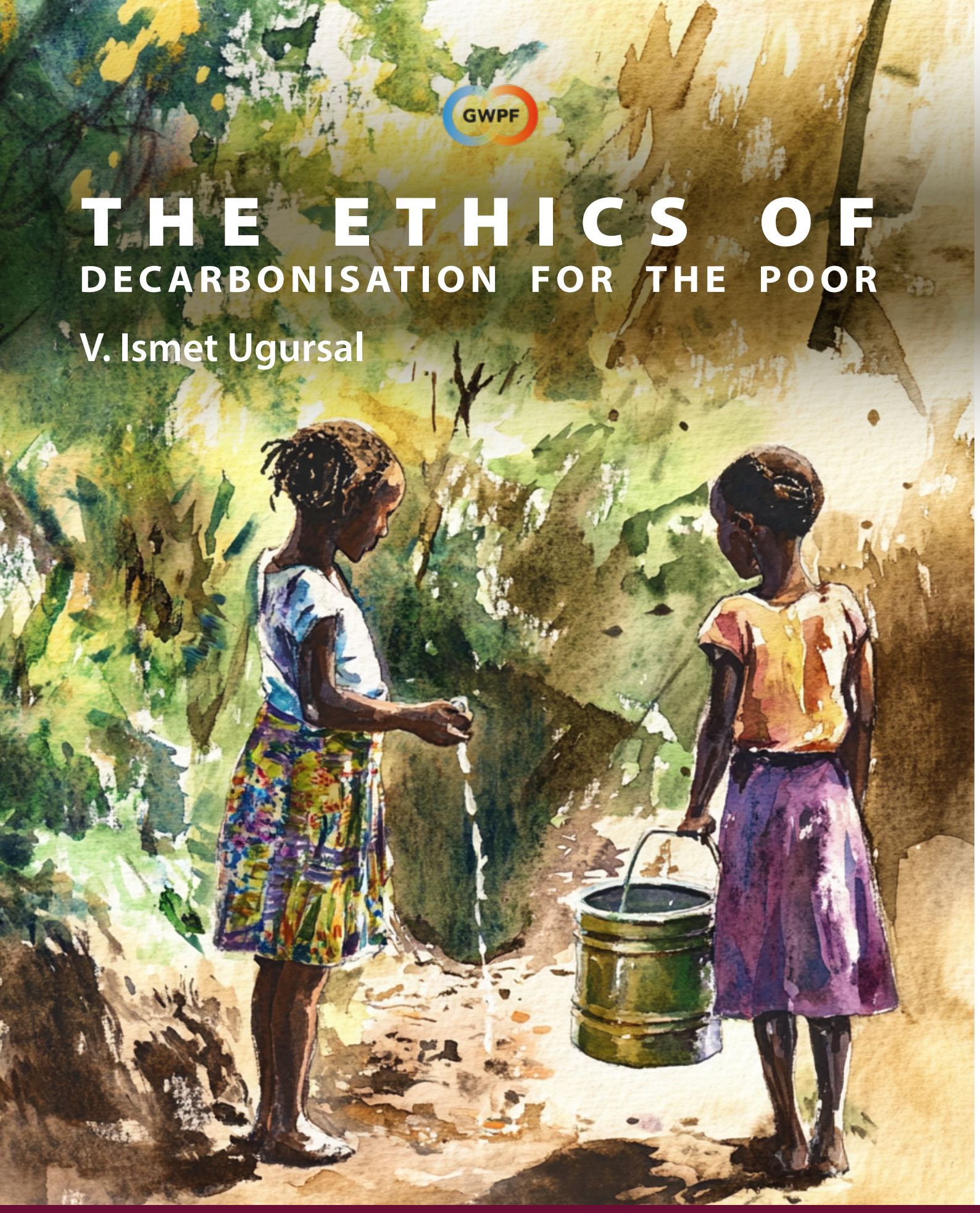

THE ETHICS OF DECARBONISATION FOR THE POOR

V. Ismet Ugursal

The Global Warming Policy Foundation
Briefing 72

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Executive summary

Using a comparative and critical analysis of economic and developmental data, this paper evaluates the potential consequences of the pressure exerted on developing countries to reduce greenhouse gas emissions. The analysis is extended to the low-income segments of the society in developed countries. The analysis shows that:

- There is no justification for forcing developing countries to make billions of their poor suffer still further in pursuit of the questionable rhetoric of saving the planet for future generations.
- The poor in the developed world also need access to more and cheaper energy to improve their standard of living.

At this point in technological advancement, the only light at the end of the tunnel seems to be increased utilisation of nuclear energy.

1. Introduction

Climate change, presumed to be unprecedented in the 4.5-billion-year history of the Earth and due primarily to the combustion of hydrocarbon fuels, is said to present us with a danger of an apocalyptic disaster, global societal collapse and human extinction. As a result, middle- and low-income developing countries are forcefully encouraged to reduce their greenhouse gas emissions, switch to renewable energy sources and to achieve net-zero energy economies. Pressure is exerted through numerous mechanisms, including trade barriers, which directly affect the already struggling populations and economies of these countries.

This paper does not discuss the nature and magnitude of climate change, or its possible causes, potential consequences and remedies; the scientific literature on both sides of the arguments is abundant and comprehensive. The focus of this paper is less contentious, but more immediate. It explores the relationships between energy consumption, greenhouse gas emissions and the state of the population and the economy from the perspective of developing countries, and also the low-income and middle-income segments of society in developed countries, who are vulnerable in similar ways to people in developing countries.

If you cannot understand why someone did something,
look at the consequences – and infer the motivation.

Carl G. Jung

2. Proposed and legislated climate actions and costs

Influential international organisations frequently declare that intensifying climate impacts require that anthropogenic greenhouse gas emissions must be reduced rapidly to keep global warming within acceptable limits.[1,2] For example, the International Energy Agency (IEA) advocates for a complete transformation of how energy is produced, transported, and consumed. This, they say, will reduce emissions to net-zero by 2050, and limit the increase in average global temperatures to 1.5°C above preindustrial levels.[1] They propose to deliver this through an unprecedentedly rapid clean technology push to 2030 – installing the equivalent of the world's current largest solar park roughly every day and increasing electric vehicle sales from around 5% of global car sales to more than 60% by 2030, as well as widespread use of technologies that are not on the market yet.[1] To achieve the global transformation from a 'heavily fossil fuel- and unsustainable land use-dependent economy' to a 'low-carbon economy' is expected to require investment of at least US$4–6 trillion per year, which is 20–28% in terms of the additional annual resources to be allocated.[2]

The Intergovernmental Panel on Climate Change (IPCC), meanwhile, suggests that global mitigation investments need to increase by a factor of three to six, and even more for developing countries.[2]

These and similar cost estimates are highly conservative and neglectful of the realities of a complete transition of the energy supply to renewables. For example, over the last decade, nearly all solar photovoltaic cell production has shifted to China.[3] The equivalent figure for wind turbines is 70% and rising.[4] Thus the entire world is now almost wholly dependent on a single country for all its solar and wind generation equipment. During the first oil crisis in 1973, the world came to understand the costs, albeit on a much smaller scale,* of dependency on a single foreign source. That lesson – of the need to diversify supply – has been repeated several times since, most recently at the start of the Ukraine war, when European countries, notably Germany, discovered that relying on Russian gas alone was a great mistake.

