REALISM OR UTOPIANISM?

A proposal for reform of Net Zero policy

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The Global Warming Policy Forum

GWPF

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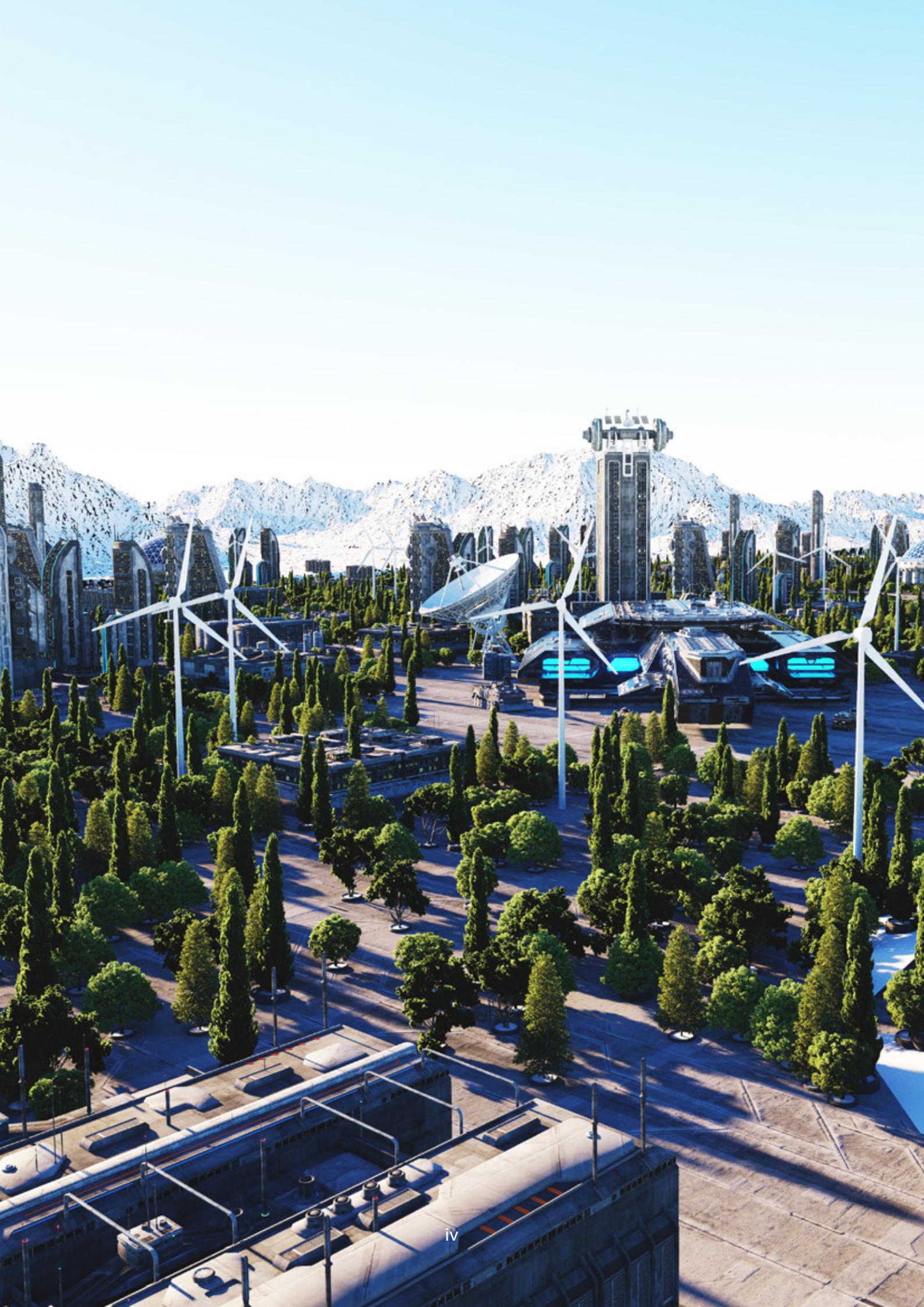

Summary

This paper calls for root and branch reform of the UK's Net Zero pathway to avoid intolerable cost and societal disruption. The alternative route proposed is a *Gas to Gas-Nuclear* programme.

As a matter of urgency, electricity generation policy must refocus on dispatchable low-emissions plant, which can deliver a secure and competitive electricity system as an enabler for the UK's manufacturing industries.

The resulting lower electricity prices will facilitate some limited electrification of domestic and commercial heating and mobility, with potential for longer-term decarbonisation in transport and heating to be investigated via a medium-term nuclear programme, including the generation of hydrogen from high temperature reactors via the thermal decomposition of water.

