

The Honourable Lamar Smith
Chair
House Committee on Science, Space, and Technology
2321 Rayburn House Office Building
Washington, DC 20515
United States of America

18 December 2015

Dear Representative Smith

I am writing in relation to the written testimony that was submitted by Dr Bjorn Lomborg to the House of Representatives Committee on Science, Space and Technology for its hearing on 1 December 2015 on 'Pitfalls of Unilateral Negotiations at the Paris Climate Change Conference'. Dr Lomborg's testimony on 'The impacts and cost of the 2015 Paris Climate Summit, with special focus on US policies' contained a number of inaccurate and misleading claims.

The first part of his testimony is based on a new paper on 'Impact of Current Climate Proposals' which Dr Lomborg has had accepted for publication in the journal 'Global Policy'. Dr Lomborg's paper concludes that the pledges for limiting and reducing annual emissions of greenhouse gases that were contained in the 'intended nationally determined contributions' (INDCs), which were submitted by countries to the secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) ahead of the 21st session of the Conference of Parties to the UNFCCC in Paris, would mean a reduction in global mean surface temperature of just 0.31°F in 2100 in his 'optimistic scenario', or a reduction of 0.17°F in 2100 in his 'pessimistic scenario'.

However, Dr Lomborg's paper suffers from a fundamental methodological flaw which nullifies his conclusions. Any estimate of global mean surface temperature in 2100 depends on assumptions about the cumulative annual emissions of greenhouse gases over the period to 2100. The pledges contained in the INDCs primarily relate to annual emissions in 2025 or 2030. Dr Lomborg primarily used the INDCs of the United States, European Union and China to estimate their emissions in 2030. This means Dr Lomborg's estimates of temperature in 2100 depend mainly on his assumptions about annual emissions by these countries during the 70 years after 2030, rather than for the 15 years covered by the INDCs. In fact, Dr Lomborg makes the very extreme assumption that all countries essentially give up on emissions reductions after 2030, in most cases leading to rises in annual emissions after 2030 that completely reverse the effects of the INDCs. For this reason, Dr Lomborg's paper does not assess the implications of the INDCs for global mean surface temperature in 2100, and merely reflect his own extreme assumptions about emissions after 2030.

Dr Lomborg's paper should never have been accepted for publication by the journal and appears to have slipped through a weakness in its peer review process. When I

alerted the journal to the fundamental methodological flaw in Dr Lomborg's paper, it agreed to publish an accompanying commentary from me explaining why its conclusions are not valid. My commentary will be published alongside Dr Lomborg's paper in the February 2016 printed edition of the journal 'Global Policy'. I have enclosed with this letter a copy of the manuscript of my commentary which has been published as a working paper

<http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/12/Working-Paper-218-Ward-2015.pdf>) on the websites of the Grantham Research Institute on Climate Change and the Environment and the ESRC Centre for Climate Change Economics and Policy at the London School of Economics and Political Science. My commentary explains in more detail the significant errors in Dr Lomborg's assessment.

The second half of Dr Lomborg's testimony purports to provide estimates of the "costs" associated with realising the pledges for reductions in annual emissions of greenhouse gases contained in the INDCs. However, Dr Lomborg makes a number of inaccurate claims that are not supported by the published research.

In particular, Dr Lomborg extrapolates from the results described in a series of journal papers from the Stanford Energy Modeling Forum which have been published over the past few years. It is important to note that all of these papers were published before the INDCs were submitted to the UNFCCC, so none of them explicitly address the costs of implementing the INDCs. But Dr Lomborg also makes claims about the conclusions of the research results that are inconsistent with the published academic papers.

For instance, Dr Lomborg refers to papers published in 'The Energy Journal' in 2014 about the Energy Modeling Forum Inter-comparison Project number 24 (EMF 24) on United States Technology and Climate Policy Strategies. Although Dr Lomborg claims that he has extrapolated from the results of EMF24, he has not published his calculations, and he did not provide any details in his testimony, so it is impossible to verify his figures. However, it should be noted that EMF24 included scenarios from nine energy-environment-economy models that examine the implications of technological improvements and technological availability for reducing greenhouse gas emissions by the United States by 50 per cent and by 80 per cent by 2050. According to the 2014 paper by Leon Clarke and co-authors (<https://www.iaee.org/en/publications/ejarticle.aspx?id=2586>), which Dr Lomborg cites, the 'optimistic technology' reference scenarios for these models assume that the GDP of the United States increases at a rate of between 1.8 and 2.6 per cent per year between 2010 and 2050, leading to an rise of between 100 and 200 per cent by 2050 ie GDP rises from about \$12.5 trillion in 2010 to between about \$25 trillion and \$37.5 trillion in 2050. The paper concludes: "The net present value of economic costs through 2050 under the most pessimistic (most optimistic) assumptions about technology fall between \$1 trillion and \$2 trillion (less than \$1 trillion) in most models. GDP in 2050 is reduced by between 2% to 4% (0.5% to 1.5%) below what it otherwise would be in most models that produce this metric under the most pessimistic (most optimistic) assumptions about technology." In addition, the

authors note that the hypothetical counterfactual growth rate in the reference scenarios, which are used to calculate the costs of policies to reduce emissions, assumes that climate change has no impact on the economic growth of the United States up to 2050. I think this puts into context Dr Lomborg's claims about the costs of the United States reducing its emissions by 26-28% by 2030 compared with 2005, and shows that he has not accurately represented the research results of Leon Clarke and his co-authors.