Now, apparently ignoring the lessons of the recent past, the same mistake is being made on a larger scale. The intention seems to be to increase this dependency further to 'completely decarbonise' the energy supply.

Notwithstanding the single-source problem, the cost of supplying all energy (or nearly so) in the form of electricity produced from solar and wind resources is prohibitively high due to the intermittent nature of solar and wind energy, which necessitates the deployment of large-scale storage to cover periods with low sun or wind. Consequently, estimates of the cost of electricity in a system with high renewables penetration must account for the cost of storage and other system costs. In a recent study, the levelised full system cost of electricity (LFSCOE) for five dispatchable technologies – biomass, ultra-supercritical coal, natural gas combined cycle, combustion turbine and nuclear – was compared with that of wind, utility scale solar photovoltaics and an optimal combination of wind and solar for two markets – Germany and Texas – and for 100% and 95% coverage.[5] The results indicate that the LFSCOE is much higher for wind and solar than for conventional and dispatchable fuels, because of the need for large quantities of storage; and even if storage costs drop by 90%, renewables are still not competitive on an LFSCOE basis. If 5% of the annual demand can be supplied by a very inexpensive dispatchable source of electricity, so that intermittent renewables supply only 95% of demand, the system costs will be halved, but will still be prohibitively expensive. This finding indicates that 100% emission-free approaches are not reasonable due to the enormous costs of supplying the last 5%.

On the legislative front, the EU announced the European Green Deal (EGD) in 2019. This envisions transforming Europe into the world's first 'climate-neutral' continent by 2050, reducing emissions by 2030 to at least 55% of 1990 levels.[6] One of the tools through which the EU hopes to impose its climate mitigation measures on non-EU countries is the Carbon Border Adjustment Mechanism (CBAM), which subjects certain carbon-intensive

* In 1973, OPEC member countries were supplying about 50% of the world's oil, and oil supplied about 50% of the world's energy demand.[8]

imports to the same carbon price imposed on internal producers under the EU Emissions Trading System.[7] The CBAM allows the EU to unilaterally impose a levy on such imports from countries that do not meet the environmental standards set by the EU. Debate on the negative spill-over effects of the CBAM for developing and least-developed countries has been intense.[9]

Such measures are being foisted upon developing countries and their peoples without attention to social or economic justice. Vulnerable populations are disproportionately affected by such a swift and deep transition to renewables and/or net zero emissions. They are much less able to cope with the increased cost of energy to achieve compliance and accompanying job losses in traditional industries. As discussed in the next section, these actions will certainly lead to halting and reversing the economic progress of developing countries.

3. Energy consumption, wealth and human development

Poverty deprives millions of the basic necessities of life and keeps them from decent lives, prevents them raising healthy children, condemns them to permanent dependence, subjugation and humiliation, and destroys hope.

Today, more than 250 years after the Industrial Revolution, almost half of the entire human population lives on less than US$6.85/day, a quarter survives on US$3.65, and one in every eleven has less than US$2.15 (all figures in 2017 PPP†).[10] To reduce and eventually eradicate poverty, the poor require better incomes, and access to more and better food, water, clothing and shelter.

Income is related to production. Figure 1 shows gross domestic product (GDP)‡ and gross national income (GNI)§ by country. Nations with high income also produce more, both in absolute terms (Figure 1a) and on a per-capita basis (Figure 1b). Therefore, to increase the income of people in poor countries, the domestic product of these countries must also increase.

Production requires work, and work requires

† Purchasing power parity (PPP) is a currency conversion rate used to equalise the purchasing power of different currencies by eliminating the differences in price levels between countries through a 'basket of goods' approach.
‡ Gross domestic product (GDP) is the total value of goods produced and services provided in a country in one year.
§ Gross national income (GNI) is the total amount of money earned by the people and businesses of a country in one year.

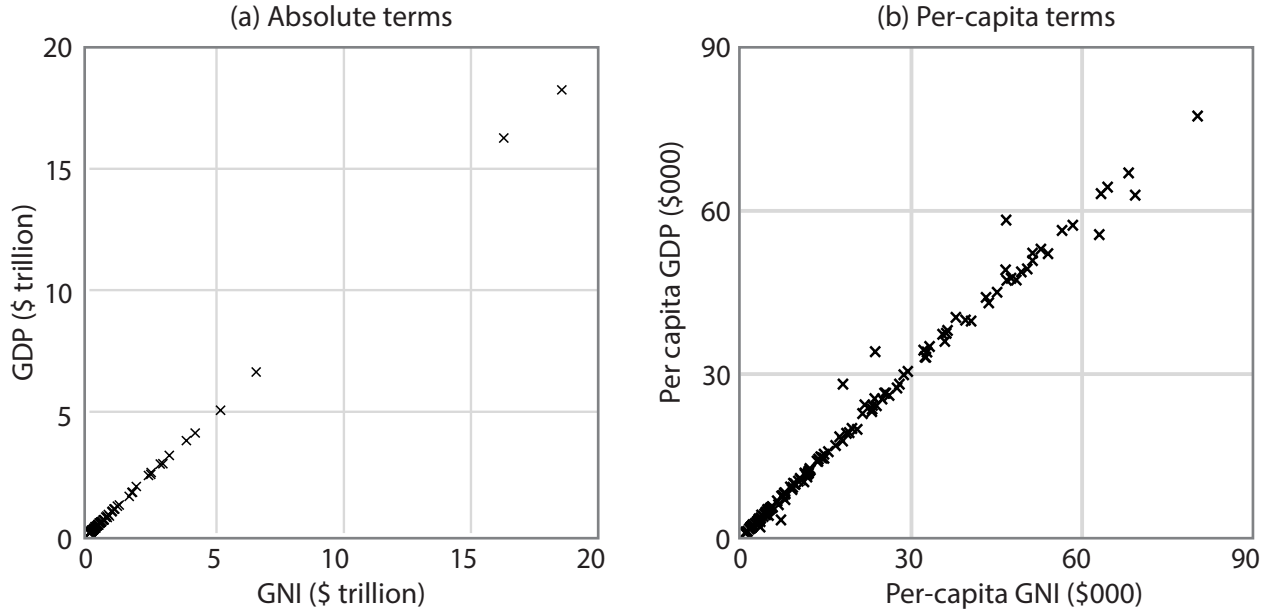

Figure 1: The relationship between income and production

(a) GDP versus GNI and (b) Per-capita GDP versus per-capita GNI. All figures for 2014, at PPP in constant 2017 US dollars. Source: World Bank.[12]

energy. Figure 2 plots GDP and energy consumption by country. Nations that produce more, use more energy, both in absolute terms as well as on a per-capita basis. Increasing production in poor countries therefore involves greater energy use. The relationship between energy consumption and poverty is a manifestation of the laws of nature. Energy is required to do work, work is required

