LI C.L.P. COUNCIL AND MP May-October 2023 NEWSLETTER

CLEAN HEAT CAMPAIGN SPECIAL EDITION 2023

Heat *"is still overwhelmingly generated by burning fossil fuels, making it an enormous source of the carbon emissions driving climate change."*

Amin Al-Habaibeh, Professor of Energy, Nottingham-Trent University: 'Seven Ways to Recycle Heat and Reduce Carbon Emissions,' The Conversation, 12.04.2023

People and Planet require the very speediest possible green transition. Experts detail dire economic and environmental disasters ahead should temperatures continue their relentless rise. We witness wildfires attributed to the 'Big Oil Arsonist', throughout Canada and nine Mediterranean states. Continued fossil fuel consumption will undoubtedly result in an abject failure to realise critical Paris accord climate goals.

Heat represents around 50% of all UK energy demand, mostly satisfied by fossil fuels. 86% of UK Homes are natural gas heated. 17.0% of 2022 domestic UK carbon dioxide emissions (excluding electric ones) are attributable to heat. (2022 Greenhouse Gas Emissions (Provisional Figs.). Department for Energy Security & Net Zero 30.03.23)

Yet Rishi Sunak and Co. announce a new Cumbrian Coal Mine, approve one hundred new North Sea oil and gas exploration licences and give serious consideration to the pursuit of an anti-green Manifesto. Labour is committed to Clean Power by 2023, but regrets that phasing out fossil fuels will necessarily be a long term project.

Both incur entirely unnecessary decarbonisation delays. The world possesses huge renewable resource reserves whose "technical renewable energy potential can exceed 100 times present global energy consumption". ("Busting the Myths: Debunking myths about renewable energy. WWF Report 2013). The UK alone has a 100 year supply of ground heat.

This Special ‘Clean Heat’ Edition of our newsletter focusses on how the political push to extend fossil fuel consumption obscures perception of the extensive existent opportunities that enable an urgent, speedy and eminently affordable transition to clean heat right now.

The Politics of Clean Heat

We wholeheartedly welcome Labour’s Commitment to accelerate the existing trend and attain clean electricity by 2030 - solar power already represents around 4%, wind, 21% of the UK total. But realisation of 100% clean electricity will only cut around 15% of our carbon emissions. Its not enough. Add Clean Heat into the mix and we might just win.

UK Labour and Conservative political parties both pursue variations of ‘the bridge’ approach to climate change containment. It includes old energy comfort blankets like nuclear and fossil fuels, to ensure we don’t run -out of juice, some renewables, notably solar and wind, and other, as yet unproven, technological fixes like Carbon Capture and Storage that might just make the problem disappear. (D, Raso and G, Williams. Climate Money Watchdog. October 2022).

Labour favours clean electric heat, particularly perhaps from nuclear power plant development. But these plants are costly and time consuming to develop, fraught with indeterminate lead times, site difficulties, delays and soaring costs. Uranium reserves are finite, risks arise associated with terrorism and war and essential cooling becomes problematic as heat raises river and sea temperatures whilst drought lowers water levels below those necessary for effective cooling to occur.

Generating electricity to provide heat is energy inefficient and solar and wind power cannot easily be stored. Electricity needs to be distributed but our current National Grid is not fit for purpose so that a great many wind, solar and geothermal energy projects are being abandoned at worst, put on hold at

best, for want of a connection date this side of five, more probably, ten years hence. When the electricity arrives it's not cheap.

UK MPs seemingly fight shy of systems that might, as is often the case with clean heat options , involve any disruption – installing distribution pipework into streets for instance, to develop heat networks. Overseas where populations tend to have more collective outlooks and well organised installations incur minimal disruption and deliver maximum benefit, fear of disruption is far less of an obstacle.

We believe that many UK voters would, especially given energy security and price and global warming crises, welcome speedily available clean heat that is cheap, slashes carbon emissions, and lowers the negative impacts on health of extreme heat and cold.

Waste, Latent, Geothermal and Ground Source Clean Heat accord with the view of Mark Jacobson of American Green New Deal Fame that fast decarbonisation is best achieved by renewables like geothermal heat and power.

