



St George's House Consultation March 23-24 2021

The Economics of Climate Change

Dr Robin Russell-Jones

Facilitator St George's Climate Consultations

Introduction

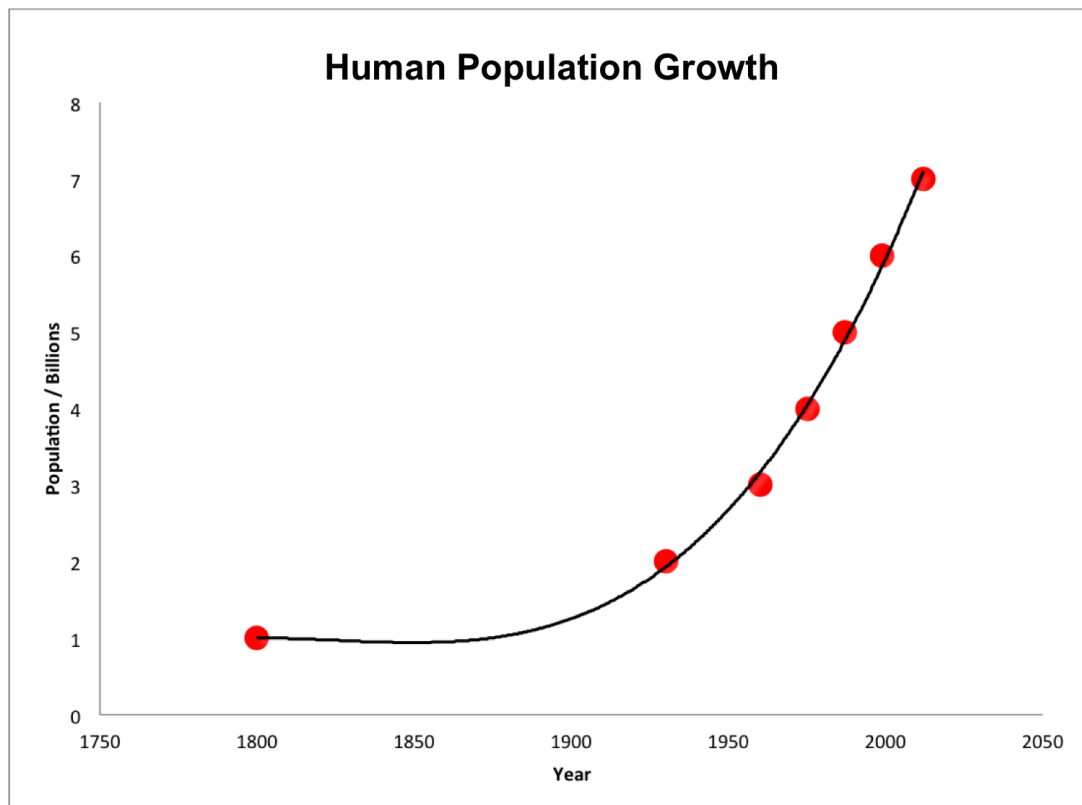
Since the Scientific Briefing Paper for the first St George's House consultation was written, we have learnt that global temperatures in 2020 peaked at 1.25C with an average of 1.2C of warming for the whole year. Four years ago the figure was 0.85C of warming, so global temperatures have started to increase by around 0.1C per annum, and will likely reach 1.5C of warming by 2025. If the level of GHGs in the atmosphere is stabilised, there would still be another 0.6C of committed warming. Already therefore it will be very challenging to limit global warming to 2.0C, let alone the preferred limit of 1.5C stipulated in the Paris Agreement.

According to Professor Wigley's analysis, we are bound to overshoot 1.5C and our only hope is to claw back. BUT the longer we overshoot the more likely we are to hit tipping points which could make climate change irreversible. For all GHGs listed in the Kyoto and Montreal protocols, Prof Wigley estimates we will need a balance between sources and sinks by 2036 for a small overshoot, and by 2044 for a larger and more prolonged overshoot. This is two decades sooner than envisaged by the Paris Agreement that does not require this balance to be achieved until the second half of this century. If other climatically active species such as sulphates are included, then the balance needs to be achieved by 2048 for a small overshoot, and 2051 for a large overshoot.