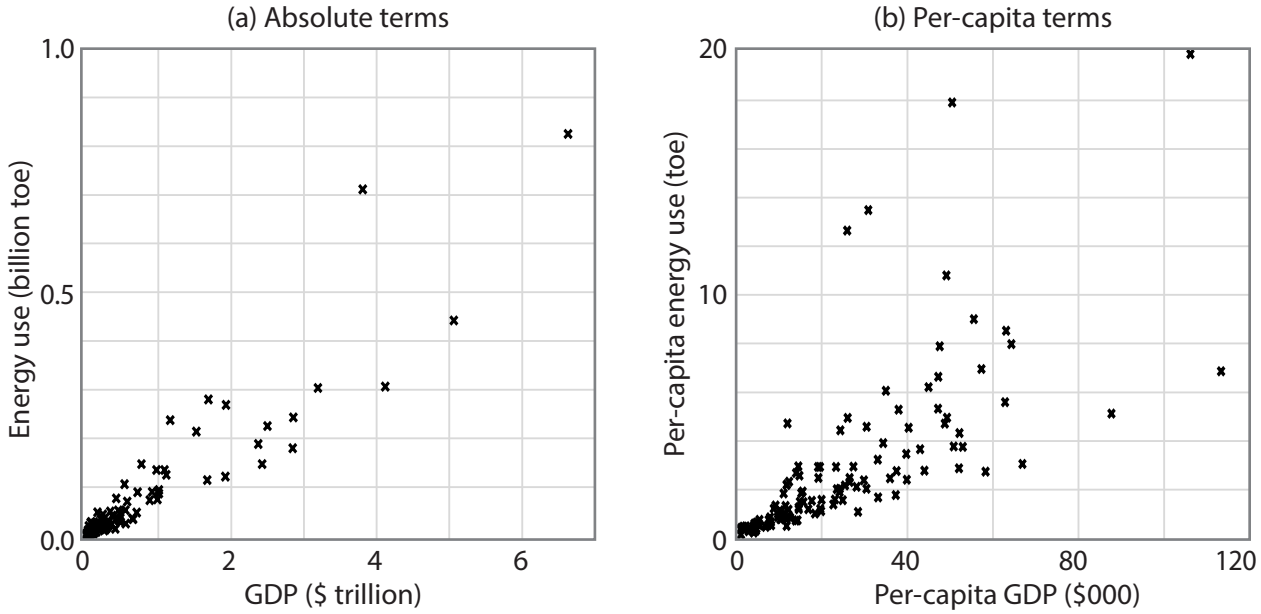

Figure 2: The relationship between energy use and production

(a) Energy use versus GDP (b) Per-capita energy use versus per-capita GDP. All figures for 2014. GDP at PPP in constant 2017 US dollars. Energy use in tonnes of oil equivalent (toe). Source: World Bank.[12]

to produce goods, production of goods brings income, and income brings better lives. These relationships are based on the laws of nature, and low energy consumption therefore necessarily brings poverty, while higher energy consumption brings better standards of living. Figure 3 shows the laws of nature have not changed over time.A commonly accepted definition of human development – it is difficult to define, and harder to quantify – rolls measures of health, education

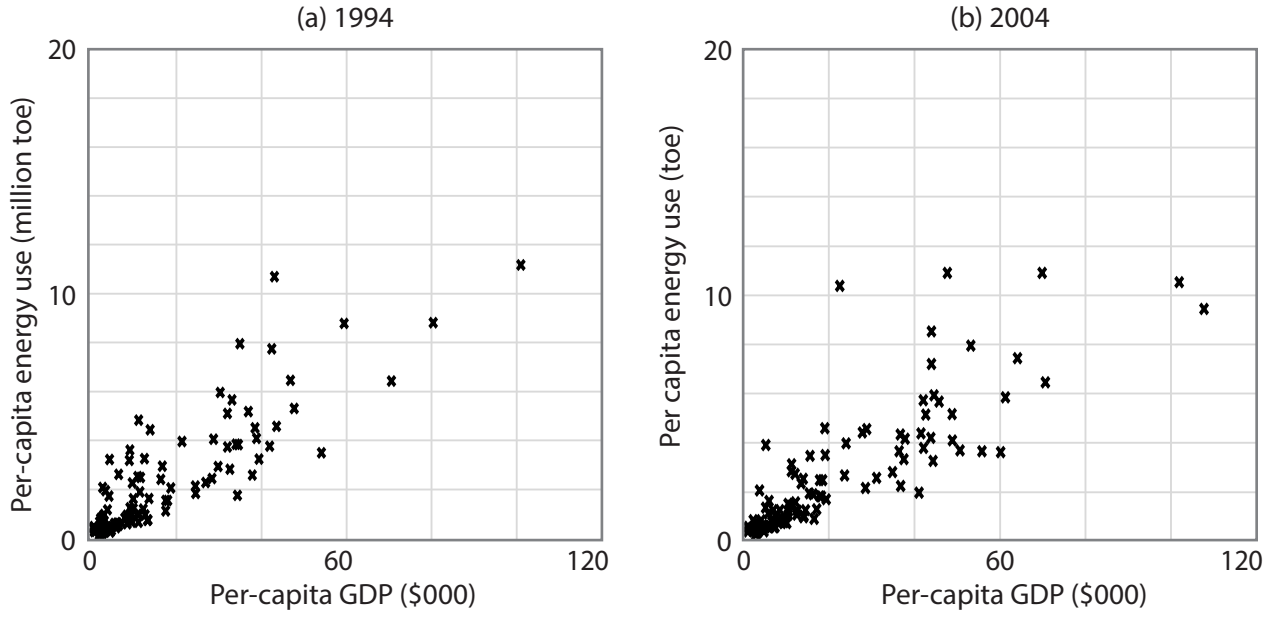

Figure 3: The relationship between production and energy over time: 1994 versus 2004.