They ease the difficulties of financing decarbonisation because they do not require expensive geo-engineering. Proven, they need no investment in extensive Carbon Capture and Storage R&D - they deploy reliable proven technologies - turbines and heat pumps for Mine Water Heat Capture, Latent Heat and Ground Source Heat extraction, for instance. Increasing domestic production of these green products will generate more UK jobs; more technology exports for a nation whose European export market disappeared post-Brexit.

Clean Heat can re-invigorate our compromised democracy.. Heat does not travel well, so resources need to be developed and distributed close to their origins ideally under local council and community auspices just like Starmer and Miliband sought. National democratic control over energy affairs can

recover as dependence upon fossil fuel imports ends. No more energy price hikes, supply disruptions and threats.

Clean Heat Project by Clean Heat Project, locality by locality, we can wean ourselves off our staple fossil fuel energy diet onto an altogether healthier one so that Britain will truly become a world class leader in the fight to contain global warming.

The Fossil Fuel Challenge

Rishi Sunak's August 2023 speech in Aberdeen following his party's slender Uxbridge by-election win, approved over 100 new fossil fuel North Sea licences and announced that the Tories would prolong the Anti-Green approach to Climate and Energy issues that he believes secured it.(A.Lawson. UK Offers 100 new North Sea Oil and Gas Licences Despite Climate Concerns 07.10.2023).

Railing against London Mayor, Sadiq Khan's legally permitted, Ultra Low Emissions Zone (ULEZ) expansions, in the hope of recovering marginal outer London seats in the coming General Election, may backfire. More voters than expected will back the expansion because they believe in green climate innovations. They experience the costs of air pollution, rising temperatures and extreme weather. ULEZ does not have to disadvantage the disadvantaged most. It could include, for example, generous enough scrappage payments to finance clean replacement vehicles.

The rosy future the Tory Right and their fossil fuel friends paint, is mythical. Carbon Capture and Storage (CCS), research is majorly financed by Big Oil, whose idea that carbon may be stored in North seabed caverns emptied by gas extraction, won't work, certainly not in the foreseeable future. Fossil fuel industries have adopted no Green Business plans – a clear indication that their protestations of support for green transition are decidedly lukewarm. In reality the industry is entirely pre-occupied with the short-term gains that can be realised by squeezing every last bit of fossil-fuel from North Sea reserves even though these are only expected to produce three weeks more power per year at most. (Proposed new UK oil and gas fields would provide at most three weeks of energy a year. Guardian. 11.07.2023).

The real future will be determined by damage being done right now by fossil fuels.
15.8% of UK carbon emissions remain attributable to fossil-fuels.(2021 UK Greenhouse Gas Emission Provisional Figures. The Dept. of Business, Energy and Industrial Strategy. 31.03.2022). Current trajectories will mean that North America and Europe who have produced the greatest amount of carbon in the world since the Industrial Revolution will continue to shoulder the greatest responsibility for the dangerous and damaging worldwide global warming we are all which we all experience. (April 2022 's IPCC Report).

From now onwards people will increasingly suffer as global warming intensifies. Demands for government expenditure on resilience and amelioration measures will grow. Health care expenditure will rise. "Extreme heat makes the heart pump faster, blood races and organs begin to fail". (Niranjon,Symons and Voce. Guardian July 2023). Heat stroke, heart failure, hypertension, will "significantly and immediately increase(s) hospitalisations and deaths.....economic costs accumulate up to £5 million per 10 million population per hot day. (30+ degrees C.)". (Karisson, Zelbarth 2023).

101 Nobel laureates and over 3,000 scientists call for a fossil-fuel non-proliferation treaty. The New IPPC Chair, Hoesung Lee, the UN Head, Antonio Guterres, Professor Kevin Anderson and many other heads of important international agencies, stand united behind the IEA who "warn that no new exploration and development of oil and gas fields around the world should now take place if the world is to limit global temperature rises to 1.5C above pre-industrial levels." (R, Solnit, Forget Geo-Engineering. We need to stop using fossil fuels right now. Guardian 24.03.2023).

