



# CIES POLICY BRIEF 1

## HOW TRUMP'S CLIMATE AGENDA THREATENS CLEAN INNOVATION

Joëlle Noailly, Lecturer in Economics and Head of Research, CIES

Since the start of the Trump's administration, the US is withdrawing many of its action to address climate change. On top of the US pullout of the Paris climate change agreement announced last June, the Trump administration proposed draconian federal budget cuts and eliminating programs that fund innovation in clean technologies, such as the Advanced Research Project (ARPA-E) and the US department of Energy loan guarantee program, which support technologies too risky for bank financing. Some observers have minimized the impact of the budget cuts arguing that the clean technology transition that has already started cannot be derailed. In this context, this policy brief aims to assess what the Trump's environmental rollback implies for innovation in clean technologies, not only in the US but also worldwide.

The Trump administration wants to continue to lead the world in energy innovation and justifies the cuts at the Department of Energy by arguing that innovation is most effectively created and promoted by private industry – not the government. While this may be true for many technologies, clean technologies are an exception due to their public good nature: everyone benefits from developments in cleantech but - in the absence of a price on carbon - everyone has an incentive to free ride on the other (Jaffe et al, 2005). Public support is thus key. Accordingly, renewables and energy-efficiency have been supported by massive investments in public finance in the past. Cost reductions, in particular in wind and solar,

have been impressive and these sectors may now be at a stage where public flows are less important as the technologies are becoming cost-competitive. For many other key clean technologies, however, such as advanced grid storage technologies, hydrogen fuel cells, electric-vehicle-to-grid systems, etc., companies still have little incentives to make risky massive upfront investments in emerging and immature technologies.

Further, the argument of the Trump administration that «the private sector is better positioned to finance disruptive energy technology» is misleading in the case of cleantech. Innovation often follows a path-dependent process and firms that have invested a lot in 'dirty' technologies in the past find it more profitable to continue doing so, rather than investing in disruptive 'clean' technologies (Acemoglu et al, 2012). Large energy firms are traditionally reluctant to acquire promising cleantech startups. Figure 1 shows for instance that compared to other sectors cleantech startups have fewer exit opportunities (Gaddy et al, 2016). Large corporations have a legacy business to protect – often in the fossil-fuel sector - so their role in investing in disruptive clean technologies should not be overestimated.

If there is not much to expect from the private sector, can other countries – in particular China – fill in the investment gap and take the lead on clean innovation? For now, it is still too early to bet on China's innovation machine

Cleantech companies saw fewer exits overall, and fewer acquisitions compared to other sectors.

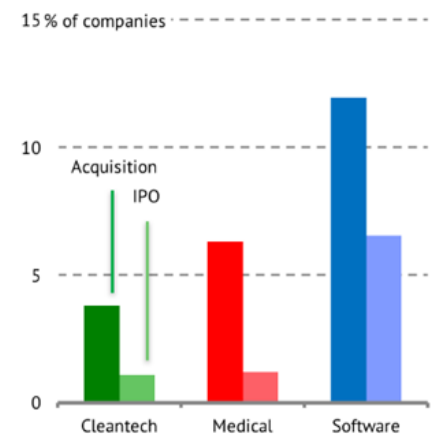


Figure 1: No exit for cleantech, Source: (Gaddy, Sivaram, Varun, & O'Sullivan, Francis, 2016)

to replace the US one. The US is one of the top-innovating countries in clean technologies, accounting for 21% of all cleantech patents worldwide over the 2009-2011 period (Hascic and Migotto, 2015). The country has developed strong cleantech centres (e.g. solar in California, clean conventional fuels in Dallas, storage in Boston) and can rely on a high-skilled workforce and reliable investment framework. China is catching up quickly: the country is today a top-innovating country in solar and wind energy and spends three times as much as the US on energy R&D (Virum et al, 2016). But the quality of Chinese patenting activities remains low and the investment framework still presents risks for foreign in-

ventors, in particular in terms of protection of intellectual property.

As a last resort, some observers are optimistic that Trump's proposed cuts will not pass the Congress and that the withdrawal from Paris may not be effective before November 2020, around the time when the next president should be declared. Nonetheless, we

have reasons to worry that the "wrong" signal which was sent to investors in the last months may have long-lasting damaging effects. The Trump's announcements introduced significant uncertainty into the cleantech sector. Given the long term and irreversible nature of R&D investments, firms typically want to know which policy framework will be valid for their projects over the next 15 to 25 years. Faced

with uncertainty about the US climate actions, investors and firms will prefer to postpone their decisions and banks may increase the cost of finance for cleantech firms. The harmful impact of policy uncertainty on investment is well-known in the economic literature, as increases in policy uncertainty proxied by newspaper-based indices (see Figure 2) have been recently

shown to be associated with a reduction in industrial production, employment and GDP (Baker et al, 2016). In the cleantech sector, there is evidence that the on/off pattern of federal production tax credits in the past have deterred long-term investments in the US wind industry (Barradale, 2010). In short, even if Trump's actions can be reversed, it is likely that the current uncertainty about the US agenda on climate change is already delaying cleantech investments and thereby further postponing the development of much needed technologies to address climate change.

