

8th July 2016

Re: Public Consultation on the Draft National Risk Assessment (NRA)2016

To: Department of the Taoiseach

Dear Sir/Madam,

Please find attached a submission from An Taisce's Climate Change Committee in response to this Public Consultation.

We ask the Department and other readers to give full consideration to this contribution. In it we outline what we consider as serious climate risks that any credible National Risk Assessment and consequent political decision-making must take into account if we in Ireland are to play a full part in meeting the global challenge that climate change now presents.

Ireland has both the responsibility, due to high emissions per capita, and the economic capacity of a relatively wealthy country, to act with all urgency to achieve substantial and sustained cuts in emissions far faster than has been envisaged to date. We urge Government, the Department, and the Climate Change Advisory Committee, to develop a National Risk Assessment that will genuinely address the mitigation and climate risks that already threaten Ireland's future well-being and are already affecting vulnerable nations.

Please can the Department make known to An Taisce any further consultation planned regarding the NRA and issue An Taisce with notification of any proposed amendments.

Yours sincerely,

Eoin Heaney
Programmes and Administration
Officer eoin.heaney@antaisce.org

on behalf of An Taisce Climate Change Committee.

An Taisce's Response to the Public Consultation on the Draft National Risk Assessment (NRA)

**An Taisce Climate Change
Committee (ATCC) July 2016**

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An Taisce, the National Trust for Ireland, is a membership-based charitable organisation committed to enhancing our quality of life, heritage and environment.

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Executive Summary

Our society and economy are entirely reliant on preserving environmental integrity, maintaining biodiversity and ensuring climate stability. Climate change is the critical planetary boundary being crossed in the world today and over the coming decades¹. As climate change is a threat-multiplier in all policy areas, so continued greenhouse gas emissions should be upgraded to a **top-priority risk** in the National Risk Assessment. **In fact, climate change is a superordinate threat which is sui generis, unprecedented, implying impacts of a magnitude that exceed all other risks.** In signing the Paris Agreement and as a high per capita emitter of greenhouse gases, Ireland has agreed to restrict total future emissions to a decarbonisation pathway aligned with “well below 2°C” average global warming above pre-industrial levels in accord with science and equity.

Ireland urgently has to address both the economic mitigation risks of achieving a stable pathway and the national responsibility for past and future emissions causing escalating climate risk already for poorer tropical nations and for future generations globally. Global warming causing climate change is essentially irreversible but can be stopped and stabilised if net emissions go to zero as soon as possible.

Risks that are expected to be exacerbated by greenhouse gas emissions causing climate change include:

- **Extreme weather events leading to involuntary migration.** Especially droughts in vulnerable regions, are likely to add to political instability leading to mass involuntary migration and unrest causing social and political tension affecting Europe and Ireland.
- **Food security that will be negatively impacted by climate change.** Ireland’s current position as a net calorie importer due to a dependence on livestock agriculture negatively affects global food security. A diversification of agricultural production away from beef and dairy could contribute to increased global food security, reduce our dependence on export markets and cut emissions, thereby contributing to climate change mitigation.
- **Energy system change:** Ireland’s inordinate dependence on fossil fuels adds to climate risk globally and for Ireland. Urgent and rapid decarbonisation of Ireland’s energy system is needed, especially so that low carbon electricity is available for transport and heating as well as power. Achieving this requires planning for immediate closure of peat burning power plants and closure or carbon capture and storage (CCS) refit of Moneypoint. Demand-side measures must also be affected in order to make carbon-neutrality feasible. Failure to implement a transition to a low-carbon economy risks a ‘hard landing’ as global fossil fuel prices rise over coming decades.
- **Land use change:** Current plans for energy system change are wrongly reliant on unsustainable forestry and biomass-use, based on a misleading assumptions of carbon neutral energy from biomass and equating carbon sequestration with climate mitigation. These are high risk assumptions because both are false. In fact, biomass can produce very high emissions and continuing high emissions in agriculture and energy cannot be offset with forestry or soil sequestration.
- **Biodiversity loss** is another ‘core’ planetary boundary. The safe threshold has already been crossed and biodiversity has deteriorated badly over past decades. Ireland’s terrestrial and marine wildlife is threatened mainly by unsuitable agricultural and afforestation practices.