Similarly, Dr Lomborg refers to a paper by Brigitte Knopf and co-authors (<http://www.worldscientific.com/doi/abs/10.1142/S2010007813400010>), published in the journal 'Climate Change Economics' in 2013, which describes the results of the Energy Modeling Forum 28. The paper describes an assessment using 13 models of the long-term transformation of the European energy system to achieve a reduction in annual emissions of greenhouse gases by 80 per cent compared with 1990. Again, Dr Lomborg extrapolates from the results in an opaque way which prevents independent verification. He claims that the models show an average 41 per cent reduction in emissions by 2030 and "estimate GDP loss is equivalent to reducing EU's GDP by 1.6% in 2030 – or €287 billion (\$305 billion) in 2010-euros". However, this claim is contradicted by the paper, which states: "Nearly all the models can achieve the long-term target of reducing GHG emissions by 80%, with only a moderate reduction in GDP (less than 0.7% by 2030 and below 2.3% by 2040)". Hence Dr Lomborg's assertions about the results of Brigitte Knopf and her co-authors are not consistent with the published paper.

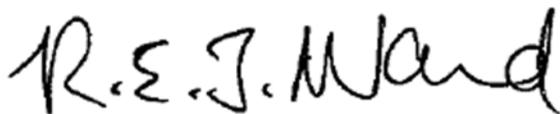
Dr Lomborg claims that "China has promised to reduce its energy intensity to at least 60% below 2005" and that this is "equivalent to reducing its emissions by at least 1.9 Gt CO₂ each year". But the latter number has no basis in the published literature. Careful analysis by Rodney Boyd, Joe Cranston Turner and me (http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2015/10/Boyd_Turner_and_Ward_policy_paper_October_2015.pdf) concluded that China's emissions, according to its INDC, will increase from about 5.9 billion tonnes of carbon dioxide in 2005 to between 12.8 and 16.3 billion tonnes in 2030, depending on what assumptions are made about its rate of economic growth between 2005 and 2030. Dr Lomborg also provides no indication of how he estimates that China's mitigation up to 2030 will cost "about \$200 billion in annual GDP loss". Although he cites a paper by Katherine Calvin and co-authors published in the journal 'Energy Economics' in 2012 (<http://www.sciencedirect.com/science/article/pii/S0140988312002174>), it describes the results of the Asia modelling exercise about pledges for emissions reductions by 2020, and does not cite any costs for China. This is another example of Dr Lomborg not accurately representing the results of the research.

Based on his flawed and misrepresentative claims about the costs of reducing emissions, Dr Lomborg concludes that the "costs for the world is [sic] at least close to \$1 trillion per year in 2030, with likely costs due to policy inefficiency doubling to almost \$2 trillion per year". His calculations, which have not been subject to expert scrutiny through peer review, are not credible. However, even if his claims

had some legitimate basis, he has failed to present them in a proper context. The contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change concluded in its report in 2014 (http://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_technical-summary.pdf), based on an authoritative and comprehensive review of all of the research that had been published around the world, concluded that if annual emissions of greenhouse gases were cut in a cost-effective way to limit atmospheric concentrations of carbon dioxide to no more than 450 parts per million, offering a 66 per cent chance of avoiding global warming of more than 2 centigrade degrees, the global annualised consumption growth rate would be reduced by just 0.06 to 0.2 percentage points between 2010 and 2030, and reduced by 0.06 to 0.17 percentage points between 2010 and 2050. Hence, despite Dr Lomborg's attempts to make the costs of emissions reductions seem unaffordable, the peer-reviewed academic literature that has been published shows them to be both affordable and necessary, particularly compared with the very severe risks of economic damage from the impacts from unmanaged climate change.

There are a significant number of other errors and opacities in Dr Lomborg's written testimony. This may be a reflection of the fact that he has no qualifications in climate change economics or any related discipline. I recommend that the Committee obtain information about climate change policy and economics from experts in the field.

Yours sincerely,

A handwritten signature in black ink that reads "R.E.T. Ward". The signature is written in a cursive, slightly slanted style.

Robert E.T. Ward
Policy and Communications Director

cc. The Honourable Eddie Bernie Johnson