

A response to the Welsh Government's '*National Development Framework 2020-2040*'

The Free Range Network, November 2019



Contents:

<i>page</i>	
3	Summary
5	1. Legislative and evidential framework to support the 'National Development Framework'
6	2. Evidential failure to define limits to 'economic growth'
8	3. Transport, Technology and Resource Depletion
11	4. Decarbonisation and Energy
14	5. Food, Rural Areas, and 'One Planet Living'
15	6. Conclusions and Recommendations
16	Sources
5	Box 1: Section 5, Well-being of Future Generations (Wales) Act 2015
9	Box 2: Welsh share of global 'rare earth' resources
11	Box 3: Welsh carbon dioxide emissions by local authority, national estimates
12	Box 4: Welsh renewable energy production and other energy consumption by local authority
7	Figure 1. 'Extreme Carbon Inequality'
9	Figure 2. Example of REE extraction & processing
13	Figure 3: 'Carbon dioxide marginal cost abatement curve'

Report written by Paul Mobbs, Mobbs' Environmental Investigations and Research, for the Free Range Activism Network. Funded, and produced on behalf of The Greenhouse Environmental Fundraising Group.

For correspondence about this report please contact:

Tim Shaw,
Pantglas,
Hafod Bridge,
Llandwrda,
Carmarthenshire SA19 0BW.

© November 2019 Paul Mobbs/Free Range Network

This report is made available under the The Creative Commons Attribution Non-Commercial Share-Alike 4.0 Licence – <https://creativecommons.org/licenses/by-nc-sa/4.0/>



The front cover of this report pictures the Rhinogydd mountains, in the southern Snowdonia National Park, and in the foreground the outer edge of the Coed y Brenin Forest Park – which contains 200 million tonnes of copper, plus large amount of other metals as trace elements, which it would be necessary to mine within the next few decades in order to maintain the metal resources to support 'technological society'. Image courtesy of Wikimedia Commons.

Summary

The Greenhouse has commissioned and funded this study of the Welsh 'National Development Framework' (NDF) in order to test the validity of the proposed spatial development framework, and whether or not it can be considered to represent 'sustainable development' – as defined within Welsh law.

The Welsh Government are not 'free' to create a strategy that fits a particular political objective. There are key legal requirements placed upon the Welsh Government which they must fulfil when framing the content of that strategy. Failure to discharge that duty creates the possibility of a judicial review to test the law in this case.

In our view, the failure to quantify the effects of policy with regard to national environmental and climate baselines, or even create a baseline of impacts with reference to the state of the environment today, represents a clear failure of the duty upon ministers under section 5 of the *Well-being of Future Generations (Wales) Act 2015*.

Should this process continue unchanged, in our view local communities would be wise to seek a judicial review to test the applicability of 'sustainability', based upon the analysis of specific elements of the NDF policy highlighted in this report.

At various points the consultation alludes to the promotion of attainment of 'economic growth'. Whether that can be achieved within an objective definition of 'sustainability', and certainly within the requirements to significantly reduce carbon emissions to 'net zero', has not been demonstrated within the NDF.

Our query is whether that is a valid assumption, given the over-riding legal requirement to enact 'sustainable development'.

In an age of planetary boundaries and globalised trade, we must provide a measure of present-day impacts, and shift toward policies which bring that within 'planetary boundaries'. Under such an analysis, Wales is already consuming "more than its fair share".

The only current model within economic research which is able to address that within planetary boundaries is 'degrowth'. Consequently any future strategy must embrace the concept of 'degrowth', and map a national development

framework which creates patterns of development and resource use which institute such a transition.

Transport and mobility are a critical area within the strategy, and within that, the creation of a highly mobile population using more electrified methods of transport. Given the clear restrictions on the development of electric vehicles, which have been consistently ignored by the politicians for some years, there is a doubt as to whether the desire for mobility can be met without violating the 'sustainability' requirements placed upon the Welsh Government in law.

Within the NDF there is an unstated yet pervasive belief in 'technology' as the solution to the issue of 'sustainable development'. However, at no point is the evidence to substantiate that belief presented, or tested.

Today 'technological society' is thoroughly unsustainable because the resources it depends upon are in short supply and are not being recycled. Even seemingly common metals, such as copper – essential for modern electronics – are approaching the ecological limits of resource production.

We cannot accurately predict what the future will be, but we can say, based upon scientific principles, what is physically impossible.

Due to the reliance upon electric vehicles, the transport elements of the development framework are physically impossible, unless the Welsh Government publicly abandons its commitment to taking only its "fair share" of the world's resources. That is because implementing that strategy would demand an impossibly large share of the world's metal resources.

The only way it would be feasible would be – as shown already in relation to carbon emissions in figure 1 – if the top few percent of the world's population consumed the majority of the world's natural resources. That is not 'sustainable'.

The NDF does not quantify any aspect of energy and resource use with reference to present-day data, and then project forward the change required to deliver the strategy whilst maintaining the over-riding legal constraints of 'sustainable development' and achieving 'net zero carbon' by 2050. Arguably the legal duties upon the Welsh Government to decarbonise and deliver sustainable development are undeliverable within the period covered by the NDF.

If we fill-in the blanks with the latest energy and carbon statistics for Wales, we can very quickly see that the promises made in the energy and decarbonisation policies are meaningless and ineffectual. There is no rational way, based on current data, of demonstrating that NDF's strategy on energy or carbon will have any impact commensurate with the scale of action required over the time-scale remaining.

As stated previously, due to the limitations on the resources to produce digital and renewable energy technologies, the NDF is undeliverable unless the Welsh Government abandoned its commitment to only consume its "share" of resources – and engages in today's emerging geopolitical conflicts to secure them.

More generally, from covering moorland in wind turbines and solar PV, to district heating networks, the energy policies of the NDF fail to meet any qualitative test of sustainability – nor of the commitment to meet zero carbon by 2050. All policies relating to energy are, in our view, not lawful.

Due to its failure to quantify resource use, and the inherent faith of the strategy upon technology and innovation to deliver environmental goals without changing present-day economic goals, the strategy fails to secure the one key resource the people of Wales depend upon – 'food'. In contrast to the political vision offered, securing access to sustainable food and shelter using present-day resources must be the core of any future sustainable strategy.

The reality is that nothing in the NDF's policies will create any change from existing patterns of energy intensive agriculture, with their attendant high carbon footprint. Wales must look beyond the industrial food model in order to solve this. Luckily, Wales already has a framework for how this transformation can be driven in rural areas: The 'One Planet Living' model

There must be a new model for sustainable agriculture which respects 'planetary boundaries'. The NDF not only fails to provide this, but it seeks to perpetuate historic patterns of rural development which create the opposite outcomes. The NDF must lead with a new strategy to deliver opportunities for small-scale, low impact lifestyles in the countryside.

