



LABOUR INTERNATIONAL OCCASIONAL PAPER 01.

WHICH WAY ENERGY SECURITY

UK2ZERO SEPTEMBER 2026

Go local

Britain's energy insecurity won't be fixed by the Grid alone. Build decentralised clean heat and power networks, owned and run locally, tapping the waste heat, mine water and geothermal resources already sitting under our feet.

Fund it fairly

Set up Regional and Local Energy Boards, disconnect electricity prices from the highest gas bid, and finance new schemes through low-cost public loans that get repaid and reinvested locally.

Jobs, not just megawatts

Fossil fuel workers' skills transfer straight into heat pump and turbine manufacturing. Scale up the training pipeline now.

Stop chasing old fixes

New North Sea licences and new nuclear won't deliver quick energy security. Most North Sea reserves are gone, and nuclear is too slow and too costly to help in time.

Back the overlooked opportunities

Tidal Stream and geothermal power are among Britain's most reliable, most under-used resources. Invest now to catch up.

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Introduction: Which Way Energy Security

Which Way Energy Security , Labour International's (LI); first Occasional Paper, has been produced by uk2zero, LI's Green Industry Working Group.

The paper explores UK Energy Insecurities and advances uk2zero's decentralist solutions for central government problems.

Britain depends on imports for 40% of its energy consumption. Essential deliveries have been twice disrupted recently by international conflicts beyond our control. Crisis number one cost her a cool £40bn; number two is the most serious ever globally experienced, bringing shortages and unpredictability, increases in prices, Fuel Poverty, production and market uncertainty.

The worst ever European global warming impacts exacerbate the on-going energy crisis. As drought lowers clean nuclear power outputs , (and nuclear exports to the UK from France), demands rise for cooling, repair of damage from extreme climate events – earthquakes, tornados, storms and flooding: and for health care, both for their victims and others suffering health crises triggered by extreme heat events.

Fossil fuels externalise high health costs onto the Welfare State, overloading NHS care capacities and funding; fuelling the highest borrowing costs in Europe.

Its high time the UK realised its potential for clean energy self-sufficiency; re-purposed monies spent mopping-up the costs of repeated energy crisis and fossil fuel damage into investment in well charted, tried and tested, speedily developed affordable in-house clean localised energy resources; ended dependence on insecure energy imports and contributions to to global warming.

The National Grid and Energy Nationalisation developed hand in glove, set on the centralised production and supply of Coal,

gas ,nuclear and oil. Municipal power enterprises, in many ways the foundations of nationalisation were originally established to finance council welfare provision but came to compète with each other as well as with the private sector companies they knocked into a cocked hat.

The clean renewables we now require, offer cheaper, cleaner, home-grown solutions , sustainability and security and are speedily brought on stream. But the Grid is ill- equipped to balance their decentralised, often unpredictable weather-dependant outputs. Its causing energy insecurity, rationing connections and loosing investment finance, shutting down wind and solar power generation, and risking blackouts by ill-considered decisions to risk over overloading.

We need to invest public funds into inexpensive renewable thermal energy storage, to increase the productivity of existing and future wind farm turbines and benefit from continuous production, especially when the wind is strong. Unit costs and bills, decrease, investment returns and attraction improve, and the grid will not need to demand production is suspended. When needed the energy simply can be released.

Speedily implemented development of side-lined ‘in-house’ decentralised sources of additional clean heat and power distributed by localised heating networks and power grids will remove grid pressure points.

Local public controlled energy supply companies, following their own business models will take us ‘Back to the Future’, co-ordinated by Local Energy Boards raising investment funds and issuing cheap development loans repayable into investment pots. Progress will be seen to be done.

Insecure energy imports will fall; requirements for enormously costly national grid reconstruction shrink, energy insecurities diminish.

Public Investment into ‘Energising Britain’s De-industrialised Localities’, can service the UK with affordable secure energy, improving air quality, restoring democratic control of local energy to communities and local devolved government, providing new jobs, cheap energy for industries and homes, raising levels of economic demand and generating truly good growth.

Unlike austerity governance, state welfare spending can be held down through investment in technologies that directly improve lives, health, standards of living, and quality of the environments they inhabit.

Geothermal, Hydro and Tidal Stream power are all under-developed. So too are heat resources: Waste Minene Water, Sewer, Ground Source , Latent Water and Geothermal Heat, whose harnessing can meet the 40-50% of demand for energy in the form of heat , a cheaper cost than electricity generation and eminently suitable for localised heat network distribution. It lowers the overall cost of increasing in-house clean energy. It produces cheaper heat for households and industry tackling another internal cause of energy insecurity: price.

Introduction

Over the past 40 years British governments have privatised essentials -energy, water, transport and housing. Now the state, stripped of the tools to control costs at source, has been reduced to compensating after the fact.....when energy prices spiked in 2022 the government spent £40bn in a single winter cushioning the blow, not because it had a resilient energy system, but because it lacked one.....our high borrowing costs arrive because lenders lack confidence in national models that borrow to subsidise private failure while never addressing the causes. A state that shapes markets is not condemned to subsidise its failures.

Clive Lewis 2026

‘Which Way to Energy Security’ is the first of Labour International’s Occassional Papers: which draws upon aspects of exploration and debate by uk2zero, LI’s Green Industry Working Group, into decarbonisation – routes to transition from a fossil-fuel into a green economy, over a period of some three years This has necessarily embraced questions of clean energy options - projects that have benefitted from the dispersal of Department of Energy Security and Net Zero finance and support, campaigns about, and research into, both side-lined resources and mainstream players, from Mine Water Heat and Community Hydro to Wind Power. Presently the group has looked at the relevance of its work to questions of Energy Security which dominated energy discussions as supplies were abruptly destabilised by the US-Iran War and the overlying effect of the series of catastrophic

Extreme Heat and Weather Events that closely followed its outbreak.

It is organised into seven major sections. Section One : A Global Energy Crisis – a sketch of the Iran War's impact on the global energy market . Section Two : Global Warmings' Impacts upon Energy Security. Section 3 : Why Is Britain's Energy Supply Insecure ? Section Four : Fossil Fuels are not the Answer. Section Five :A Decentralised Clean Heat Network Section Six : A Decentralised Clean Power Network. Section Seven. Building Local Heat and Power Networks.

Section One : A Global Energy Crisis.

The International Energy Agency, the (IEA), has pronounced this energy crisis “the largest supply disruption in history.”(Ref. 1) The dimensions of dependency are huge. Before the War, China alone imported 42% of its consumption- 4.9 million barrels of crude, daily from Saudi, more from Iraq, The UAE and Oman, the rest from Kuwait and Qatar. (Note 1).

Everyone and everything is disaffected. The International Monetary Fund, the (IMF) advises restraint - public transport subsidies and home-working to offset shortages of fuel and outages of power. Morning Brew accurately predicted air-travel disruption. Pump prices soar. Delivery costs and energy bills rise. Food prices will follow as rising fertiliser tariffs translate into higher retail fruit and vegetable price-tags.

Energy is being weaponised, the closure of the Straits of Hormuz preventing energy dispatch and delivery. Beyond, in ‘side-shows’ such as Cuba, serious energy deprivation is occurring due to deliberate US action. Rumours circulate about sabotage attempts on subsea energy delivery cables.

The World Bank’s Chief economist believed the crisis “could push millions more toward hunger as its economic fallout reverberates around the globe.....about 100 million people suffer from acute food insecurity already....that’ll go up by 20% very, very quickly.” (Ref 2).

Since the start of the recurrent , now ‘on-going,’ Iran War, prices have inflated, deliveries have been disrupted. Soaring fossil fuel corporation profits infer corporate profiteering has been at work as « eight of the sectors biggest corporations realised an average of \$700,000 a minute for the duration of the first quarter of 2026 ».(Ref 3) Prices rose to \$126 a barrel.

Millions endure financial and climate pain. Again protesting voices demand another Windfall Tax to finance a push for more renewables.

‘Energy Security’ swiftly shifted from backstage where it had mainly focussed on ‘Fuel Poverty’, to become, for the second time in recent years, a topic very much in the national spotlight.

A crisis impacting on industry, business and economy as sudden and largely unexpected Iran War disrupted incoming flows of fossil fuel imports precipitated energy shortages and price spikes.

Questions of ‘How best to respond to energy insecurity’, similar to those raised over national defence, were surpassed by a cascade of other immediacies, newly pressing security concerns arising as global warming dramatically came home to roost in mainland Europe and Britain, shaking the very foundations of our transport systems, our agricultural and industrial production, health and health-care, the sanctity of our environment, our homes, our livelihoods. No longer did we angst about coming under fire from Russia in 2030; we were under wild-fire, warring with Global Warming and the interests behind it.

Section Two: Global Warming Dilutes Energy Security.

Its not only hard to desist from detailing the climate disasters currently surrounding us, its essential to do so if we are to comprehend the dimensions and urgency of our Energy Security crisis.