¹ Steffen et al. 2015. Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223)

- **Economic risks.** The costs of failing to act far outweigh the investment costs of reducing emissions, investments that will pay off in long-term resilience, economic sustainability and societal wellbeing. Unfortunately, due to the large uncertainties attached to climate risk analysis, traditional cost-benefit and risk assessment fails to properly weigh the benefits of action therefore policy goals based on the precautionary principle need to be set and adhered to under all circumstances to reduce risk.

Climate change is the most significant global challenge facing humanity today. All countries are affected and facing very significant impacts. The IPCC state²:

“Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems.”

“Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions.”

Ireland has the opportunity to create a resilient, fair and prosperous society that contributes to global climate stability and food security. To do this seriously Ireland must act with urgency to decarbonise rapidly across all sectors. This will require Ireland to adopt society-wide, whole-economy and politically agreed approaches to reducing climate risk as a top priority.

² IPCC. (2014). Climate Change 2014: Synthesis Report

Introduction

The NRA Draft is an important policy document that should guide how the Irish government and society address risks faced by the nation. An Taisce believes the broad and comprehensive focus aimed for in the Draft NRA is commendable, and the adoption of the World Economic Forum Global Risk Report's categorisation of risks is helpful³. However, and in line with the Global Risk Report, the NRA needs to recognise that there is also a hierarchy of risks in terms of their urgency.

As indicated in the Global Risk Report (p.11), inadequate action to both mitigate and adapt to climate change is listed as the most impactful risk facing the world in 2016. Not only this, but climate change is also a highly connected risk that acts as a **threat-multiplier in all areas** including other high-profile risks such as water crises, large-scale involuntary migration, interstate conflict and extreme weather events⁴.

Social and economic well-being is dependent on environmental well-being, as indicated in Figure 1. For these reasons, climate change needs to be considered a 'core' planetary boundary⁵. An Taisce therefore recommends strongly that climate change is upgraded to a **top-priority risk**. Both mitigation efforts in line with the Paris Agreement⁶ affecting the economy and increasing climate impacts on international security need to be priorities for risk assessment and damage mitigation.

Risks that will be exacerbated by climate change are detailed in the following sections.

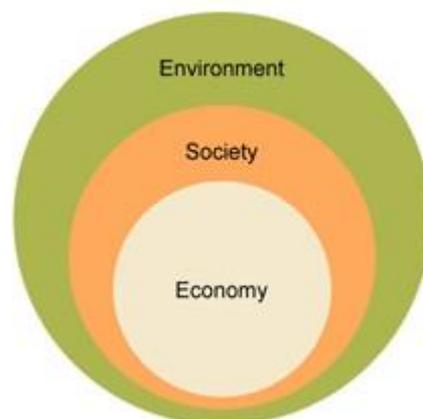


Figure 1. This nested model of sustainability shows that the economy is a subset of society, which is itself dependent on the environment. Socio-economic well-being is inherently dependent on the wellbeing of the biosphere.

³ World Economic Forum, Global Risks Report, 2016, 11th Edition <https://www.weforum.org/reports/the-global-risks-report-2016/>

⁴ IPCC. (2014). Summary for Policymakers. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects*.

⁵ Steffen et al. 2015. Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223)

⁶ https://unfccc.int/files/meetings/paris_nov_2015/application/pdf/paris_agreement_english_.pdf

Extreme weather events leading to involuntary migration

Climate change is projected to increase the frequency of extreme weather events both locally and globally⁷. This will have direct economic costs but will also lead to the displacement of people⁸. Indeed, the Arab Spring, which ultimately caused much of the recent migration flows, is intrinsically linked to environmental issues such as drought and food scarcity⁹compounding political instability. Mass involuntary migration is listed in the Draft NRA as a threat to the stability of the EU and the Single Market. This fear may well have been a factor in tipping the Brexit referendum result. Rising hostility to migration and isolationist politics are likely to be exacerbated by increasing migrant flows linked to climate change. This will likely have negative political, economic and social implications for Ireland, especially if mitigation action does not achieve sustained cuts in emissions.

