Sustainability *First*

New Energy and Water Public Interest Network – New-Pin briefing paper

Long-run resilience in the energy and water sectors: Are ´20th century´ approaches for securing resilience relevant for the citizens and consumers of the 21st? How might they need to evolve?

No one wants power cuts, water restrictions or sewer flooding. Resilience in the energy and water sectors is clearly essential for economic and environmental health and personal wellbeing. It also helps ensure value for money as major failures can be costly.

DEFINITIONS

For the public, resilience in energy and water is framed by technical, environmental & social factors. It has two elements. Firstly, it is the **ability to anticipate trends** in the resources and other factors that impact on services and systems. Secondly, it is **the ability to withstand problems and maintain services and systems** for people and protect the natural environment now and in the future.

WHAT'S THE 'RIGHT' FOCUS?

Approaches that seek to remove all risks to services and systems would be extortionately expensive, and even then couldn't guarantee against failure. **Work on resilience therefore needs to focus on managing risks** rather than seeking to provide 100% security or to be seen to do something concrete & visible after a major event. To avoid single point failure, a coordinated & collaborative approach is often needed that works across systems and sectors.

DIFFERENCES BETWEEN ENERGY AND WATER

There are clear **differences in the approach to resilience in energy and water**. As **energy** is nationally networked, the approach to resilience is currently largely based on deterministic standards that are fairly uniform across the country. In **water**, due to differences in resource levels, geographies and demand, there aren't really any underlying *national* standards in this area and the approach to resilience tends to vary on a company / catchment basis.

Existing approaches to securing resilience

Traditional approaches to securing resilience have tended to be **top down & supply side focused**. The emphasis has been on solid / hard, technically focused and dependable measures (although natural approaches are also used in water). However, **these may not provide resource where it will be needed and at the quantity required in the future**. As a result, supply side interventions may provide too much or too little security – at a cost either way.

Behavioural economic insights, tariffs and smart meters & appliances are leading to **increased focus on softer demand side approaches**, & those that tackle the supply/ demand balance. Consumer or commercially focused, they **can be more agile than hard engineering solutions**. However, the flexibility they bring to the system is not always as dependable or secure as supply side alternatives. Recent experiences with flooding are also increasing attention on response & recovery to shocks.

Energy & water companies already do a lot of work to ensure that their services are resilient but more could still be done to **share lessons between sectors & mainstream good practice**. The water sector can learn from the energy experience with markets and the involvement of third parties. The energy sector can learn from the water experience with working collaboratively and over time with a wide variety of actors to reduce the impact of challenges such as flooding. When selecting approaches to resilience, both sectors need to be aware of how they are direct users of each other's resource.

*This briefing note summarises Sustainability Second's full discussion paper on Long-run resilience. The discussion paper is based on a literature review, interviews with 16 New-Pin Network members and others, case studies from the water and energy sectors and a workshop of New-Pin Network members on 22nd June 2016. The **full paper** can be accessed here: http://www.sustainabilityfirst.org.uk/*

Key issues for the 21st century

Looking to the longer-term, the resilience picture is starting to evolve, largely down to **climate and technological change**. **Climate change** is having a significant impact on water resource issues. In energy, it is leading to the move to low carbon technologies that present challenges to existing networks. Unlike demographic change, which can be relatively easy to plan for, climate change is problematic as it is still unclear which of the scenarios that are being developed will emerge. **Technological changes**, particularly advances in IT and digital communications, are also leading to a reassessment of resilience approaches. These **drivers for change** are confronting the sectors with a number of **emerging resilience issues**:

- **Electricity dependency:** Electricity is the underlying enabler for much electronic and communications connectivity. When things go wrong, electricity can also 'disable' these services. As smart services evolve, and we move closer to a world where the Internet of Things becomes a reality, electricity dependency is likely to rise.
- **Complex inter-dependencies:** In electricity, the disaggregated value chain and the development of a suite of renewable technologies have increased the number of interfaces & actors. In water, upstream issues may lead to an increasing need to co-ordinate with a wider range of stakeholders. As well as these independencies within sectors, the two sectors are also interdependent. New approaches to resilience (such as carbon capture & storage & desalination) are increasing these links further, raising the need for a holistic '**system of systems'** approach.
- **Emergence of new actors:** IT and digital communications are leading to the emergence of new activities and new players in the energy and water sectors. Government and regulators encourage markets and new entrants in both sectors as innovative practices and increasing diversity can bolster resilience. However, new actors also pose challenges to existing players and the maintenance and integrity of existing networks and processes.
- **New types of extreme risks:** The rise in extreme risks such as intense rainfall may also impact on 21st century resilience. As these become more common, they may have bunched impacts that may be difficult to deal with.
- **Changing customer/citizen expectations:** Changing citizen and consumer experiences & expectations of energy and water services, accompanied by a growing scepticism in the ability of established institutions and processes to deal with difficult issues, are also likely to have an impact on how future resilience is managed.