Summer 2026 will go down in the climate annals as 'The Year Climate Records were Broken'. Europe has become the world's fastest warming continent , heating at more than twice the global average, experiencing repeated heatwaves that increase demands for power to operate cooling systems.

Lincolnshire, England, parts of European nations such as Germany, Italy and Greece - an entire 40 % of France, swelter in 40°C. The World Health Organisation (WHO), has monitored Extreme Heat Event fatalities – 489,000 globally – 36 % , European. (Note 02)

Hospitalisation beckons those suffering from heat exhaustion, heat stroke, aggravated diabetic or cardiovascular conditions, diseases more readily transmitted in hi-heat while nurses faint on duty in hospitals that lack power-hungry air-conditioning. (Note 3).

Hi -heat has depressed employees' efficiency, dissafecting concentration so productivity has fallen costing billions – £4.4bn reasons for air conditioning investment plus additional energy generation, and counting. We've still got the rest of the year to go. (Note 4).

Conditions perfected by wind, drought and heat are spawning far more numerous, extensive and enduring wildfires across

mainland Europe and the UK than ever before. As fast as Britain's National Fire Chiefs Council (NFCC) issues one set of urgent fire risk warnings accross the kingdom - from Eastern Scotland to South East England, more are needed. National Resilience data records fire and rescue services responding to 706 UK wildfires, 208 in just 12 July days. (Note 5). ' Rescue and Reconstruction' requires on-the spot emergency power supplies plus that needed for reconstruction and materials manufacture.

Wildfires, no respectors of national boundaries, contaminate air breathed nearby *and* far away. (Note 6). Ten percent of UK particulates originate from thousands of miles distant. Canadian Wildfires contaminate air breathed by a great many American citizens, to twice air quality regulations. (Note 7). Pre-existing cardiovascular, COPD, asthma and lung cancer sufferers experience additional serious stress (Note 8). Many will become patients in overheated hospitals that need to be equipped with electrical air conditioning, with heat-struck staff.

All Wales and half England is under drought. Livestock pastures shrivel ;agricultural drought and food shortages beckon. (Note 9). Crumbling dried-out soil undermines rail-line 'foundation' stability. Prior to a recent passenger train derailment at Lewes, during high heat and drought; several passengers travelling in earlier trains reported 'rough riding' and warping had been observed. (Note 10). Heat melts tarmac, buckles rail-lines, destabalises buses, trams and trains, lorries and private cars. (Note 11) Tarmac-laying and rail replacement don't come energy-free. Investigations, repairs and uplifting the train will prove complex.

All these climate change impacts serve as reminders of the a-priori importance of clamping down on emission levels and building in climate and energy resilience, holding back intensification of global warmings' wrath while generating the additional power it demands. We now need to do both at speed , extensively and most urgently. Further delay spells disaster. Driving in reverse gear will rarely be feasible - these impacts are mostly irreversible. Some may be mitigated. The intensification of others, checked ; deepening damage, moderated. We can still slam-on brakes. One thing is sure. We will need more power !

We *will* require extensive speedily implimented resilience and adaptation measures to ameliorate the damage current global warming levels inflict. Implimentation will require power; investment that Treasury Manadarins may believe unaffordable especially given the rule book that binds them. But spiralling global warming damage, will, in just the medium, let alone the longer, term, demand ever-rising public expenditure on clean-ups, resilience and adaptation, as well as emergency responses and recovery. Future-proofing is as much the name of the game as much as 'Search and Rescue'.

Plenty of studies have demonstated the sheer unaffordability of holding back. We need to release finance in the immediate term, for emergency responses and recovery while accelerating the pace of decarbonisation to try and depress the rate of climate change damage, impliment substantial resilience and adaptation measures all to keep abreast of the avalanche climate change and effects global warming is currently delivering. More to avoid falling so far behind as to endlessly face an ever-mounting struggle to find more and more invesment just to arrest our backward trajectory.

As Pippa Crerer advises. Daunting levels of global warming and damage don't mean we should abandon decarbonisation. Rather, the speed at which impacts arrive is making continuation ever more crucial. Investment in resilience and adaptation is an essential 'add-on', not an alternative. This summer has simply and clearly spelt-out the necessity to do both, speedily and simultaneously and given current governmental fiscalities do so in the most cost-effective, affordable way . In short 'To Do More for Less'.

Section Three : Why is Britain's Energy Supply Insecure ?

Britain's energy insecurity derives from four principle causes. The most elemental cause is, of course, that she has not sufficiently exploited the richly diverse range of readily accessible energy resources with which she is blessed – many of which could be speedily and at relatively low cost be brought on stream to produce national energy security as will be discussed later in our energy strategy section. The following three secondary causes have ensured that this a priori and elemental causation factor has turned from theory into practice. Firstly Britain has become dependant upon energy imports whose availability and price can change due to events outside her control. Secondly her energy distribution system: The National Grid has become unfit for present purposes and is obstructing the development of renewable energy. Thirdly climate change conditions are compromising clean power generation.

Imports

Imports, essential to a nation not producing a sufficiency of power to meet national demand, lie at the heart of Britain's energy insecurity. The higher the level of imports the greater vulnerability to any number of disruptions entirely out of our control including: ruptures in supply, unaffordable prices, damage during delivery, either deliberate or as a consequence of war, natural disaster and inefficiency. Subsea cable delivery is vulnerable to sabotage -how better to wage war against a sea-bound nation.

Britain has overly high energy imports - around 40 % mostly for fossil fuels but also for clean energy from European

nations like France, Germany and Spain. Fossil fuel imports are currently exposing the UK destabilising energy insecurity for the second time in recent years.

The National Grid

Once the Grid's centralised production and distribution system synergised with the prevailing centralised production structure and its consistent fossil fuel power generation. It was never intended to deliver decentralised renewable power especially, as with weather-dependant wind and solar its variable. Unfit for present-day purposes, the Grid itself has been obstructing transition to a decentralised clean sustainable, energy system along with the Energy Security we so badly need. Rather than securely delivering power it approaches collapse.

Renewable's connections to the grid are effectively rationed. Extensive connection delays have cost the sector investment. Investors once eager to commit funds to renewable projects have turned to opportunities elsewhere.

Wind farm corporations are being paid to stop production in order to avoid dangerous Grid shutdowns. Britain's North Devon largest solar farm has been obliged to freeze production. Gas is exempt because it would take such a long time to re-commence generation.

Irrespective of these preventative measures Britain came close to exceeding safety protocols this summer and shutting down around June 23rd. The Financial Times strongly and clearly spells out the risks to energy security posed by The Grid.

« Staff in The National Energy Systems Operator (NESO), which maintains Britain's electricity supply, have alleged that

The Grid fell outside safe operating limits for multiple periods » (Ref 4), on June 23rd as the country sweltered in temperatures of more than 34C »

Whistleblowers have gone so far as to infer interference in operational decision-making protocol whereby ordinarily, « when the grid falls outside the safe operating limit , controllers would be expected to cut off electricity supplies to some industrial users to rebalance supply and prevent a potential automatic shutdown. » (Ref 5) Protocol does not seem to have been followed in June and presumably only luck prevented total and catastrophic blackout.

Nuclear Power

Invariably nuclear plants incrementally increase development costs and extend projected development times. It took fifteen years to raise the £38 million estimate for the development of Suffolk's Sizewell B reactor, while Somerset's Hinkley Point C reactor costs rose from an initial £18 to £46 billion. (Note 12) As Sir Geoffrey Clifton-Brown, chair of the public accounts committee which oversees the work of the NAO commented , « Experience from comparable nuclear projects in the UK and overseas highlights their vulnerability to delays and cost overruns » (Ref 6). Both tendencies make it it is hard to conceptualise nuclear as a top contender for the urgent, but low cost, production of national energy security Britain needs.

It is also unlikely that nuclear will make much of a dent in Fuel Poverty levels. Hinkley C might power six million, homes but they will have to wait until the mid 2030s before delivery and promised overall savings will almost certainly be outstripped

by the cost of supporting construction until halfway through its operational life.

Extreme Heat Events and Drought have just lowered river levels so much that they can no longer be relied upon to cool nuclear power plants constructed beside them for this very purpose.

« Six European Union countries : France, Italy, Poland, Hungary Romania and Slovenia, have had to shut down some of their power plants due to lower river levels and increased water temperatures heatwaves have precipitated. (Note 13) .

40 % of SE European nuclear plants reliant on Danube cooling water, are offline. (Note 14). The Paks plant supplying 50 % of Hungary's power reduced production, then shutdown. Poland's Stut kozienice and Pozanic nuclear plants on the stricken Vistuala river, are offline. This is the very first time that Hungary and Romania have been obliged to shut down nuclear facilities and weather forecasts anticipate no rainfall reprieve any time soon.