Even parts of the establishment warn against over reliance upon fossil fuels and under-development or more sustainable energy options. The Office for Budget Responsibility, (OBR), warns "of catastrophic effects on the economy of continued reliance upon gas". Over 100 of our largest energy companies feared digression from a Green Agenda would cause green investment

emigration; and economic opportunity disappearances. Sharma advances economic arguments favouring faster renewable development, lower domestic energy bills and the insulation of the economy from shocks. (T, Helm & F. Harvey. Top UK energy firms to warn Rishi Sunak: 'Don't back off Green Agenda'. Sun 16.07.2023) The OBR forecasts that reliance on gas condemns the UK to volatile fossil fuel imports because North Sea reserves are shrinking -new licences are only estimated by Uplift, using North Sea Transition Authority data, to last for a mere further five years. Sunak's approved licenses will at most supply only three more weeks of gas a year. Almost certainly it will mostly be exported. (F. Harvey. See above). Supplies take years to come on stream, will not lower current consumer prices and negligibly improve UK energy security and emission levels.

Government and industry form a formidable fossil fuel alliance

The Conservative party is riddled with fossil-fuel apologists. The Net Zero Scrutiny Group includes Jacob Rees-Mogg, Lord Frost, and Iain Duncan Smith. The industry receives £9.3bn in tax reliefs for new exploration and production and £3.7 billion toward decommissioning costs since the Paris accord. (V. Seabrook. Sky News. 25.11.2021) . The industry helped design the recent Tory crackdown on climate protest. It donated £30,000 towards The Policy Exchange's "Extremism Rebellion" publication which recommended government "strengthen the ability of the police to place restrictions on planned protest and deal more effectively with mass law breaking protests" (A Barnett. De Smog).

"Big Oil has swamped Climate talks so that even the redoubtable Paris accord makes no mention of the 'fossil-fuel' word nor its family – oil, gas and coal. COP28 will be led by Sultan-al-Jaber, head of ADNOC , a national oil giant and eighth largest global oil concern. Pledging ' to bring its target Net Zero date forward by five years to 2045. (UEA state-owned company brings net zero forward to 2045. The Financial Times Limited 2023) the giant enterprise nonetheless plans to increase current production levels by 42% to 1.3bn barrels of oil equivalent in 2045. (The Independent. July 2023).

Unbeknown to many, a number of governments actually subsidise prices paid by consumers for fossil-fuel products, subsidies which play a significant role in the perpetuation of the industry. (Fossil Fuels Consumption Subsidies 2022. IEA Policy Report. IEA February 2023).

The IEA concludes that the real answer lies in governments establishing markets that allow consumers to make 'the clean choice'. Investment in clean heat could play a significant part in such a strategy.

The Economic Case for Clean Heat

There is a strong economic case that needs to be made for Clean Heat, not least since Labour now prioritise fiscal, over environmental responsibility leaving their economic Agenda worryingly close to that of the Conservatives and both Labour and Tory leaders invoke traditional economic wisdoms, bidding to appear 'the most economically responsible Party'. But Labour needs to draw the sharp clear line, Andrew Rawnsley calls 'crisp,' between itself and the Tories.

Responsible radical green economics can enable Labour to draw such a line. And clean heat systems can play a central role in them. These possess a great deal of potential to regenerate flagging local economies via new inward investment attracted the improved levels of disposable household incomes that result from reduced energy outgoings and increased opportunities to secure better employment and income. The resultant higher levels of local economic demand are most likely to be expended in the local economies in which they arose. These beneficial economic outcomes feed up into the national economy.

Labour did plan to borrow £28bn p.a. in order to finance a British version of Joe Biden's Green New Deal; pump up investment in cutting-edge technologies; reduce dependence on hydrocarbons that can be weaponised by

tyrants; create high-skill, well-paid jobs in left-behind regions. It was peanuts alongside the UK's annual £1tn expenditure and promised big prizes – saving fuel subsidies "expected to come in somewhere north of £75bn with no new infrastructure, technology or employment opportunities to show for it." (A. Rawnsley, 'Labour must do no more backsliding on commitments to create a green economy.' Guardian 25.06.2023) Decarbonisation is urgent and in dire need of this kind of substantial public sector investment which Labour have now made contingent upon improved national economic fortunes.