The action points for reform are:

- Remove market distortions and reduce consumer cost without delay, by buying back all subsidy contracts to renewables at a discount, compelling them to operate as pure merchant plant, and institute a rolling program for closure of the wind and solar fleets to reduce system operation costs.
- License rapid construction of high-efficiency combined cycle gas turbines, perhaps fitted with carbon capture and sequestration (CCS) if this proves economic. A variety of new approaches to gas turbines – for example Allam cycle turbines, may soon deliver zero-carbon electricity much less expensively.
- Use low-cost government debt to finance a new generation of nuclear plant, ideally of smaller scale than those currently envisaged.
- While reduced electricity costs will encourage adoption of heat pumps and electric vehicles where economic, the government should investigate the use of high-temperature nuclear reactors to generate hydrogen to provide an alternative option, seeking close co-operation with the Government of Japan, which is already steering in this direction.

Current UK policies will struggle to deliver Net Zero by 2050, or ever, and run a high risk of deep and irreversible societal damage. Because of the harms already inflicted, the programme outlined here cannot meet the government's timetable either, but it will reduce emissions rapidly and sustainably without destabilising British society, leaving the option for further emissions reductions as technological development makes this feasible and economically attractive. It therefore represents a realistic rather than a utopian decarbonisation model.

On the other hand, failure to reform along these lines will result in extreme costs, painful reductions in living standards for all but the richest, national weakness, societal instability and the eventual failure of the decarbonisation effort. The UK's hoped for climate leadership will become only a stern deterrent.

The UK's failing electricity sector

From 1920 to the year 2000, the UK electricity supply industry had a track-record of cutting emissions and prices as well as improving reliability, a record that was even maintained during the 1939–1945 war. This feat was achieved by increasing the thermal efficiency of generation, installing plant capable of removing specific pollutants (such as sulphur dioxide), and bringing nuclear power into the generation fleet. Despite the UK being an island grid, the incidence of major power cuts has been low, and comparable to that for the much larger and interconnected continental grids. For the most part, these developments emerged from the realm of multi-disciplinary engineering, free from policy interventions. Where policy did bear down, for example in the efforts to slow the adoption of natural gas as an electricity generation fuel, it tended to hinder emissions reductions and price cuts rather than encourage them.

However, since the year 2000 the UK's policy has been to accelerate the rate of reduction in carbon dioxide emissions, with a near-exclusive focus on the electricity generation sector. With increasing political, ideological and environmental inputs and little or no reference to sound engineering principles or economics, the UK's electricity supply industry has become much more expensive and significantly less resilient – as witness the nationally significant blackout of 9 August 2019 – yet it is delivering emissions cuts no faster than seen in the period prior to 2000.

These undesirable effects are the result of adopting thermodynamically incompetent generators such as wind turbines and solar panels, and (allegedly) low-emitting and extremely expensive fuels such as biomass. Subsidy costs to renewables are now running at about £11 billion per year. The cost of balancing the grid, at nearly £2 billion a year, has risen four-fold since the early 2000s and will rise still more sharply as batteries are built to provide ancillary services. Transmission network costs are rising as the result of onshore grid reinforcement and the construction of subsea cables, such as the Western and Eastern links, which are introduced exclusively to support the renewables sector.

Detailed professional criticism of this mistaken policy direction has been ignored, and as a result the situation is now becoming critical. To put it no more strongly: The present evolution of the electricity supply system is failing, with increasing risk of deep societal harm through low productivity, intolerably high electricity costs and extremely harmful interruptions of supply.

The details of the problem are set out in the following sections.

Grid security is at serious risk

All renewable generation apart from hydro and biomass is intermittent, with highly variable and uncontrollable production levels. In addition, in the event of faults, renewables are much more likely than traditional generators to trip off the grid entirely.

The grid is becoming less resilient

System inertia – which slows the impact of faults, making the grid more resilient – is already falling due to installation of renewables. The response time for frequency control plant has decreased by a factor of ten since the 1990s, a terrible indictment of system management. The amount of traditional generation on the grid is likely to halve by 2030, so this situation will become much worse.

Other than hydro power generation the only dispatchable renewable generation available is the burning of wood at stations such as Drax. This is dubiously low-carbon and is deeply unpopular in the United States, where the bulk of the fuel is obtained, because of manifest environmental damage.

Electricity storage is not a solution

It is claimed that intermittency can be addressed through electricity storage. There has been no statement of the storage capacity required, but modelling studies suggest that 1 terawatt hour will not suffice, even when interconnector import is added to the generation mix. Storage on this scale will be near-impossible to install.

Nor are interconnectors

There is an increasing dependency on interconnectors with serious implications for energy security because of:

- political exposure, now more obvious than ever with the recent French threats to Jersey
- large weather systems, such as a pan-European high, bringing low wind speeds across Northern Europe, from Scotland to Poland.

Nor are smart meters

The smart metering initiative is over-budget (now in excess of £15 billion or £555 per household per meter), has dubious information security, is compromised by out-of-date technology and incapable of interacting with any prospective IoT (Internet of Things). Smart metering is a paradigm for the Net Zero project and a catastrophe.

We lack raw materials for Net Zero

The installation of wind and solar generators, with battery storage to mitigate intermittency, requires the increased use of rare earths, nickel, silica, lithium, cobalt and possibly vanadium. As demand for renewable generation grows these materials will become strategically important, resulting in increasing international geopolitical competition. Scarcity will cause price increases, and the proposed Net Zero programme will become still more expensive and will stall.

