concerns from NGOs that this may not be watertight, and it is unclear how far future EU environmental protection will be mirrored in the UK.

Climate and environmental risks clearly also play out in other ways: over time (intra- and intergenerational); across geographies (e.g. globally, nationally, regionally, locally – and between coastal communities and cities, etc); and between customer segments (e.g. industrial customers and domestic customers).

[4] See, for example, https://www.sciencedirect.com/science/article/pii/S0160412019313492?via%3Dihub
[5] https://beyondpesticides.org/assets/media/documents/LakeErieBillofRights.pdf

For infrastructure, the shape and nature of the risks can also change depending on the stage of a scheme or activity. For example, different risks are likely to come to the fore when a new strategic investment is being made compared to when a company has already designed and built the solution and it is operational – when some aspects of climate and environmental risk are to some extent then 'baked in' (e.g. stranding of gas assets with the introduction of hydrogen).

The annex explores these vertical risks further, including an assessment by energy and water sub-sectors.

Horizontal risks

The following horizontal risks can both escalate and mitigate the impact of the above vertical environmental risks.

How inadequate company and wider behaviour can *escalate* political and regulatory risk and uncertainty

Company failure to comply with existing environmental regulations

These are clearly part of the basic regulatory contract. Failure to meet existing standards can damage the climate and the environment – as well as company reputations and confidence in the wider policy framework and regulation. Over time, this ups the level of political uncertainty and regulatory risk. Problems can be exacerbated if companies treat environmental fines as a 'legitimate business expense' – particularly if these fines lead to irreversible damage (e.g. species and habitat loss). We would note that the EA have decided not to investigate category 3 pollution incidents as a principle of policy, and the recent Ofwat settlement with Southern Water led to Southern making a repayment to customers of over £100m but did not involve any restitution to the environment. More widely, historic fines have felt well short of meeting monetised damage, although levels have increased recently.

Short-term nature of price control processes and focus on price reductions for today's consumers

This is a potential issue on a number of fronts. Firstly, in terms of addressing climate change, restricting investment ahead of need runs the risk of reducing optionality and closing the pathways to meeting net zero at an acceptable cost. This may not only lead to excessive future costs but could also potentially exacerbate climate impacts if future generations are unwilling to pay this price.

Secondly, numerous commentators consider that, particularly in the water sector, there has been a long-term underfinancing of capital maintenance and/or resilience activity in the service of price reductions in five-year control periods. This increases the likelihood of environmental risks crystallising (e.g. damaging pollution incidents from burst pipes).

Whilst price control periods and frameworks are clearly set by economic regulators, companies can use their expertise and knowledge to 'call out' the potential climate and environment risks of taking a more short-term approach. A failure to flag emerging systems issues and sharing insights and expertise may be perceived as a failure to deliver on the company's role as part of complex interdependent eco-systems.

Clarity and coherence across government policy plus advice of external statutory bodies

A lack of alignment on commitments to climate and environmental policy at the international, national, regional and local levels, across government departments (e.g. in terms of building standards and climate goals) and with the advice of bodies such as the Committee on Climate Change (CCC) or the National Infrastructure Commission (NIC) can increase political and regulatory risk and uncertainty and potentially lead to company inaction and inertia. In the meantime, public expectations around the need for change may build, potentially amplifying political uncertainty further. The recent recommendation by the NIC that Ofgem, Ofwat and Ofcom should have net zero and resilience duties should be helpful in ensuring better policy and regulatory alignment.[6]

Limited co-ordination between regulators

Conflicts, gaps and uncertain boundaries between different regulatory bodies, and the limited ability of environmental regulators to influence the economic regulators' capex and opex settlements in price controls, can be a significant issue, particularly in the water sector. Key players may not only be economic and environmental regulators, but also health & safety (e.g. the HSE's cast iron mains replacement programme[7]); planning consent bodies; data regulators etc.

Unanticipated policy risks

The following can increase climate and environment risk: major unanticipated changes to standards (emissions; approaches to carbon accounting; electrical losses); and major health and safety responses (battery explosions and fires). We would note that policy risks can also arise because policy can follow/respond to one off incidents/single issue campaigning.

How utility company approaches to the environment and climate can *mitigate and reduce* political and regulatory risk and uncertainty

Understanding the company's role in delivering systems value

While many environmental risks are capable of specific individual or collective mitigation, we would argue that there is a totality of environmental risk which is more than the sum of the parts. Crucially, companies need to understand their roles in terms of delivering this wider systems value.

