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Collaboration and innovation will be key if the COP21 talks are to be deemed a success. A global deal is needed not only to get tackling climate change back on track, but also to act as a clarion call for infrastructure managers and related businesses to pull their weight in driving innovation to reduce energy consumption.



Adrian Johnson, technical director and sustainability leader at MWH Global

For example, pumping and treating water and wastewater uses a lot of energy. And in Europe, for example, more stringent environmental regulation has led to the installation of more treatment processes, which tend to use more energy. Although many in the water and environmental sectors are making advances – for example by collaborating to implement catchment-level rather than end-of-pipe solutions and recovering increasing amounts of energy from sewage treatment – we can and should do more. Sustainable solutions are not only effective and reduce costs but also are more energy efficient and generate less carbon emissions.

Although last time round the US and China didn't play ball - there are hopes that this time it will be different. Europe is no longer at the helm. The kingpins, the US and China, are now running the show. In the run-up to COP21, many countries have submitted commitments – specifically their "Intended Nationally Determined Contributions" (INDCs) – to reduce emissions. At the end of October, the UN published the INDCs saying that because they cover more than 85% of global emissions – a massive improvement on Kyoto – a meaningful agreement is in sight.

Make no mistake, the sum of the INDCs is still not enough to keep global temperature rises below the 2°C threshold and much is conditional (on finance for developing countries, in particular) but, the focus in Paris must be on agreeing what is now on the table. The UK already has its own domestic carbon targets enshrined in law and the Government says it is committed to pushing for legally binding rules that hold all countries to account[1]. But the UK is just one country and of course there are different perspectives vying for attention. We should be under no illusion that a meaningful agreement will be easily won.

Why it will be hard to reach an agreement?

I see two stumbling blocks. Firstly, because, we are addicted to consuming more 'stuff' made by burning coal – by this I mean not only the energy used directly in product manufacture (from steel to clothes to mobile phones) but also all the other resources used in production, including clean water, which in turn also require significant amounts of energy for their production and conveyance. Reducing emissions on the scale we need, will require nothing less than transformation of the energy and related infrastructure that underpins our economy. But decarbonisation is no small task. And since 2009 things have got more complex. Fukushima put a spanner into European aspirations for expanding nuclear energy – a big piece of the low carbon energy jigsaw. The discovery of new natural gas fields, the breakthroughs in non-conventional shale gas and the reduction in subsidies has further put the economics of conventional renewables (wind and solar) into question. And above all we know that, although China is investing in low carbon measures, the speed and scale of its economic expansion has led to huge increases in coal-fired energy generation. It is not easy to wean the world off its coal addiction when it is such a plentiful resource and the alternatives remain comparatively expensive.

Secondly, we have tended to focus on reducing the carbon emissions from production – the greenhouse gases (GHGs) emitted by the production of energy and materials in individual countries – rather than our consumption of carbon-intensive products. This does not take into account the fact that as countries like the UK de-industrialise, their 'carbon of production' reduces while the 'carbon of consumption' (the GHG emissions attributed to the products we buy) continues to rise. In the UK, for instance, we are buying more and more energy-intensive products but increasingly their manufacture occurs overseas, often in developing countries. Under current accounting, the associated emissions accrue to the producer's rather than the consumer's carbon balance sheet! Hence, the view of leading commentators, including Dieter Helm and David MacKay, is that what we really need is an economy-wide carbon tax. This is likely to increase the cost of things made with dirty energy, such that we start switching to buying lower carbon products or we buy less. This would ripple across the economy; for example in the water sector, because pumping water around needs lots of energy, the cost of water production also would likely rise. To address this, we either pump water around using cleaner energy or we find ways to pump less of use less water. Of course you have double the impact when you consider our profligate use of hot water – in industry as well as in the home, which accounts for a large proportion of carbon emissions from the overall water cycle in developed countries.

The ingredients of success: innovation, collaboration and a global price for carbon

Negotiating a common commitment to price carbon will be the most efficient way of driving investment in low-carbon technologies across the world. In addition, supporting poorer countries – particularly rapidly industrialising ones and those expected to be impacted most by increased risks of droughts, storms and flooding from climate change – will be crucial to creating a truly global agreement.

Earlier in October, Professor David MacKay (former chief scientist to Decc) and colleagues argued that without common agreement on a global carbon price, little would be achieved at the Paris Summit. Indeed, many corporations – including some of the largest oil companies and industrials – as well as NGOs agree that an international price on carbon would be the most efficient way of driving investment into low-carbon technologies.

Drawing on the principles of 'the tragedy of the commons', the science of cooperation and the need for reciprocity, MacKay et al. advocate the need to negotiate a common commitment rather than relying on individual pledges predicated on self-interest. In short, 'a common price commitment would harness self-interest by aligning it with the common good'. It appears that the negotiators are listening; the draft text for Paris now acknowledges that 'carbon pricing is an important approach for cost-effectiveness of the cuts in global greenhouse gas emissions'. The price needs to be high enough and sufficiently stable to change behaviour (unlike that of the EU Emissions Trading Scheme) but even if the price were set low initially, with agreement on a mechanism for increasing the price over time, this would be a good outcome.

