

**Professor Gareth Wyn Jones**

**Talk delivered during Dyffryn Ogwen's Community Assembly on the Climate**

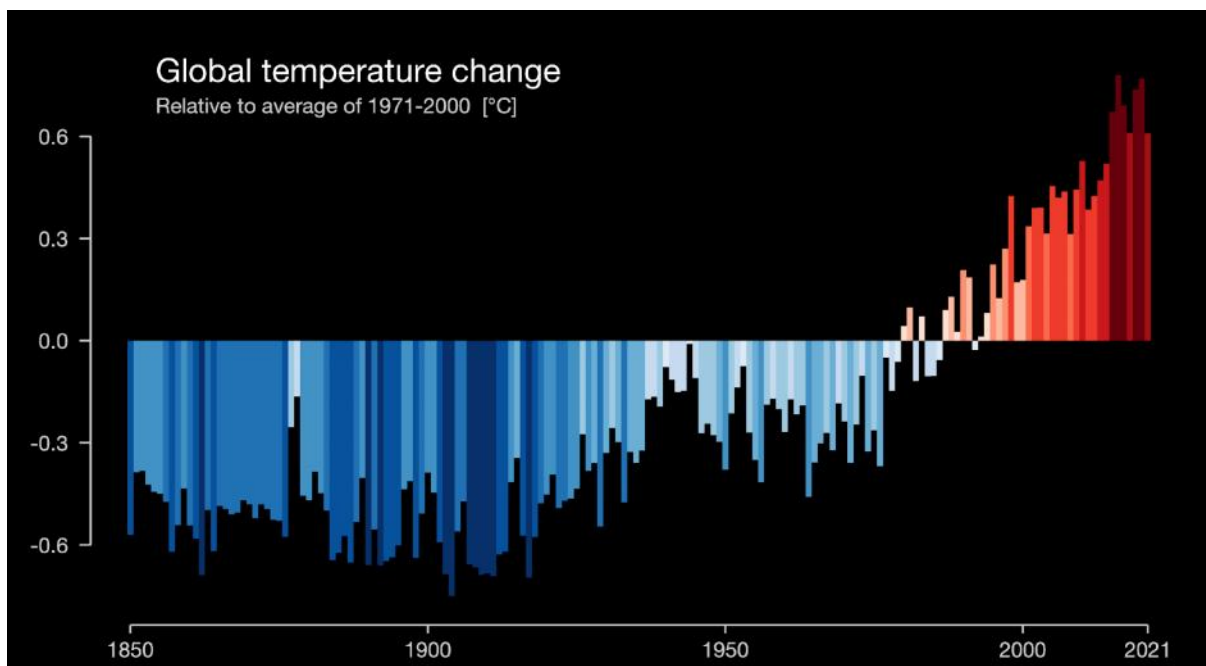
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Thank-you very much for the invitation.

When I look at the audience in front of me I doubt if you need anyone to give you any information at all; you are a very well informed audience and there are several of you who could give this talk just as well as me, but I will do my best!

What I hope to do today is to convince you of only two things, because I only have twenty minutes. The first thing is the **urgency** of the problem. I won't be able to go into all the scientific details about climate change as it would take three days to discuss the details. And we must recognise climate change influences all aspects of our lives, every second of the day: including our use of electronic tools like zoom. All our activities use energy and they all produce greenhouse gases [GHG]. Nevertheless drastic action is **urgent**.

I will then briefly discuss what we can do as individuals and to some extent what we can do in society.



Just in case some of you are unfamiliar with it, this famous graph is the work of Ed Hawkins from Reading University. It shows the very dramatic warming that we have experienced since the start of the Industrial Revolution. We can see the changes over this period very clearly and of course this is the background to all our concerns. The main reason for the warming is the increase in the level of carbon dioxide in the air and to some extent the other GHGs, especially methane and nitrous oxide. It is shocking to see how quickly the changes are taking place in the last few decades.

You have heard, I hope, about the IPCC - the International Panel on Climate Change. Last summer they published their 6<sup>th</sup> Report – and it contains a crucially important table. I have summarised the frightening data in the table below. Since carbon dioxide remains in the air for a long time, the additions we are making – what is known as the ‘anthropogenic carbon dioxide’, correspond to a specific increase in the temperature in the air above our planet.

So the greater the GHG emissions, the greater the increase in the average temperature. The scientific and political consensus is to try to avoid increasing the average world temperature by more than 1.5°C (degrees centigrade) if possible, and definitely no more than 2.0°C. We have already reached +1.2°C. It is possible, therefore, to work out how large is the ration of CO<sub>2</sub> emissions left to us before reaching +1.5°C or +2°C.

TABLE 1.

