A new partnership for greener infrastructure

Why collaboration is key to making urban development more sustainable. Environment Analyst explores lessons learned from innovations in resilience building in Copenhagen to best practice examples from Crossrail and Thames Tideway

BY NICK COTTAM

When it rains in Paris it floods. Not true of course but the recent pictures of an out of control River Seine apparently swirling around the base of the Arc de Triomphe sounded like another climate change alarm bell. Could there be a connection between changing climate and the rising levels of risk – not to mention water – in a city like Paris posed the New Scientist and other media? And, perhaps more importantly, what should the authorities be doing to protect our cities more effectively?

The answer to the first question seems to be a tentative yes. Nigel Arnell a climate specialist at the University of Reading makes the link between warming temperatures and the capacity of air to hold more water. This, he notes, could mean a greater chance of floods. But there are other factors at work – for example changes in land use as cities undergo more intense development in response to population increases. Arnell argues that while we can't actually point the finger at climate change for the Paris flood, busy, developing, populous European cities need to be prepared and so does their infrastructure.

The partnership approach

One solution for cities, suggests Christian Nyerup Nielsen, a global service line leader and head of department for climate adaptation and flood risk management at Danish-headquartered engineering and environmental consultancy Ramboll, is to adopt more of a partnership approach to development. Plan early, work together, think about the links between design and developing infrastructure which actually helps to protect the city and its people. This he believes has been the case in Copenhagen, Denmark, where numerous sustainable infrastructure projects have been initiated in response to extreme rainfall events in 2010 and again in 2011.

"The innovation for Copenhagen has come from the overall integrated planning of the entire city," says Nielsen. "As part of this process you have to gather together different agencies and encourage them to work together." Ramboll's contribution in Copenhagen, alongside German sustainable cities planning specialist Atelier Dreiseitl – which Ramboll has since acquired - was to develop a "cloudburst concretization masterplan" for four of Copenhagen's eight city catchments. The practical upshot of the masterplan is that as the city's infrastructure is upgraded it is also protected against future flooding with a new generation of parks, boulevards and other features for better water retention and drainage.

Adapting to climate change

Thanks to the drama, not to mention the cost of its floods in 2010 and 2011, Copenhagen can now claim to be ahead of the curve in its approach to this type of sustainable infrastructure development. The city which on 2 July 2011 was deluged with close to 100mm of rainfall in just an hour, has plans to implement some 350 projects over the next 15-20 years. Its climate change adaptation plan has given birth to a cloudburst management plan, launched in 2012, which in turn divides the city up into cloudburst catchments and an integrated project-by-project approach based on the catchment concretization masterplans.

Working as part of consortia

What could the UK, France and other countries learn from Copenhagen? How can infrastructure development be made to produce a net positive for the environment as well as social and economic development? Lesson 1-100, it seems, is more joined up thinking, more co-operation between different agencies and consultants, and generally more of a partnership approach to development.

In the UK, for example, both HS2 and Crossrail have given us a consortia of consultants working together to shape the projects as they are guided towards development and operation. In Copenhagen, the floods gave city authorities a new reason to bring different experts together – designers and engineers working alongside planners and environmental consultants to develop a workable plan for the future.

In fact the Copenhagen masterplans manage to combine traffic planning, urban renewal and development with adaptation. The Copenhagen inter-agency collaborative approach has successfully been implemented by Nielsen and others for various masterplans. How can agencies be brought together and enthused about the need to achieve practical sustainability goals? Getting people – different parties to a project – to share sustainability goals is certainly a key element, says Chris Fry, managing director of the infrastructure and environmental consultancy Temple Group. "You have to think about people throughout the process – passengers, communities, designers, contractors and operators all have a stake and you have to get under the skin of what they are thinking and how they relate to infrastructure projects."

Innovative thinking

Temple Group's track record for innovative thinking around sustainable infrastructure in the UK includes contributing to such high profile projects as HS2, Crossrail and improving the capacity of London Overground. Alongside people, Fry highlights the importance of timing and what he terms practical innovation in producing sustainable infrastructure. Like Nielsen, he isn't advocating the need to reinvent the wheel every time you improve the transport network or propose a housing development – more the need to think differently where different thinking is required.

This kind of approach was indeed in evidence at London's Green Sky Thinking week which took place in and around London at the end of April. The week broke down into a series of presentations on how sustainable infrastructure can make urban environments better, healthier places in which to live, work and play. Under the themes of urban resilience – think of Copenhagen's response to extreme weather - green technology and health and wellbeing, the week sought to share learning and show how a modern city should be trying to look after its citizens in the name of development.

In Copenhagen there is now a direct connection between city improvements and resilience. You make the city more green and blue by draining off rainwater at ground level. You only tunnel in areas where the existing density of development doesn't allow any other solution. And you involve different parties – for example project funding, revenue generating utilities – as up-front partners in the project.