In conclusion:

The 'National Development Framework 2020-2040' report contains fundamental errors which render, in our view, the strategy chosen unlawful – because it violates the duty on the Welsh Government to implement 'sustainable development', and because the strategy cannot deliver the legally-binding requirements of the Climate Change Act 2008.

As a result, this report can have only two recommendations:

- ◆ To the Welsh Government, "try again" – and this time measure and model a quantified approach based upon the legal duty to implement sustainable development.
- ◆ To the network of local environmental and green activists who commissioned this report, "find a lawyer". Given the duties upon Welsh ministers, and their singular failure to discharge those duties in forming the the policies of the National Development Framework, should this document be enacted as policy this document represents a tremendous opportunity to test the limits of the law on sustainable development in Wales.

1. Legislative and evidential framework to support the 'National Development Framework 2020-2040'

The Welsh Government are not 'free' to create a strategy that fits a particular political objective. There are legal duties placed upon the Welsh Government which they must fulfil when framing the content of that strategy. Failure to discharge that duty creates the possibility of a judicial review to test the applicable law in this case.

Wales has one of the most progressive legislative frameworks in the world. It creates a duty, in section 79, *Government of Wales Act 2006*, that:

The Welsh Ministers must, in the exercise of their functions, make appropriate arrangements to promote sustainable development.

The duty of 'sustainable development' is defined within *Part II* of the *Well-being of Future Generations (Wales) Act 2015*. Section 2 of that Act notes,

In this Act, "sustainable development" means the process of improving the economic, social, environmental and cultural well-being of Wales by taking action, in accordance with the sustainable development principle (see section 5), aimed at achieving the well-being goals (see section 4).

The 'National Development Framework 2020-2040' seeks to frame development within the 'well-being goals' defined in section 4 of that Act. That requirement is clearly satisfied by the content of the NDF.

What the NDF fails to do is provide a clear, evidence-based framework for 'sustainability' under section 5 of the Act (see Box 1, right).

The framework is accompanied by an 'Integrated Sustainability Appraisal' report. While in England this might pass as 'good practice', for the purposes of the duties of Welsh ministers this is not sufficient. That is because it is possible to demonstrate, across many criteria, that the core principles of 'sustainable development' are violated by the policies of the framework.

The detailed criteria about how 'sustainability' should be appraised and quantified are set out in section 4 of the *Environment (Wales) Act 2016* – and have direct effect on decisions of Welsh ministers. The evaluation provided within the 'Sustainability Appraisal' is not sufficient to address

Box 1: Section 5, Well-being of Future Generations (Wales) Act 2015

5. The sustainable development principle

- (1) *In this Act, any reference to a public body doing something "in accordance with the sustainable development principle" means that the body must act in a manner which seeks to ensure that the needs of the present are met without compromising the ability of future generations to meet their own needs.*
- (2) *In order to act in that manner, a public body must take account of the following things –*
 - (a) *the importance of balancing short term needs with the need to safeguard the ability to meet long term needs, especially where things done to meet short term needs may have detrimental long term effect;*
 - (b) *the need to take an integrated approach, by considering how –*
 - i. *the body's well-being objectives may impact upon each of the well-being goals;*
 - ii. *the body's well-being objectives impact upon each other or upon other public bodies' objectives, in particular where steps taken by the body may contribute to meeting one objective but may be detrimental to meeting another;*
 - (c) *the importance of involving other persons with an interest in achieving the well-being goals and of ensuring those persons reflect the diversity of the population of—*
 - i. *Wales (where the body exercises functions in relation to the whole of Wales), or*
 - ii. *the part of Wales in relation to which the body exercises functions;*
 - (d) *how acting in collaboration with any other person (or how different parts of the body acting together) could assist the body to meet its well-being objectives, or assist another body to meet its objectives;*
 - (e) *how deploying resources to prevent problems occurring or getting worse may contribute to meeting the body's well-being objectives, or another body's objectives.*

the quantitative basis of criteria in the that Act.

Unlike 'goals', sustainability is not a value-based matter. Sustainability can be quantified with reference to evidence regarding the current state of the natural world, the availability of resources, and the impacts of society and technology upon human society and the natural world.

At the very least, the quantification of baselines and impacts should have begun with the list of criteria specified in the Act.

As stated on page 6 of the NDF report, *The NDF is the highest tier of development plan and is focused on issues and challenges at a national scale.*

The NDF report is at the root of all subsequent spatial development policy-making in Wales. A failure to quantify impacts and effects here will therefore propagate to all other areas of policy as subordinate policy documents are drawn-up.

That there is no quantified impact for how policy will implement both sustainability, and long-term environmental goals and international com-

mitments, represents a failure of the Welsh Government's policy-making process.

Throughout this report our goal is to take elements of the NDF's policy objectives and show – with reference to present-day data and research evidence – we can easily invalidate the claims of the NDF when we look at their impact on ecological and social sustainability.

In our view, the failure to quantify the effects of policy with regard to national environmental and climate baselines, or even create a baseline of impacts with reference to the state of the environment today, represents a clear failure of the duty upon ministers under section 5 of the Well-being of Future Generations (Wales) Act 2015. Should this process continue unchanged, in our view local communities would be wise to seek a judicial review to test the applicability of 'sustainability', based upon the analysis of specific elements of the NDF policy highlighted in this report.

2. Evidential failure to define limits to 'economic growth'

At various points the consultation alludes to the promotion of attainment of 'economic growth'. Whether that can be achieved within an objective definition of 'sustainability', and certainly within the requirements to significantly reduce carbon emissions to 'net zero', has not been demonstrated within the NDF.

Within the NDF report – as in politics generally – the concept of 'economic growth' is accepted as an "uncontested good"; as something which everyone accepts as valid without question.

Our query is whether that is a valid assumption, given the over-riding legal requirement to enact 'sustainable development'.

The concept of economic growth is simple. Each year everyone will have more. Let us dispense with the arguments with regard to 'distribution', and concentrate on the issue of material economic growth.

At the simplest level, the economic principle of 'growth' violates both the *First* and *Second Laws of Thermodynamics*: It is not possible to have

continuous growth within a finite ecological space (First Law); and it is not possible to off-set the material impacts of growth through greater efficiency or innovation due to the thermodynamic restrictions on efficiency (Second Law).

The limits are defined by physical laws, and so cannot be bent or substituted by any rational appeal to human inventiveness. Even Adam Smith, in chapter 8 and 9 of Book I of *The Wealth of Nations* foresaw the day when 'limits' would constrain the growth of human society.

The issue of the ecological limits was highlighted most notably in the 1972 report, *The Limits to Growth* {Meadows 1972}. That report has since been updated each decade, finding

consistently similar results as data and statistics has developed.

The long-standing argument with regard to the environment is that modern-day society can 'decouple' the impacts of economic growth from the process of generating economic growth. There is currently no evidence to confirm that this is physically possible, nor that the process has ever been attained.

