



Views & Comments

Can Engineers Lead Again?

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The industrial revolution which transformed Europe, and Britain in particular—was led by engineers. From James Watt to Isambard Kingdom Brunel, the finest engineers combined a whole host of skills and disciplines. They were entrepreneurs, developers, lobbyists, financiers, contractors, designers, manufacturers, and project managers—all rolled into one. And, above all, they were leaders.

They inspired future generations of engineers, too, and in doing so laid the foundation of the UK's expertise in engineering education. It is in part thanks to their example that we now teach and practice engineering as a highly dependable, highly competent profession: one which can simultaneously maintain high standards while also responding to its clients' needs and preferences.

But today we urgently need our engineers to step into those big shoes of their forebears and become leaders once again. Why? Because we now face the mother of all engineering challenges: climate change. This is the defining issue of our time. Thanks to decades of extraordinarily detailed research and analysis—in which UK scientists have played a key part—we now have a very clear understanding of both the science of climate change, and the threat it poses to us. This leaves no excuse for procrastination, or for claiming that “the jury is still out”: The science is settled, and the choices are clear. Either we act decisively to keep global temperature rises well within a two-degree limit—or we suffer some frankly devastating consequences.

If we carry on “business as usual,” then the stable climate within which human civilization has flourished for millennia will fall apart. We will face floods, droughts, and heatwaves; our food and water supply will be massively disrupted; millions will migrate in search of survival. The consequences, in terms of global insecurity, of economic and political instability, hardly bear thinking about. Climate change is a “threat multiplier”: It takes existing challenges—such as political tensions, poverty alleviation, and threats to ecological security—and makes them far more difficult problems than they are now.

We are already starting to see its impacts, in terms of increasingly unreliable and extreme weather. And we are barely in the foothills of the mountain of problems that climate change will pose as the weather continues to warm up.

Faced with this, some people—including many in our profession—argue that we can tackle the changes by adapting to them.

This is risky thinking. Yes, adaptation may play a part, and smart engineering can help here. But it can only do so much, and ultimately an “adaptive” mindset could be massively counterproductive. Just look at the example of the recent floods in the UK, where limited resources meant that some areas were protected and others were not. This was politically divisive, especially as many suspected that wealthier, more influential parts were protected at the expense of others. So there is a moral element to this issue. A focus on adaptation will often mean that the wealthy keep their lifestyle intact while the poor suffer. That is a recipe for increased global inequality and, ultimately, increased resentment and hence political turmoil, too.

Meanwhile, some short term adaptation methods—on flood prevention, for example—can actually make the problem worse in the long term. And many involve expending more high-carbon energy—so such “adaptive” solutions would compound, rather than solve, climate change.

The good news—and there is some—is that 2015 saw two amazing landmarks: the UN Sustainable Development Goals (SDGs) and the UN Framework Convention on Climate Change COP 21 Accord. The latter is of course the much-trumpeted Paris Agreement, the culmination of over two years' intensive diplomatic activity. In itself, that is an amazing achievement—as any engineer who has been involved in more than a five-way international joint venture will recognize! By setting an ambitious goal to keep temperature rise to a 1.5 °C ceiling, and to move to a carbon-neutral economy, this plan plots a route to a genuinely sustainable future for our world.

The Paris Agreement makes a good complement to the SDGs—17 goals to protect the planet, end poverty, and ensure prosperity for all, each with specific targets to be achieved over the next 15 years. It is fitting that these groundbreaking landmarks materialized within months of each other—because unless we can tackle climate change, then the SDGs won't be worth the paper they're written on.

So that is the challenge before today's engineers and their successors: to shift decisively to a low carbon economy. This is not only economically sensible, politically wise, and morally right; it is also a fantastic creative opportunity for our profession: a chance for engineers to be real innovators on behalf of society—as they were during the industrial revolution.

The challenge of decarbonizing our global economy far and

fast enough calls for bold, focused action. If this is to be effective, this initiative will need to unleash change at a pace and scale that will make that industrial revolution look like something that happened in slow motion. It will mean designing and implementing the expected \$30 trillion USD of urban infrastructure needed globally with a radically reduced carbon intensity. It will mean implementing learning cycles that are in months not decades. It will mean developing a much more diverse set of skills in design teams—something often aspired to and rarely achieved. It will mean designing with an open carbon budget as well as a capital expenditure (CAPEX) budget.

Winning the public and political support for this will also

mean that engineers must be able to communicate the challenges clearly and effectively—something which engineers could do well to take on board. It's not rocket science: The great engineers of the past—such as Brunel—were great communicators, too. That was part of the secret of their success. They fueled the imaginations of the public with the power of their words.

None of this will be easy: The changes we need shall involve disruption, risk, winners and losers, and uncertainty. But then nothing worth doing is ever easy. For our profession, it should be a challenge to relish—and a chance, once again, to show that engineers can take the lead. We might even say that our future depends on us doing just that.