Taking a holistic look across the business and improving environmental performance in the round is important in its own right, but also because a significant mitigation when things go wrong is the ability to call upon authentic reputation and/or third-party endorsement. This may not be forthcoming in the absence of a more strategic approach to climate and environmental issues.

Partnership working and collaboration

Many environmental risks, as they impact and interact with eco-systems, cannot be solved by one player alone. Working together with others across the sector and more widely is therefore vital. Sector- and systems-wide initiatives are vital to mitigate many climate and environmental risks. These include working with government (local, regional and national) on carbon taxes, Sustainable Urban Drainage (SUDs), zero carbon homes, etc.

Some of this needs to be done at scale and through changes in standards – not by individual or voluntary arrangements with individual companies, local authorities or developers, etc. However,

[6] https://www.nic.org.uk/wp-content/uploads/NIC-Strategic-Investment-Public-Confidence-October-2019.pdf
[7] http://www.hse.gov.uk/gas/domestic/gasmain.pdf

these smaller scale arrangements can point the way to the wider changes in standards, funding, etc. that may be needed.

There are a range of situations which benefit from having developed local/specialised partners, who can both take some of the environmental risk but also serve as a genuine third-party endorser, on the basis of detailed and trusted knowledge of a company's operations and ethos. Partnerships for co-design, co-delivery, support and learning (including lessons of what has worked well and what has not) are all important.

Working with third parties can reduce costs and provide flexibility (avoiding the need for reinforcement) and can be highly productive (e.g. customer behaviour change on water and energy use, the water industry's work with food outlets to reduce fatbergs, working with developers on new home standards – zero carbon, grey water reuse, etc.).

Accidents can and do sometimes happen, particularly in a system which tends to incentivise regulators to under-allow for deferable spend – e.g. on capital maintenance and resilience. Establishing good and transparent stakeholder relations in 'peacetime' and investing in good early-warning systems, 'near early-warning audits' and outreach to the local community can help address environmental problems when they do occur.

However, it must be remembered that some accidents are 'waiting to happen', do not come from leftfield and should therefore have been predicted. Developing specific mitigations while on the back foot is nearly always suboptimal.

Lastly, partnerships can also serve political purposes. As many of the environmental issues faced by the sectors represent a 'long haul' challenge, developing consensus and cross-party solutions that will last despite political turmoil and distraction is an important risk mitigation.

Helping to shape policy and regulatory frameworks

Engaging with policy makers and regulators to help develop new approaches and frameworks that better address environmental challenges, sustainable development and the long-term public interest can reduce risks in this area. As a first step, this requires an honest conversation about what the risks are and how these may be most effectively mitigated**.**

'Safe spaces' are needed for this to occur to develop more mature and trusted relationships where there are fewer surprises and a more stable environment for more radical long-term thinking. Areas of attention could include: decisions around investment ahead of need; and governance arrangements which better share risk and reward, and encourage the collaboration and partnership working that enables the delivery of multiple benefits.

Given that many of our existing institutions are unlikely to be fit for purpose to deliver a fair transition to net zero, energy and water companies will also want to share their expertise and engage in debates around more fundamental institutional design (e.g. with the proposals in Sustainability First's 'Circling the Square' report[8] and the IPPR's proposals for a Sustainable Economy Act).[9]

[8] https://www.sustainabilityfirst.org.uk/images/publications/other/SF_Future_of_utilities_regulation_Discussion_Paper_FINAL.pdf

[9] https://www.ippr.org/research/publications/rethinking-economics-for-the-age-of-environmental-breakdown

Companies can play a role in shaping future policy and regulatory frameworks to ensure these are more coherent and to help ensure that important decisions are not delayed until they become highly politicised, environmental harm has occurred (which in the case of species loss, SSI / ANOB degradation, etc. may be irreparable), costs have increased and optionality (for the move to net zero, for example) is reduced.

Innovation and developing environmentally beneficial business streams and business models

New mechanisms are already drawing utility companies into the wider 'business of environmental protection'. At a high level, these include:

- A shift from selling kWh of electricity and litres of water to selling **electricity and water services** (including smart kit) that help conserve resources and reduce usage at peak (time of day for electricity, seasonally for water) and wider eco-systems services (to reduce pollution).
- **Market mechanisms,** including those that enable more efficient (short- and long-term) **systems operation** (e.g. contracts for inter-company water transfers, interruptible electricity contracts, etc.).
- New **circular and integrated business models** and approaches (e.g. energy and water network companies becoming **service platforms** for other actors to develop new sustainable services on the back of).
- More **local solutions and approaches** to problems (e.g. more widespread catchment management approaches to improve water quality).