Romania actually instructed her naval forces to carry out a controlled explosion - an extraordinary endeavour designed to enable construction of a temporary dam and divert remaining Danube water to its one remaining nuclear plant :Cernavoda. Defence Minister, Rada Miruta explained that just one day of the plants continued production more than compensated for the manoeuvre. (Note 15)

French nuclear plant closures have risen to four. Output from others has been reduced. Accustomed to summer shutdowns during warm summer periods the French grid is well prepared, but clean power exports are the first in line for disconnction

when output decreases and that includes the UK along with Germany and Belgian grids which typically become stressed. Gas-fired power can be boosted in order to compensate but retail prices still upwardly spike.

EDF in France is investing 9bn. Euros to try and adapt plants to climate change. But this plan is expected to take 15 years. (Note 16).

Like the UK's reconfiguration of the Grid it is no quick fix. S.W Garonne level projections for levels c. 2050 are down 30 - 50%. Since 70 % of French energy is nuclear sourced EDF's project is of major import.

UK plants are sited by the sea. Unfortunately, like river temperature rises, sea ones are also heating-up since our oceans absorb more than 90 % of the extra heat carbon emissions trap. Mostly rises are around the 1 % mark, but some seas like the Mediterranean are experiencing increases of double – around 2 %.(Note 17). Temperature rises exceed those recorded in 2023 indicating the start of a disturbingly upward trajectory which might conceivably compromise the safety of continuously operating coastal nuclear plants.

Section Four. Fossil Fuels Are Not the Answer

Climate Deniers , including the Reform Party back fossil fuel industry suggestions that fossil fuels are the solution and call for increased exploitation of dwindling North Sea fossil fuel reserves in Rosebank and Jackdaw fields. Offshore fossil fuel workers trade unions , thousands of whose members have already lost their jobs since the start of the sectors slow-down, agree.

Britain's newly crowned Prime Minister, Andy Burnham seems tempted to take a similar line. Jobs have displaced Net Zero as more important determinants of public sector procurement allocations despite all the evidence presented by Ed Milliband when Seretary of State for Energy of the success of the burgeoning green economy in creating new job opportunities. Burnham also appears open to the idea of granting new liscences for further Rosebank and Jackdaw exploitation.

But it is hard to see how energy security can be advanced by exploiting a site from which over 90 % of economically viable reserves have gone and whose output auomatically goes onto the open international market. We have no priority claim on North Sea Oil. (Note 18).

The British government *has* received significant sums from North Sea operators in the past, but income will dwindle from now onwards.

Ed Milliband called the proposed issue of new licences 'Climate Suicide'. Oxfam, used the Mortality Costs of Carbon formulae which links the number of excess deaths to C02 output. They expect that approval for both Jackdaw and Rosebank fields would lead to sufficient carbon emmissions –

some 35,800,000 tonnes, to kill 65,495 globally over some decades. (Note:19).

The governments Office of Budget Responsibility's functions include foreseeing financial benefits accruing to the government from North Sea operations. They predict that offshore corporation tax, (including 'ring fence' corporation tax, and the supplementary charge), petroleum revenue tax and the energy profits levy, should total around £2.7 bn. for the 2025/6 period. (Note 20).

Income has fallen annually since 2022-3. Discrepancies between these projections and that of Offshore Energies UK can be accounted for by the latter's inclusion of payrolls tax receipts bringing the total up to some £13bn.(Note 21).

Payroll receipts could, of course, still be received should sufficient and necessary retraining support be extended to members of the North Sea workforces facing redundancy as the fields value and life-span depreciates. The remaining credit balance could almost certainly be offset by the savings in the increased levels of health-care and benefits that will have to be expended as a result of the health damage the emissions will cause.

Kicking the fossil fuel can down the road will open a window in which more carbon emissions will intensify global warming damage to 'People and Planet' that government, in the current scheme of things, will be obliged to cover in addition to financing the retraining and benefits which will still be required by the workforce when their employment inevitably and finally ends. Corporations will write-off their decommissioning overheads against their tax dues while those suffering the consequences at first hand will have lost most. Once extra time is played-out the growing difficulties of life on earth will

have intensified without having significantly boosted public sector bank deposits at all.

Most UK fossil fuel supplies for power generation, come from overseas rather than domestic sources, but since deliveries from Gulf States have been severely obstructed by closure of the Straits of Hormuz due to the on-going Iran War, prices have spiralled. The \$22 billion 'surcharge' on top of Europe's normal fossil fuel import bill amassed over the very first 44 Iran War days, undoubtedly helped cement convictions that the pre-existing 'renewables plus nuclear mix' already providing 70 % of the EU's Europe's electric power should be rapidly expanded. (Note 22).

Excesses of this dimension seem particularly unpalatable considering that whilst domestic fossil fuel corporations receive around £17.5bn in annual subsidies, they only yield about £7bn net, a sum highly unlikely to come any where near close to the costs they externalise onto health and health-care and the myriad inequities they visit upon People and Planet.

Section Five : Decentralised Clean Heat Networks

When ‘Energy Security’ became headline news, discussion soon turned from the immediate impacts of the supply crisis to questions about ‘What kind of energy strategy could restore security ?

Italy and China had continued to consume coal despite a more generalised movement away from fossil fuels as reserves depleted and increasing evidence of their true costs surfaced. There was no rush to return to coal. Just as well given that the last rush for cheap coal had left virtually no spare capacity capable of satisfying one. Most nations recent experiences of importing fossil fuels from often politically unstable nation states and suppliers, has proved somewhat unreliable and highly expensive of late.

Unsurprisingly_Carbon Brief’s analysis of sixty nations’ responses to the on-going global energy crisis found, just four weeks into the eruption of hostilities, « European nations poised to call for swifter deployment of clean energy to combat fossil fuel shocks ». (Ref 8).

Uk2zero’s response centres more upon new local clean heat development than power. Heat is a key component of the stratgy given that its resources are ‘location-specific ; and like good wine , do not travel well so their beneficial economic, social and ecological impacts are tied to their location. Clean heating also hs a rôle to play in decarbonisation since heat conributes 32 % to uk air pollution levels. Other renewable energy resources : solar, wind , hydro, geothermal and tidal stream also have a key rôle to play. Proposals focus upon the affordable, swift substantial contributions decentralised

networks of clean , often under- developed heat and power can make to dislodging certain barriers to UK Energy Security as well as to many social, economic and ‘climate’ objectives.

Low development and supply costs are particularly appropriate for these financially straightened times, Low cost, affordable projects that maximise value for money and exploit locally available energy resources can revitalise de-industrialised localities across the UK, regenerating local economies , improving living standards and welfare: maximising value for money.

They meet a range of investment criteria appropriate to the dictats of present day pressures and demands: affordability, cost-effectiveness, value for money, energy efficient, democratically accountable to communities and local government, speedy to put on line, producing clean heat and power, non-polluting, producing ‘good’ organic growth that benefits local communities, creating ‘good’ local employment opportunities , providing low cost heat and power to increase local living standards and disposable incomes. These criteria speak to the satisfaction of local needs - for jobs, affordable heating and power, improved living standards, better health and welfare.

Bringing by-passed energy resources on stream to provide cheap heat lies at the heart of the strategy. Heat is generally tied to localities which it will sustain over time since it cannot readily be transported an across any distance or be significantly scaled-up Relatively unattractive to large financiers and corporate interests it represents an ideal infrastructural sector suitable for plundering by local authorities and communities to the benefit of national and local interests : the attainment of energy security and improvement of welfare, the lowering of energy bills for

households and concomitant reduction in welfare and benefit expenditures for central government.

Enterprises satisfying the 45 % of energy demand represented by heat with heat, rather than power, will be at an economic advantage, entering the marketplace at a competitive advantage because their prices will be cheaper than those for power.

Importantly the development of sources relatively new to energy markets, broadens- out national energy dependency from four main power resources : nuclear, fossil fuel, wind and solar to far more. The old adage 'Don't put all your eggs in one basket', applies to energy in giant neon lettering. Fossil fuels have long since had governments, desperate to guarantee energy supply, over, to repeat another age-old adage, a barrel.

At the same time it broadens out the benefits public sector investment can realise. Cheap heat Improves living standards by tackling Fuel Poverty . It lowers household and benefit bills ; industrial overheads and subsidies.

Until recently, successive governments simply gave heat a nod, allocating limited pilot scheme funding. More recently policy-makers have started to regard heat developments more favourably.

HNES improvements reached 181 heat networks, improved 27,500 residents energy supply and cut carbon equivalents of almost 2,000 London-New York flights annually. The Green Heat Network Fund (GHNF) accelerated deployment. £224 m financed 21 new low-carbon schemes. The Heat Network Technical Assurance Scheme HNTAS), delivered draft standards, and completed new-build pilot and training courses.