Professor Wigley is particularly critical of the decision by the IPCC, and in this country by the UK Climate Change Committee, to use Global Warming Potentials (GWPs) which are then used to estimate Nationally Determined Contributions (NDCs) and target dates for Net Zero Carbon. It has been known for years that the use of GWPs is arbitrary, because the conversion number depends upon the time horizon. Thus the GWP of methane is 86 times that of an equivalent mass of carbon dioxide at 20 years, but 36 times at 100 years. The IPCC have plumped for the 100 year value, but neither gives a true picture. The concept of GWPs should be replaced by an Emissions Scaling Factor (ESF) for each gas to estimate its scaled CO₂-equivalent effect. The appropriate scientifically acceptable way to estimate outcomes is to undertake simulated computer-based modelling which incorporates all GHGs as well as aerosols. The presentation given by Professor Wigley at Windsor on Feb 16 has now been submitted to Science, and will not therefore be available until it is accepted for publication.

Population and Climate Change

Another weakness in IPCC reports is an absence of any serious strategy to limit human numbers. The simplest way to express the existential threat facing humanity is to use Einstein's famous formula in reverse. So $E = MC^2$ becomes $Mc^2 = E$ where **M** stands for **M**ultitude, **c**² stands for **C**arbon per **C**apita, and **E** stands for **E**xinction of species, or for those who don't care about flora and fauna, the **E**nd of human civilisation as we know it.



It is estimated that the population of the world reached one billion for the first time in 1804. It was another 123 years before it reached two billion in 1927, but it took only 33 years to rise by another billion people, reaching three billion in 1960. Thereafter, the global population reached four billion in 1974, five billion in 1987, six billion in 1999 and, seven billion in October 2011. It is now 7.7 billion and the UN estimate that it will reach 9 billion by 2050. This is what is known as unsustainable. In Jesus' day the population of the world was around 200 million, and no more than 7 million in 9000 BC. This means that for every Neolithic ancestor, there are now more than 1000 inhabitants that require, as a minimum, food, warmth, shelter, clothing and transport. Without effective population control, it will be impossible to control climate change. Since WW2 world population has trebled. This is the elephant in the room that the IPCC, UK CCC and government worldwide conspicuously fail to address. The other is closely related: the stupidity of relying on GDP as a marker of progress.

The Global Carbon Incentive Fund (GCIF)

The basic rationale is to create a UN administered fund to which countries would contribute if their carbon emissions per capita are above the global average; and from which they would receive payments if their carbon emissions per capita are below the global average. The beauty of this proposal is that it punishes developed nations with profligate energy use, and incentivizes developing nations to avoid fossil fuels. It also provides a financial instrument to enforce "Contract and converge".

There are different ways of calculating a country's emissions. The national emissions Inventory (NEI) covers all greenhouse gases, but only considers "territorial" emissions produced inside the frontiers of the country. There is no attempt to calculate the carbon footprint of imported goods, and international aviation and shipping are also excluded.

The IEA publish annual emissions data for fossil fuels and waste and produced a global figure of 32.9 Gt CO₂ for 2017; global average 4.3 tonnes per capita. Again these figures do not consider the consumption of imported goods; nor does it include other industrial sources of carbon dioxide.

The Global Carbon Project (GCP) publish CO₂ data for "industrial" fossil fuel emissions from energy and cement production which produces a global figure for 2017 of 36.2 Gt CO₂ which equates to 4.8 tonnes per capita. The great advantage of the GCP data is that they provide both production and consumption-based emissions by country from 1990. It seems appropriate to use the consumption-based emissions as this reflects more accurately the carbon footprint of the country concerned. At the time of writing, 2017 is the latest year for which both production and consumption based data are available.

The GCP data does not consider other greenhouse gases. This is not really a problem as other GHGs are usually emitted roughly in proportion to carbon dioxide, so using GCP figures would not produce any distortion into the calculations. More significant is that the GCP data does not include CO₂ emissions from AFOLU, (Agriculture Forestry and Other Land Use), so separate account would need to be taken of countries that promote deforestation or agricultural changes that result in large GHG emissions..