The UK government contend that we are decoupling the impacts of growth from economic growth {ONS 2019}. This position, however, relies on the theoretical effects of the 'environmental Kuznets curve' – for which arguably there is no statistical justification without the imposition of tight boundaries to the evaluation of impacts {Stern 2004}.

As industry in the developed world has closed down, and imports have risen, the environmental impacts of development have been outsourced from those economies. If we evaluate the 'embedded carbon' {Wiedmann 2008}, and other indicators, from both direct and indirect consumption what we see is no decoupling of growth from impacts.

A more recent report commissioned by DEFRA sought to evaluate the carbon emissions attributable to UK consumption {Barrett 2011}:

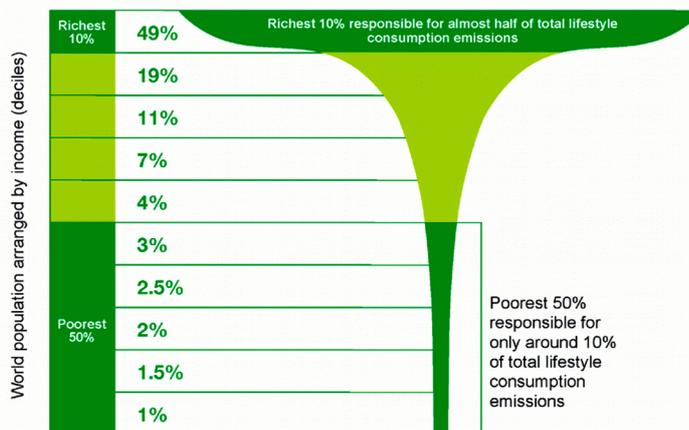
The UK's full supply chain emissions from consumption are 853Mt CO_{2e}. This does not include direct emissions from households as a result of burning fuel for heating and private car use. These accounted for a further 161Mt CO_{2e} bringing the total emissions to 1014 Mt CO_{2e}.

This corresponds to three times the current level of emissions which the UK government reports under the UN Framework Convention on Climate Change {BEIS 2019e}.

When this model is applied to the whole world, in order to attribute emissions to those who consume the products of those emissions, what we see is that 10% of the world's population is responsible for half of global emissions (see figure 1). The Welsh population falls within that 10%.

Conversely the poorest half of the world's population is responsible for 10% of emissions.

Percentage of CO₂ emissions by world population



Source: Oxfam

Figure 1. 'Extreme Carbon Inequality' {Oxfam, 2015}

As stated on page 12 of the NDF report, *We depend on high quality natural resources to fuel our industries, provide our food, clean air and water and create jobs and wealth. We are committed to living within our means, **using only our share of the planet's resources and using them efficiently.** (our emphasis)*

Clearly, in terms of carbon emissions, the evidence available today contests the position of the Welsh Government that present development patterns ensure we use 'only our share' of the planet's resources.

A decade ago Rockström et al. defined a series of 'planetary boundaries' {Rockström 2009} which provide a basis for quantifying a baseline for human activity – and thus for the priorities for change and adaptation towards a sustainable environment.

At no point does the NDF seek to measure the effects of the NDF against a holistic set of sustainability criteria – and therefore we would argue that the Welsh ministers duty in law has not been discharged.

Policy P1 (page 26) states, *Urban growth should support towns and cities that are compact and orientated around urban centres and integrated public transport and active travel networks.*

As the explanatory text of the NDF outlines, *Sustainable growth will involve setting an ambitious strategy for achieving biodiversity and green infrastructure enhancement in our*

urban areas... growing population to ensure a healthy natural environment and economic and social stability.

This is an assumption. For example, in relation to 'social stability', there is no evidence that this can meet the legal requirements of the *Climate Change Act 2008*, nor international environmental obligations to prevent a catastrophic breakdown of the Earth's climate systems.

At no point does the NDF quantify the resource demands of the development framework, nor its impact upon the local and global environment, and the effect this has upon the planetary boundaries to sustainability. It does not quantify a baseline for Welsh consumption {Wiedmann 2015}, nor does it outline how that must change if we are to meet over-riding global goals on the climate and environmental protection.

Consequently the NDF cannot prove – for the purposes of the law – that the decoupling of growth from its impacts has been attained, or that it is even possible {Ward 2016}.

Economic growth and development cannot be assumed, as it currently is within the NDF, to be an 'uncontested good'. In an age of planetary boundaries and globalised trade, we must provide a measure of present-day impacts, and shift toward policies which bring development patterns within 'planetary boundaries'.

'Prosperity' cannot be measured in solely economic terms because not all ecological factors are measured as economic values {Kubiszewski 2013}. Likewise the 'equality' dimension of sustainable development requires we 'think globally and act locally'.

Wales is already consuming “more than its fair share”. The only current model within economic research which is able to address that within planetary boundaries is ‘de-growth’ {Cosme 2017}. Consequently any future strategy must embrace the concept of ‘degrowth’ {Kallis 2018}, and map a national development framework which creates patterns of development and resource use which institute such a transition.

3. Transport, Technology and Resource Depletion

Transport and mobility are a critical area within the strategy, and within that, the creation of a highly mobile population using more electrified methods of transport. Given the clear restrictions on the development of electric vehicles, which have been consistently ignored by the politicians for some years, there is a doubt as to whether the desire for mobility can be met without violating the ‘sustainability’ requirements placed upon the Welsh Government in law.

Within the NDF there is an unstated yet pervasive belief in 'technology' as the solution to the issue of 'sustainable development'. However, at no point is the evidence to substantiate that belief presented, or tested.

As an example of this, let us examine Policy P7 (page 32),

Ultra Low Emission Vehicles: The Welsh Government supports the increasing use of ultra low emission vehicles. We will work with the UK Government, local authorities, the energy sector and businesses to plan for and implement the roll out of electric vehicle

charging infrastructure, including the creation of a network of rapid charging points to enable longer distance travel by electric vehicles throughout Wales.

This poses a very simple question from the point of Welsh ministers legal duties in regard to sustainable development: *Has the Welsh Government any proof that this policy is physically possible to deliver, or what quantity of transport demand might be shifted to electric vehicles?*

Likewise page 12 states,

Welsh coal, steel and iron drove the industrial

revolution, and our wind, solar and tidal resources point forward to a clean, sustainable future.

Again, as the corollary to the policies on electric vehicles – since they require a power source – is there direct evidence that renewable generation policies are achievable?

Box 2: Welsh share of global 'rare earth' resources (BGS data)

'Rare earth' metals are at the heart of all 'advanced' digital and renewable energy technologies. The greatest example of this is the mobile phone – which can contain up to 70 of the 83 stable elements of the periodic table, and up to 62 different metals {Rohrig 2015}.

In terms of sustainability, and our ability to create 'green' technologies, how much of the world's resources can Wales 'fairly' claim?