A somewhat crude skeletal exposition of the ways in which 'sustainable' economics can indeed be regarded as 'responsible' economics follows. Indeed 'sustainable economics may, be persuasively considered more responsible economics than more classical traditional ones because they directly relate to the significant contextual economic changes effected by the dangerous global warming we now face).

Sustainable 'fiscal prudence' involves 'future-proofing' investment intended to either avoid entirely, or significantly reduce substantial expenditures that would otherwise be incurred in the future. It also means balancing expenditures in the here and now against savings they realise across departmental government silos. Economies effected in 'Department A' consequent upon monies expended by 'Department B', would cancel each other out. A reduction in fuel subsidies or NHS expenditures on heat-related expenditures, that would have been financed by the Department of Social Security can offset Department of Energy expenditure upon projects that lower both fuel bills and global warming emission levels. Positive financial impacts on projected future expenditure upon heat resilience and so forth, would go onto the new balance sheets.

Green investment should also achieve 'Sustainable Economic Growth', the one and only kind of economic growth that can be countenanced in our currently hazardous circumstances. Demand will expand as more and better quality green jobs are created and outgoings on overly expensive heating bills diminish. Demand will also expand as wealth grows in depressed parts of the

country as local supplies of clean heat are harnessed and delivered in the locality and inward investment flows in. National economic stability would improve as it became insulated from shocks like import price hikes and threatened disruptions to the flow of energy imports. The national purse would be pleasingly padded-out by receipts from renewable technology exports such as heat pumps and turbines.

True. The 2022 ARC IPCC Report advises that the additional cost of decarbonising the energy system in order to have a greater than 67% chance of keeping warming below 2 degrees C corresponds to a GDP loss in 2050 0f 1.3 – 2.7%." But this finding has been challenged by Oxford researchers, for instance who predict that indicate growth would expand instead. (Renew Extra 23/10.2022), whilst Rupert Way calculates that speedy development of clean heat, can realise financial benefits amounting to a trillion dollars, not least since speedily realised benefits may accrue over longer periods of time.(Rupert Way in Jules Journal Vol 6 Issue 89 21.09.2022. pp 2067-82).

CLEAN HEAT EXPLOITS LOCAL RESOURCES BY PROVEN MEANS

Councils seized opportunities when funding like the Government Heat Network Investment Project (HNIP) has been made available. Their initiatives illustrate the viability of Waste, Latent, Ground Source and Geothermal Heat. Private funding has now entered the scene financing council Ground Source Heat Pumps in Cornwall, Latent heat capture in Bristol Harbour. This second section reports on clean heat innovations in the UK against a background of European developments. (see also our Clean Heat Information Pack).

Mine Water Heat (MWH) from disused coal mines is being harnessed in the UK and Europe. It has gained most traction in Europe. The largest scheme in Barrudas Mine, Mieres, Asturias, Northern Spain, supplies upgraded heat to hundreds of homes, a hospital, a University, a secondary school, and other public and private sector buildings. The developer guarantees prices below those from fossil fuel heat. In Heerland, Netherlands, where the World's first MWH power station is in operation, warm floodwater heats 500 homes along with nearby commercial facilities. Mijnwater proceeds with the decarbonisation of its operation with a closed loop system that pipes excess heat back into underground waters which act as a heat store.

The UK possesses so many abandoned coal mines that 25% of UK homes sit on top of them. At it's 1952 peak the Coal Industry boasted 1,500 coal mines with a total of 150,000 coal mine shafts. MWH harnessing , supported by The Coal Board has made but slow progress despite favourable cross Party Committee of Inquiry findings as councils are being starved of finance and only pilot scheme government funds have been available. Brexit removed EU grants from local authority reach but some authorities secured grants before deadlines and three schemes are underway in northern England with its heavy concentration of coal mines.

In Seaham, Co, Durham, The Coal Authority together with Durham County Council and Tolent Construction plan to heat the new Seaham Garden Housing development with Dawden MWH, the centre piece of Durham County Council plans to reduce 60% of carbon emissions by 2030 and achieve carbon neutrality in 2050.