For this proposal to be both acceptable and effective, the carbon price should start at a relatively low level, say \$30 per tonne of CO₂, equivalent to the current carbon price on the EU Emissions Trading Scheme. If this strategy is adopted at COP 26 in 2021, then the price could double every 2 years after that, so that by 2028 the price per tonne of carbon dioxide would be \$240. Before fossil-fuel dependent industries object too vigorously, it needs to be remembered that Sweden already operates with a carbon tax of \$123 per tonne of CO₂. Second BP are already factoring in a carbon price of \$200 per tonne of CO₂ by the 2030's. Finally IMF figures show that air pollution is already costing the global community \$140 per tonne of CO₂.

An alternative scenario, which many might prefer, is to price initially at \$60 per tonne of carbon dioxide, and then double every 3 years, which again gets you to \$240 per tonne by 2028. Any subsequent increase would depend upon the impact on emissions of CO₂, and more specifically the level of GHGs in the atmosphere.

Assuming for the moment, that CO₂ is priced initially at \$60 per tonne, then it is

possible to calculate the contribution of different countries and the payments received (See Table)

Using production-based figures, China's per capita emissions are 9.84Gt divided by the population of the country (1.386bn in 2017) which equals 7.1 tonnes per capita per annum. China's contribution to the fund would be \$191bn (subtract 4.8 from 7.1, multiply by the population of China, times \$60 per tonne). Using consumption-based data China's per capita emissions reduce to 6.2 tonnes per annum, so the payment reduces to \$116 bn per annum, a saving of \$75 bn, or 39 per cent. Clearly China, as the world's largest polluter, will be much happier with a consumption-based system, as would Russia which is fourth on the global list of carbon emitters at 5% of the global total.

For the US production and consumption were very similar in 1990 (5.1bn Gt) but by 2017 Consumption is 8% higher (5.69Gt versus 5.27Gt). This equates to 17.5 versus 16.2 tonnes per capita; or £248 bn versus \$222 bn, an increase of 11.7 % using consumption based emissions.

The country that will benefit most is India. Consumption and Production were very similar in 1990 (616Mt), but by 2017 production is higher than consumption (2.46Gt versus 2.26 Gt) The 2017 population is 1.339bn, so per capita emissions are 1.84 tonnes using production figures, or 1.69 tonnes using consumption based emissions. India is below the global average of 4.8 tonnes. So would receive \$170 bn versus \$138 bn, an increase of \$32 bn (23%) using consumption-based emissions. Clearly this would encourage India to develop its huge potential for solar power, rather than building yet more coal-fired power stations.

Country Population	Per capita annual emissions CO2	Price Per Tonne of CO2	Price per tonne of CO2
		\$30	\$60
China 1.386 bn (2017)	7.1 tonnes pa (Production-based) 6.2 tones pa (Consumption-based)	\$95.6 bn \$58.2 bn	\$191 bn \$116 bn Difference 39% Better off
United States 325 million	16.2 tonnes pa (Production-based) 17.5 tonnes pa (Consumption-based)	\$111 bn \$124 bn	\$222 bn \$248 bn Difference 12 % Worse off
United Kingdom 66 million	5.8 tonnes pa (Production-based) 8.4 tonnes pa (Consumption-based)	\$1.98 bn \$7.13 bn	\$4 bn \$14 bn Difference \$10 bn 250 % Worse Off

The UK situation

The country that will lose out most is the UK. Production-based emissions have fallen from 600 Mt in 1990 to 387.4 in 2017 (UK average 5.8 tonnes per capita) But consumption-based emissions rose from 657.8 Mt in 1990 to 728.8 in 2007, before falling back to 556.5 in 2017 (UK average 8.4 tonnes per capita). Hence UK would have to pay $8.4 \text{ minus } 4.8 \times 66 \text{ million} \times \$60.00 = \$14 \text{ bn}$ as opposed to \$4 bn, an increase of \$10 bn using a consumption-based system. However it needs to be remembered that historical UK emissions are very high, and represented virtually 100 per cent of anthropogenic carbon emissions in 1750. As the country that initiated the industrial revolution, and benefited massively from the burning of fossil fuels, Great Britain should also be the country that shows the world a route out of the Anthropocene. If the UK can lead the world in producing Covid vaccines, and can demonstrate to the EU how to roll out a vaccination programme, then there is no reason why the UK cannot do the same for climate change. We got the world into this mess. GB should be the one to get us out.