Details as per Figure 2.

and standard of living into the so-called 'Human Development Index' (HDI). The HDI of countries as published by the UN Development Program (UNDP)[11] is based on life expectancy at birth (as a proxy for health), average years of secondary schooling (as a proxy for education) and income per capita (as a proxy for standard of living).

The relationship between energy consumption and human development is shown in Figure 4, where the annual per-capita energy consumption of countries is plotted against their HDI for 1990 and 2010 (the last year for which both datasets exist).

As might be expected, countries with high HDI have high energy consumption, while nations with low energy consumption have low HDI.

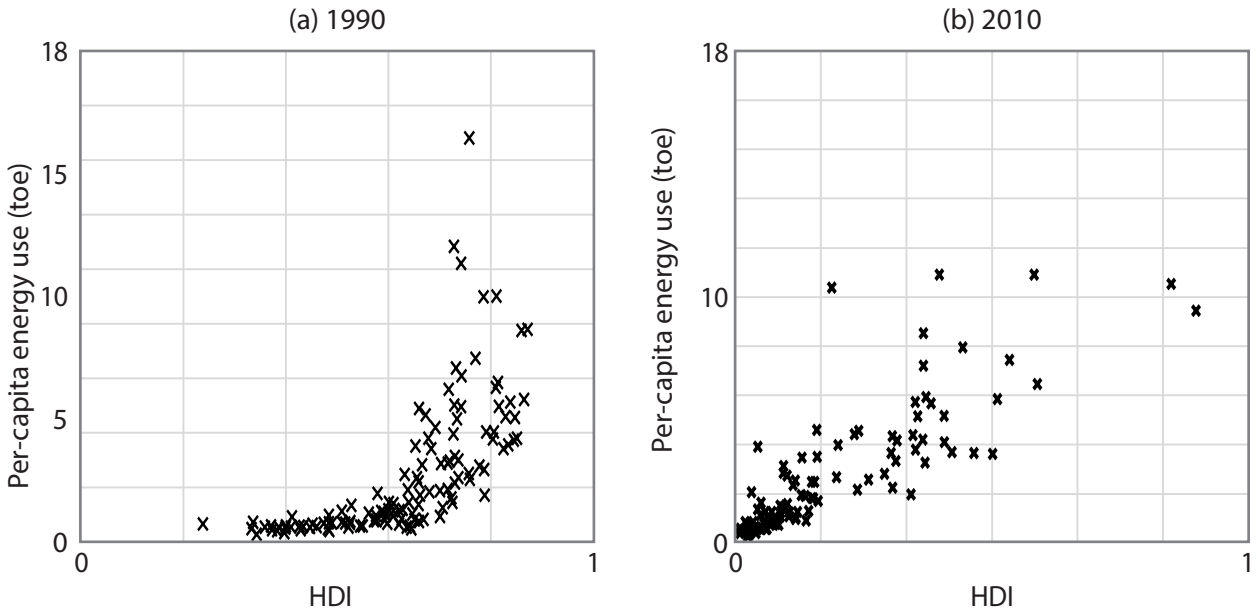

Figure 4: The relationship between HDI and per-capita energy consumption: 1990 vs 2010.

Sources: UNDP and World Bank.[11,12]

This conclusion is supported by the findings of Banerjee, Mishra and Maruta,[13] who studied the effect of energy poverty (lack of access to and usage of electricity and other types of energy) on health and education outcomes for 50 developing countries in the period 1990–2017. Their results show that 'higher energy development leads to higher life expectancy rates, lower infant mortality rates, a higher progression from primary to secondary schooling and higher average years of schooling', and 'access to electricity has a higher and significant positive effect on development outcomes than energy use'.

Figure 5 plots national total and per-capita energy use against carbon dioxide emissions; energy consumption comes with such emissions because the vast majority of fuels used to produce end-use energy have been, and still are, hydrocarbons, as shown in Figure 6.

The evolution of per capita GDP, per capita energy consumption and per capita CO_2 emissions

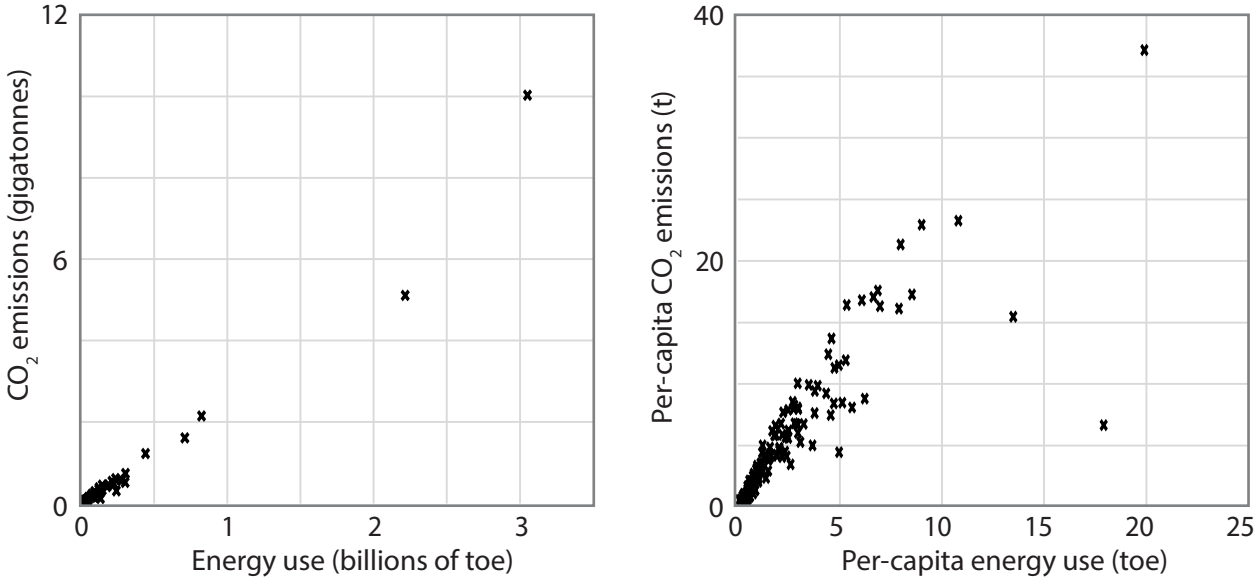

Figure 5: The relationship between energy use and emissions

(a) in absolute and (b) in per-capita terms. 2014 data. Source: World Bank.[12]