The old High Main coal seam in Gateshead provides 15 degree C water heat pump upgraded to heat a bakery, a distribution warehouse and a bottling plant. Cooled water is returned to the disused mine tunnels for re-heating – a perfect closed loop circular system. The scheme has been developed by The Coal Authority in conjunction with Gateshead Council and is being financed by central government's Heat Network Investment Project finance (HNIP).

Hebburn Colliery MWH features within South Tyneside's Viking Energy Network near Jarrow, intended to include solar, CHP and heat pumps. Eleven public buildings including a tower block are expected to save £150,000per annum. Priced at £7million, half from the EU Regional Development Fund, the scheme will be run by a partnership between The Coal Authority, South Tyneside Local Authority and Durham University. Carbon Emissions in the order of 300 tonnes should be saved annually. (Nottingham has just secured EU Funding to explore the possibilities for a scheme centred upon Bulwells' Cinderhill Colliery. (The Energyst 26.07.2023).

MWH will create new jobs producing turbines in the Heavy Engineering industry.
(https://www.gov.uk/government/news/uks-first-district-heating-scheme-using-mine-water-energy-now-in-development)
(https://www.bbc.com/future/article/20219706-how-flooded-coal-mines-could-heat-homes/).

Sustainable Energy Systems in Sweden have developed a variation on the MWH theme. Emphasising safety and economic as well as environmental (methane is discharged by open abandoned mines)issues they suggest that

mines can function as energy stores using their in-house Underground Pumped Hydro Storage (UPHS) technologies..

Geothermal Heat lies beneath our feet. The British Geological Society concluded that Britain cannot attain net zero by 2050 without it (S, Evans, UK Geothermal Energy boiling beneath the surface? Power Technology 11.12.2019).

The highest temperature water originates from the deepest aquifers in granite at high enough temperatures to generate electricity, as the Tories meant to do. Rishi's turn around might, of course, put a stop to Tory pursuit of such green activities Lower temperature heat is readily available from shallower aquifers found in limestone karst.

Virtually carbon-free heat can be relatively quickly and continuously extracted as required. It is not weather dependent and predictions suggest we possess 100 years worth of geothermal reserves and could save 160 million tonnes of fossil fuel carbon emissions annually.. (N.Marayan, J. Gulyas, and C Adams. Is the UK in Hot water? GeoScientist 28(9) 10-15pp 2018).

Seismic activity in Basel and Staufen, 50km to the south of Basel, the only cases of which we know, may explain reluctance in the UK to pursue geothermal heat capture. But in Europe schemes can be found quite close to Basel. IN nearby Swiss Riehen and Offenburg schemes expand , Sudbaden's plans progress and Rhine Valley schemes may follow.

Identification of extensive geothermal heat in non-volcanic limestone karst and EGS developments - the creation of subterranean rock fractures into which water can be injected for geothermal warming - should prove game-changers.

European cities like Paris and Munich are decarbonising their city DH schemes using geothermal heat. (Anna Gumbau Sun Beneath Our Feet: The Europeans Now Turning to Geothermal Energy. Euroactive 25.10.2022). French departmental advice that geothermal heating proved cheaper than gas

encourages such developments. Switch-over disruption may rove minimal - Geothermal wells sited on urban fringes can be connected to customers throughout the city.

Once the prerogative of Iceland, France and Hungary, European geothermal heating networks are spreading. German investment should top $1.5billion by 2030. Croatia, Greenland and Denmark have found previously undiscovered geothermal potential. About 505 of Croatian shallow sub-surface has been found to be limestone karst possessed with excellent predictors of geothermally warmed water. (Solda et al. Conditions for shallow geothermal energy utilisation in Dinaric kast terrains in Croatia. Environmental Earth Sciences. Vol. 78 Article Number 245 (2016).

In Denmark and Greenland one to three kilometres beneath the surface “a treasure trove of hot groundwater in porous layers of subsoil sandstone” has been found. (Dept. of GeoSciences and Natural Resource Management at the Dept. of GeoSciences at Aarhus University). Denmark aims to supply 6% of Copenhagen demand.(O. Erickson Enormous Potential: Deep Groundwater could heat half of Denmark. Faculty of Science, University of Copenhagen.30.04.2022).