Food security

Climate change is projected to undermine food security¹⁰. Ireland can and should contribute to global food security in the coming decades. However, the current policy trajectory acts contrary to these objectives:

Beef and milk together comprise 69% of Ireland's agricultural output at producer prices¹¹. This high reliance on beef and dairy farming requires large amounts of feed. The average calorie conversion efficiency of dairy is 40% and protein conversion efficiency is 43%¹². For beef, these figures are 3% and 5%, respectively¹³. These poor conversion ratios result in Ireland being a **net importer of calories**¹⁴ using imported and home-grown animal feed that is human-edible or that is grown using land that could produce human-edible grain, vegetables and pulses that could feed far more people than Ireland does currently. In 2012 Ireland had 2.7 million tonnes of cereal for domestic use¹⁵, only 17.9% of this went to human consumption¹⁶. Even small shifts in our allocation of crops from animal feed to direct human consumption could significantly increase local and global food security¹⁷. Instead, the planned increases in beef and dairy exports under FoodWise 2025 and the accompanying marketing push for Western-style diets and consumption patterns actually **undermines food**

⁷ IPCC. (2014). Climate Change 2014: Synthesis Report

⁸ *ibid.*

⁹ Johnstone, S., & Mazo, J. (2011). Global Warming and the Arab Spring. *Survival (00396338)*, 53(2), 11-17. doi:10.1080/00396338.2011.571006

¹⁰ IPCC. (2014). Climate Change 2014: Synthesis Report

¹¹ DAFM. (2016). Fact Sheet on Irish Agriculture - June 2016

¹² Cassidy, E. S., West, P. C., Gerber, J. S., & Foley, J. A. (2013). Redefining agricultural yields: from tonnes to people nourished per hectare. *Environmental Research Letters*, 8(3), 034015. doi:10.1088/1748-9326/8/3/034015

¹³ *ibid.*

¹⁴ An Taisce. (2016). Ireland's Agricultural Sector's Role in Food Security in the Wake of Climate Change.

http://www.antaisce.org/sites/antaisce.org/files/irelands_agricultural_sectors_role_in_food_security_in_the_wake_of_climate_change_.pdf

¹⁵ Central Statistics Office, 2016

¹⁶ *ibid.*

¹⁷ Cassidy, E. S., West, P. C., Gerber, J. S., & Foley, J. A. (2013). Redefining agricultural yields: from tonnes to people nourished per hectare. *Environmental Research Letters*, 8(3), 034015. doi:10.1088/1748-9326/8/3/034015

security^{18,19}; increasing global risks and food prices for the poorest. The high demand for livestock fodder also drives up global food prices for those with the least resources.

As mentioned in the Draft NRA, Ireland's rural economy is highly dependent on agri-food exports, primarily beef and dairy²⁰. This creates a high dependence on foreign export markets' continued growth, which are outside the control of the Irish government or producers. At the same time, Ireland imported €1.15bn in fruit and vegetables in 2015, comprising our largest portion of food imports at 17.3%²¹. This food imbalance poses a risk that is not best addressed by trying to maintain global competitiveness in particular sectors in the face of uncontrollable external events, such as the recent Chinese government decision²² to cut meat consumption by 50%. Actions like this are out of the hands of the Irish government and agricultural sector, yet still have large ramifications for our food industry.

Agriculture currently makes up 32% of overall GHG emissions and 47% of non-ETS emissions in Ireland^{23,24}. The trajectory of the current National Policy Position will result in agriculture monopolising 100% of non-ETS emissions by 2040 with no emissions space available for transport and energy²⁵. Beef and dairy are the main emitting sectors in Irish agriculture. Any financial gains from increasing beef and dairy productivity will be reduced by subsequent fines if Ireland does not meet its EU-set targets, which it is not expected to do²⁶. This trajectory also contradicts the global sustainability goals enshrined in the Paris Agreement to which we have subscribed.

A diversification of agriculture away from an unsustainable model that is overly dependent on global markets for GHG-heavy produce, to one based on supporting local and global food security based on calories is in line with a sustainable and resilient vision for Ireland. Indeed, a recent UNCTAD (United Nations Conference on Trade and Development) report by more than 60 international experts urges the need for a 'mosaic' approach to agriculture which entails greater product variety, reduced inputs, support for small-scale farmers, and a reduced distance between production and consumption²⁷.