Decarbonising by increasing clean, and decreasing polluting, energy, progresses government carbon emission targets , takes us closer to delimiting global warming . Tackling ill-health, especially pulmonary conditions both caused and exacerbated by 2 .5 pm particulate emissions : asthma, COPD, Bronchitis, Pnumonia, lung cancer and emphysema, it concommitently lowers NHS expenditure. Many welfare demands placed upon the state be they for NHS treatment, fuel or rent subsidies, could, indeed should, be preventable in this way.

A core element of our approach is the creation of a decentralised network of heat harnessing schemes to exploit location-specific energy resources to meet the 45 % of energy demand attributable to household and industrial heat. Demand for power which is far costlier to develop and often has a far longer lead-time, falls. Overall national energy security greatly improves. Pre-existing development by local authorities and community organisations has created strong foundations on which to build.

Localised development possibilities for Waste, Sewer, Mine Water, Latent, Geothermal and Ground source heat projects detailed below will be followed by discussion about a parallel decentralised network of clean power incorporating under-developed clean heat resources alongside localised modest solar and wind power.

Harnessing waste, ground and air, geothermal, latent water, and Mine Water Heat, (MWH) is a hugely energy efficient way to satisfy up to 40% of our energy demand - it lowers electricity generation, eliminates the ‘doubling-up’, involved in first generating power then transforming it into heat, circumnavigates lengthy grid distribution wherein power is lost

en route. Its cost effective too bringing a resource, currently wasted into profitable and useful consumption.

Waste Heat.

Plentiful Waste Heat may be captured from numerous and diverse sources. Some pilot schemes have been developed in the UK – one captures tube tunnel heat in Islington. High-energy industries offer high rewards. In the 1970s SERA's 'Combined Heat and Power' pamphlet looked to waste power plant heat to feed into residential inner city areas to lower heating bills, improve energy efficiency and save North East England's heavy engineering jobs, sadly lacking regard for carbon émission levels. The closure of inner city plants put paid to such ideas,

More recently waste heat from a Humberside hi-energy chemical works has begun circulating around neighbouring factories. Heineken, along with other breweries have proved rather energy-innovative. In Manchester Heineken invested £25 million in the installation of an industrial heat pump network that recovers waste heat from refrigeration and brewing processes to power mashing, pasteurisation and keg washing, almost halving fossil fuel gas use at the site.

Scottish moves toward a coordinated industrial clean heat strategy noticably began in earnest at the time when the SNP worked with Green MPs in government. Mitsibushi had transitioned from production of 80 % air conditioning unit manufacture for the Global South, to 80 % heat pump manufacture for Western markets. Production re organisation had improved productivity to the point when Scottish-made products were beoming price-competitive with Asian ones, whose market edge had been honed by cheaper labour costs.

Skill sets seemed to synergise with many possessed by the Scottish offshore oil labour force and often require only bolt-on training course. A mobile training unit supplied outreach training in remoter Districts although the heat pump hub to which government aspired, centred around the central belt Mitsibushi plant.

The strategy largely faded with the disillusion of the SNP-Green 'pact'. Nonetheless in 2025 Springer reported that Scottish government 2030 clean energy targets reflected the recognition that heat represented 50 % of national energy demand. Currently however plans are only afoot for a joint Fosterhill Health Campus Aberdeen Heat and Power granite geothermal scheme that would halve the formers £1 million monthly energy bill. Hope would be stronger perchance should the completed 2016 Banchory geothermal feasibility study have been moved forward.

Overseas, harnessing heat for industrial, institutional and residential consumption is increasingly commonplace begging the question as to whether heat could become a mandatory part of hyperscale design'.

Nordic countries blaze a trail. Finland heats 20,000 homes efficiently and cheaply, integrating a data centre within a District Heating Network. Subterranean construction maximises the efficiency with which heat can be trapped, harnessed and distributed. 'Sweden Data Parks' are determined to waste no data centre waste heat and Helsinki's Microsoft plans the world's largest heat recycling scheme. London's Mayor, Sadiq Khan, is coming on board with his plans for 9,000 data centre heated London homes.

Data centres have been constructed underground and the heat they release put to good use. But we must bear in mind that their water requirements present a far trickier conundrum.

Municipal waste incinerated waste heat has, to date, created too much pollution to be a very acceptable source. (Note 23) Although a recent piece in 'The Conversation concluded it was the best available option for municipal waste disposal, it has been criticised for burning recyclable materials and polluting local residential areas.(Note 24)

_Waste Heat is considered capable of meeting up to 30 %_of our demand for heat (Note 25).

Ground Source Heat

Ground source heat has been installed by Cornish Kensa Utilities whose corporate-owned shared heat pump arrays now service three Cornish villages. Time will tell if Kensa's ' low-cost heat pump scheme stands alone without the European funding that bankrolled it. (Note 26)

Duncan Lucas, a uk2zero member, once a planner with Grantham Council, currently a New Zealand housing association property manager, foresees a strong future for ground source heat in rural areas like Norfolk and Lincolnshire, where scattered settlements favour stand alone energy systems and local authorities retain ownership of 3 – 50 % of housing constructed in suitable blocks. He estimates that a total of around 9.6m rural, market town village and hamlet homes could benefit. (Note 27)

Latent Water Heat

Latent Heat has been at the bottom of the UK's energy priorities until very recently despite a highly favourable UK 'GOV' Report on Latent Heat and German initiatives in the field.

Berlin river and wastewater has been innovatively developed to decarbonise city heat networks a combination being replicated in London where industry, and therefore substantial quantities of waste heat, are not commonly available. In Germany, commentators observe that heat harnessing from river water concomitantly lowers the temperature of the water source.

Another aqua scheme, constructed by BEW - Berlin Energies ; has, in line with many EU nations, been built to decarbonise inner city district heating networks and heats 80,000 apartments and commercial properties. (Note28). Thermal energy, extracted via an aqua heat pump from the Spree river is raised to 90°.

In the UK pilot schemes have been undertaken in Glasgow's former John Brown shipyards site where harnessed heat warms 1,000 homes, plus community and business premises. Bristol Harbour's Castle Park Water source heat pump has been developed by a council keen to dilute its 1,000 household strong heat network's carbon load. Urban areas like Nottingham with 100MW capacity, plus smaller Chertsey, Egham, Goole and Gainsborough with demand levels beneath 50Mws could be warmed by Thames and Trent river heat. (Note 29)

Mine Water Heat (MWH).

NWH lies beneath 25 % of UK houses. Harnessed from geothermally heated abandoned mine tunnel flood waters, temperatures vary with depth -the deeper the hotter, usually from 10-20°, a range suitable for upgrading and circulating via District Heating Networks. Rarely temperatures of 40° are found suitable for power generation as in one Catalonian scheme.

MWH possesses three clear advantages. Mine workings are located near or under residential districts housing potential District Heat customers. Reliable, it is neither seasonal nor weather dependent. Renewable – cooled water can simply be fed back into the tunnels for re-heating.

MWH is clean and cheap, tackling Fuel Poverty , decarbonisation and de-industrialisation.

Promotion is conducted by The Coal Authority and The Mining Redemption Authority plus the British Geothermal Society, (the flood water being geothermally warmed). In a collaborative endeavour an interactive map, freely available to developers, planners and researchers, showing the mines locations and potential heat levels has been published.

The map and research behind it can be accessed on <https://www.lyellcollection.org/action/oidcStart?redirectUri=%2Fdoi%2F10.1144%2Fqjegh2020-109> - a paper published in The Journal of Engineering Geology and Hydrology.

Gareth Farr, the BGS geoscientist who headed the project said « This has been a very exciting piece of work. It's the first time we have been able to visualise the temperature of Britain's coalfields. We have found records of heat temperatures going

back more than 100 years and compared them to temperatures in the mines now, and found them to be quite similar. This is a clear indication that geothermal processes that create this heat will be here for a long time to come. “ (Ref. 9)

Cornwall County Council has even conducted an investigation into the potential of its Tin Mines to fuel similar schemes.

NE England’s new-build Seaham Garden Village and Gateshead Industries, two of some thirty possible schemes being investigated in 2020 when the map was published, are heated by MWH, the first to access central government’s £320 million ring fenced for its Heat Network Investment Programme.

MWH possesses the potential to meet 5-15 % of UK heat demand.

Geothermal Heat

Europe has been enthusiastically exploiting geothermal heat , to decarbonise long established inner city District Heating Networks by deep drilling into aquifers on city perimeters for MWH.

Drilled geothermally warmed aquifer water has huge potential. An estimated 100 year supply lies beneath our feet. Yet its extensive potential has been largely ignored until lately.

Whilst Basel experienced a minor seismic event which received major media attention early this century, when drilling

for geothermal energy to supply heat to its new District Heating Network ; accross the border development a cluster of German towns continued drilling successfully and smoothly.