Areas where current approaches may need to change

- **Adapting to the new local / regional landscape**: New local and regional approaches can provide diversity, be tailored to meet resource and community needs (including the desire for devolved people 'power'), benefit from community knowledge and improve the anticipation of future trends at the local level. Engaged communities may also be more prepared to be active in the demand side and to respond to shocks. However, unless affordable storage is available, local solutions may still need to link in to existing networks for back-up, leading to the need for expensive system balancing. They can also lead to the unwinding of cross subsidies & reduce the opportunities for sharing costs / risk pooling - potentially leading to stranded assets.
- **Cross sector approaches**: Inter-dependencies between different services within a sector and between sectors require strong leadership and cooperation between all key actors. Cross sector approaches represent important vehicles for stakeholders to share information and experience that can help avoid single point failures and potentially lead to greater cost effective synergies between different approaches. They can also enable a more comprehensive assessment of value for money and affordability. Identifying the inter-dependencies between resilience initiatives is undoubtedly complex, potentially leading to the loss of sector specific insights & inertia.
- **Markets and other interventions**: Markets can provide a faster and more flexible response to resilience than regulation, in the process encouraging efficiency, innovation and diversity. They can enable the emergence of new local actors better placed to understand and respond to local risks. However, markets can create new inter-faces that need to be managed and by their nature can be disruptive to the networks that may still be needed as back-up. Some market failures may also not always be visible (at least for some time). Markets may find it difficult to access adequate capital for significant resilience related investments. In some areas, interventions (eg planning, building and product standards) may be more effective than market approaches.

Possible practical steps to know if you are on the 'right track' to secure resilience

Stakeholder engagement

- All stakeholders need to be actively engaged in decisions to identify what their views on risk and resilience are, to help set priorities for change, and help identify and anticipate vulnerabilities in the system.
- Present information in a way that enables citizens and consumers to understand and compare approaches.
- Use a common and accessible language, especially on costs and risks.
- Clarity needed on who leads on engaging stakeholders in cross sector and local issues and on joining up stakeholder views from the community and national levels. Identifying the 'community of interest' that needs to be engaged and who is best placed to lead on this can help.

Information sharing

- Develop and share a robust evidence base of resilience challenges, customer requirements and the risks, costs and benefits of different options to enable competition, collaboration and consumer & citizen engagement.
- Involve third parties, including NGOs, in building up the resilience evidence base.
- Data needs to be open and capable of being interrogated at an appropriate level of granularity. Information also needs to be inter-operable to meet the needs of multiple end users and be correlated against data from other sources and service providers.
- Ensure lessons from failures are shared widely.

Standards and decision-making tools

- Standards can potentially act as an enabler to help secure resilience. They can be distinguished in terms of how they are applied (universal or tailored) and the basis on which they are set (deterministic or risk based).
- Government and regulators should play a key role in working with stakeholders to design standards frameworks**.**
- Given the uncertainty that exists, in energy, moving from a deterministic and universal approach to standards, to a more risk based, tailored and possibly even a 'mitigated' state approach, may be helpful. However, any changes need to take into account increasing social / economic dependency on electricity to power digital communications.
- Assess potential distributional implications of transitioning towards a tailored and risk based approach.