¹⁸ An Taisce. (2016). Ireland's Agricultural Sector's Role in Food Security in the Wake of Climate Change. http://www.antisce.org/sites/antisce.org/files/irelands_agricultural_sectors_role_in_food_security_in_the_wake_of_climate_change_.pdf

¹⁹ Doyle, C (2016) Feeding the World Sustainably? - analysis of Irish and EU food nutrition trade balances. Presentation to Whitaker Institute, NUIG, April 2016. Climate <http://www.antisce.org/publications/feeding-the-world-sustainably-an-analysis-of-irish-and-eu-food-nutrition-trade-balances>

²⁰ DAFM. (2016). Fact Sheet on Irish Agriculture - June 2016

²¹ Central Statistics Office, 2016

²² Milman, O. & Leavenworth, S. (2016, June 20th). China's plan to cut meat consumption by 50% cheered by climate campaigners. *The Guardian*. <https://www.theguardian.com/world/2016/jun/20/chinas-meat-consumption-climate-change>

²³ Department of Communication, Energy and Natural Resources. (2015). White Paper - Ireland's Transition to a Low Carbon Energy Future 2015-2030

²⁴ EPA. 2016. Ireland's Greenhouse Gas Emissions to 2020 - An Update. <http://www.epa.ie/pubs/reports/air/airemissions/irelandsgreenhousegasemissionsto2020anupdate.html>

²⁵ Price, P. 2015. Are We Serious About Limiting Global Warming? Confronting Persistent Climate Policy Failure in Ireland, in Kirby, P. & Ó Broin, D. 2015. Adapting to Climate Change: Governance Challenges.

²⁶ EPA. 2016. Ireland's Greenhouse Gas Emissions to 2020 - An Update. <http://www.epa.ie/pubs/reports/air/airemissions/irelandsgreenhousegasemissionsto2020anupdate.html>

²⁷ UNCTAD. (2013). Wake up before it's too late: Make agriculture truly sustainable now for food security in a changing climate. http://unctad.org/en/PublicationsLibrary/ditcted2012d3_en.pdf

Energy system change

As mentioned in the Draft National Risk Assessment, Ireland's energy system is almost completely dependent on imported fossil fuels, thereby contributing to climate change risk. In order to have a 66% (or better) chance of staying below 2°C requires global reductions in energy-CO₂ of, on average at least 5% per annum from 2025, transitioning rapidly to zero emissions by 2050²⁸ (high emitting nations will need to do more). To do this, at least two-thirds of the known fossil-fuel reserves must be left in the ground²⁹ and alternative sources of clean energy found³⁰.

As recognised in the Draft paper, higher prices on fossil fuels are required to push the transition to a low-carbon economy, as blueprinted in the White Paper on Energy³¹. This should be emphasised and Ireland should be pushing for this at international level. Indeed, as the global economy transitions to a low-carbon economy, \$2 trillion in investments in fossil fuels run the risk of becoming stranded assets as price rises and demand falls³². This must mean ending all future fossil fuel exploration and stopping peat extraction if we are to act in accord with the Paris agreement. Additionally, Moneypoint should be closed and/or refitted with Carbon Capture and Storage (CCS) technology. Incentives should be put in place for a renewable, low-carbon indigenous energy supply, making use of Ireland's favourable conditions to achieve energy sustainability, meanwhile creating green jobs and avoiding a 'hard landing'.

What is required is the complete decarbonisation not only of our electricity systems but also of our transport and heating systems. Renewable energy production currently accounts for less than 1,000 ktoe³³ of primary energy demand and can never hope to substitute for the scale of our current fossil fuel use, which has a cumulative demand for over 12,000 ktoe per annum³⁴. Downscaling energy consumption through careful planning, design and investment is the only option to bridge the gap³⁵. Cost-effective, demand-side measures must therefore be front-and-centre of any effective and affordable clean energy transition strategy. Only after setting deep demand reduction targets can appropriate and affordable strategies for supply-side technologies and deployment be pursued.

²⁸ Anderson, K. (2015). Duality in climate science. *Nature Geoscience*, 8(12), 898

²⁹ McGlade C, Ekins P (2015) The geographical distribution of fossil fuels unused when limiting global warming to 2 °C *Nature* 517, 187–190 doi:10.1038/nature14016

³⁰ McGarry. (2015, June 22nd). Climate action on fuels needed, says Mary Robinson. *The Irish Times*. <http://www.irishtimes.com/news/social-affairs/religion-and-beliefs/climate-action-on-fuels-needed-says-mary-robinson-1.2259240>

³¹ Department of Communication, Energy and Natural Resources. (2015). White Paper - Ireland's Transition to a Low Carbon Energy Future 2015-2030 <http://www.dcenr.gov.ie/energy/SiteCollectionDocuments/Energy-Initiatives/Energy%20White%20Paper%20-%20Dec%202015.pdf>