In water, many companies are already proactively seeking solutions (e.g. Anglian Water are looking at possible work with land managers in Lincolnshire to create new water sources, Wessex Water have created Entrade as a possible profit centre for environmental trading and Severn Trent have been leaders in the development of anaerobic digestion and turning sewage sludge into energy). Many of these initiatives are investigating circular/integrated approaches – e.g. through rivers trusts – in a way which has not been done before.

In **energy,** significant strides have been made in terms of renewable and digital technologies and big data to enable the development of renewables and flexibility services, and companies are actively engaged in adopting innovative solutions in a wide variety of areas including constraint management, SF6 reduction and working with biomethane producers. However, issues remain in terms of the need to find new and far more effective ways to radically improve domestic energy efficiency (e.g. through home insulation and retrofitting existing building stock). Business models will need to adapt accordingly.

Scenario analysis and adaptive planning

Long-term water planning is now undertaken on a regional and even cross-regional basis. The 2016 Water UK sponsored study into 'Long Term Water Resources in England and Wales' concluded that the increasing risk of drought with climate change, population growth and the need to protect vulnerable ecosystems meant that solutions to drought needed to be wider than the ambit of any one water company.[10] Two regional groups took this agenda forward – Water Resources East and Water Resources South East. Other regions have now followed suit and are working together on the

[10] https://www.water.org.uk/publication/water-resources-long-term-planning/

issues most relevant to them, although the drought risk remains most acute in the east and south east.

The concept of 'adaptive planning' – whereby analysis is undertaken of steps which need to be taken now to prepare for a range of future scenarios, which scenarios can be met cost effectively and which actions can wait for more knowledge about how climate change is developing – has moved towards common currency, although techniques need further refinement.

Environmental data, transparency, monitoring and reporting

There is clear return to investing in good quality **telemetry and data interrogation**, as such systems enable a better understanding of network and asset health, improving network management and stopping problems before they occur. AI, robotics, digital twinning, etc. – along with sensors, predictive analytics, etc. – are changing things significantly in energy and are starting to have an impact in water (e.g. 'sewer bats'). Companies are also increasingly sharing data sets to enable others to develop solutions through competitions, hackathons, platforms, etc.

Natural Capital Accounting and **six capitals reporting, triple bottom line techniques and accreditation mechanisms** (e.g. ISO standards, B Lab certification, BITC responsible business tracker, etc.)[11] are starting to provide more robust and transparent frameworks to report climate impacts and environmental performance against, and help ensure that environmental risks can be better integrated into the company's mainstream decision-making and risk management frameworks. Water companies have also felt better able to report on biodiversity now that Natural England has produced a biodiversity index that they felt was sufficiently robust to use.

Improved reporting can help all parties understand trends and emerging risks, thus helping to reduce political and regulatory risk. Environmental reporting by individual companies needs to be bought together to provide a cross-sector and industry view of key issues (e.g. carbon emissions). Trade bodies, regulators and policy makers need to be able to make meaningful comparisons between companies on performance and actively analyse reports – not just collect information.

Proper understanding and reporting of the wider environmental footprint of an energy or water company operations would seem important, including on:

- landfill/recycling;
- use of non-renewable plastics, sustainable timber, etc.;
- promotion of biodiversity (e.g. on owned land, contributions to others' habitat/species recovery), including against the UN Global Assessment; and
- wider environmental supply chain performance, which we suspect will become a major area of pressure.

Communications and reputational risk

Developing a positive framing and narrative around climate and environmental outcomes which values the resources in question (e.g. amenity / public and mental health benefits / green tech / cutting edge employment and environmental businesses being attractive employers for millennials) can help build trust.

[11] Some of these accreditation schemes and metrics were explored in the Fair for the Future workshop on narratives and reporting for a 'Sustainable Licence to Operate' on 19th November 2019.