European cities have forged ahead, decarbonising District Heating networks and developing new ones, especially in Germany where the sector is expected to attract over \$1bn dollars by 2030

The UK boasts but few initiatives ; most prominently The Eden Projects' Domes and administrative office project and Southampton's geothermal contribution to its heating network. The latter benefits from clean deep drilled geothermal heat thanks to the determined endeavours of Alan Whitehead, Labour's Test and Itchin MP, a Southampton Councillor at the time and now in the Lords. He might not have managed to persuade the Department of Energy to finance an extensive scheme but he did secure the loan of a suitable drill.

Nearby, the Royal Bournemouth Hospital is in the process of weighing up its two decarbonisation options – deep geothermal drilling or heat pumps. (Note 30)

The British Geological Society has warned Britain that Britain will be unable to attain Net Zero without geothermal power and a recent Cross Party Committe of Inquiry's findings were favourable to its development. But still initiatives are in short supply.

Hopefully the newly lanchd British Geological Societies' 'Geological Platform' which covers individual systems, whole towns and industrial parks will spark interest. Highly accessible and informative its national-local scale maps link geologically

favourable locations to policy and the four available geothermal technologies:-

- shallow, vertical closed-loop with ground source heat pump - - shallow open-loop with ground-source heat pump**
- deep, hot sedimentary aquifers (hydrothermal) -**
- deep, engineered geothermal systems in granites (petrothermal) “(Ref 10)**

“The closed-loop systems can technically be deployed almost anywhere across Great Britain Up to 55 per cent of the population has the potential to extract up to 15 000 kWh of thermal energy (the typical annual energy of a gas boiler), via a single, 150 m-deep, closed-loop system.

Towns, cities and industrial sites can be assessed for the potential to retrofit geothermal technology and It highlights the fact that planned development for the Liverpool–Manchester–Leeds–Sheffield growth corridor can take advantage of multiple geothermal energy technologiesé”.’ (Ref 12).

<https://www.bgs.ac.uk/news/new-platform-highlights-geothermal-potential-across-the-uk/>(Note 34))

When will the UK follow Europe’s burgeoning Geothermal sector growth?

Sewer Heat

Sewer heat has been considered a probable « cornerstone of future sustainable sewerage systems. » (Ref 8) and lauded in the Government's 'Guidance' paper for its unique correlation between populations, heat demand and sewer system scale, Hundreds of thousands of kilometers of sewer systems, the Guidance observes, are destined for waste water treatment plants. » (Ref 9). Upstream, near residential communities, water suitable for heating and cooling at a stable temperature can be harnessed with wastewater heat pumps.

In Berlin heat has been extracted from Ruhleben wastewater lower down, near to the point of discharge into river waters.

Inner cities like London typically lack industrial waste, Mine Water or accessible geothermal, heat. The Dept of Energy Security and Net Zero together with Westminster council plan to harness heat from at least four sources: the underground, the river Thames, sewer networks *plus* industrial waste heat from the city outskirts transported in shipping containers floated up river.

§1bn sterling equivalent has been allocated to develop this »first zonal scale network in a market that offers an investment potential the size of the UK shore wind industry » (Ref:10)

Outer London Hounslow's outskirts anticipate a £10.55m grant to heat 2,000 homes using recovered sewer heat. (Ref 11).

Sewer heat should meet up to 10 % of the demand for heat .

All of the above clean heat options are at once proposals. Renewable and clean they form the building blocks of a decentralised decarbonised network of local energy projects that can be speedily established delivering affordable heat safely with minimal energy loss via its short interconnected heat networks.

Together with certain clean power projects that can form a parallel network, also from in-house sustainable energy resources they can revitalise local de-industrialised economies boosting health, employment economic demand and good growth.

Heat, directly delivered via Heat Networks reduces the volume of power being handled by The National Grid obviating pressures caused by the unpredictable weather dependant decentralised wind and solar power inputs that risks hazardous shutdown and blackout.

Meeting up to 45 % of the national demand for heat and substituting harnessed heat derived from in-house energy resources for power , displaces power imports substantially buttressing UK energy security.

Section Six : Decentralised Clean Power networks.

Heating networks lower the volume of power generation required to meet demands for energy in the form of heat, in itself able to lower demands for insecure imported fossil fuelled power and avert Energy Crisis like the one presently suffered on account of the so-called Iran War.

Local power grids supplied by power generated from in-house energy resources like Geothermal, Hydro and Tidal Stream energy also lower demand for imported fossil-fuelled power that is destabilising UK energy supply – freezing deliveries, spiking prices and hurting households, industries and government.

A decentralised network of localised power generating schemes ranging from solar and wind weather-dependant renewable power sources to tidal stream , hydro and geothermal could all be distributed via Local Power Grids quite independently of The National Grid with the self-same benefits.

Solar.

Solar generation can come from roof panels installed on domestic, local insitutional and industrial premesis or large solar arrays.

Overseas solar power installations include innovative discrete installations suited to modest localities. Fences and Crash Barriers , solar panelled on each side, with central bifacial solar cells, plug-in units and floating panels (Germany), stilt-

mounted over cooled livestock (France); Roof tiles (York Minster UK) Terracotta Reglo (Pompei), inter-rail tracks (Switzerland) and paint, are just some of the applications on offer. (Note 32)

Wind turbines come in different shapes and sizes, and can operate singly or in small clusters as well as in wind farms. There was once a time when Danish communities applied to bank managers for community loans so that they could install turbines and connect to electrical power.

Smaller-scale local solar and wind, along with Tidal Stream, Hydro and Geothermal power, locally distributed via short distance power grids will suffer little power loss during delivery unlike the substantial losses experienced by The Grid.

Data on ‘distributed energy’ both from the USA and from UK community renewable power schemes, tells us that it is perfectly possible to distribute wind, solar, hydro, tidal stream and geothermal power via local power grids as well as solar, more usually the source of local power generation. (Note 33)

Weather-Dependant Renewable Energy Storage.

Both wind and solar power are hamstrung by The Grid. Delays in connection both slow down the rate at which these renewables can expand supply and advance National Energy Security. They cost investor capital which is placed elsewhere. Even where projects do secure connection generation may be disrupted when supply will exceed demand and potentially

precipitate dangerous shutdown so that schemes are paid to cease generation.

The output of operational renewable wind and solar power installations can be increased by improving their productivity. Thermal storage of production in excess of demand levels ie. surplus to immediate requirements, enables continuous generation uninterrupted by Grid edicts to cease production.

Thermal storage allows power, surplus to requirements to be stored. It can greatly improve productivity given that generation can continue through periods of high winds (Note 36) and the practice of paying operators to discontinue generation when winds are strong, demand weak, may be discontinued. Unit costs fall, returns on investment rise, attracting investors to the sector.

Britain needs to urgently invest in game-changing eminently affordable thermal renewable storage facilities designed and successfully operationalised in Nordic nations like Finland. Large quantities of renewable energy may be stored as heat for months in cheap mediums like salt and sand.

Storage will enable the proportion of the national demand for power met by wind and solar will increase, productivity rises will depress unit production costs, increasing returns on investment and attracting new investors. Demand for clean power should fall as widespread clean heat will provide a cheaper alternative so less additional generation will be required to meet Britain's Paris Agreement.

An alternative solution in Heerland, Netherlands uses surplus power to electrostatically produce hydrogen that can be consumed or stored. (Note 37).

Another option is demonstrated by Germany's conversion of renewable power surplus into heat and fed into District Heating. Mitte Combined Heat and Power Plant and due to come on stream in 2028. "If there is an excess of electricity from wind and solar power plants, it can soon be converted into district heating at the Mitte CHP plant within a matter of minutes" (Ref 12).

76,000 tons of CO2 savings should be made in the first five years - gas consumption will decrease as cheaper clean heat increases. The District Heating will supply more than 30,000 households in winter and hot water for 360,000 in summer.

The 120MW power-to-heat plant has a 75m. euro budget. BEW , a state-owned company, will undertake the construction; Herz the finance. (Note 38).

Geothermal Power

Next-generation geothermal energy emerges as a promising yet often overlooked solution to the challenges posed by Energy Security and decarbonisation.

Deep drilled hi-temperature geothermal aquifers fuel power generation at United Downs Plant, Devon, the sole geothermal power plant in the UK. (Note 39).

The relative dearth of geothermal power generation in the UK contrasts quite incredibly with her in-house availability of the resource.

The British Geological Society Geothermal Platform extols 'Next Generation' geothermal powers' advantages: " it is clean,

has a small surface footprint, can be built rapidly, is always available, load-following capabilities, and can scale from single MW installations to dozens of GWs across a grid. Because it is constructed by the existing oil and gas drilling workforce, it can be scaled up without building new factories or creating new supply chains. In addition to clean electricity and heat, it produces hot water as a by-product, which is ideal for district heating networks.

Next-Generation geothermal plants could revitalise the South-West, North-East, and Northern Ireland, providing high-skilled jobs, affordable electricity, and nearly free heating to areas that need support. These plants could also supply decarbonised heat to local industrial facilities.