Political Considerations

The beauty of the GCIF scheme is that it penalises the profligate whilst simultaneously incentivising the low-emitting countries to adopt low carbon technologies, thus avoiding the need for developing nations to rely on fossil fuels with all the geopolitical complications that entails. However, there are two further requirements to make the GCIF scheme both equitable and effective.

First there has to be a mechanism for dealing with deforestation and other changes in land use which affect carbon emissions but which are not included in the Global Carbon Project figures. Second there needs to be a mechanism for rogue countries that refuse to participate. The answer to both these difficulties is a border carbon tax on all exports from those countries that delight in trashing the planet. And the tax needs to be set high enough to compensate for the loss of revenue to the GCIF.

Finally we have to get away from unanimity. Five countries refused to sign up to the IPCC document on limiting global warming to 1.5C: Russia; Saudi Arabia; Kuwait; Australia and the US under Trump. Mercifully the US is no longer under the malign influence of climate denying clown; at least not at the governmental level; so US support is no longer a problem. The other four all have a significant vested interest in promoting the sale and distribution of fossil fuels. If they won't cooperate then they need to become international pariahs and told in no uncertain terms that they are forfeiting the future of the planet for profit.

At COP26, resolutions are supposed to be unanimous, which means that any one country can frustrate the will of the majority. This is a system that is designed to fail, and may well explain why the last 25 COP meetings have been Cop Outs. We need COP 26 to be a Cop In, but for that to happen we need to find a mechanism around the unanimity roadblock.

One way is to establish a Global Carbon Coalition (GCC) of the willing; which would have to include the four biggest emitters: China; US; EU; and India. India would be happy to cooperate as it will be receiving considerable funds from the other three. The

EU is already committed to a redistribution model, and China will probably cooperate as it will pay relatively little using a consumption-based system. That leaves the US, which claims to be taking climate change seriously.

So this is where the main diplomatic effort needs to be directed. And it needs to involve everyone: The UN, UNEP, the UK and Italy the co-host for COP 26. But it also needs to be promoted vigorously by the Prime Minister at international meetings such as the G7 and at the pre-COP 26 meeting in Bonn, both held in June. Furthermore we need everyone to get behind this idea: politicians, our civic leaders, scientific organisations including, for once, the Royal Society; the media including the most cynical of political journalists, and of course civil society itself, and particularly environmental groups such as XR, Greenpeace, WWF etc.

We even need the help of the WI, religious leaders and the Royal Family. Otherwise we will go quietly into that dark night and the glory that was human civilisation will be destroyed forever.

Summary

The Global Carbon Incentive Fund is a neat solution to climate change as it incorporates two key elements: punishment of the profligate and financial incentives for developing nations to maintain their low-emitting status. The IPCC have recommended that emissions globally need to reduce by 7.7% per annum between now and 2030 in order to limit global warming to 1.5C. Thanks to Covid the first year of the decade is roughly on target: but going forward this will require a reduction 70% over 9 years, or 50% if compounded.

Let us put to one side for the moment the fact that keeping below 1.5C is impossible, and that for all GHGs, a balance between sources and sinks needs to be achieved by 2036 just to prevent a prolonged overshoot.

What is abundantly clear, is that if a strategy is not agreed at COP 26 this year, then the world will be on a course to irreversible climate change. Using consumption-based data should provide the key to unlocking the log-jam that has characterised previous climate change negotiations, and a carbon price that doubles every two year or three years until 2028 will convey the urgency of the measures that are necessary to gain control of the climate crisis.

So there's the solution. All we need now is the political will, and leaders with sufficient standing on the world stage to actually make this happen. Where I wonder would they all be hiding?

The author is the facilitator of the St George's Climate Consultations. He is Chair of Help Rescue the Planet (hrtp.co.uk) and organiser of the upcoming Mayday C4 events (maydayc4.com) in the run-up to COP 26. He was Scientific Advisor to the All Party Parliamentary Group on Air Pollution in the U.K. from 2017-2021, and is the former chair of CLEAR, the Campaign for Lead Free Air. He is the author of the *Gilgamesh Gene* (Shepherd-Walwyn 2017) and the updated version is now available to order (*The Gilgamesh Gene Revisited*).