The table below takes a UK-based global resource dataset {BGS 2011} and calculates the global per-capita allowance of REEs. Other datasets are available (notably, USGS) though they all generally agree within a small fraction on the global resource availability.

Composition of source rocks vary. For this reason only a global 'total' for REE's is available, and the amounts for each individual elements must be inferred from previous production data:

World 'rare earth' resources:

Element(s)	Production, te, 2014	Global resource/capita, kg	Welsh resource share, te
Cerium	79,156	6.06	18,797
Lanthanum	54,092	4.14	12,845
Neodymium	33,665	2.58	7,994
Yttrium	12,735	0.98	3,024
Praseodymium	9,909	0.76	2,353
Samarium	4,596	0.35	1,091
Gadolinium	3,575	0.27	849
Dysprosium	1,830	0.14	435
Ho, Tm, Yb, Lu	1,592	0.12	378
Erbium	1,181	0.09	280
Europium	659	0.05	156
Terbium	512	0.04	122
Total	203,502	15.59	48,326
<i>Rare earth reserves, million tonnes</i>			113.8
<i>Global population, billion</i>			7.3
<i>Welsh population, million</i>			3.1

'Global per-capita resource' calculated as 'rare earth reserves' divided by 'global population', multiplied by the percentage of production (total divided by element) for that element in 2014. 'Welsh resource' calculated as 'per-capita resource' multiplied by Welsh population.

Electric cars are highly dependent upon 'rare earth elements' (REEs). Many kilos are used in the drive motors and electrical control systems. The assumption is that electric cars must be 'greener' because they use a renewable power source. However, the production of REEs is itself highly polluting (see figure 2) {Guardian 2014/BBC 2015/Simmons 2016}.

Likewise both solar photovoltaics (PV) and wind turbines are dependent upon the availability of REEs, sometimes in large quantities. For example some of the latest direct drive wind turbines use neodymium-iron-boron magnets in their generator, with utilisation rates of 200 kilos

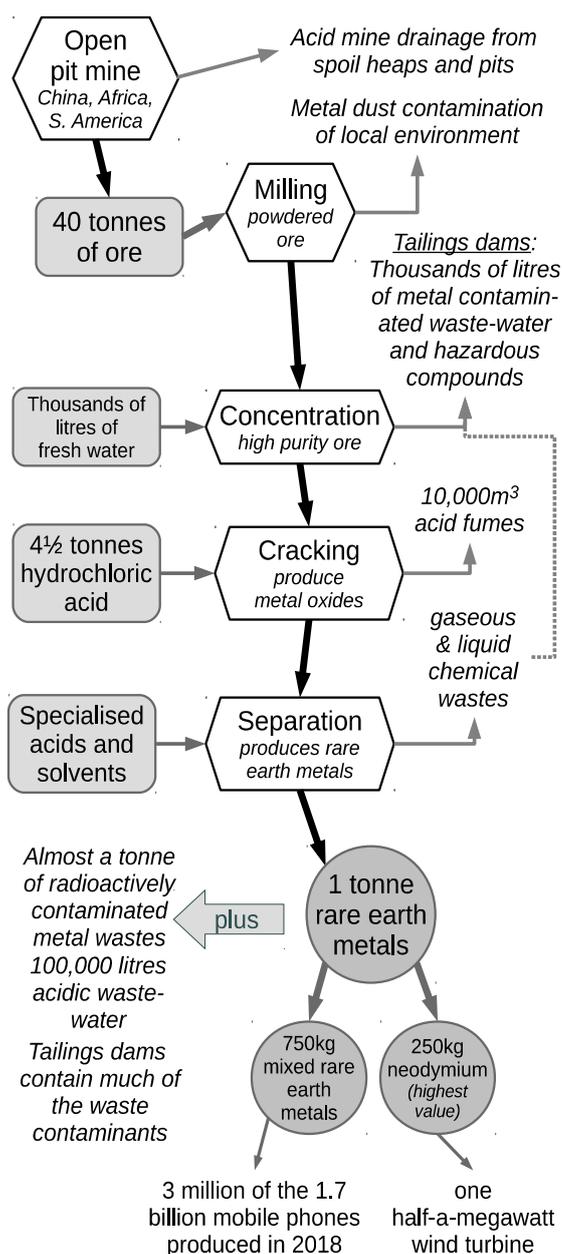


Figure 2. Example of REE extraction & processing

to 600 kilos per megawatt of turbine capacity {BGS 2011}. Neodymium is also found in applications such as a hardener in glass headlights, the motor in the hard disk drives of computers, or in the small earphones commonly used with mobile phones and music players.

The reality is that currently, per person, the global resource will only supply two-and-a-half kilos of neodymium per person. That would barely make one small motor for a road vehicle, or a lifetime's supply of hard disk drives. The 8,000 tonnes of neodymium allocated to Wales, if a third were used for wind turbines, would only create around 10 giga-watts of capacity. And while consumer electronics is today one of the leading applications of REEs, less than 16% of electronic waste globally is recycled {Greenpeace 2017}; and REEs are not currently a target for bulk reclamation operations.

Today 'technological society' is thoroughly unsustainable because the resources it depends upon are in short supply and are not being recycled {Cohen 2007}. Even seemingly common metals, such as copper – essential for modern electronics – are approaching the ecological limits of resource production {Kerr 2014}.

This is why we used an image of Coedy Brenin Forest Park for the cover of this report. If current policy continues, within a decade or two that area would have to be mined to extract the 200 million tonnes of copper and valuable trace metals which it contains.

Page 5 of the NDF report states,
The challenge for a plan like the NDF is not necessarily to predict how Wales might change over the next twenty years, but to make sure we can build a society and an economy that is flexible and resilient, to enable all of us to benefit from the changes in a sustainable way.

True. We cannot accurately predict, but we can say, based upon scientific principles, what is physically impossible.

For example, page 32 of the NDF states,
It is important that we plan and deliver the infrastructure, and in particular the charging infrastructure, that electric vehicles will rely on.

In late June 2019 the Office for Low Emission Vehicles in England published details of its proposed charging infrastructure to support a 'net zero' transport system {OLEV 2019}. Only three weeks before, an expert panel assembled by the Natural History Museum concluded that such plans, in a resource context, were 'challenging' {NHM 2019} – though if you read the text of their statement, you will find that the requirements for a mass roll-out of electric vehicles are near impossible in terms of the resource demand implications. To quote their statement:

To replace all UK-based vehicles today with electric vehicles (not including the LGV and HGV fleets)... would take 207,900 tonnes cobalt, 264,600 tonnes of lithium carbonate (LCE), at least 7,200 tonnes of neodymium and dysprosium, in addition to 2,362,500 tonnes copper. This represents, just under two times the total annual world cobalt production, nearly the entire world production of neodymium, three quarters the world's lithium production and at least half of the world's copper production during 2018.

Page 32 of the NDF also states,
The advent of driverless cars will inevitably... transform the current concepts of private car.