This is a rapidly-developing field with few clear global leaders. The UK was among the first countries to experiment with enhanced geothermal energy in the 1970s. A concentrated push from the government now could result in reclaiming Britain's early dominance and being a global leader for this field. Traditional technical challenges and questions concerning geothermal have largely been solved by government-backed research in the US and Iceland. Relying on this research drastically decreases the financial burden for the UK.” (Ref 13).

Geothermal Power is estimated by a statistician ; Michael Hogg, a uk2zero working group member, to be capable of supplying a notable 11-15% of the UK's power consumption.

Tidal Stream Power

Tidal Stream Power, a hugely predictable and dependable source of power that is governed by the gravitational forces of

the moon and sun, but has been highly under-developed despite possessing advantages weather-dependant renewables like solar and wind lack. It is constantly available somewhere and should prove a suitable addition to the UK's base load energy required to balance the grid.

Expensive to develop it has been estimated to cost around three times offshore wind power to bring on stream. Underwater turbines and the large quantities of concrete in dams and barrages are costly. Tidal Stream has not been the first choice of energy policy makers or private venture capital.

Presently Tidal Stream schemes are dearer to develop than the nuclear power plants, generally considered the dearest among power generating projects.

Coral Point suggests however, that in the time it takes for a nuclear plant to come on stream, Tidal Stream options will have become cheaper.(Note 40).

University of Edinburgh policy modelling , published by Supergen in 2025, promulgated persuasive arguments for Tidal Energy installations. "62 GW of Tidal Stream development by 2050 could consolidate over £50bn in gross value added to the UK economy and sustain over 80,000 jobs. NESO's own analysis suggests tidal generation could reduce wholesale energy prices by around 120m annually, at a point between 2037 and 2060." (Ref. 14).

The big question remains unanswered. Who will put up the Risk Capital needed to take the technology to the point when private capital follows of its own volition ?

Clearly Tidal Stream Energy in Britain possesses sufficient potential to contribute a substantial percentage – 11%, of the

current demand for power. To date less than 0.1% of its potential has been realised.

Policy makers have toyed with estuarial barrages and lagoons – in Liverpool, Swansea and along the North Wales coast, but decided against them. Nevertheless The Hebridean Maygen scheme off the Scottish coast, stands as one of the world's most advanced schemes and generated a record breaking 25GW in 2022. (Note 41)

In 2021 the technology was allocated a £20 million per annum budget under Contract for Difference. Four new projects were expected to come on stream by 2027. Orbital Marine Eday 4-80 178 -54; Morlais Magallenes , GR3 Wales, Orbital Marine Eday 1; 2-40, 178-54 . The fourth, Maygen, is now in operation.

In 2023 the first offshore Tidal Array of six seabed mounted turbines came on stream and in the same year The Independent Review of Net Zero “highlighted tidal stream energy as an area in which the UK is a ‘first mover’ and, with further investments, could create distinct advantages in the future”.(Ref 15) An annual budget was affirmed but for 50% of that agreed in 2021.

To date, the Task Force Government launched in June 2025 charged with the development of a Strategic Road Map for Tidal and Wave Energy, led by Energy Minister Michael Shanks, and funded by The Crown Estate and Crown Estates, Scotland has not yet reported its findings.

Globally, as well as domestically, the resource has been under- exploited. The Rance Barrage constructed in 1996 near St Malo, Brittany, was the first in the world. Hebridean Maygen became the most prominent in the 2020s but a Korean project is now the largest.

Ocean Energy Europe quoted in Moene, foresees 2.4 GW of Tidal Stream developed by 2030, burgeoning to a £13bn global tradable market by 2050, so long as 50 GW has, by then, been developed.

Hydro Power

Hydro Power satisfies 2-2.5 % of our energy demand ; a contribution that could be roughly doubled, to total around 5%. More schemes are in the process of construction, not least since, as will be explained below, pumped storage hydro is essential to national energy security.

Globally hydro power represents one-third of electricity generation. Fifty per cent of all Europe's hydro capacity lodges in Norwegian reservoirs. Many of modest size commence generation in early summer when brim-full in early summer, lest they overflow during heavy summer rainfall.

Statkraft , Europe's largest producer, has been invested in hydropower these past one hundred years, holding five schemes in North Wales alone, fifteen in Scotland. It employs 3,300 people in its eighty generation sites and offices . It contributes to community funds – £6.1m in 2024.

Some hydro schemes build upon natural aqua features. Others erect valley dams to create rainwater storage - a reservoir from which managed flows can precipitate generation within the hour, while drinking and irrigation water can also be extracted.

Pumped storage hydro, (PSH) operates by pumping water back uphill to await further generation. Four large UK publically funded schemes were constructed over forty years ago in the

UK to help balance the grid. They held some 240 to 289 Gigawatt hours (GWH) - 8% of our electricity production, storing nuclear and coal power ready for generation within an hour. 100GW, representing 200GWh are being planned or constructed in 14 schemes.

Government is supporting the development of this additional storage development encouraging supply chain competition by topping up operator income should it fall beneath floor level up to cap level ensuring investors suffer no capital losses.

A January 2025 University of the Highlands and Islands inquiry warned that the tight Scottish labour market would need expansion. But so far its £30m proposed Centre of Excellence for Skills, Safety and Innovation has seen little progress. Uncertainty is also spread by delays to National Grid connections.

Interestingly at the other end of the scale, The British Hydropower Association lists a number of small-scale operators including domestic, farms, mill owners, community schemes and even off-grid examples.

An Oxfordshire community scheme for example, funded, as are many community schemes, by community share capital, is based around Olney Lock and incorporates the UK's first Fish Leap enabling fish to travel, un-injured by the technology, up and down stream. (Note 42).This particular scheme is also notable for the research functions undertaken.

Rural hydropower can protect rural communities who may otherwise suffer blackouts around ten years hence, when expanding electrification will wipe out sub-station headroom leading to blackouts.

Section Seven : Building Local Heat and Power networks

Local heat and power project networks should win public popularity being visible evidence of progress toward affordable energy for all, cleaner air, healthier environments, job creation et al. Support should grow as word spreads about cleaned-up locales benefitting from lower pollution, cheaper energy bills and revitalised local economies. Mine Water Heat in Northern England, Scotland and Wales will revive Mining towns: Tin Mine Heat profit deprived rural Cornish communities; Latent water heat recovery piloted in Glasgow and Bristol Docklands latent heat will hearten residents.

Community Wealth Building the Green Way will directly support, expand and strengthen the Clean Energy Economy. Organically growing the local economy as enterprises attracted by clean air, 'empty' roads, and thriving industries and workforces, migrate inwards, the calibre of job applicants rises, disposable incomes ,standards of living and local economic demand improve.

Making the price right.

Producing energy is only half the story; selling it another. Making the price right is a crucial deerminant of sales. While Wind and Solar Power costs less to produce than fossil fuel electricity it has regrettably cost more to purchase.

LI has already asked the Labour government to resolve this contradiction to, "Disconnect electricity contracting as soon as possible from the highest marginal costs among bidders and

award contracts on the basis of price bids as suggested by Dale Vince.” (Ref 16).

“Gas prices typically set the wholesale price across the market under Britain’s ‘pay as clear’ electricity market design.....Ed Miliband, the energy secretary, said that renewable power stations that currently received subsidies under the legacy, ‘renewables obligation’ would be encouraged to sign so-called ‘contracts for difference, under which the government guarantees them a fixed price regardless of the wholesale price, funded by a levy on consumer bills.” (Ref 17)

Disconnecting renewable from fossil fuel pricing will help ensure retail prices for renewable electricity properly reflect their lower level and thermal storage will greatly uprate wind power’s energy productivity. The more wind and solar power we develop the stronger our energy security will be.

Administrative Matters

Advancing local heat and power development at the local level requires overarching administration and finance to provide shared expertise and avoid overlaps.

Regional and Local Energy Boards have a key rôle to play in both, synergising with Labour’s commitment to devolved government.

Common-wealth, a UK Think-Tank, has proposed the establishment of Regional Energy Boards, which might, like the regional public sector suppliers who issued bills less than

forty years ago, retail local energy products to local industrial, institutional and residential consumers.

« Regional Energy Boards, (REBs), would supply everyone in their designated area, accelerate energy efficiency improvements, simplify support for fuel poor families... Design and deliver tariffs suited to different household incomes and needs » (Ref 18).

Going forward uk2zero conceptualises an even more substantial rôle for Public Sector Energy Boards at a more localised as well as a regional level : attracting investment finance , ensuring smooth relationships between regions and localities, providing shared expertise advice, research and support, establishing shared training hand in glove with relevant trade unionists and encouraging appropriate manufacturing facilities.

Growing Jobs for fossil fuel workers in the Green Economy.

To date more than a million green jobs enjoying levels of pay topping £43,000 p.a. have been established, in the green economy, more than the £39,000 national average. 308,000 were directly engaged in solar panel installation, wind and turbine manufacturing plus supply chain employment and 600,000 in waste and pollution.