European investment of around $7.7 billion should expand capacity to 6.2 GW thermal by 2030 – 58% up on 2022. (Press Release 27 September 2022 ‘Full Steam Ahead: Europe to spend $7.4billion on geothermal heating. Rystad Energy)

UK politicians hold back, lagging behind Europe despite favourable findings from a Cross Party Committee of Inquiry. (M. Cuff, Can Geothermal Energy Supply All of the UK’s heating Needs? New Scientist. 2010.2022)

The Southampton borehole, developed by Southampton Council, drilled into the Triassic Sandstone Aquifer feeds the mixed fuel heat network. Plans now exist to fully decarbonise the network.

It has been joined by Eden Geothermal Project funded by the EU, Cornwall County Council and private finance. It has just begun to heat its Biomes and administrative buildings and a second well will later supply St Austell homes.

Cornwall Council anticipates that job creation and inward investment will follow its plan to supply 3,500 residents with about 100MW of heat in its new Langarth Garden Village housing development and Cornwall Geothermal Distillary Company with 2.5MW of hot water. (P. Largue. Four Deep Geothermal Plants announced for the UK. The Clarion. 02.97.2022).

Ground Source Heat has a major contribution to make to Net Zero transition. (The 2021 Cross Party Inquiry into Geothermal Energy) and fuel poverty relief. But £20,000 individual heat pump price tags and failures to warm certain homes have discouraged take-up.

Now 'Heat The Street' collectivised ground source heating provision has arrived in Sithians, Carlyon Bay and St Austell Cornwall. Kensa Utilities, a local energy company inspired by retired engineer Brian Piper are developing the scheme whose cost is financed by a £6.2 million EU European Regional Development Fund (ERDF) grant. Kensa anticipates it will stand alone, independent of government finance and grow.(S, Laville. Pump Up the Volume: Cornish village to pilot communal grid for green energy. Guardian 22.06.2022).

The pipes will endure for 100 years, the heat pumps are free of charge, a single connection fee only has to be paid by householders – there are no standing energy charges. Heat will be plentiful and cheap. Shared ground loop heat array scheme heat pump networks deliver ground source heat without burdening householder shoulders. This exciting scheme is the first worldwide to demonstrate scaleable, street by street and affordable heat pump solutions. It is also the world's first in-road private retrofit of both social and private homes. It produces no carbon emissions so that carbon emissions should fall by 70% per dwelling, no air pollution and no energy supply volatility.

Duncan Lucas, a uk2zero researcher, concludes that ground source heat has particularly strong potential in rural areas such as Lincolnshire and Norfolk

which may lack viable alternative clean heat sources, and where scattered settlement patterns permit minimally disruptive district heating network installation. 68m UK citizens in market towns, villages & hamlets could benefit. 9.6 million – 14% live in market towns; 4.4 million – 6.5% in villages and hamlets. 5.1 million total potential houses that might be connected represent one fifth of UK housing stock.

Local authorities still own between 3-50% of rural housing constructed in blocks within useable common land. This means installation and connection will prove straightforward. Local authority tenants are frequently found amongst the less affluent members of society and are less able to meet high heating costs. Cheap heat delivery to social housing will alleviate an especially large amount of fuel poverty and prove particularly effective in concomitantly lowering government expenditure on energy price relief schemes.

Delivering clean heat to rural social housing schemes will also lower a notable volume of carbon emissions. One fifth of the UK's housing emits a lot of carbon. In South Keveston Lincolnshire 200,000 rural council and ex-council-owned dwellings discharge around 5 tonnes of CO2 annually. In the new system only 0.7 tonnes would be emitted per dwelling bringing total potential carbon savings to 200,000 x 5 tonne of co2 = 1 million tonnes saved less the 0.7 tonnes per household under the new system = 1 million tonnes - 140,000=860,000 tonnes of carbon savings per annum**.**

LATENT HEAT in canals, lakes and coastal waters is probably set to increase as global warming raises sea, river and lake temperatures.