³² Carbontracker.org. (2015, November 24th). Fossil fuel firms risk wasting \$2 trillion on uneconomic projects. <http://www.carbontracker.org/in-the-media/fossil-fuel-firms-risk-wasting-2-trillion-on-uneconomic-projects/>

³³ Ktoe = thousand tonnes of oil equivalent

³⁴ SEAI. (2014). Quantifying Ireland's Fuel and CO₂ Emissions Savings from Renewable Electricity in 2012. [http://www.seai.ie/Publications/Statistics_Publications/Energy_Modelling_Group_Publications/Quantifying-Ireland%E2%80%99s-Fuel-and-CO₂-Emissions-Savings-from-Renewable-Electricity-in-2012.pdf](http://www.seai.ie/Publications/Statistics_Publications/Energy_Modelling_Group_Publications/Quantifying-Ireland%E2%80%99s-Fuel-and-CO2-Emissions-Savings-from-Renewable-Electricity-in-2012.pdf)

³⁵ An Taisce. (2016). Planning for Ireland's Energy Future (forthcoming July 2016)

Land use change

Ireland's future climate action with respect to energy and agricultural policy is falsely based on the use of forestry for offsetting emissions and the use of biomass (imported and homegrown) for low carbon emissions. These are both based on serious misunderstandings of climate mitigation and emissions accounting. Therefore very substantial rethinking of land use policy is required to limit the economic, societal and climate risks that could result from this policy direction.

Climate science is very clear that carbon sequestration in forestry, grasslands and soils cannot substitute for leaving fossil fuels in the ground or substantive reductions in energy and agricultural emissions³⁶. The burning of carbon deposits that have been stored for millions of years cannot be offset by forestry and biomass sequestration that cannot provide the level of permanency required to sequester carbon for the time periods necessary to prevent catastrophic climate change.

Furthermore, biomass burning is not carbon neutral even for short-rotation crops, the assumption of carbon neutrality is based on mis-accounting of emissions by the EU³⁷. The current trajectory of the National Policy Position means that agriculture will account for 100% of non-ETS emissions by 2040, with CO₂ sequestration from forestry intended to nullify projected emissions increases from agriculture³⁸. GHG emissions need to be reduced outright, and *sustainable* biomass sequestration practices used to bolster these efforts.

Peatlands represent a major carbon store that should be preserved and rewetted. This means extraction needs to stop to prevent further carbon loss.

Biodiversity loss

A large fraction of species faces increased extinction risk due to climate change during and beyond the 21st century, especially as climate change interacts with other stressors³⁹. Biodiversity loss is another 'core' planetary boundary that is being transgressed. It is absent from the draft NRA report⁴⁰. Biodiversity is inherent to the functional capacity of the biosphere, which provides humans with a safe operating space. The overall status of biodiversity in Ireland is inadequate and declining⁴¹. Threatening these ecosystems is analogous to threatening our societies. Therefore, any efforts to mitigate or adapt to climate change must be aware of ecological interdependencies and limits. For example, afforestation

³⁶ IPCC (2013) AR5 WG1 Chapter 6.

³⁷ Searchinger T, et al. (2009) Fixing a Critical Climate Accounting Error. SCIENCE VOL 326 23 OCTOBER 2009

³⁸ Price, P. 2015. Are We Serious About Limiting Global Warming? Confronting Persistent Climate Policy Failure in Ireland, in Kirby, P. & Ó Broin, D. 2015. Adapting to Climate Change: Governance Challenges.

³⁹ IPCC. (2014). Climate Change 2014: Synthesis Report

⁴⁰ Steffen et al. 2015. Planetary boundaries: Guiding human development on a changing planet. *Science*, 347(6223)

⁴¹ NPWS (2013). The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Editor: Deirdre Lynn

schemes which aim to sequester carbon should undergo appropriate assessment so as not to threaten natural habitats with non-native or poorly selected species^{42,43}. Similarly, Ireland's unique peatlands need to be conserved. Agriculture also poses a significant threat - mostly in the form of unsuitable grazing practices and nutrient runoff - to much of Ireland's biodiversity and criteria for what is considered sustainable agriculture should be updated⁴⁴. Ireland has committed to halting any further reduction in biological diversity under the International Convention on Biodiversity. In order to prevent potential legal action the NRA must ensure that Ireland adheres rigidly to its substantial legal obligations under EU law.