Chris Fry's reference to timing is relevant here. "Get in early," he says, "in linking the overall goals of a project with sustainability ambitions. But once the strategy is set and key risks are understood, don't try to deal with everything too soon if better outcomes can be achieved by resolving them a little later." Thus in Copenhagen, new streets can in certain circumstances become green streets as part of improved rainwater retention. Different levels can be created for aesthetics and interest but also to improve water run-off in a generally flat city. And a district might get a new park for both recreational purposes and to improve flood resilience.

Crossrail's legacy

In a London Crossrail context there is the overall legacy of a better connected city with new job, leisure and housing opportunities for the people who live and work there. There are also ways that a project of this size can be a catalyst for best practice in a whole range of areas – from the recycling of construction waste to the management of noise and vibration throughout the project.

At £14.8 billion, Crossrail is Europe's largest infrastructure project with the muscle to demand innovation in sustainability as in other areas. As such, the project can and does boast a dazzling array of statistics, from the 95% of Crossrail construction contracts that have stayed in the UK, to the 200 million journeys a year it will facilitate once fully operational. Contractors are asked for their credentials in a whole range of areas, from the creation of proper apprenticeships to their ability to manage and where appropriate to reduce construction noise.

Given the swathe cut by Crossrail through the heart of London, it's no surprise that construction noise has featured high on the radar of people concerns. After all, you don't benefit from a new railway until it starts running – before that you just see the downside of high construction.

"Control of noise and vibration is one of Crossrail's biggest challenges," says Rhian Locke, now a principal consultant at Temple having previously worked for Crossrail as an EMS and performance manager. "One of the key lessons learnt from Crossrail was that early engagement with stakeholders is essential. Being proactive after receiving complaints and enquiries helps ensure effective working relationships."

Tideway - engagement benchmark

Geoff Loader, head of stakeholder engagement for the £4 billion Tideway project to clean up the Thames with a new sewer system agrees. "The project couldn't have got off the ground without widespread stakeholder engagement. My role is to continue the theme of Tideway being really accessible to stakeholders, including members of the public and local communities. One of our aims is to set a new benchmark for the way that projects like this deal with the public."

So what's the sustainability legacy of a project like Tideway whose main tunnel will run from Acton in the West to Abbey Mills pumping station near Stratford in the East? There's the central – originally EU-driven – legacy of keeping an average of 40 million tonnes of sewage a

year out of the Thames. Aside from enjoying a cleaner river, the project is apparently set to leave London with a more vibrant river economy, 600 new river-based jobs and better riverside access. Think barges and more river traffic generally to relieve London's road system and you begin to get a picture of what might follow the construction of a Tideway super sewer.

Low carbon construction

Another piece of the Crossrail legacy is the 1,500-acre wildlife habitat which has been created at Wallasea Island in Essex. In this case the reserve has been developed out of 3 million tonnes of excavated material, transported by rail and water to an area which is now home to 40 nationally and internationally important species. In all, nearly 80% of excavated material for Crossrail (some seven million tonnes in total) has been sent to its destination by water and rail – another boost, we are told, towards meeting low carbon, energy efficient construction targets.

As Ramboll's Nielsen notes you need a plan and a structure for more resilient, sustainable infrastructure that accommodates the "big picture" vision but the devil is in the detail, which have become clear in the collaborative workshops and follow-up implementation projects. In the case of Copenhagen you divide the city up into manageable projects and you seek viable partnerships. For Crossrail you set targets, you involve suppliers and you measure performance on a regular basis. Everyone is expected to do their bit towards what Chris Fry terms "practical innovation" – everything from using renewable energy technology in a new situation to the all important incremental changes to the way that projects are run to improve collaboration.

And as Anglian Water highlights in its initiatives to save costs and carbon in line with the government's 'infrastructure carbon review', it may be as elegant and simple as changing the shape of the bucket on your trench digging plant.

A new Dartford crossing

No doubt these and other sustainability details will be considerations for the LTC Cascade consortium - a partnership between the consultancies Arcadis, CH2M and Cowi – which has been appointed by Highways England to provide technical support on the £5 billion Lower Thames Crossing project. The LTC proposals are designed to relieve pressure on the existing Dartford Crossing which is now exceeding its original 50 million crossings a year capacity. A new LTC would involve building a 30km motorway to link the M2 and the M25 for which getting the green light with enough green measures is now a priority.

The balance as always is reconciling the political and economic drive for new infrastructure with environmental and indeed wider sustainability concerns. Amid all the noise around Brexit, the government recently introduced a new Neighbourhood Planning and Infrastructure Bill which aims to further free up the planning system and elevate the National Infrastructure Commission to statutory level. Will it work; and is there any chance at all of this or the next government building a million homes? Or are we over protective of green belt land, not to mention our bat colonies and great crested newts?

There's little doubt that well planned, well-conceived infrastructure can be a catalyst for new approaches to environmental protection and sustainability. This should apply whether it's been raining heavily or not.

Nick Cottam works in freelance writing, journalism and communications support with particular experience in environmental, sustainability and health & safety risk management & consultancy