Climate adaptation

Build resilience into infrastructure, engineers tell UK

An alliance in the UK representing nearly half a million engineers has called for infrastructure to be more resilient to climate change in a report to government released earlier this year.

The report *Infrastructure, engineering and climate change adaptation – Ensuring services in an uncertain future* examines vulnerabilities in energy, transport, communications and water systems. It was written by the Engineering the Future Alliance and prepared from the perspective of the engineering profession, with particular input from the Institution of Engineering and Technology, the Institution of Civil Engineers, the Institution of Chemical Engineers, the Institution of Mechanical Engineers and the Royal Academy of Engineering. The alliance presented the report to the UK government's chief scientific adviser Professor Sir John Beddington at a launch event hosted by the UK Institution of Engineering and Technology in London.

UK minister of the environment and responsible for adapting to climate change Lord Henley wrote in his foreword: "We need an infrastructure system that is more resilient to climate change. This will reduce the risk of economic disruption to the country and enable the opportunities from well-adapted infrastructure to be maximised."

The UK government released a National Infrastructure Plan last year underlining the importance of maintaining its transport, water and energy systems in the face of climate impacts.

The report by Engineering the Future sets out how innovation and new engineering approaches can boost climate resilience. It noted the potential for massive infrastructure failure and examined vulnerabilities in different infrastructure sectors. It considered vulnerabilities that affect the infrastructure system as a whole and which arise as a result of interdependencies between different sectors.

The report noted that infrastructure is becoming more interdependent. For example, energy systems rely more on ICT, and the electrification of transport systems mean transport is more reliant on the grid. To overcome this problem, the report said the engineering profession must use "systems thinking to plan, design and maintain infrastructure".

"Systems resilience, rather than sector resilience, is required to adapt to climate change. Current silos and boundaries must be broken down by culture and any other available levers," the report concluded.

Lord Browne of Madingley, president of the Royal Academy of Engineering, wrote in his foreword: "A holistic approach to the development and protection of infrastructure is essential, with an awareness of where failure in one sector can lead to a cascade of failures elsewhere. An integrated approach to planning and managing infrastructure development is key. Government should take a systems approach to the processes of planning and regulation."

One of 20 findings in the report focuses on how the public may also have to adjust its expectations regarding the continuity of services.

The report noted that it was unlikely society will be willing to pay the increasing costs of "always on" services, so a national debate would be needed on the balance between acceptable levels of disruption verses higher costs.

"Increased resilience comes at a cost, so given that there are limits on the extent to which government and the public are likely to be willing to pay for resilience, failures cannot be avoided completely," the report concluded. "As the climate changes and infrastructure systems are exposed to different and more extreme conditions, it is highly likely that degradation and interruption of vital services will occur at certain times. Therefore, there is a need to limit the consequences of failure and accelerate restoration capabilities, both through engineering solutions and by managing consumer expectations."

The report stated that resilient communities were needed as well as resilient infrastructure and that communicating to the public the limits on resilience, and the need to modify demand on the infrastructure, is a major challenge.

Read the report at http://bit.ly/dNa7RJ. The government aims to publish a response on adapting national infrastructure in the near future.

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