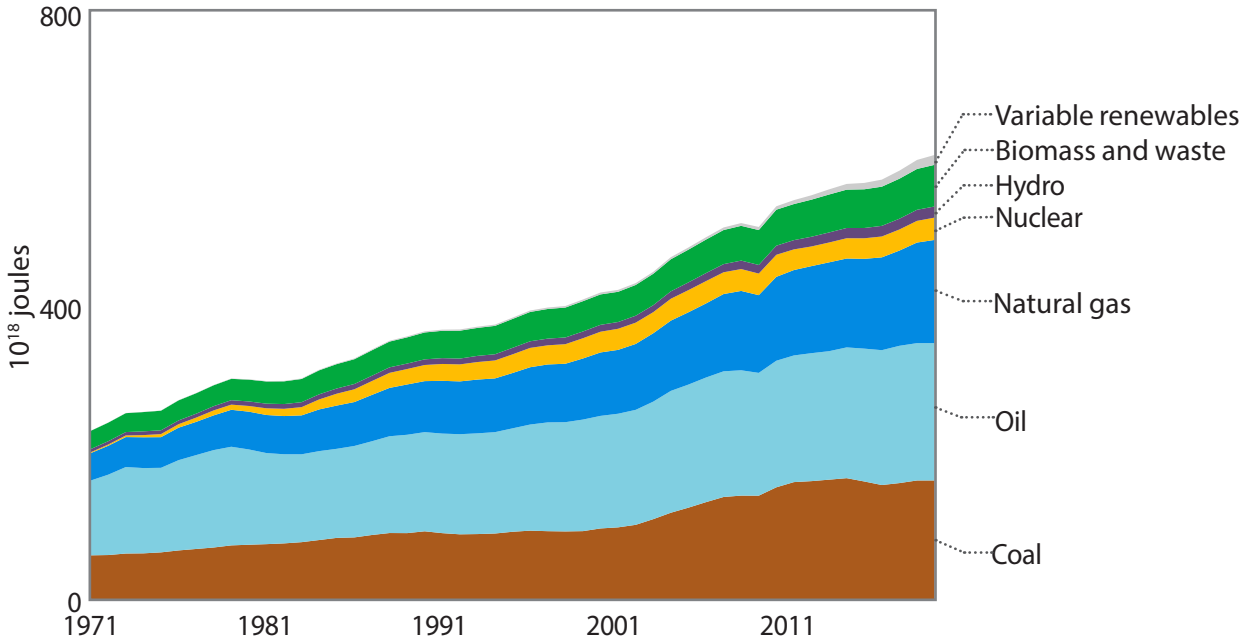

Figure 6: World energy supply by source, 1971–2019

Source: IEA.[14]

for selected developed and developing countries are shown in Figure 7. To avoid extremes, the EU average and Belgium, France, Germany and Italy represent the developed world, while Bangladesh, Nigeria, India, Indonesia and Pakistan – close to 30% of the world's population – represent developing countries.

Figure 7a shows the huge (as much as an order of magnitude), and growing difference in wealth between the developed and developing countries. Figures 7b and 7c show similarly large, but recently reducing, differences in per-capita energy consumption and per-capita CO_2 emissions, driven by decreases in developed countries. These changes can be explained as follows. Firstly, developed countries have mature infrastructure.

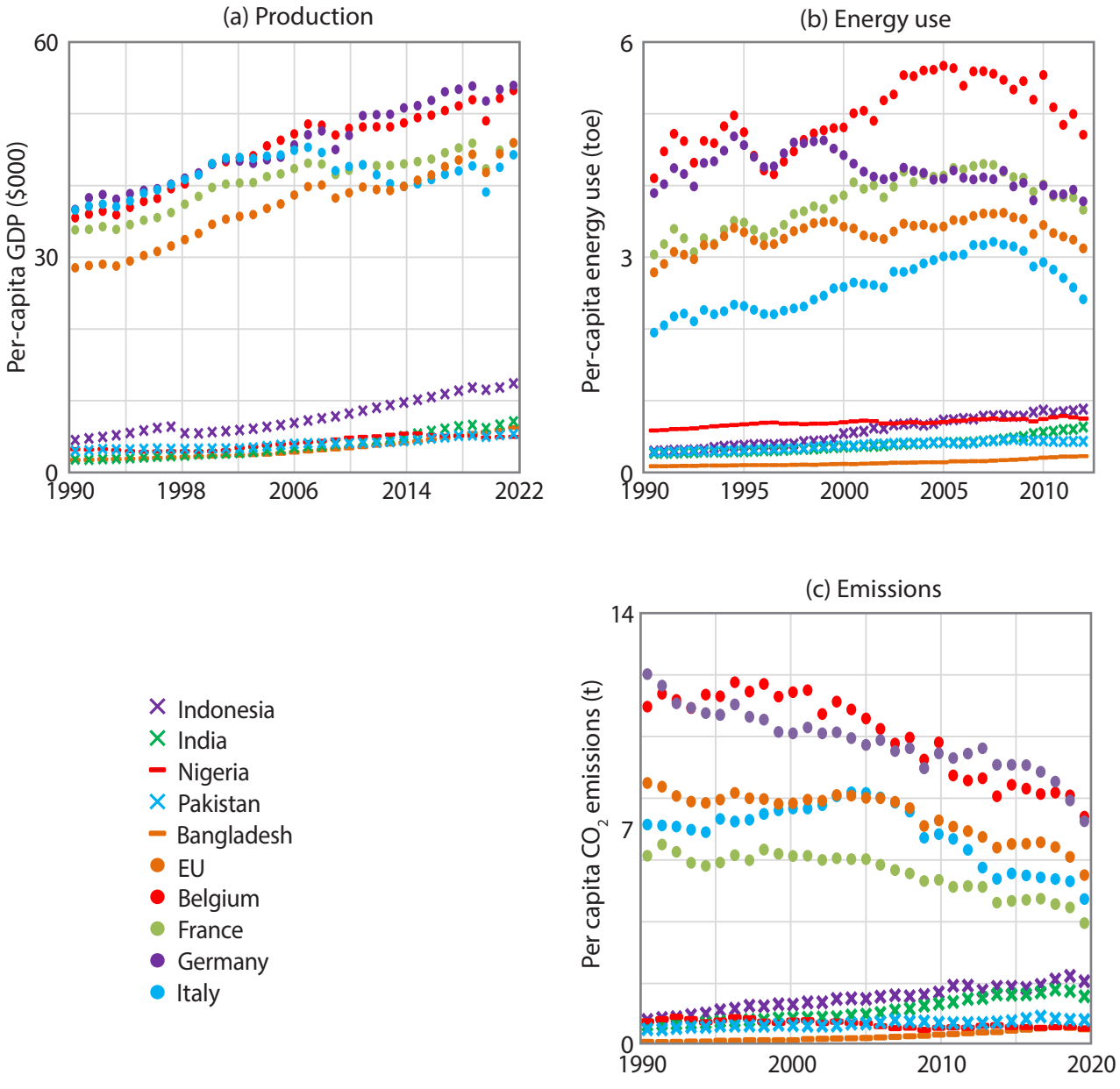

Figure 7: The relationship between production, energy use and emissions over time

Per-capita figures for (a) GDP (b) energy use and (c) emissions. GDP in 2017 prices at PPP. Source: World Bank.[12]

Transport networks, buildings, industrial and agricultural facilities are well developed, with little need for new construction. As a result, the energy consumption and associated CO_2 emissions are only those needed for incremental improvements. For example, the Canadian government recently announced its decision to stop investing in new road infrastructure.[22]

Secondly, energy efficiency in developed countries has been high due to highly developed human capital and better technology. This is shown in Figure 8, where the energy consumption to produce $1,000 worth of GDP is plotted for developed and developing countries. Developed countries use less energy to produce the same amount of product, indicating that they use energy with higher efficiency.