These numbers should help re-assure fossil fuel workers whose labour market began to leach jobs some 13 years ago - 200,000 in 2013; that transition to the green labour market was assured.

Re-assurance might also have been taken from earlier Scottish Assembly plans to encourage the establishment of a heat pump hub in Scotland's central belt which noted a fortuitous synergy between existent skills deployed in the fossil fuel sector which indicated that often only bolt-on skills training would be needed to fit many redundant fossil fuel workers for alternative employment in heat pump production and installation.

Unfortunately the Aberdeenshire endeavour to create jobs for an industrial workforce facing the end of their sectors life has yielded rather few employment opportunities to assuage their fears and implimentation of Highlands and Islands University calls for a retraining centre near Inverness doesn't appear to have yet begun.

Jobs suited to fossil fuel industry employees are most likely to be created when the Clean Energy Economy grows. UK heat pump installations grew by 43 % between 2023 and 2024, supported by the government Heat Pump Accelerator Competition whose grant funding leveraged investment to create new jobs.

Productivity improvements achieved through the re-organisation of heat pump production make UK production competitive with Asia. Expansion into this burgeoning sector is indicated not only by multiple prospects indicated above but also by sectoral reviews.

The joint SNP and The Scottish Greens government aimed to establish 'A Heat Pump Hub' in Scotland's central belt inspired by Japanese-owned Mitsibushi company,s' reversal of production from 80 % air conditioning units and 20 % heat pump manufacture into the opposite. Some progress was

made and workers re-skilled in colleges and a mobile training unit.

The Heat Network Technical Assurance Scheme (HNTAS) , has delivered draft technical standards and appropriate training courses. A pipeline for training-up workers to fill heat sector jobs has been established and the numbers trained has been expanding. 3,149 individuals have been trained through the government Heat Training Grant supported by a £5 million Heat Training Grant.

A major initiative to foster turbine and heat pump manufacture would buttress both British Energy security, the jobs market and the economy. Reliance on technology imports would fall; employment opportunities grow.

Financing heat networks and power grids.

Securing Britain's energy supply at speed by investing in more clean power and heat, is cheaper than inaction. The speedier the action the more the saving. Fiscal constraints bite deep, other departmental budgets grow. Higher taxes win few prizes. Borrowing heavily when recession hovers in the wings and we already pay interest rates over and above other G7 nations, wouldn't seem the wisest choice.

Investment in the green economy is worth it. « The Clean Energy Economy is currently worth over £1bn a year and growing three times as fast as the rest of the UK economy. Nearly half a million pounds of investment funds are in the pipeline » (Ref 19).Twenty-two thousand firms are involved .

One key potential source of investment finance is the offsetting of clean energy investment against savings it realises in other government departmental budgets.

Lower dependancies on benefits and services translate into government savings that might be repurposed into clean energy investment funds for Regional and Local Energy Board dispensation as low cost, repayable loans to finance more local clean energy production by small to medium sized enterprises, co-operatives and public energy companies that may positively impact other segments of the local population and economy.

Investment in local energy projects is the very stitch in time we need sewn with great speed. Resilience measures already account for 4 % of global emissions and rising. Water shortages are shortly expected to double to 5bn litres a day. Nuclear Power' clean power generation is hampered by drought. Energy costs are amongst the highest in the world ; energy insecurity and imports persist.

Inaction is unaffordable. The cost « of failure to act is rising from about £60bn p;a ; and could reach £260bn in just over two decades » (Ref 20) The financial support extended by government to industry is paralleled by the benefits it pays people whose poor health and compromised life chances demand compensatory welfare payments. Tipping points loom and the financial and emission costs of resilience mounts Local finance generation could take us back to the future.

Early 20th century councils enjoyed low cost public sector loans, to launch Municipal Power companies to finance welfare schemes.

Loans were repaid, all other overheads were covered ; welfare innovations financed. Disregarding 'profit', they successively drove down retail prices, offering their constituents cheaper energy bills.

Municipal power enterprises dominated the capitalist marketplace and continued to do so until central government built a nationalised energy sector on them. (Note 43)

Local public sector heat and power enterprises operating in the marketplace could grow a circular financial system wherein low cost central government investment capital loans were 'repaid' but into Local Energy Board holding accounts , transformed into investment capital.

A third route could speak to John Denham and Jess Stoddarts' (Note 44) system of pooling local government departmental budgets to fund large projects.

Conclusion

This paper has argued the case for urgent development of two parallel decentralised networks of local,energy projects based upon the development of clean, in-house energy resources. Enabled by Local Energy Board advice, retail, and investment support, they majorly strengthen National and Local Energy Security whilst enhancing health, income, domestic and industrial climate, public expenditure and democratic securities.

The propositions respond to energy insecurities and their negative impacts, aiming to recover control of our energy supply and price.

A dozen sound reasons for supporting these proposals have been advanced and are summated below. One. Local Power Grid distribution of additional,renewable clean power, generated from localised energy resources, both weather-dependant solar and wind, and constant -Tidal and Geothermal, lift pressures from Grid shoulders which they were never designed to handle.

Two. Expanding local heat harnessing and distribution displaces grid distribution of power supplied to meet national demands for energy in the form of heat, further lowering pressures on the Grid .

Together 1 and 2 help dilute the urgency and costs of massive Grid reconfigurations A more slimline smart grid could become an eminently swifter and more affordable project.

Three: Lowering health conditions associated with pollution, particularly particulates, translates into rising internal

workforce productivity levels as concentration and attention span improve, and sick leave lowers.

Four : Energy efficiency improves as newly generated power distributed via local energy grids will lose less power than in longer distance grid transmission.

Five : Energy Security stabilises energy prices and supply, production and economy.

Six : Decarbonisation pairs with redistributive welfare impacts.

**Seven: Power blackouts can be confined to any one location
Disconnection from any failing grid can be swiftly effected.**

Eight: Localised, place-specific systems enhance the prospects of enriched democratic accountability.

Nine: Extensive local clean heat and power initiatives will economically, socially and ecologically revive , regenerate and energise de-industrialised localities, directly delivering health, income and welfare benefits via selective technological choices.

Ten. Keystone local energy projects synergise well with the greater devolution of administration and finance to which central government is already committed .

Eleven : As health levels improve and Fuel Poverty shrinks, health care and benefit expenditures fall.

Twelve : As Energy Security rises, price spikes, energy shortages, rising prices economic desabalisation diminish.

References

- 1. IEA 2026 Energy Crisis Policy Tracker 31.07.2026**
- 2. World Bank Chief Economist Warns of Hunger Risks from War in Iran. 16.04.2026**
- 3. Jillian Ambrose and Damian Carrington. Revealed : major oil firms make \$93bn profits amid war and climate crisis.**
- 4. Richard Newstead. UK Close to Blackout in June but Scale of the Crisis was Hidden. Financial Times 10.07.2026.**
- 5. as Ref 4.**
- 6. Watchdog warns the cost of Sizewell C Nuclear Plant is risky. The Guardian. 20.05.2026.**
- 7. Iran War : EU Strategy sets out 44 actions to limit fossil fuels Carbon Brief 23.04.2026.**
- 8. Waste water Heat Recovery Huber Solutions for Local and short loops Huber France 2026.**
- 9. As above**
- 10. As above**
- 11. Hounslow sewer heat scheme.**
- 12. British Geological Society.(BGS). UK Geothermal Platform.**
- 13. David Merino, Garcia Drew Nelson Logan Hakey. Britain's Buried Power : the case for next generation geothermal.. 05.09.2026.**

14 .Supergen Uni of Edinburgh 2025

15. Berlin De. The Official Website of Berlin. District heating from surplus electricity - BEW builds new plant 05.04. 2026

16 as above

17. The Independant Review of Net Zero.

18.Ed Miliiband on Contracts for Difference and Renewable Energy Pricing

19. Stephen Hall. Retail Re imagined. How Regional Energy Boards can deliver a Fair and Flexible System. Common-Wealth 31.03;2026. Common-Wealth

20. UK2Zero NPF Submission 2026

Notes

Note 1. IEA 2026 Energy Crisis Policy Tracker 21.07.2026

Note 2. World Health Organisation.(WHO), Heat and Health 21.07.2026.

Note 3 . Peter Walker, Tobi Thomas and Aletha Adu. Nurses fainting in ‘inhumane’ conditions due to extreme heat, union warns. The Guardian. 13.08.2026)

Note 4. Verdant Thinktank in Heather Stewart £4.4 bn in lost output so far this year, analysis finds. The Guardian. 12.08.2026.

Note 5. National Fire Chiefs Council. 28.08.2026.

Note 6. WTTW. 26.07.2026

Note 7. Copernicus Atmosphere Monitoring Service.

Note 8. As Note 02.