This ignores that fact that the technology required, the 5G network, will consume 2 to 3 times more power than the existing 4G network {Johnson 2018}; and that thousands of new base station – made with REEs – must be placed at short intervals along major roads {NIC 2016}.

The energy, transport and technological elements of the development framework are physically impossible – unless the Welsh Government publicly abandons its commitment to only taking its "fair share" of the world's resources. That is because implementing that strategy would demand an impossibly large share of the world's rare earth metal resources.

The only way it would be feasible would be – as shown already in relation to carbon emissions in figure 1 – if the top few percent of the world's population consumed the majority of the world's natural resources. That is not 'sustainable'.

4. Decarbonisation and Energy

The NDF does not quantify any aspect of energy and resource use with reference to present-day data, and then project forward the change required to deliver the strategy whilst maintaining the over-riding legal constraints of 'sustainable development' and achieving 'net zero carbon' by 2050. As a result, arguably current legal duties upon the Welsh Government are undeliverable within the period covered by the NDF.

Energy, because it is traded within an organised and regulated market, is one of the most measured and reported commodities in Britain. Even so, the NDF fails to work from a measured baseline of current energy demand, and the infrastructure required to implement key changes, to meet national or international obligations.

As an example, let's begin with Box 3.

Britain has agreed to a target of achieving 'net zero' by 2050. On the current 1990 baseline Britain has reduced emissions by 40% {BEIS 2019b} – primarily through fuel switching in power stations and destroying Britain's primary manufacturing industries and importing manufac-

tured resources instead (as outlined earlier in relation to 'embedded carbon').

As of yet, there is no projection {CCC 2019} as to what kind of carbon sequestration systems might be viable in order to 'carry on consuming'. Carbon capture and storage, on a life-cycle analysis, may not in the end be economically viable; and it may actually be easier to look at more radical changes to economics and lifestyle.

Let us assume that 90% of current carbon emissions must be 'avoided' by 2050. Is there any viable mechanism to deliver this within the NDF? No.

Page 15 of the NDF states,

Box 3: Welsh carbon dioxide emissions by local authority, national estimates 2017 (kteCO₂)

Area	Large Industrial Installations	Agriculture	Industry & Commercial Total	Domestic	Transport	LULUCF Net Emissions	Population, thousand	Per Capita Emissions, te	Area % of Wales	
Blaenau Gwent	0.0	0.4	98.7	107.7	79.4	-2.8	283.0	69.6	4.1	1.1%
Bridgend	49.8	6.7	295.5	205.9	310.5	-2.7	809.3	144.3	5.6	3.3%
Caerphilly	2.3	6.0	223.0	272.4	238.1	-6.2	727.2	180.8	4.0	2.9%
Cardiff	22.0	2.9	551.1	450.6	662.0	0.8	1,664.5	362.8	4.6	6.7%
Carmarthenshire	54.1	108.9	433.7	326.9	436.8	-50.3	1,147.1	186.5	6.2	4.6%
Ceredigion	0.5	70.6	178.8	137.5	151.2	-28.7	438.8	73.1	6.0	1.8%
Conwy	0.0	19.9	124.7	181.6	278.5	4.5	589.4	116.9	5.0	2.4%
Denbighshire	0.0	21.9	151.5	151.9	199.7	-7.1	496.0	95.2	5.2	2.0%
Flintshire	529.7	15.1	984.2	261.8	392.1	4.1	1,642.3	155.2	10.6	6.6%
Gwynedd	0.0	46.9	214.8	203.1	281.8	-23.6	676.0	123.7	5.5	2.7%
Isle of Anglesey	0.0	34.5	121.2	124.7	136.3	20.4	402.6	69.8	5.8	1.6%
Merthyr Tydfil	0.0	1.1	79.9	91.5	89.5	-3.0	257.9	60.0	4.3	1.0%
Monmouthshire	0.2	32.9	171.5	151.4	350.4	-28.2	645.1	93.6	6.9	2.6%
Neath Port Talbot	6,588.1	7.6	7,018.6	242.5	307.4	-11.9	7,556.6	142.1	53.2	30.6%
Newport	47.8	6.1	390.5	222.8	458.8	-4.3	1,067.8	151.5	7.0	4.3%
Pembrokeshire	0.1	72.9	338.9	218.8	224.2	-19.0	762.8	124.7	6.1	3.1%
Powys	9.0	121.8	321.8	249.0	338.5	-71.5	837.9	132.5	6.3	3.4%
Rhondda Cynon Taf	6.6	7.6	268.8	351.1	451.2	-11.2	1,059.9	239.1	4.4	4.3%
Swansea	6.0	11.2	374.5	399.7	371.2	-7.3	1,138.1	245.5	4.6	4.6%
Torfaen	0.4	2.2	165.5	127.1	133.5	-2.7	423.5	92.3	4.6	1.7%
Vale of Glamorgan	524.5	14.1	693.0	191.1	224.7	7.6	1,116.4	130.7	8.5	4.5%
Wrexham	5.7	17.0	529.6	208.1	240.1	7.2	985.0	135.6	7.3	4.0%
Wales Total	7,847.0	628.4	13,729.9	4,877.2	6,355.9	-235.8	24,727.2	3,125.2	7.9	7.0%

Source: BEIS 2019a. 'LULUCF', Land use, land-use change, and forestry.

Climate change and the decline in biodiversity are global challenges and the biggest issues faced by our nation... we have declared a Climate Emergency. In response to the challenge, we are committed to decarbonising Wales and to delivering healthy, resilient ecosystems.

Does the NDF contain a framework to reduce carbon emissions, without, for example, excavating large areas of open moorland to deliver biomass or wind energy projects? No – the NDF contains no set of policies commensurate with dealing with the declared ‘climate emergency’.

There is no mechanism because those chosen – from a large roll-out of wind power to electric cars – are not viable within the terms of the strategy itself. The resources do not exist to efficiently build those projects.

Page 36 states,

We have set the following ambitious targets for the generation of renewable energy: For 70 per cent of electricity consumption to be generated from renewable energy by 2030.

What is the baseline for this policy? Compared to today, what practical measures or capacity must be created in order to fulfil this target?

Box 4 below shows Welsh renewable energy generation by local authority – and other forms of energy consumption for the same. In Wales total electricity consumption (14,861GW-h) represents only 16% of total energy consumption (90,504GW-h). 70% of 16% is only 11% of total energy consumption – 10,400GW-h.