Ocean acidification is another major concern. Acidification is a result of increased CO₂ emissions which the ocean absorbs. This acidification could have profound consequences for the biodiversity in the world's oceans and Irish seas. The undermining of these ecosystems 'is likely to have major consequences for climate processes, food production, biodiversity and sectors reliant on these services, such as fisheries and aquaculture'⁴⁵. Just like climate change, ocean acidification is basically irreversible on human timescales, and every molecule of CO₂ emitted now from long-stored carbon reserves cannot be taken back.

Economic risks

It has been well established that the economic costs of insufficient climate change action far outweigh the benefits of delaying action^{46,47}. The potential costs relating to property insurance claims in Ireland due to sea level rise could reach billions⁴⁸ and recent flooding events offer an indication of extreme weather events that will become more common under climate change as acknowledged in the Draft NRA⁴⁹. These costs are only set to increase and can only be lowered through immediate, strong and sustained mitigation and adaptation efforts^{50,51}.

⁴² Jones et al. 2003. A Review of the CAP Rural Development Plan 2000-2006: Implications for Natural Heritage. http://www.heritagecouncil.ie/fileadmin/user_upload/Publications/Wildlife/rural_plan.pdf

⁴³ An Taisce. (2016). Re: Public Consultation on the Draft Environmental Requirements for Afforestation. http://www.antaisce.org/sites/antaisce.org/files/an_taisce_submission_on_the_consultation_for_the_environmental_requirements_for_afforestation.pdf

⁴⁴ NPWS (2013). The Status of Protected EU Habitats and Species in Ireland. Overview Volume 1. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. Editor: Deirdre Lynn

⁴⁵ Ni Longphuir, S. Stengal, D., O'Dowd, C., McGovern, E. (2010). Ocean Acidification: An Emerging Threat to our Marine Environment. Marine Institute

⁴⁶ Stern, N. (2006). The Stern Review on the Economic Effects of Climate Change. <http://onlinelibrary.wiley.com/doi/10.1111/j.1728-4457.2006.00153.x/abstract>

⁴⁷ Global Commission on Climate Change and the Economy Better Growth Better Climate (2014). The New Climate Economy Report. <http://newclimateeconomy.report/2014/>

⁴⁸ Flood, S., & Sweeney, J. (2012). Quantifying Impacts of Potential Sea-Level Rise Scenarios on Irish Coastal Cities. *Resilient Cities* 2, 37. doi:10.1007/978-94-007-4223-9_5

⁴⁹ IPCC. (2014). Climate Change 2014: Synthesis Report

⁵⁰ EEA (European Environmental Agency). 2012. Climate change, impacts and vulnerability in Europe 2012. <http://www.eea.europa.eu/publications/climate-impacts-and-vulnerability-2012>

⁵¹ National Climate Change Adaptation Framework. 2012. <http://www.environ.ie/sites/default/files/migrated-files/en/Publications/Environment/ClimateChange/FileDownload,32076,en.pdf>

The IPCC's Synthesis Report concludes that no more than 1,000 Gt of CO₂ can be emitted globally between 2011 and 2100 for a 66% chance, or better, of remaining below a 2°C rise⁵². However, between 2011 and 2014 global CO₂ emissions from energy production alone amounted to about 140 Gt of CO₂⁵³. This is a serious constraint on future economic choices, incurring escalating economic risks unless substantial and sustained mitigation of emissions is rapidly achieved. Critical political decisions are urgently required to plan the future direction and balance of Ireland's economy within a very limited future cumulative carbon budget.

However, traditional risk-based decision-making breaks down in the face of great uncertainty. Both the impacts and likelihood of climate change are significantly uncertain due to the difficulty in predicting both the local climate impacts and global political systems that determine emissions, as well as lack of knowledge. This high level of uncertainty precludes the use of traditional risk assessment or cost-benefit analysis which rely relatively on certain estimates or probabilities of outcomes. Failure to act due to this uncertainty actually increases the level of risk^{54,55}. Decision-making tools under circumstances of high uncertainty requires precautionary principle thinking to set goals which insure Ireland against significant risk^{56,57}.