## Remaining Carbon Ration

### Dogn Carbon ar ôl

| Mean max. warming<br>target [from 1850 -1900] | Remaining CO <sub>2</sub> budget from<br>January 2020 (Gt)<br><i>(% likelihood of keeping temp. rise)</i> |      |            |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------|------|------------|
|                                               | 17%                                                                                                       | 50%  | 83%        |
| 1.5°C                                         | 900                                                                                                       | 500  | <b>300</b> |
| 2.0°C                                         | 2300                                                                                                      | 1300 | <b>900</b> |

IPCC data

Since the planetary system is so complex, we must approach the problem statistically – that is assessing the probability of reaching +1.5° or +2° degrees if we emit such and such amount of CO<sub>2</sub>. So we can see above the amounts for a low probability - 17%, or a medium probability - 50%, or a high probability - 83%. To be responsible we clearly need to aim at a high probability of avoiding disaster.

The evidence is quite clear; if we allow a rise of more than +1.5 or even worse +2 C, we are in danger of reaching tipping points, that is irreversible changes. Such as the ice melting on Greenland and/or the tundra starting to break up and releasing methane and/or the forests in the Amazon disappearing. as losing their capacity to be net carbon sinks.

So look hard at the rations that are available to keep the increase under 1.5° or 2° C with a good probability [83%]; only **300 and 900** gigatonnes. (By the way a gigatonne is the same as a billion tonnes)

To understand the significance of these rations and the urgency I have referred to, we need to know how much GHG, and CO<sub>2</sub> in particular we, as humanity, are emitting each year.

We emit about 36 to 37 gigatonnes of carbon dioxide a year from burning fuel to which we must add to that the carbon dioxide that comes from land use and deforestation. So our total CO<sub>2</sub> emissions are about 40 gigatonnes a year. If you consider all the greenhouse gases expressed as CO<sub>2</sub> equivalents, the figure is over 50 Gt. But I will focus on CO<sub>2</sub> only.

Compare the emissions of ~40Gt with the rations we have in the table - 300 and 900 Gt (with a good probability). Remember that the rations in the table were calculated starting from January 2020. So two years have already passed and we have used - despite Covid - about 80 gigatonnes of our rations already. Consequently the rations are down to **220 and 820 Gt**.

## CO<sub>2</sub> emissions and the time left

|                                           |               |
|-------------------------------------------|---------------|
| CO <sub>2</sub> emssions from fossil fuel | ~ 36 Gt       |
| from land and farming                     | ~ 4 Gt        |
| <b>Total [per annum]</b>                  | <b>~40 Gt</b> |

So, with a probability of 83% ->  $220/40 = >6$  years

(Complexity of methane +/- 200 Gt)

This means, if we are to avoid raising the temperature more than 1.5 or 2 C, we have very few years left – only some 4 or 5 years before reaching 1.5C if we emit CO<sub>2</sub> at the current rate. In about eight to ten years we will have emitted so much GHG that a rise of more than two degrees is almost inevitable.

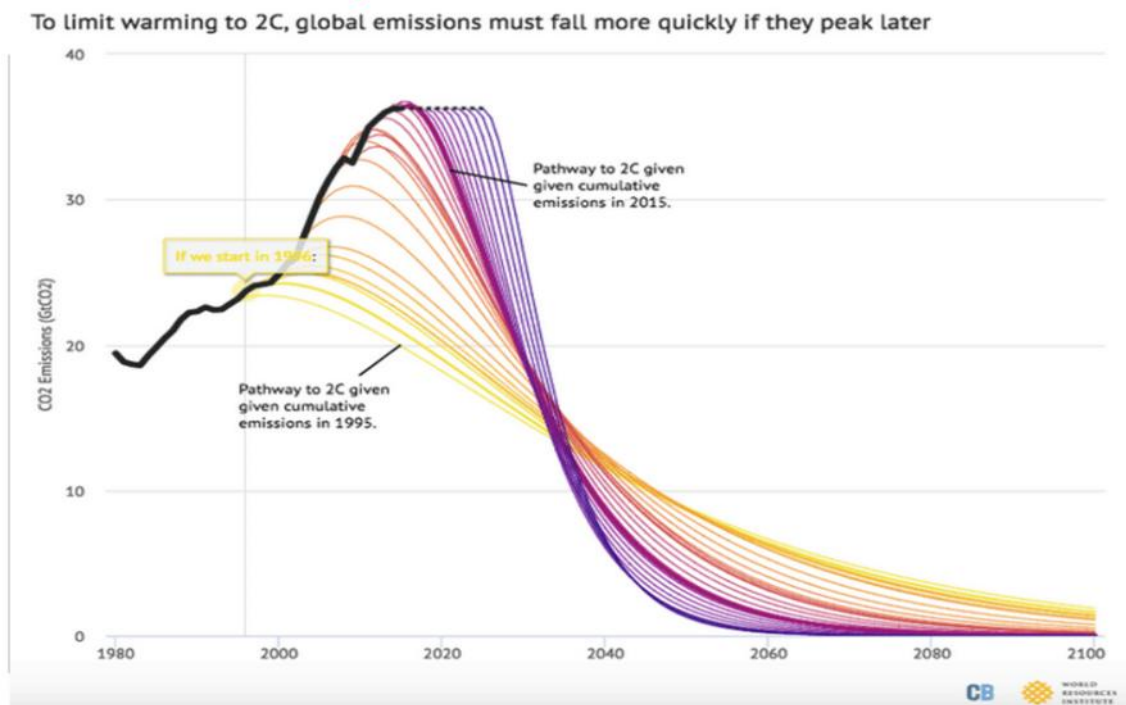
Remember, and this is extremely important, that all this talk about two degrees relates to the global average. The figures show that the increase over the oceans is less than that over the land – the continents. We have already nearly reached +1.5 C degrees over the continents. The increase at the Poles is very much more than in the tropics. So in the islands of northern Canada and places like Svalbard the increase is already over three degrees. Recently the temperature in Pakistan and India reached 50 degrees. Imagine going out to work in the fields if the temperature is 50 degrees outside. It is literally hellish!

