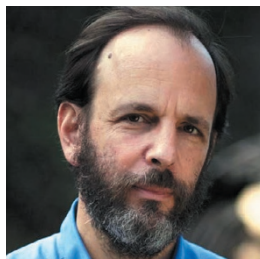


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Science and innovation policies for Donald Trump

Daniel Sarewitz says the new US president will need to promote creative science to benefit the disaffected millions who voted for him.

America's 'rust belt' states, which gave Barack Obama their votes in 2008 and 2012, have now sent Donald Trump to the White House. It's a shocking reversal that testifies to disaffection on many fronts. But it's also a long-term political consequence of bipartisan trade, economic and innovation policies that have focused on growth and competitiveness while largely neglecting the negative impacts of technological change and globalization on quality of life in the American heartland.

Trump built his campaign on the promise to help a middle class struggling from such dislocations to regain its footing. If he is serious, he will need to mobilize smart and creative science and innovation policies. Here are some.

One rare bipartisan initiative of the past few years has been Manufacturing USA, a network of nine regional centres focused on specific technological challenges such as 3D printing, photonics and functional fabrics. Each centre brings together private, government and university partners to help small firms to scale up and commercialize new technologies.

The Trump administration should significantly build on this programme and integrate it with the Manufacturing Extension Partnership, which provides small manufacturers with technical assistance. The overall goal should be regional innovation networks that draw from local universities, talent and resources to build new industries, expand manufacturing and create jobs.

Initially, these and other programmes could be funded by Trump's plan to repatriate profits, amounting to up to US\$2 trillion, that US corporations have moved offshore. Trump wants to bring the money back to the United States by offering a one-time repatriation tax rate of 10% as an incentive. The resulting \$200 billion or so of revenue is the equivalent of nearly three years of total non-defence government research and development spending.

Repatriation of offshore pharmaceutical-company profits alone could generate \$40 billion of revenue. This money could be spent on high-priority health-care problems relevant to Trump's agenda. First, an organization similar to the Defense Advanced Research Projects Agency is needed to bring academic, private-sector and government research and development capacities together to pursue high-risk, high-gain solutions to health problems such as obesity, diabetes and substance abuse, which are especially acute in economically depressed areas of the nation. Second, a national database should be created to integrate biomedical research data with electronic health records. Such a system is a prerequisite for a 'learning' health-care system that can use the huge amount of information generated both at the bench and in the clinic to deliver better health outcomes. Only government can do this.

Trump is publicly sceptical about the seriousness of climate change,

and is committed to the coal industry. Yet climate change offers him the opportunity to steal one of the Democrats' key issues while advancing the nation's economic interests and energy security. As a supporter of nuclear energy, he could increase funding for research, development and demonstration of next-generation reactors — on which the United States lags far behind China and Russia — and reopen the licensing process for the Yucca Mountain waste-storage facility.

Meanwhile, Trump could reignite efforts to develop coal plants that co-fire biomass and capture carbon dioxide — thus protecting jobs, creating economic opportunities for rural communities that provide fuels such as timber residues, and producing meaningful emissions reductions. Power companies could in turn sell desperately needed CO₂ to the oil industry for advanced oil recovery — stimulating private-sector

investment in infrastructure for CO₂ transport, while returning more CO₂ to the ground. Trump would barely have to soften his stance — just enough to acknowledge the pragmatism in measures that both benefit the economy and reduce the threat posed by greenhouse gases.

Once committed to an increasingly clean electricity grid, a Trump government could further invest in a national network of electric-vehicle recharging stations — thus solidifying the nation's competitive advantage in this key technology, and taking a giant step towards the elusive goal of a low-carbon transport infrastructure.

There are other ways for the anti-regulatory president-elect to create growth while protecting the environment. The US chemicals industry accounts for more than 10% of the nation's manufacturing revenue and nearly 800,000 jobs

in a highly competitive global market. A Trump regime could adopt the proven model of the Massachusetts Toxics Use Reduction Act, in which toxic chemicals are not directly regulated and banned, but firms work with government and academia towards assessing and adopting safer alternative chemicals and processes. Such an approach would help to protect the health and jobs of the manufacturing workers and communities Trump is concerned about, while stimulating innovation.

There is much — much — to worry about with Trump's election, starting with his apparent intolerance of fundamental tenets of civil society, such as rule of law and freedom of speech. But it's also true that, as a political outsider, he is less beholden to constituencies that would limit the political options of more-mainstream candidates on both sides. As such, his presidency at least has the potential to open up productive new policy pathways. We will soon find out if he is serious about doing so. ■

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