Cost-benefit analysis logic is still being used in the Draft NRA so economic compliance costs are mentioned as being in competition with the risk of climate change. This does not make sense when one recognises that the economy is dependent on the environment, as illustrated in Figure 1. Although, cost-benefit analysis has an important role to play in determining a cost-effective strategies for near-term, national goals that are relatively easy to quantify. However, economic cost-benefit calculations fail under high uncertainty because they cannot sufficiently gauge damage costs or the co-benefits for long-term and global risks decisions. Decision-making under uncertainty requires serious political discussion of national values, undertaken in the context of understanding climate risk so that difficult decisions can be made⁵⁸. This cannot be left to economists or sectoral interests. Substantive and continuous public engagement is required to limit political risks of acting without consent.

The Irish Government signed the Paris Agreement on behalf of the Irish people, thereby enshrining the objective of limiting temperature rise to *well below* +2°C (over pre-industrial levels) as a national goal, for the welfare of our people and people around the world. It should not mean the goal is diluted or shirked away from if making certain political decisions toward that goal *appears* to be economically costly, as that appearance is an artifact of ignoring the essentially unlimited potential cost of worst case climate impacts, combined with misplaced

⁵² IPCC. (2014). Climate Change 2014: Synthesis Report

⁵³ Anderson, K. (2015). Duality in climate science. *Nature Geoscience*, 8(12), 898

⁵⁴ Lewandowsky, S et al. Climatic Change. (2014). Scientific uncertainty and climate change: Part I. Uncertainty and unabated emissions. 124: 21. doi:10.1007/s10584-014-1082-7

⁵⁵ Lewandowsky, S et al. Climatic Change. (2014). Scientific uncertainty and climate change: Part II. Uncertainty and mitigation. 124: 39. doi:10.1007/s10584-014-1083-6

⁵⁶ Van den Bergh, J. C. (2004). Optimal climate policy is a utopia: from quantitative to qualitative cost-benefit analysis. *Ecological Economics*, 48(4), 385. doi:10.1016/j.ecolecon.2003.10.011

⁵⁷ Anderson, K. (2015). Duality in climate science. *Nature Geoscience*, 8(12), 898

⁵⁸ Pidgeon N (2012) Uncertainty, risk and decision making. University of Oxford video podcast

<https://podcasts.ox.ac.uk/uncertainty-risk-and-decision-making-view-environmental-social-sciences>

short term thinking. This approach significantly increases climate change and associated risks facing Ireland and is the reason for Ireland being set to cumulatively exceed its EU target by between 3-12Mt CO₂⁵⁹. This trend will make even more difficult our meeting of cumulative emissions targets beyond 2020, in line with the goal set forth in the Climate Action and Low- Carbon Development Act 2015, as well as EU and Paris obligations⁶⁰. Due to the cumulative nature of emissions, the longer it takes to implement emissions reductions, the sharper and more drastic later changes will need to be. Inaction continually escalates risk.

Resilience is the capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment⁶¹. In this way it is the antithesis of risk. If Ireland is to become a resilient society of prosperous people, it needs to start taking seriously the risk of climate change and the multiple risks associated with it. Uncertainty about impacts urges us even more to act now and act decisively. Doing this will give us a better chance of creating a fair, resilient and prosperous society for all.

Recommendations

- The NRA must prioritise climate change as a **top-priority risk**, given its high impact status as a threat-multiplier
- Addressing climate change urgently, comprehensively and decisively will help to reduce a number of other significant risks facing Ireland
- Uncertainty must lead to greater impetus for action, not less. Uncertainty assessment is needed as well as risk assessment.
- To build economic and societal resilience despite uncertainty requires flexibility in governance, anticipatory risk management and strong, open engagement with the public and with all stakeholders. Awareness of the risks and uncertainties needs to be widely understood as a context for low-regret decision-making.
- Ireland's future economic and societal well-being depend on difficult political decisions being made to limit the economic risks due to climate action as well as the future risks due to climate impacts.

⁵⁹ EPA. 2016. Ireland's Greenhouse Gas Emissions to 2020 - An Update.

<http://www.epa.ie/pubs/reports/air/airemissions/irelandsgreenhousegasemissionsto2020anupdate.html>

⁶⁰ Anderson, K. (2016). Presentation at Royal Irish Academy. <https://www.youtube.com/watch?v=dVJ8IMlm9-c>

⁶¹ National Climate Change Adaptation Framework. 2012. <http://www.environ.ie/sites/default/files/migrated-files/en/Publications/Environment/ClimateChange/FileDownload,32076,en.pdf>