Trusted relationships can help companies that face a potential long-run existential challenge, such as fossil fuel generators or gas networks with the potential move from natural gas to hydrogen. The temptation faced with such a threat is to batten down the hatches: to do only what is necessary given that the possibility of stranded assets markedly lowers the return to investment, and to focus on lobbying for a future role. We would however argue that this is perhaps short-sighted. The companies who are most likely to be 'permitted' to develop hydrogen networks, for example, may well be those which have made the effort to demonstrate to stakeholders that they can be trusted with their current role.

In cases where technology does not clearly signal where future roles and responsibilities should sit, political decisions will need to be made. And politics responds to reputation and to the climate of opinion. So, perhaps initially counterintuitively, a Sustainable Licence to Operate has an important role for companies in this situation.

Proactively communicating this to internal and external stakeholders is key. Communications, particularly aimed at consumers and communities, need to show how the company is leading by example (e.g. valuing water itself by fixing leaks and reducing river pollution). Absent this, the company will not be seen as 'walking the talk' on environmental performance and people may be less willing to change their own behaviour and act responsibly (e.g. not flushing wipes down the loo or saving energy). Any 'cognitive dissonance' in this area (e.g. through a mismatch between words and deeds) can undermine the impact of positive behaviour change activity (e.g. nudge and gamification initiatives in water companies), erode trust and increase political and regulatory risk.

Cultural change

Given that policy risks can be difficult to predict, developing a culture of continuous climate and environmental improvement – to ensure the sectors are up to date and in step with developments in scientific understanding, technological possibilities and changing public expectations – is now understood as important by most companies. This requires creating a test-and-learn environment, proactively disseminating good practice, developing new skills, incentivising new working arrangements, taking a more outward-focused approach, etc.

Ensuring companies have the right skills to address both supply- and demand-based solutions to climate and environmental risks is also accepted as important. Companies already recognise the importance of building up expertise in customer communications, community outreach, data analytics, etc – areas outside of the traditional engineering disciplines – but these are perhaps still not given sufficient weight and prominence in some companies.

Annex: Similarities and differences between the energy and water sectors on climate and environmental risk

Some common issues

The climate and environmental footprint of water and energy, and therefore the nature of political and regulatory risk, is **not homogenous**. However, in both sectors it has supply- and demand-side implications – many of which are often outside a company's direct control but where the business can play a key role in informing, influencing and enabling others to take action.

Both sectors have issues around their **business carbon footprints** and the **wider environmental footprint** of non-frontline operations (e.g. recycling and energy / water use in offices). They therefore face potential criticism if they do not tackle such **'basic housekeeping'** or 'practice what they preach'. With the exception of retail, all also have issues around their **construction footprint** and emissions from their **vehicle fleets**. Badly planned street works can also lead to knock-on local air quality problems.

Energy

For **networks** (electricity transmission and gas distribution), Ofgem's RIIO-2 guidance on environmental action plans gives an indication of their priorities in this area and the key environmental risks in the sector.[12]

Some of the key climate and environmental risks and issues for **electricity network's** include: connection of renewables (with associated problems of intermittency and distributed power); more active networks; demand reduction and demand-side flexibility; digitisation and smart technologies; and ongoing efforts to reduce emissions of SF6 in capital equipment and losses. Some of these risks sit outside the direct control of the companies. This is a fast-moving area and significant innovation is taking place to manage these risks.[13]

The role of electricity networks in the decarbonisation of transport and heat is a growing and significant issue as new loads are likely to be large and uncertain. The networks' role as an enabler of the shift to EVs, for example, is the subject of much debate. And there are also big questions around roles and responsibilities in future heat networks. Taken together, these points have implications for network charging and systems operation – at the national and distribution levels.

Electricity networks also face local issues around visual amenity (undergrounding of overhead lines) that play out in the planning process.

For **gas networks** (transmission and distribution) the major environmental and climate issues are around leakage of methane, biomethane injection, and (mid to longer term) facilitation of hydrogen as a potential replacement for methane. The latter is clearly an existential risk.

For **electricity production**, there are obvious major existential climate risks, around the phasing out of fossil fuels, and opportunities, including around renewables and Carbon Capture and Storage (CCS). The major pressure here is from the national political agenda. There can also, however, be local air pollution and other environmental risks such as discharges to water (e.g. past technetium

[12] See Appendix 2, https://www.ofgem.gov.uk/system/files/docs/2019/10/riio-2_business_plans_guidance_october_2019.pdf

[13] For example, see https://www.smarternetworks.org

discharges from Sellafield into the Irish Sea). And, of course, the siting of power stations – and renewables – can lead to concerns around visual amenity and wider environmental impacts (as well as safety concerns) that should be addressed in the planning consent process.