Note 9 Helenda Horton. The Guardian 02.08.2026 ; Besard, Arthur, Manon Rescan. Drought Causes ‘collapse’ in France’s vegetable production. Le Monde. 02.08.2026 ; Drought.gov

Note 10. Derailment of a Passenger Train at Lewes. Rail Accident Investigation Branch 10.08.2026)

Note 11. Note 11 Fortune 04.08.2026

Note 12. Spending Watchdog warns £38bn cost of Sizewell C Nuclear Plant is Risky. 20.05.2026.

Note 13. Anna Joubinet. Heatwave forces power plant shutdown across Europe , putting electricity grid under strain. Le Monde 07.08.2026)

Note 14. As 13.

Note 15. Lorenzo Tondo Romania blasts rock to divert water from drought -hit Danube to nuclear reactor. The Guardian 03.08.2026.

Note 16. Adrian Peciut. Frances' EDF to invest 9bn over 15 years to adapt power plants to Climate Change. Le Monde. 06.08.2026

Note 17. Tom Pickerall. As Temperatures Rise the Oceans take the Brunt. World Resources Institute. 22.07.2026.

Note 18 Renewableuk 10.09.2025; Montel News 04.08.2026

Note 19. Hamish Morrison. Rosebank and Jackdaw would kill more than the population of inverness. The National. June 2026.

Note 20. Oil and Gas Revenues November 2025 Economic and Fiscal Outlook ; Chief Economist Directorate. Government Expenditure and Revenue Scotland 2025_ 26. 12.08.2026.

Note 21 :OE UK Boosting North Sea investment could generate £13.4bn to eliminate fuel poverty and add an additional £60bn to the UK economy ; 17.06.2026 ; A summary of evidence due to be presented by the OE UK's CEO, David Whitehouse to a parliamentary select committee.

Note 22 EU Fossil Fuel import bill jumps £22bn since Iran War began 13.04.2026.

Note 23 Wendy Fowler. Municipal Waste Incineration Power Generation. Uk2zero Summer 2024

Note 24. The Conversation.Municipal Waste Incineration. Summer 2025

Note 25. Energy capacity estimates are provided by Mike Hogg a statistician in the UK2Zero Working Group

Note 26. Kensa Heat Pumps Heat on Your Street Campaign Material

Note 27. Duncan Lucas. Shared Heat Array Suitability for Scattered Rural East English Settlements. Summer 2023

Note 28. Marc Clausse , Frederic Lefevre , Yoann Jovet , Antoine Fontaine , Laurence RocherRiver water heat pumps to decarbonise district heating and promote the resilience of hydrosystems: Technico-economic, environmental and sociological challenges. Energy Nexus 16. Science Direct. 2024

Note 29. Duncan Lucas. Shared Heat Arrays in Rural East England 2024.

Note 30. Decarbonisation options for the UHD hospital estate. Prepared by George Atkinson, Associate Director of Estates, UHD.2025.

Note 31. De Berlin Officil Website of Berlin. District heating from surplus electricity - BEW builds new plant 04.05.2026.

Note 32. Innovative solar installations

Note 33 :see for example The Economics of distributed energy generation. A Literature Review. Science Direct ; Top Ten things you didn't know about distributed Wind Power Department of Energy ; What is Distributed Wind Energy ; Distributed Wind Energy Association ; Providing distributed electrical generation through retrofitting disused docks as Tidal Range Energy Schemes, Science Direct.

Note 34.Olney Lock Project uk2zero 2024 presentation

Note 35. British Geological Platform Geological Society Platform. 2025.

Note 36. Coral Point. Insight : Tidal Power's Moment of Reckoning; 20.08.2026).

Note 37. Heerland Netherlands Electrostatic Hydrogen production

Note 38. Berlin.de The Official Website of Berlin. District Heating from Surplus Electricity . Summer 2026

Note 39 . BBC. Earth's Heat to Power 10,000 Homes in Renewable Energy First for the UK . 36.02. 2026.

Note 40. Insight Tidal Power : Moment of Reckoning 20.05.2026

Note 41. Moene. What is Tidal Energy and How is it Obtained 22.10.2025

Note 42. see Note 34

Note 43 see Arthur's Substack. The Golden Age of Municipal Energy 1840- 1950 March 2024

Bibliography

Anon. Sewer Heat Recovery: Exclusion Zone Methodology. UK Gov 28.01.2025.S.

<https://heathealth.info/heat-and-hea>

**Yiannis Baboulias. Europe's rivers are running dry
Guardian 05.08.2026**

**Arthur Besnard & Manon Rescan. Le Monde 02.08.2026)
Copernicus Atmosphere Monitoring Service 17h July 2026**

**Cozzi, L · Gül, T · Spencer, T · et al. Clean energy is boosting economic growth International Energy Agency, April 18, 2020.
<https://www.iea.org/commentaries/clean-energy-is-boosting-economic-growth>**

**Department for Energy Security and Net Zero UK first major economy to halve emissions. Gov.uk
<https://www.gov.uk/government/news/uk-first-major-economy-to-halve-emissions> Feb 6, 2024**

Drought.gov

Stephen Hall. Retain Re-imagined. How Regional Energy Boards can deliver a Fair and Flexible System. Common-Wealth 31.03;2026.

Fiona Harvey. The UK's growing green economy is worth more than £100bn a year. The Guardian. 02.06.2026.

Fiona Harvey The cost of failure to act is rising from about £60bn p;a and could reach £260bn in just over two decades. 20.05.2026.

Hess, J · Lowe, R · Al Maslamani, M · et al. Climate change and communicable diseases. *British Medical Journal*. Nov 15–20, 2020; <https://www.bmj.com/communicable-diseases>

The Independent Review of Net Zero

INRAE. Agricultural Drought : A Comprehensive Review of Research Trends , Monitoring Indices modelling frameworks, knowledge gaps and future pathways. *Journal of Hydrology. Regional Studies*. Volume 66 August 2026. **Evans UK** Geothermal Energy Boiling beneath the Surface ? Power Technology. 11.12.2019.

International Labour Organization Working on a warmer planet: the impact of heat stress on labour productivity and decent work International Labour Organization, 2019

ITF How Public Transport can stay cool in a warming world. 10.11.2026

ITF ‘Global Facility for Disaster Reduction and Recovery – Heatwaves and their Effects on Transportation Systems.

ITF ‘Preparing Resilient Transport for Heatwaves’.

ITF Heatwaves: How can Public Transport Adapt? ITF Factsheet (2026)

ITF Adapting Transport to Climate Change and Extreme Weather (2016)

Kjellstrom, T · Freyberg, C · Lemke, B · et al. Estimating population heat exposure and impacts on working people in conjunction with climate change Int J Biometeorol. 2018; 62:291-306 [Scopus \(132\)](#),

Becca Massey Chase , IPPR 2026.

Met. Office <https://www.metoffice.gov.uk/about-us/news-and-media/media-centre/weather-and-climate-news/2026/heatwave-continues-as-uk-records-unprecedented-run-of-35c-days#:~:text=Not%20only%20have%20we%20now,in%20May%2C%20June%20and%20July>.

Met Office <https://www.metoffice.gov.uk/about-us/news-and-media/media-centre/weather-and-climate-news/2026/heatwave-continues-as-uk-records-unprecedented-run-of-35c-days#:~:text=Not%20only%20have%20we%20now,in%20May%2C%20June%20and%20July><https://www.metoffice.gov.uk/about-us/news-and-media/media-centre/weather-and-climate-news/2026/heatwave-continues-as-uk-records-unprecedented-run-of-35c-days#:~:text=Not%20only%20have%20we%20now,in%20May%2C%20June%20and%20July>

Montel News 05.08.2026

Rachael Millard. Anthony Armstrong and Jim Pickard. Ed Miliband unveils move to de link gas and electricity prices.

Richard Newstead UK close to blackouts in June but 'scale of crisis was hidden' Financial Times 20.04.2026.

Mora, C · McKenzie, T · Gaw, IM · et al. Over half of known human pathogenic diseases can be aggravated by climate change Nature Clim Change. 2022; 12:869-875

Montel News 04.08.2026

Mora, C · McKenzie, T · Gaw, IM · et al. Over half of known human pathogenic diseases can be aggravated by climate change *Nature Clim Chang.* 2022; 12:869-875 Scopus (605), PubMed, Google Scholar Montel News 04.08.2026

Gelu Portusini. What Are the Latest Innovations in Solar Power ? RICS Mordus Journals. 21.07.2025

Coral Point. Insight Tidal Power Moment of Reckoning.

Jalie John Rotterdam, Alice Hancock. Iran pushes European chemicals industry to breaking point. Financial Times. 17.05.2026

Renewable UK and Offshore Wind Industry Council Joint Press Release. Renewable UK. 17th June 2025

2027. Summit on Governing Resilient Transport

Transport Network Resilience to Critical Events Working Group (2026)

WTTW 26.07.2026 Transport System Resilience