So that's the background. It is terribly urgent that we cut out emissions of greenhouse gases; up to fifty per cent in these next few years.

Here is the slide that shows strikingly the crisis situation that we are in, considering CO<sub>2</sub> alone.

## Urgency, delay and steepness

### Brys, oedi a serthni



Unfortunately there is no time to discuss methane and agriculture and such things although there are farmers in the audience. The graph above shows clearly; the more we delay, the steeper the reduction in our emissions will have to be achieved and the less carbon dioxide that will be available for our children and their children to sustain their lives without suffering climate change and terrifying heating.

If we had started to respond at the end of the last century it would have been comparatively easy but we have been spouting hot air for decades! I have been talking about this since the 70s and no-one has taken much notice. But if we had started in the nineties (yellow lines) it would have been easier to make the necessary cuts. But since we have carried on business as usual and burning fossil fuels, we have used our rations and now there is almost nothing left.

I will now try to note one or two things about the situation we find ourselves in here in Wales.

First, there is a lot of talk about electricity and renewable electricity. And that's a good thing. But we must remember that electricity contributes less than 20%, (about 15% in Wales) to the total energy that we use in our lives. In Wales about half the electricity comes from renewable sources but the rest of our total energy (over 80%) comes from burning fossil fuel e.g. petrol for our cars and oil and gas to heat our houses and so on. So we must discuss not just electricity but all the energy that sustains our lives. Rather paradoxically, we must electrify the rest in order to reduce our carbon footprint. So we must produce much more renewable electricity, not just to meet the present demand for electricity but to meet the increasing future demands arising from the electrification of transport and indeed the whole economy!

And the second very uncomfortable thing to remember... the richer we are, on the whole, the greater our carbon footprint. I wrote in an article in the magazine *Barn*, if Africa were to halve their carbon emissions tomorrow – it wouldn't make much difference! They are not the problem. **We**, the rich countries of the world, are the problem. I know that we don't feel rich, **but our way of life is the problem**. This is crucial – it is us who have to reduce our carbon footprint.

In Wales our footprint is just over 10 tonnes a head and this will have to come down to less than one tonne a head within a decade. How on earth are we to do that? But those are the honest figures and the challenges. We are by no means the worst. The world average is around 6-7 tonnes a head – but Australia, for example, emits 20 tonnes a head. Thankfully, in the recent election, the women of Australia turned against the right-wing party that refused to admit the importance of climate change and they insisted that their country respond to it.

But, the final point, our economic system depends on consumerism – on buying and selling non-stop. That's why, to a great extent, governments are so reluctant to act. This, as well as the fact that the fossil fuel company lobby is so strong, accounts for the great procrastination. Governments don't know what to do to reconcile our desire for wealth and their desire for our votes, with the need to reduce our GHG emissions substantially and quickly.

So what can we do as individuals?

## What can be done

- Social and political activities?
- Change the Policies of Wales / Gwynedd / London?  
(drive more slowly: 70 -> 60 miles per hour)
  - Purchases? Beware of green wash
  - Reduce our personal carbon footprint?

As we can see and experience today, social activities are important in order to convince people and to maintain activism. Politically we must apply pressure to change Welsh

policies, in our Senedd, and at the Gwynedd Council level. (I don't have any hopes for London, while Mr Boris Johnson is Prime Minister.)