Although the direct climate and environmental risks and impacts of **energy retailers** are in some ways limited, they can clearly play a vital role in reducing energy demand and enabling flexibility (e.g. through service packages and offers and time-of-use tariffs that include energy efficiency measures, heat pumps, smart appliances and home automation, storage, PV, EVs, vehicle to grid charging, peer to peer trading, etc). As business models develop and boundaries blur, retailers selling electricity can also play a potentially significant role in the decarbonisation of transport (e.g. Ovo's current market offers).

Wastewater and water

The Environment Agency's (EA's) Water Industry National Environment Programme (WINEP) and Water Industry Strategic Environmental Priorities (WISER) set out the environmental regulator's capital priorities for water which give an indication of the key environmental risks in the sector.[14] Plastics in water is also a growing issue; the EA has recently published research on source apportionment[15] and UKWIR have carried out work on micro-plastics in drinking water.[16]

For **wastewater** the main environmental risks are around accidental and permitted discharge of treated and untreated effluent. There are also issues around Sustainable Urban Drainage and the impact of run-off, both in terms of sewer overflows but also, of course, local flooding. In addition, there are concerns around phosphates, antibiotic resistance and oestrogen in sewage that could impact on soil and the wider environment. For example, studies have been carried out on oestrogen in rivers and resulting gender changes in fish.[17] Local amenity (e.g. odour from sewage treatment) can also be an issue.

There are also significant water/energy nexus issues here, and environmental opportunities from managing the risks around wastewater; most notably from using **anaerobic digestion** to treat sewage and sludge to capture and store methane which can then be transformed into renewable energy using Combined Heat and Power systems. The opportunities in the water sector for carbon sequestration (e.g. through planting reeds and trees alongside riverbanks and around reservoirs) are significant – and this can clearly have multiple additional benefits such as reducing chemical run-off from fields, providing natural flood management,[18] increasing biodiversity, improving public amenity, etc.

For **water supply**, the main environmental issues are around the implications of abstraction – including low flow in internationally significant and sensitive rivers such as chalk streams – and the

[14] https://data.gov.uk/dataset/a1b25bcb-9d42-4227-9b3a-34782763f0c0/water-industry-national-environment-programme
[15] https://consult.environment-agency.gov.uk/++preview++/environment-and-business/challenges-and-choices/user_uploads/plastics-challenge-rbmp-2021.pdf

[16] https://www.ukwir.org/view/$NvDnwfm!/
[17] https://www.gov.uk/government/publications/assessment-of-anti-oestrogenic-and-anti-androgenic-activities-of-final-effluents-from-sewage-treatment-works
[18] https://catchmentbasedapproach.org/learn/what-is-natural-flood-management/

energy (and therefore climate) footprint of treatment and pumping. 'Newer' sources of water (e.g. desalination plants, pumping from deeper aquifers) are more 'energy-hungry.'

Leakage is also a totemic issue for the sector – and can send negative signals to consumers about the importance of them also saving water.

For **water companies** pollution and low flow in rivers have a real immediacy and are felt on a more local/sub-regional scale than many of the environmental risks experienced in the energy sector. Even well-run operations can have accidents. And the sector operates on the basis of permits which limit environment damage but do not entirely remove it – e.g. storm overflow of untreated sewage.

In terms of **water retail** and the demand side, there are issues around the need to reduce per capita consumption levels through water efficiency, grey water recycling, etc. There is considerable scope for action here as in 2018 the average household in England and Wales used 143 litres of water per head whilst the comparative figure for Germany was 121 litres per head.[19]

In the absence of universal metering, the scope for developing seasonal tariffs to encourage sustainable behaviour change is limited. In addition, the relatively low cost of water (compared to energy) can make getting people to value water a challenge. Linking water saving initiatives to energy saving ones (e.g. shorter showers and lower temperatures) can be a positive way through this. Water companies are also doing much more to address risks from people flushing the wrong things down the toilet (e.g. wet wipes, sanitary towels and condoms) and drains (e.g. fats, oils and greases) that lead to pollution and blockages such as fatbergs. Companies are now increasingly active in this area (e.g. the Thames Water 'wet wipe challenge').[20]

[19] https://www.discoverwater.co.uk/amount-we-use
[20] https://corporate.thameswater.co.uk/Media/News-releases/Wet-Wipe-Challenge