Current renewable production is 6,228GW-h, though this includes a large component of non-electrical energy. That figure, however, also in-

Box 4: Welsh renewable energy production and other energy consumption by local authority, 2017

Local Authority Name	Renewable energy sources, GW-h:										Fossil fuels/nuclear, GW-h:				Total, GW-h
	PV	On-shore Wind	Hydro	AD	Off-shore Wind	Sewage Gas	LFG	MSW	Biomass	Total Plantrenewable, GW-h	Coal	Petroleum	Gas	Electricity	
Blaenau Gwent	23	7	0	0	0	0	5	0	0	35	6	344	640	259	1,299
Bridgend	36	130	0	17	0	1	1	0	0	185	142	1,253	1,294	605	3,408
Caerphilly	58	40	0	8	0	0	26	0	0	132	21	1,024	1,317	687	3,182
Cardiff	13	5	1	4	0	20	16	0	0	60	152	2,459	2,897	1,553	7,229
Carmarthenshire	111	239	0	3	0	0	5	0	0	358	74	2,509	1,059	888	4,766
Ceredigion	31	210	99	8	0	0	0	0	0	349	22	1,200	183	349	2,132
Conwy	24	40	63	0	2,019	1	11	0	0	2,159	13	1,208	720	399	2,455
Denbighshire	9	105	4	7	175	0	0	0	0	300	14	997	602	375	2,102
Flintshire	72	0	0	0	0	1	4	0	0	77	131	1,961	1,529	1,027	6,380
Gwynedd	36	12	98	3	0	0	1	0	0	149	31	1,585	534	544	2,932
Isle of Anglesey	38	87	0	11	0	0	1	0	0	137	14	857	319	296	1,596
Merthyr Tydfil	3	3	1	0	0	0	0	0	0	6	5	359	566	203	1,173
Monmouthshire	74	1	1	2	0	1	0	0	0	78	12	1,499	708	401	2,748
Neath Port Talbot	27	218	1	0	0	7	9	140	0	402	4,479	1,392	1,117	1,378	8,838
Newport	25	31	0	0	0	0	6	0	0	63	54	1,801	1,488	840	4,262
Pembrokeshire	197	34	1	0	0	0	8	0	0	240	2,917	8,349	571	962	12,965
Powys	22	416	19	15	0	0	4	0	0	476	42	2,224	530	590	3,604
Rhondda Cynon Taff	43	745	0	7	0	0	8	0	0	803	27	1,770	1,924	768	4,684
Swansea	43	4	0	0	0	3	5	0	0	55	18	1,531	2,306	906	4,910
The Vale of Glamorgan	80	2	0	3	0	5	0	0	0	90	7	575	828	404	1,871
Torfaen	10	0	0	0	0	4	0	0	0	14	9	1,017	890	511	2,943
Wrexham	39	0	0	2	0	0	18	0	0	59	13	1,098	2,147	915	5,025
Wales	1,015	2,330	289	90	2,194	44	126	140	0	6,228	8,203	37,014	24,167	14,861	90,504

Source: BEIS 2019c; BEIS 2019d. ‘PV’, Photovoltaic; ‘AD’, Anaerobic Digestion; ‘LFG’, Landfill Gas; ‘MSW’, waste incineration. The above figures exclude ‘bioenergy and waste’ from consumption, since they roughly balance (within a few percent) of the renewable generation figure from the ‘renewable generation’ dataset.

cludes waste incineration – which per unit of energy is more polluting than gas-fired power stations {FoE 2006}.

The pledged increase in renewable production is, therefore, limited – and will make little difference to carbon emissions as a result. And though the target it called “ambitious”, when viewed with recourse to data on the present-day situation it is not only meaningless, it is arguably unlawful.

‘Unlawful’ is because that level of renewable energy production would still represent such a small fraction of energy overall that it would meet fail to meet the demands of the *Climate Change Act*, for decarbonisation, and could arguably fall foul of the tests of what is ‘sustainable’ under the Welsh law.

The reality is that, in a cost-constrained world, what matters is achieving those things which *reduce carbon* by the greatest amount for *the least cost*. That is not necessarily the production of more ‘green energy’. As figure 3 shows {McKinsey 2010}, if we look at the development options which reduce carbon in terms of their relative costs or savings, there are many options which produce a better effect than green energy – most specifically, *reducing demand*. The NDF is silent on many aspects of those alternatives.

Let’s take another example, ‘district heating’ under Policy 14 (page 43),

Priority Areas for District Heat Networks: Within Priority Areas for District Heat Networks, planning authorities should identify opportunities for District Heat Networks and ensure they are integrated within new and existing development.

District heating systems require a large, high-grade heat source. Are the existing sites with an

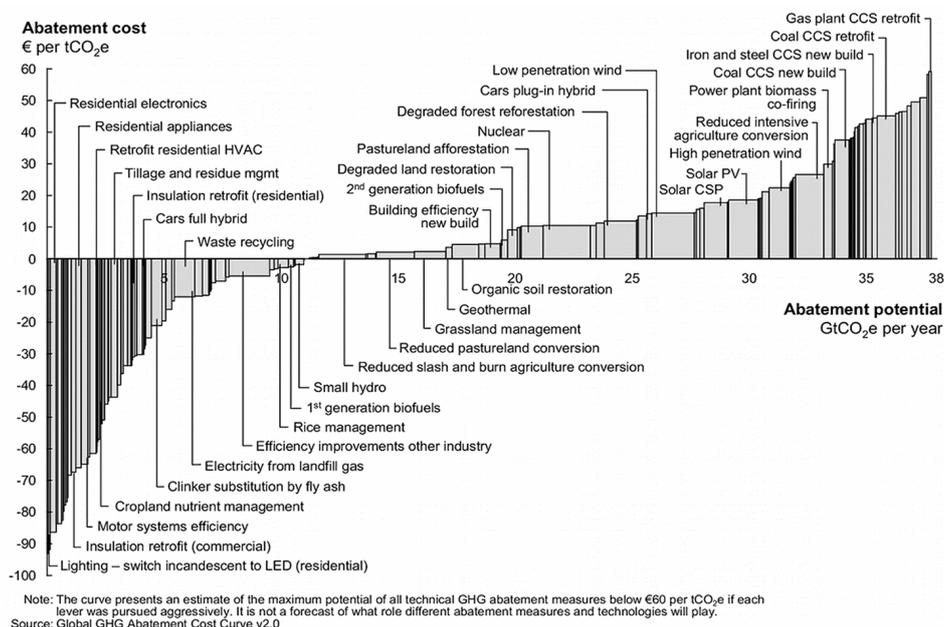


Figure 3: ‘Carbon dioxide marginal cost abatement curve’

excess of high-grade heat available, or have new sources been identified in the NDF, and are they ‘net zero’ carbon sources of heat? *That is not tested.*

A district heating system requires a large outlay in pipeworks and ground engineering, all of which entails a large release of carbon emissions during installation. Do the carbon savings pay-back those emissions over the period of the NDF in order to achieve ‘approaching’ zero carbon by the 2040s? *That is not tested.*

The failure to consider that very basic level of deliverability test is why the ‘*Integrated Sustainability Appraisal*’ document is not ‘fit for purpose’.

As stated previously, due to the limitations on the resources to produce digital and renewable energy technologies, the NDF is undeliverable unless the Welsh Government abandoned its commitment to only consume its “share” of resources – and engages in today’s emerging geopolitical conflicts to secure them.