Finally, developed countries have been offshoring energy-intensive industrial production to developing countries, thereby increasing

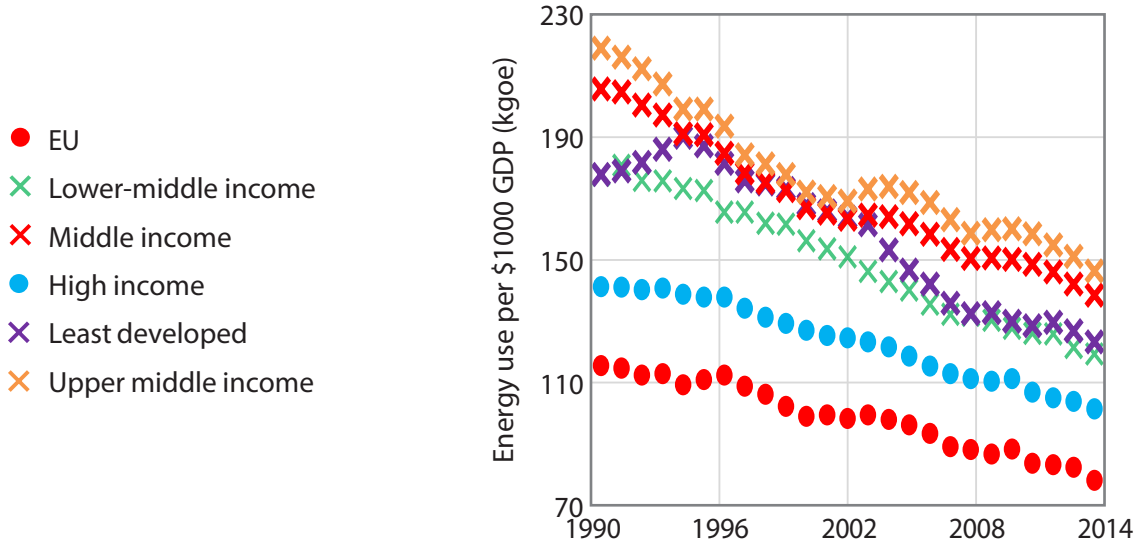

Figure 8: Evolution of energy use per $1000 GDP in developed and developing countries

GDP in 2017 prices at PPP. Source: World Bank.[12]

energy consumption and associated CO_2 emissions overseas while reducing them locally.[15–20] As stated in the IMF report *Data for a Greener World*:[21]

> Since the mid-2000s total emissions by advanced economies, both production- and consumption-based, have fallen, while for emerging market and developing economies they have increased. For the advanced economies, this reflects the efforts being made in many of these countries to reduce total emissions. For emerging market and developing economies, the increases are a consequence of economic development; that is, on one hand emissions related to a significant increase in exports to meet demand in advanced economies, and on the other hand, the growth of these economies to meet basic needs and improve the quality of life of their population. However…advanced economies still have much higher per capita emissions than emerging market and developing economies.

The latter statement is supported by a graph, reproduced here as Figure 9.

The data in Figure 7 show that on a per-capita basis, the selected EU countries and the EU average have been substantially wealthier, consumed substantially more energy, and produced more CO_2 emissions throughout the period for which World Bank DataBank[12] provides data publicly. Incorporating other developed and developing countries into the analysis does not change the conclusions.

Cumulative differences in wealth, energy consumption, and CO_2 emissions for longer periods can be calculated for countries where there is long-term data. Figure 10 shows cumulative per

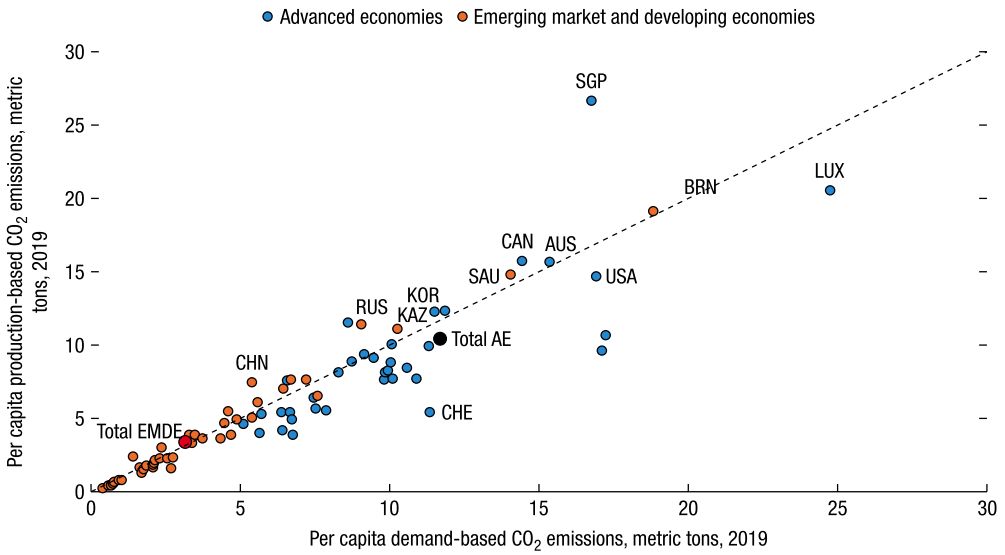

Figure 9: Per-capita production-based and demand-based CO_2 emissions from fuel

[Original legend] Sources: Organisation for Economic Co-operation and Development's TECO2 database, 2022 edition; and authors' estimates. Note: Economies above the diagonal line were net exporters of CO2; those below the diagonal line were net importers. Data labels in the figure use International Organization for Standardization (ISO) country codes. CO_2 = carbon dioxide.

capita CO_2 emissions over the past 55 years for ten nations. Even this limited dataset indicates that the difference in the accumulated per capita CO_2 emissions from wealthy countries (such as the USA, Germany and Japan) and developing countries (such as India and Indonesia) is very large.