To conclude, the US pullout of the Paris climate agreement and announcement of budget cuts for energy R&D – although not yet effective – provide a wrong signal to cleantech investors. Developing clean technologies without the US – a top-innovative country – will be difficult and will likely limit the scale of the transition to a clean economy. As innovation is a very long-term investment, policymakers should be particularly concerned with committing to a stable and credible climate policy over long-term horizons. Future research can help informing policymakers on which types of policy signal or instrument appear credible to investors.

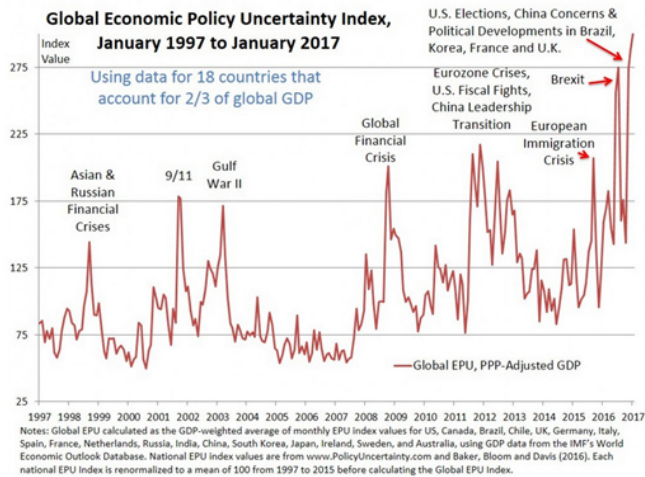


Figure 2: Global Economic Policy Uncertainty Index (Source: Baker et al, 2016): the surge in policy uncertainty created by the election of Donald Trump was unprecedented over the last 20 years.

## References

Acemoglu, D., Aghion, P., Bursztyn, L., Hemous, D., 2012. The Environment and Directed Technical Change. *Am. Econ. Rev.* 102, 131–66.

Baker, S. R., Bloom, N., & Davis, S. J. (2016). Measuring Economic Policy Uncertainty. *The Quarterly Journal of Economics*, 131(4), 1593–1636. <https://doi.org/10.1093/qje/qjw024>

Barradale, M. J. (2010). Impact of public policy uncertainty on renewable energy investment: Wind power and the production tax credit. *Energy Policy*, 38(12), 7698–7709. <https://doi.org/10.1016/j.enpol.2010.08.021>

Bloom, N. (2014). Fluctuations in Uncertainty. *Journal of Economic Perspectives*, 28(2), 153–176. <https://doi.org/10.1257/jep.28.2.153>

Hascic, I., & Migotto, M. (2015). Measuring environmental innovation using patent data. *OECD Environment Working Papers*, (89), 0\_1.

Jaffe, A. B., Newell, R. G., & Stavins, R. N. (2005). A tale of two market failures: Technology and environmental policy. *Ecological Economics*, 54(2), 164–174.

Nanda, R., Younge, K., & Fleming, L. (2015). Innovation and entrepreneurship in renewable energy. *The Changing Frontier: Rethinking Science and Innovation Policy*, 199.

Noailly, J., Smeets, R., 2016. Financing energy innovation - The role of financing constraints for directed technical change from fossil-fuel to renewable innovation, EIB Working Paper No. 06/2016, Luxembourg.

Virum, S., Norris, T., McCormick, C., & Hart, D. (2016). *Energy Innovation Policy: Priorities for the Trump Administration and Congress*. Washington: Information Technology and Innovation Foundation.

## About the Centre for International Environmental Studies

- Established in 2010, the Centre for International Environmental Studies (CIES) is the Graduate Institute's focal point for research on environmental issues. The centre is dedicated to the better understanding of the social, legal, economic and political facets of global problems related to the environment, with an emphasis on the international dimension and the North-South relations.
- The centre addresses complex problems such as climate change, biodiversity, food security, energy, natural resources and development. CIES's mission is to conduct high level academic research to improve the quality of decision making in public and private spheres. This goal is achieved by creating a platform for researchers to conduct interdisciplinary research on the environment, by providing training to PhD students in specialized areas of research and by disseminating research results through outreach activities targeted to academic experts and policymakers.
- CIES is part of a number of academic networks and partners with academic institutions and stakeholders throughout the world. Located in the heart of International Geneva, CIES regularly hosts workshops and conferences that bring together researchers and policy-makers.



CENTRE FOR INTERNATIONAL ENVIRONMENTAL STUDIES  
 GRADUATE INSTITUTE OF INTERNATIONAL AND DEVELOPMENT STUDIES  
 Case postale 136, 1211 Genève 21  
 T +41 22 908 44 61  
[cies@graduateinstitute.ch](mailto:cies@graduateinstitute.ch)  
[www.graduateinstitute.ch/cies](http://www.graduateinstitute.ch/cies)