Metrics

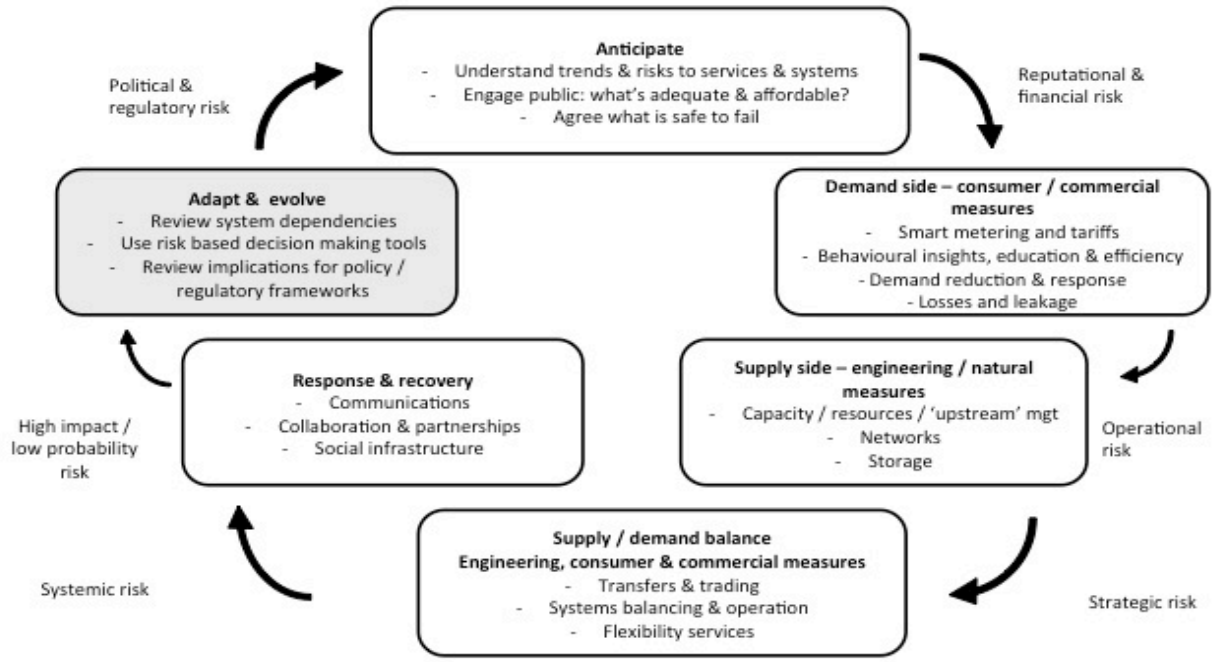
- Measuring resilience is important to allow the public and providers to judge performance, make comparisons between areas and companies and to track progress over time.
- Articulate expectations and 'resilience goals / targets' clearly, and report metrics against such goals.
- Resilience metrics need to be outcome based and related to why the service is needed by citizens and consumers. They should be connected to public expectations and the societal needs fulfilled by the service in question.
- Consideration needs to be given to the development of cross sector metrics.

Roles, responsibilities and leadership

- Strong leadership is vital, particularly when there are distributional impacts or in complex areas like flooding.
- This requires clarity of roles & responsibilities and clear decision-making and funding frameworks, particularly when solutions may require cooperation across institutional boundaries.
- Government has a key role to play in deciding the appropriate level of risk & who should bear this.
- Companies need to meet customer expectations on resilience and to consider developing approaches that may go outside regulated asset bases.

A suggested approach to securing long-run resilience for citizens and consumers

Given the uncertainties of climate & technological change, an adaptive planning approach is needed. The Diagram below illustrates what this could look like; the demand side is before the supply side to ensure flexibility & a public interest focus.



Proposed principles for securing long-run resilience

- **Risk based**: Resilience approaches should take into account the full range of risks (including systemic risks).
- **Agile**: Resilience approaches need to be adaptive, keep options open & prioritise those delivering multiple benefits
- **Engaged stakeholders**: Resilience approaches need to engage citizens and customers in cross sector issues.
- **Understanding of affordability**: Resilience approaches should account for fairness, including between generations.
- **Cross sector view**: Resilience approaches should be joined up technically, commercially, across systems and from citizen / consumer point of view.
- **Partnerships and collaboration**: Resilience approaches should build connections to promote diversity, develop capacity for response and recovery and to spread good practice.
- **Transparency**: Resilience approaches should share assumptions, clarify responsibilities and explain reasons for decisions to build confidence in decision making.

ABOUT SUSTAINABILITY FIRST AND NEW-PIN

Sustainability First is a small environmental think-tank. The charity's New-Energy and Water Public Interest Network (New-Pin) project brings together public interest advocates, companies, regulators and government actors with an interest in energy and water to: develop clearer alignment between different stakeholders as to what the long-term public interest looks like in these sectors; increase understanding of any differences in views between stakeholders; develop capacity and expertise amongst public interest advocates to ensure a more level playing field in long-term company and regulatory decisions; and improve understanding amongst company and regulatory boards of the value of public engagement in these sectors and what successful engagement looks like.