After that we must think about our personal activities – the things we buy, the way we behave, and try to reduce our personal and family carbon footprint.

In the table below I note some important elements!

## Components of our personal footprint

- Space heating: our houses, (schools, hospitals, workplaces)
- Travel (work and pleasure)
- Appliances: fridge / freezer / washing machine / computers and so on
- Food (red meat/milk/cheese ---) and Drink
- Clothes, furniture, curtains and so on
- Pet?
- Other.

As my time is almost over I can't discuss all the elements of our personal footprint. There is a lot of information available on the internet about how to work out your personal carbon footprint. One of the things I would strongly suggest to this group is to ensure that the information is also available in Welsh. What about GWYRDDnI producing a bespoke website?

To consider some elements briefly.

First how much energy do we use to heat, light, and cook etc. our houses? We must think about where the energy comes from. Usually from oil or gas or electricity? And, knowing how much fuel is used, work out how much CO<sub>2</sub> is emitted to achieve these tasks? Very often the amount of kWh used in a home is given on our bills. And knowing that, it is not difficult to estimate how much CO<sub>2</sub> is emitted.

## Heating/lighting/cooking

- How many kilowatt hours (kWh) are used to keep our home snug, to cook, to light, to use appliances
- Electricity, gas, oil, coal, firewood?
- How much CO<sub>2</sub>?

If electricity is used, here is a simple example of the sums.

## Electricity

- ~0.3 kg CO<sub>2</sub> are emitted for each kWh of electricity used  
If 2,000 kWh a year = 0.62t CO<sub>2</sub> a year for each 'household'.
- Options:
  1. **save** e.g. bulbs, induction hob etc.
  2. **buy** low-carbon, renewable electricity
  3. **instal PVs** --- (although there are no FiTs now)

So it's not too hard to work out our requirements for electricity or gas or oil nor, consequently, how much CO<sub>2</sub> is emitted. And then we must consider how to reduce this.

Another example is travel, which also makes a big contribution to our personal footprint. Roughly 30% of the energy we control goes on travel, either for work or pleasure. Travelling for work or shopping is important but what about an electric car [EV] or going by bus or walking or a car share. With fuel prices so high it is common sense to save on fuel!

A lot of travel is for pleasure – holidays, seeing friends etc. Think carefully about your carbon footprint and please don't fly or go to Dubai for your holidays. That makes a very large contribution to your carbon footprint (from 1 tonne up to 5 tonnes, depending on the journey); totally irresponsible in my opinion. Unfortunately many people feel that they are entitled to go on their holidays when and wherever they like. And this is very environmentally destructive.

All the things we buy, including our food, have a carbon footprint. Food is a big, abstruse, topic in its own right. On a global scale, the food chain is responsible for at least 30% of all greenhouse gas emissions. Partly, carbon dioxide but also methane and nitrous oxide. Still, as I showed at the start of the talk, we have to make huge reduction in all our emissions – to less than one tonne a head in just over a decade but we also have to feed all the people in our world. This is completely fundamental and grievous problem but not one I can address today.

The events in Ukraine show how hard it is already to feed the world with Russia threatening the wheat exports. But climate change is already making the situation even more insecure! I received an email about a fortnight ago from a friend in Faisalabad in Pakistan saying that the yield of wheat in Pakistan had fallen by 30% because of the heat-wave in this spring. The situation is critical and I fear that there will be serious problems in the next few months – partly because of war and partly because of climate change.

Let us remember everything that we do adds to our footprint and so I would ask everyone to work out how much energy they use individually and seriously consider how to reduce it.

I am going to close by saying two things – I would be very happy if this group were to consider what can be done personally and socially and also how they can put pressure on the Welsh Government.

For example I strongly recommend that Wales, as a sign that of our seriousness, legislates to reduce the speed limit on our motorways from 70 to 60 miles per hour and on every other road in Wales to 50 miles per hour. That in itself would save fuel, reduce our cost of living and reduce our carbon foot-print as a nation and show that we are serious. And nobody would be worse off! No-brainer in my opinion!

Secondly, one of the big failures in my life was the Snowdonia Green Key Project. When I was with the Countryside Council the Snowdonia Green Key scheme was discussed so that the transport in the Park was much more green and our visitors offered a better experience – while – very importantly – ensuring that villages around the Park benefitted from these visitors. That is, that the whole system was more sustainable, environmentally, socially and economically. Think again about the plan and the relationships between the Park, the people and the transport. It's great that people come to the mountains, it's great that they enjoy themselves but why does everyone have to drive here? And why don't local people get much benefit?

Thank-you for listening.