From the discussion above, two conclusions can be drawn:

- to reduce and eradicate poverty and to improve human lives, developing countries must increase their energy consumption, and consequently, their CO_2 emissions
- to be able to increase energy consumption, developing countries need to have access to affordable energy.

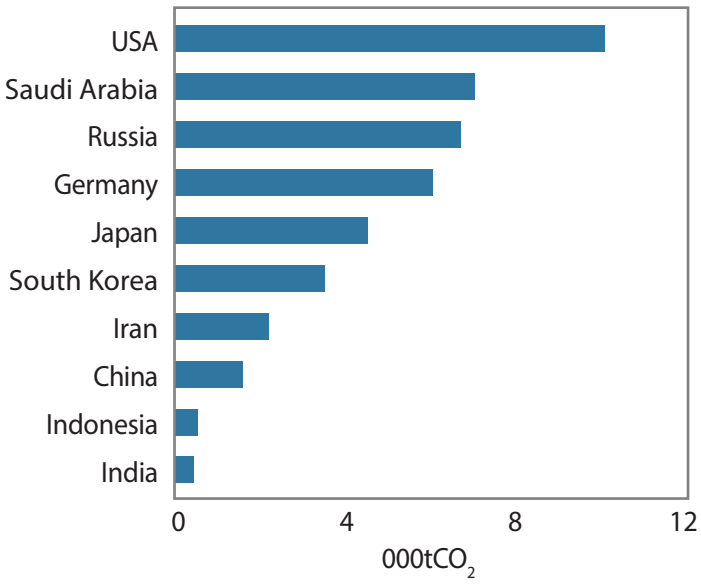

Figure 10: Cumulative CO_2 emissions per capita from 1965 to 2019

Source: Chen et al.[23]

Even with the current low prices of energy and electricity in developing countries, energy is unaffordable for many people. In Table 1, energy prices and energy affordability are shown for selected countries by comparing the cost of electricity, gasoline and diesel fuel to monthly income. Although energy prices are substantially lower in these nations, they are much less affordable to their populations. A swift and deep transition to renewables and/or net zero emissions will make energy even more unaffordable, thus halting and even reversing development.

Developed countries have been consuming inexpensive energy and emitting high levels of CO_2 for decades, acquiring in the process the wealth, high human development, mature infrastructure and energy efficiency they enjoy today. These countries go to almost any lengths to prevent upwards perturbations of energy prices. Recently, in reaction to spiking natural gas prices, they did not hesitate to turn to 'dirty' coal as soon as natural gas prices reached levels they considered unacceptable.[24–26] However, using weapons such as the CBAM, they are still prepared to punish poor developing countries for doing the same.

Table 1: Energy prices and affordability in selected countries

	Prices				Affordability		
	Electricity[1] US$/kWh	Petrol[2] US$/l	Diesel[3] US$/l	GNI per capita[4] US$	Electricity[5]	Petrol[6]	Diesel[7]
Belgium	0.416	1.74	1.90	53,890	4.6	1.5	1.7
France	0.257	1.94	1.92	45,290	3.4	2.1	2.0
Germany	0.399	1.90	1.89	54,030	4.4	1.7	1.7
Italy	0.431	1.99	1.95	38,200	6.8	2.5	2.5
Bangladesh	0.061	1.14	0.99	2,820	13.0	19.4	16.9
India	0.079	1.25	1.13	2,390	19.8	25.1	22.7
Indonesia	0.097	0.87	0.98	4,580	12.7	9.1	10.3
Nigeria	0.046	0.44	0.81	2,160	12.8	9.8	18.0
Pakistan	0.056	0.98	1.00	1,560	21.5	30.2	30.8

1. June 2023; 2. February 2024; 3. February 2024; 4. Atlas Method, current prices; 5. Cost of 500 kWh of electricity as percentage of monthly income; 6 and 7. Cost of filling a 40-liter fuel tank as percent of monthly income. Sources: GNI per World Bank[11]; prices per globalpetrolprices.com

Over the past decade, growth in per-capita GDP in some developed countries has become decoupled from the growth in per capita CO_2 emissions.[19,27–29] This has been attributed to various factors, including changes in energy and industrial structures reducing energy and carbon intensity that overwhelm the effects of increases in population, income and production.[23,28,30] As an example, the evolution of the value added by the manufacturing and services sectors in the UK is plotted in Figure 11 for the period 2004–2022. The data show the low and declining share of (energy intensive) manufacturing and the high and increasing share of (low-energy) services in the economy. This has undoubtedly contributed to the decoupling effect.

The possibility of a similar decoupling in developing countries, especially in the expanding economy of China, has been extensively studied.[19,30–32] The findings suggest that decoupling is unlikely in developing countries unless low carbon and energy intensity, and near complete decarbonisation of supply chains, is achieved. But this would destroy economies, further lower human development and increase poverty, as discussed above.

Some studies have argued that decoupling does not go far enough.[34–36] They suggest that to deliver complete decarbonisation of the energy

supply together with the associated objective of reduced resource use, degrowth (i.e. shrinking of the economy) is necessary. The problem with the concepts of decoupling and degrowth (and their less punitive-sounding euphemisms, 'beyond growth' and 'post-growth') is that they ignore poverty in the world. Poverty must be eradicated, and to do so increased energy consumption is a necessity, not an option. Sadly, this fact is denied – or perhaps not understood – by those who have never lived in poverty, day after day, year after year.

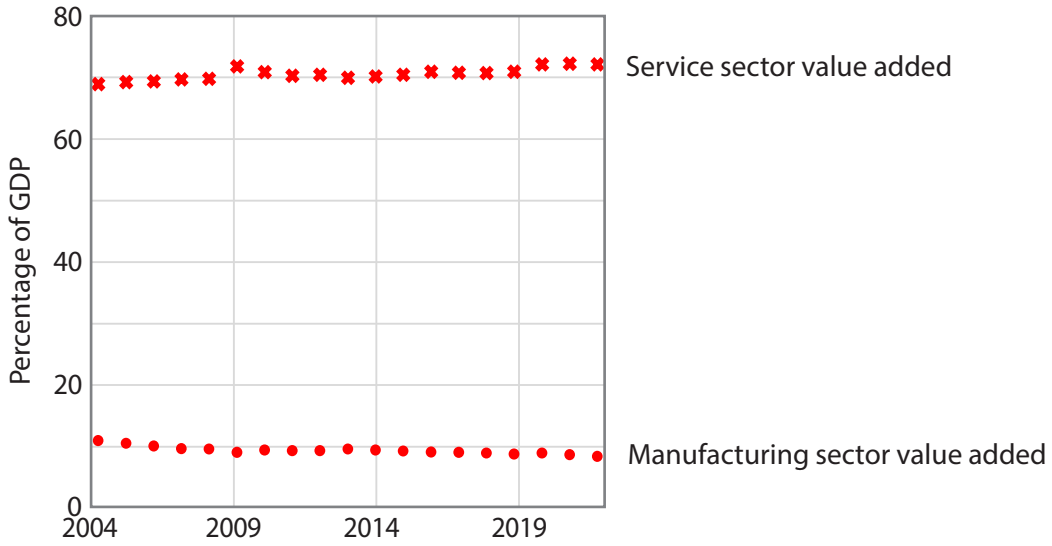

Figure 11: Value added by manufacturing and services sector in the UK, 2004–2022

Source: World Bank.[12]