More generally, from covering moorland in wind turbines and solar PV, to district heating networks, the energy policies of the NDF fail to meet any qualitative test of sustainability – nor of the commitment to meet zero carbon by 2050. All policies relating to energy are, in our view, not lawful.

5. Food, Rural Areas, and 'One Planet Living'

Due to its failure to quantify resource use, and the inherent faith of the strategy upon technology and innovation to deliver environmental goals without changing present-day economic goals, the strategy fails to secure the one key resource the people of Wales depend upon - 'food'. In contrast to the political vision offered, securing access to sustainable food and shelter using present-day resources must be the core of any future sustainable strategy.

There is one critical, 'renewable' energy sources which the NDF fails to provide any realistic framework for: *Food*.

Page 20 of the NDF states,
There will be support for the agricultural sector and its supply chains to boost resilience through diversification.

This is refined in page 24,
By focussing large scale growth on the urban areas, development pressures can be channelled away from the countryside and productive agricultural land can be protected. Rural areas have an important function as providers of food, energy and mineral resources.

The active policy of the NDF, Policy P4, then unites these positions –

Supporting Rural Communities: The Welsh Government supports sustainable rural communities and appropriate proportionate growth in rural towns and villages. The future for rural areas are best planned at the regional and local level. Strategic and Local Development Plans should plan positively to meet the needs of rural communities with regard to housing, transport, businesses, services and diversification in the agricultural sector.

The reality is that nothing in that policy will create any change from existing patterns of energy intensive agriculture, with their attendant high carbon footprint. Therefore, both in terms of enabling sustainable lifestyles for the whole (not just rural) population, and in securing the urgent need both to reduce carbon emissions and improve carbon capture through better landscape planning, the NDF fails.

If we look at modern consumption footprints evaluated over a broad class of sustainability criteria {Nijdam 2008}, food represents one of the largest parts of a person's carbon budget. It is both the source of widespread pollution, carbon emissions, and energy consumption.

There is no 'industrial' or 'intensive' model of food production which is not dependent upon dense energy sources, and upon external inputs of finite, non-renewable resources – such as phosphate rock {Gilbert 2009}.

Wales must look beyond the industrial food model in order to solve this. Luckily, Wales already has a framework for how this transformation can be driven in rural areas: The 'One Planet Living' model {OPC} and the planning framework designed to accompany it {WAG 2012}.

In order to reduce carbon emissions and resource demands, people must live closer to their food and work. That requires a wholly different model from the present urban model, developed almost two centuries ago in Britain as part of industrial urbanism.

Currently 'One Planet Living' is tolerated by many local authorities across Wales. What the Welsh Government should be doing is actively promoting this approach as a low-cost means to repopulate the countryside, thereby creating more support for local communities, public services and businesses in more remote locations.

There must be a new model for sustainable agriculture which respects 'planetary boundaries'. The NDF not only fails to provide this, but it seeks to perpetuate historic patterns of rural development which create the opposite outcomes. The NDF must lead with a new strategy to deliver opportunities for small-scale, low impact lifestyles in the countryside.

6. Conclusions and Recommendations

The 'National Development Framework 2020-2040' report contains fundamental errors which render, in our view, the strategy chosen unlawful – because it violates the duty on the Welsh Government to implement 'sustainable development', and because the strategy cannot deliver the legally-binding requirements of the Climate Change Act 2008.

Little more can be said about the value of the NDF as a spatial development strategy, given it seeks to guide policy at a most critical time in the future of human society.

Though it gives voice to the 'well-being goals' defined in section 4 of the *Well-being of Future Generations Act*, what the NDF fails to do is provide a clear, evidence-based framework for 'sustainability' under section 5 of the Act.

This failure is compounded the lack of any quantified path to meet the legal duty to work towards implementing 'net zero' carbon emissions by 2050 under the *Climate Change Act*.

There is no semblance of small tweaks which can rectify the serious errors within the NDF. Those error stem from one very simple root: A failure to measure a baseline for present-day development trends in Wales; and then model the NDF strategy on a package of measures which, quantifiably, shift present-day trends towards where they need to be to achieve sustainable development.

In that sense, this report can have only two recommendations:

To the Welsh Government, "try again" – and this time measure and model a quantified approach based upon the legal duty to implement sustainable development and to achieve net zero by 2050.

To the network of local environmental and green activists who commissioned this report, "find a lawyer". Given the duties upon Welsh ministers, and their singular failure to discharge those duties in forming the the policies of the National Development Framework, should this document be enacted as policy I believe it document represents a tremendous opportunity to test the limits of the law on sustainable development in Wales.

Paul Mobbs
Mobbs' Environmental Investigations
November 2019

Sources

- Barrett 2011 *UK Consumption Emissions by Sector and Origin* (project report EV0466), Barrett et al. For DEFRA, May 2011. [http://randd.defra.gov.uk/Document.aspx?Document=FINALEV0466report\(2\).pdf](http://randd.defra.gov.uk/Document.aspx?Document=FINALEV0466report(2).pdf)
- BBC 2015 *The dystopian lake filled by the world's tech lust*, Tim Maughan, BBC News, 2nd April 2015. <https://www.bbc.com/future/article/20150402-the-worst-place-on-earth>
- BEIS 2019a *UK local authority and regional carbon dioxide emissions national statistics: 2005 to 2017*, Department for Business, Energy & Industrial Strategy, 27th June 2019. <https://www.gov.uk/government/statistics/uk-local-authority-and-regional-carbon-dioxide-emissions-national-statistics-2005-to-2017>
- BEIS 2019b *Updated energy and emissions projections 2018*, Department for Business, Energy & Industrial Strategy, April 2019. <https://www.gov.uk/government/publications/updated-energy-and-emissions-projections-2018>
- BEIS 2019c *Total final energy consumption at regional and local authority level*, Department for Business, Energy & Industrial Strategy, September 2019. <https://www.gov.uk/government/statistical-data-sets/total-final-energy-consumption-at-regional-and-local-authority-level>
- BEIS 2019d *Regional Renewable Statistics*, Department for Business, Energy & Industrial Strategy, September 2019. <https://www.gov.uk/government/statistics/regional-renewable-statistics>
- BEIS 2019e 2018 UK greenhouse gas emissions: provisional figures - statistical release, Department for Business, Energy & Industrial Strategy, March 2019. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/790626/2018-provisional-emissions-statistics-report.pdf
- BGS 2011 *Rare Earth Elements Profile*, British Geological Survey, November 2011. <https://www.bgs.ac.uk/downloads/start.cfm?id=1638>
- CCC 2019 *Net Zero: The UK's contribution to stopping global warming*, Committee on Climate Change, May 2019. <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>
- Cosme 2017 *Assessing the degrowth discourse: a review and analysis of academic degrowth policy proposals*, Cosme et al., *Journal of Cleaner Production*, vol.149. pp.321-334, 2017. <https://eprints.whiterose.ac.uk/112000/1/1-s2.0-S0959652617302202-main.pdf>
- de Ridder 2013 *The Geopolitics of Mineral Resources for Renewable Energy Technologies*, Marjolein de Ridder, The Hague Centre for Strategic Studies, August 2013. https://www.hcss.nl/sites/default/files/files/reports/The_Geopolitics_of_Mineral_Resources_for_Renewable_Energy_Technologies.pdf
- FoE 2004 *Dirty Truths: Incineration and Climate Change*, Michael Warhurst and Anna Watson, Friends of the Earth, May 2006. https://friendsoftheearth.uk/sites/default/files/downloads/dirty_truths.pdf
- Gilbert 2009 *The disappearing nutrient*, Natasha Gilbert, *Nature*, vol.461 pp.716-718, 9th October 2009. <https://www.nature.com/articles/461716a>
- Greenpeace 2017 *Guide to Greener Electronics 2017*, Greenpeace, October 2017. <https://www.greenpeace.org/usa/wp-content/uploads/2017/10/Guide-to-Greener-Electronics-2017.pdf>
- Guardian 2014 *Rare earth mining in China: the bleak social and environmental costs*, Jonathan Kaiman, Guardian On-line, 20th March 2014. <https://www.theguardian.com/sustainable-business/rare-earth-mining-china-social-environmental-costs>
- Johnson 2018 *The 5G Dilemma: More Base Stations, More Antennas – Less Energy?*, Dexter Johnson, *IEEE Spectrum*, 3rd October 2018. <https://spectrum.ieee.org/energywise/telecom/wireless/will-increased-energy-consumption-be-the-achilles-heel-of-5g-networks>
- Kallis 2018 *Research On Degrowth*, Kallis et al., *Annual Review of Environment and Resources*, vol.43 pp.291-316, October 2018. https://www.academia.edu/download/56941683/Degrowth_Research_Annual_Review_of_Environment_and_Resources_1.pdf