But however carbon is priced, the poorer countries need help. The need is twofold: (i) industrialising countries are at greatest risk of rising emissions (not least because they increasingly run the factories producing the goods the rest of world consumes); and (ii) many developing countries are predicted to be most severely affected by the impacts of a changing climate. On the second point, we know that protecting people from the projected increases in the risks of droughts and flooding will require investment in the water and environment sectors to be increasingly directed towards improving the resilience of city infrastructure systems to such events. Thus, it is no surprise that the INDCs declared by many developing countries are conditional on them receiving substantial support – more than \$100bn a year from 2020. Without such support, there will be no global agreement.

What it means for energy intensive industries and for infrastructure

If a meaningful global agreement is reached, including a carbon price or tax, the cost of carbon-intensive building materials (steel, aluminium, cement) should start to rise. We will have to find ways to deliver more without increasing the cost. In short, we must focus on material efficiency to find ways to build less, build clever and build efficiently. When we think of infrastructure we tend to think of the energy and transport sectors. But this applies as much to the water sector – with its large programmes of investment across its many above and below ground assets as well as some large projects such as the Thames Tideway to deliver. Given the twin imperatives to achieve a global agreement on climate change and to invest properly in our own critical infrastructure, the overarching message of the Infrastructure Carbon Review "reduce carbon, reduce cost" could not be more fitting.

This is rather topical given the launch, in October, of the UK Infrastructure Commission headed by Lord Adonis, tasked with getting the huge backlog of our critical infrastructure moving. One might argue that building more infrastructure to strengthen our economy at home means that we will need to buy much more (construction) materials and that is at cross-purposes with the need to limit global carbon emissions. But as on the global stage, here is the opportunity for innovation and collaboration.

In their book 'Sustainable materials – with both eyes open', Professor Julian Allwood and colleagues cite some startling statistics including that each one of us in the developed world consumes materials – steel, aluminium and cement (the major construction materials) plus plastic and paper – equivalent in size to 15 eight year old children(!) (and emits carbon equivalent to burning coal amounting to the mass of 4 adults) every year! They advocate that although there is still scope in the production industries to save energy, our focus should switch more to 'material efficiency' – using less material in the way we consume. This has big implications; for example, instead of building our way out of flood risk with yet more concrete flood walls or addressing water supply deficits with large transfer pipelines, we will have to devise leaner solutions that combine some construction works with a range of other smart measures. Indeed the UK water industry with its emphasis on catchment planning, water efficiency, flood resilience, energy recovery and so on has already been making big strides in this direction and is leading the way in many respects.

What if we fail to get agreement in Paris?

Well, we won't see progress at the same rate. However, I do think that ever-increasing global competitiveness, continued pressure to reduce pollution and improve public health, the social and economic pressure to stop burying our waste (in fact we will soon stop talking about waste altogether) plus the need to adapt to climate change and other hazards will continue to drive us towards the so-called 'circular economy' that will deliver carbon reduction almost as a by-product, particularly in developed countries who can afford to invest. The leaders will be those countries, and those cities, whose stakeholders work out how to innovate and collaborate in very practical ways.

To cite a couple of examples – Firstly, we are already seeing great advances in technology for energy storage and this has a huge part to play in helping to improve the resilience of our energy networks as well as the expected revolution in electric cars. Quite apart from the low carbon agenda, electric vehicles will happen because they mean less pollution and better health for urban populations. And this will undoubtedly contribute to transforming our transport infrastructure. Secondly, the need to address the increasing risk of flooding, caused by growth in the amount of paved surface area as well as more extreme storm events, together with the demand to improve the 'green infrastructure' in our cities is leading to drainage solutions that manage surface water much more sustainably.

Combining such energy, transport and water initiatives with efforts to eliminate waste (through energy and material efficiency) and to create greener public spaces will bring us ever closer to truly integrated infrastructure that will meet the needs of the increasing numbers of people living and working in our cities. In short, integrated urban infrastructure will help drive the low carbon circular economy and vice versa.

So whether we are working at the global or national or city level, the keys to success are innovation and collaboration. The world really needs the Paris conference to reach a global deal in December, not just to get the process of addressing climate change back on track but also to provide a clarion call to all those working to improve services for people in industrialised, emerging and poor countries alike.

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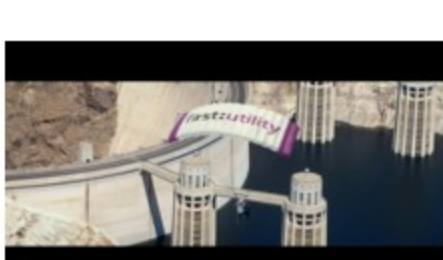
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