4. Meanwhile, in developed countries…

While poverty is primarily a problem of developing countries, large percentages of the populations of developed countries are poor too. Economic inequality, in terms of both income and wealth, has steadily increased in high-income countries for four decades, and this increasing inequality manifests itself in increasing poverty¶. In addition to unjust societal structures, intergenerational immobility and reduced productivity, economic poverty leads to energy poverty, which brings cold and damp homes, reduced access to services that require energy.[37,38]

The extent of poverty, as well as energy poverty, in developed countries has become alarming: the population living below the poverty line** in Belgium is 7.8%, in France 8.5%, in Germany 11.6%, in Italy 12.8% and in the USA 18%.[39] The problems associated with the poor in developed countries are just as bad as in developing countries: one in five children in Canada are at risk of going to school hungry on any given day;[40] in the USA 44 million people live in food-insecure households;[41] over 41 million people in the EU (9.3% of the population) were unable to keep their home adequately warm in 2022, 65 million (almost 15%) lived in dwellings with leaks, damp or rot in 2020;[42] around 13% of households in England, 25% in Scotland, 14% in Wales, and 24% in Northern Ireland were fuel poor in 2022,[43] and the number of excess winter deaths in Great Britain caused by living in a cold, damp home climbed to 4,950 in 2022/23 winter despite relatively mild weather.[44]

The recent rapid increase in the production of electricity from solar and wind has led to regressive pricing structures for electricity in the EU,[45] which in turn have contributed to the

¶ Poverty referred to here is relative poverty, which is defined in reference to the median income of a country. In absolute terms poverty in developing countries is much larger in magnitude compared to the poverty in developed countries.

** The poverty line is taken as half the median household income of the total population of a country.

increase in energy poverty. The electricity pricing structure is regressive in that, on a per-kilowatt hour basis, electricity is more expensive for poor households than for wealthy ones. This is in part due to the way subsidies are granted for solar and wind generation, and the dominant fixed charges in renewable electricity pricing to recover high capital costs with low (often about 25%) capacity factors.[††,45,46]

The regressive nature of solar and wind pricing structures also presents itself in indirect ways. In many developed countries, governments provide grants and subsidies for household photovoltaic installations. Since poor households can rarely afford these, even when generous government grants are available, they cannot benefit, although perversely it is their taxes that pay for the programs.

5. Conclusion

Although poverty has been reduced by economic growth over the past century, in much of the developing world – and parts of the developed one – it remains a problem, both in terms of its depths and prevalence.

This paper has shown that to escape poverty, people need things; to obtain things, they need income, and to produce things and income, energy is required, since without it nothing can be made or moved. To produce more things for more people, more energy must be accessed, and to access more energy, it must be affordable.

Thus, to reduce and eradicate poverty, economic growth and increased energy use are necessary, not optional. None of this should be surprising; those who have even a rudimentary understanding of the laws of nature understand and recognise that these are indisputable facts.

The amount of energy needed to improve the wealth and quality of life of everyone to acceptable levels requires a lot of energy – about 40% more than is used today, even with a substantial increase in the average efficiency with which it is used.[47] It is empirically clear that renewable energies cannot deliver such an increased level of energy consumption at reasonable cost. They can meet only a small fraction of the energy demand now, and then only at a cost that is substantially higher, and increasingly so as energy storage has to be deployed alongside to compensate for intermittency.

Objectives such as net-zero energy, decarbonisation and degrowth are therefore not credible. They are misguided follies, which will be discarded sooner rather than later, as the harms they cause to everyone, but especially the very poor, become clear. We must abandon all forms of economic and political coercion in the name of 'fighting climate change', and the highly questionable rhetoric of 'saving the planet for future generations' at the expense of the billions of people who are suffering right now.

So, then, what needs to be done instead? Just as solar and wind are unsuited to meeting our energy needs, so too are hydrocarbons, which are much more valuable as chemical feedstocks. The answer to the question has been obvious for decades, but is widely denied and repudiated: nuclear energy. It is abundant, safe and inexpensive (if sensibly regulated), and in spite of the immense barriers to its use erected by foolish politicians, the technology is advancing. Moreover, if a fraction of the public money wasted on climate change and related 'research' was spent on nuclear power, those advances would have been even greater. However, notwithstanding the obstacles and closed minds, there are signs that the tide is turning. Recognising the potential role of nuclear energy in achieving substantial emissions reductions, 25 countries[‡‡] recently signed a declaration to triple nuclear energy capacity by 2050.[48] With the recent advances in nuclear

†† The cost of provision of electricity includes fixed costs to recover the capital cost of generation equipment (such as power stations, wind turbines, photovoltaic farms) and variable costs (such as maintenance, operating and fuel costs) to run the generation equipment. Since solar and wind generation equipment operate at a fraction of their installed capacities most of the time, their fixed costs are dominant in electricity pricing. Consequently, in renewable electricity pricing, the fewer kWh a household consumes, the more it pays per kWh.

‡‡ Armenia, Bulgaria, Canada, Croatia, Czech Republic, Finland, France, Ghana, Hungary, Jamaica, Japan, Republic of Korea, Moldova, Mongolia, Morocco, Netherlands, Poland, Romania, Slovakia, Slovenia, Sweden, Ukraine, United Arab Emirates, United Kingdom and United States.

energy technology and the reduction of political barriers, the future of affordable energy supply looks much more promising. Once the leap to affordable energy is made, people will no longer suffer from demeaning and repugnant ideas such as degrowth. Developed and developing countries need to focus on nuclear energy to satisfy the growing needs for energy to ensure higher human development and quality of life.

Personal statement

The author is personally and deeply concerned about the future of his grandchildren, his extended family, his recent students, and the world's youth in general, and hopes that they will collectively and successfully reform current climate policies and prevent the widespread human suffering that seems an inevitable consequence of the present agenda.

The author is grateful to Dr John Constable for encouraging him to write this paper, and to Andrew Montford for skilfully editing it.

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