- Kubiszewski 2013 *Beyond GDP: Measuring and achieving global genuine progress*, Kubiszewski et al., Ecological Economics, vol.93 pp.57-68, September 2013. http://www.vikalpsangam.org/static/media/uploads/Resources/genuine_progress_indicators_kubiszewski_etal.pdf
- McKinsey 2010 *Impact of the financial crisis on carbon economics: Version 2.1 of the Global Greenhouse Gas Abatement Cost Curve*, McKinsey & Associates, 2010. <https://www.mckinsey.com/business-functions/sustainability/our-insights/a-cost-curve-for-greenhouse-gas-reduction>
- Meadows 1972 *The Limits to Growth*, Potomac Associates, 1972, ISBN 9780-8766-3222-2.
- NHM 2019 *Leading scientists set out resource challenge of meeting net zero emissions in the UK by 2050*, Natural History Museum, 5th June 2019. <https://www.nhm.ac.uk/press-office/press-releases/leading-scientists-set-out-resource-challenge-of-meeting-net-zero.html>
- NIC 2016 *5G Infrastructure Requirements in the UK*, National Infrastructure Commission, December 2016. <https://www.nic.org.uk/wp-content/uploads/5G-Infrastructure-requirements-for-the-UK-LS-Telcom-report-for-the-NIC.pdf>
- Nijdam 2008 *Environmental Load from Dutch Private Consumption: How Much Damage Takes Place Abroad?*, Nijdam et al., *Journal of Industrial Ecology*, vol.9 no.1-2 pp.147-168, January 2005. <https://onlinelibrary.wiley.com/doi/abs/10.1162/1088198054084725>
- OLEV 2019 *New requirements for electric chargepoints as country moves towards net zero*, Office for Low Emission Vehicles, 24th June 2019. <https://www.gov.uk/government/news/new-requirements-for-electric-chargepoints-as-country-moves-towards-net-zero>
- ONS 2019 *The decoupling of economic growth from carbon emissions: UK evidence*, Office for National Statistics, October 2019. <https://www.ons.gov.uk/economy/nationalaccounts/uksectoraccounts/compendium/economicreview/october2019/thedecouplingofeconomicgrowthfromcarbonemissionsukevidence>
- OPC *One Planet Council* – <http://www.oneplanetcouncil.org.uk/>
- Oxfam 2015 *Extreme Carbon Inequality*, Oxfam, December 2015. https://oi-files-d8-prod.s3.eu-west-2.amazonaws.com/s3fs-public/file_attachments/mb-extreme-carbon-inequality-021215-en.pdf
- Rockström 2009 *A safe operating space for humanity*, Rockström et al., *Nature*, vol.461 pp.472-475, 2009. <https://www.nature.com/articles/461472a>
- Rohrig 2015 *'Smartphones, Smart Chemistry'*, Brian Rohrig, *ChemMatters* (Journal of the American Chemical Society), April/May 2015. <https://www.acs.org/content/dam/acsorg/education/resources/highschool/chemmatters/archive/chemmatters-april2015-smartphones.pdf>
- Simmons 2016 *Derived from the data in 'Rare-Earth Market: By monopolizing the mining of rare-earth metals, China could dictate the future of high-tech'*, Lee Simmons & Luke Shuman, *Foreign Policy*, 12th July 2016. <https://foreignpolicy.com/2016/07/12/decoder-rare-earth-market-tech-defense-clean-energy-china-trade/>
- Stern 2004 *Environmental Kuznets Curve*, David I Stern, in *The Encyclopaedia of Energy*, pp.517-525, Elsevier, 2004. <https://www.sciencedirect.com/science/article/pii/B012176480X00454X>
- Turner 2014 *Is Global Collapse Imminent?: An Updated Comparison of The Limits to Growth with Historical Data*, Graham Turner, Melbourne Sustainable Society Institute, 2014. https://espas.secure.europarl.europa.eu/orbis/sites/default/files/generated/document/en/MSSI-ResearchPaper-4_Turner_2014.pdf
- WAG 2012 *One Planet Development – Technical Advice Note 6, Planning for Sustainable Rural Communities*, Welsh Government, October 2012. <https://gov.wales/planning-permission-one-planet-developments-open-countryside>
- Ward 2016 *Is Decoupling GDP Growth from Environmental Impact Possible?*, Ward et al., *PLOS One*, vol.11 no.10 e0164733, October 2016. <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0164733>
- Wiedmann 2008 *Development of an Embedded Carbon Emissions Indicator* (project ref. RV02033), Wiedmann et al for DEFRA, July 2008. http://randd.defra.gov.uk/Document.aspx?Document=EV02033_7331_FRP.pdf
- Wiedmann 2015 *The material footprint of nations*, Wiedmann et al., *PNAS*, vol.112 no.20 pp.6271-6276, May 2015. <https://www.pnas.org/content/112/20/6271.full>