The rapid deployment of battery powered electric cars will make further demands on rare earth materials, lithium and cobalt,

and the required rate of delivery will result in acute scarcity, calling into question the focus on battery powered EVs. Hydrogen propulsion is likely to be a superior alternative, combined with further improvements in the efficiency and cleanliness of the internal combustion engine, which has a proven track record of such improvements and known potential for further progress. Consideration should also be given to using LPG as a vehicle fuel.

Net zero technologies will be an environmental disaster

The increasing volume of decommissioned renewable generators and batteries will require disposal or recycling. New industries will be required to process, for example, eroded wind-turbine blades and worn generators, solar panels and rechargeable batteries. At present, most of these components are simply sent to landfill, or even burned. Reprocessing them will be energy-intensive, and thus expensive, further increasing systemic costs.

Increasing amounts of productive agricultural land are being diverted to renewable energy, mostly solar, generation. About 1,000 acres of farmland a month are now entering the planning system for solar development, with even DEFRA conceding that over 20% of farmland will be lost to renewables to meet Net Zero targets. With a growing population, such a reduction in farmland would leave the UK 50% import dependent for all foodstuffs within twenty years.

Renewables will become politically unsupportable

Renewables are driving the price of electricity steadily higher resulting in an increasing likelihood of defaults on domestic and smaller commercial bill payments. There is a high probability that the Net Zero project will more than double electricity prices again, with iniquitous social impacts, since policy costs are cruelly regressive. Manufacturing, including that of electricity generation plant of all kinds, is being shifted offshore.

And with a grid that may soon no longer be reliable. domestic and commercial consumers are being driven to buy back-up generation or batteries to mitigate threat of disruption, to improve frequency stability, or to protect against interference from smart-grid tariff impositions.

As the cost and other implications of renewables hit home, the programme will come to be seen. as a political error.

Renewables will prevent decarbonisation

Moreover, renewables may actually prevent long-term decarbonisation. The high price of electricity brings a reluctance among consumers to convert to heat pumps – the ratio of electricity to gas fuel prices is now higher than 3:1 and exceeds the likely maximum coefficient of performance for most heat pumps. The operating costs with therefore be more expensive than gas-fired boilers.

In addition, the increasing instability of the electricity grid may necessitate the elimination of nuclear power stations from the grid, thus eliminating the only reliable and scalable zero-carbon generation technology we have.

Remedial action

The dash for gas programme of 1990–2005 delivered cuts in carbon dioxide emissions at a faster rate than the present and cut the cost of electricity at the same time. Gas prices have remained low and are unlikely to increase if other countries continue with renewables.

The UK should therefore adopt a *Gas to Gas-Nuclear* programme, with gas-fired electricity and heating creating the economic growth needed to restart the nuclear sector; the electricity system for the foreseeable future should be a mix of modern combined cycle gas turbines (CCGT) and existing large and new small modular reactors (SMRs).

The CCGT initiative can make rapid progress by switching the elderly CCGT plants (46% efficiency) to modern 63% efficient models. No new generation sites, electrical connections, gas and cooling connections, or employee availability or skills are required. Roll-out can be rapid. No premature scrapping of plant is required – the CCGT fleet is at the correct point to accommodate these moves within a normal plant retirement programme. If additional CCGT generation is required, the retired coal plant sites can be used: all they lack will be a gas connection. Subsidised biomass burning at Drax and other smaller sites should cease as soon as possible and government should fast-track planning consents to rebuild high-efficiency gas generation (or nuclear) instead on the Drax site, which is excellent.

The gas initiative sketched here should include Allam Cycle turbines if they prove successful in production testing in the USA.

International supplies of natural gas are plentiful, but the UK should resume drilling for unconventional sources of natural gas to diversify sources of supply, subject to safety concerns being successfully addressed.

A revitalised nuclear programme should be started, underwritten by low-cost government debt. In addition to the Rolls Royce option, close contact should be sought with the Government of Japan, which has high-temperature reactor technology suitable for the thermal decomposition of water to produce hydrogen, as well as a long-standing commitment to this line of development. The United States has strong security as well as economic reasons for wishing to see a renaissance of its own nuclear industry, and joint initiatives on financing and technology should be investigated. This is geopolitically prudent as well as economically promising.

None of the positive programme outlined above can take place without the removal of market distortions and the extreme consumer costs imposed by the existing large, low-productivity fleets of wind and solar. This will only be possible through *force majeure* legislation compelling wind and solar to operate as pure merchant plant by buying back all subsidy contracts to renewables at a discount, giving immediate relief to consumers. This should be closely followed by the institution of a rolling program for the closure of the wind and solar fleets to reduce system operation costs, with the sites and grid connections being re-used where appropriate for SMRs or CCGTs.

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About the Global Warming Policy Forum

The Global Warming Policy Forum is the campaigning arm of the Global Warming Policy Foundation, an all-party and non-party think tank and a registered educational charity which, while open-minded on the contested science of global warming, is deeply concerned about the costs and other implications of many of the policies currently being advocated.

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