"There is increasing interest in using water bodies as renewable energy sources to heat and cool buildings and infrastructures" (A. Guadard, A. Wuest and M. Schmidt, 'Using lakes and rivers for extraction and disposal of heat:

Estimate of regional potentials.' Renewable Energy Volume 134 April 2019 pp 33-342). Already investigations suggest that lake-source " district systems are found to be particularly promising for Italy, Germany, Turkey and Switzerland.". (Energy Conversion and Management Vol 283 1st May 2023).

UK urban areas beside rivers with 100MWt capacity, like Nottingham and London are potential beneficiaries. Smaller Chertsy and Egham , Goole and Gainsborough with a heat demand less than 500GWt per annum could have all of their heat demands met without carbon expenditure, by their local rivers. But it is not being done!

One English scheme, Castle Park Water Source Heat Pump Project in Bristol Harbour is just being developed by Bristol City Council to dilute Bristol Heat Network's 1,000 strong households' carbon load. (https://www.energyservicebristol.co.uk/business-heat-networks/) Another in Clydebank, Glasgow, will capture latent heat from the former John Brown shipyards to heat over 1,000 new homes, plus community and business premises, from the river Clyde. (https://theconversation.com/how-sewerage-plants-and-data-centres-coiuld-help-heat-one-in-five-uk-homes-16161)

WASTE HEAT from from hi-energy industries, wastewater treatment works, buildings, underground train tunnels, power station cooling towers and more can be distributed by District Heating Networks.

Wastewater Heat freely available in sewers near you within sludge that can reach 70 degrees, could be delivered at low development costs to government and low consumption prices to you, In China and Japan human excreta fuels electricity generation and provides agricultural fertiliser. "Energy recovery from excreta is likely to be a cornerstone of future sustainable sewerage systems." (T. Onabanjo, A. J.Kolios, K Patchigoll, s. t. Wagland, B. Fidalo, N.Jurado, D,P

Hanek, V. Manovic, A., Parker, E Mcadam, l. Williams, S. Tyrrel &E. Cartmel An Experimental Investigation of the combustion performance of human faeces. Fuel. London, Nov 15, 2016. 184 780-791pp). Human excreta possesses more energy than wood. It can be used in communal power plants to provide heat via district heating systems and fuel pellets for stand-alone systems, or fuel electricity generation and produce compost as in China and Japan.

The 16 billion litres of UK wastewater daily consigned to the sewers have the potential provide 20 Twt of heat energy per annum – enough for space and water heating in 1.6 million homes. (S. Farman Ali, A. Gillich, 2020 CIBSE Technical Symposium, 2020 in A. Pearson, 'London's Hidden Energy Source: recovering heat from sewerage.' CIBSE Journal April 2021). London's eight WWTPs could provide 4Twh of heat a year; the largest, at Beckton, East London, alone produces space and water heating for 100,00 homes every year.

A small-scale college scheme in the Scottish Borders town of Galashiels, produces 1.9GWt of heat a year, saves the college £10,000 worth of gas heating bills and meets 86% of the college's heat requirements.

A proposal for a Kingston-upon-Thames sewerage heat scheme has seemingly been abandoned by Kingston Council and Thames Water Authority putative developers.

But a Wastewater Heat Scheme is forging ahead in Bedminster, Bristol where the council plans a highly innovative sewer heat energy centre on Wessex Water land to expand the existent 1,000 council home strong heating network.

The only note of caution to be added to this exciting project is that the possibility of methane emissions needs to be fully explored.

Underground Train Tunnel Waste Heat has been successfully directed from a shaft at the old City Road Underground train station by Islington council into

homes and leisure facilities via 1.5km of pipes. Heating bills are lowered by around 10% and Co2 emissions by around 500 tonnes a year.

Electricity Transformer Waste heat produce large amounts of waste heat source near peoples' homes and workplaces, and may become valuable 'community boilers' serving local heat networks with low, even zero, carbon heating. A trial is underway at the National Grid's Deeside Innovation Centre (http://w.w.w.operstionsengineer.org.uk/operstions-engineer-news/industry-collaberation-to-turn-power-grid-transformers-into-heat-network-boilers/239842/) (https:/www.sse.com/news-and-views/2021/08/sse-and-national-grid-pilot-project-to-use-electricity-transformers-to heat-homes/)

Biomass Waste General biomass, usually composed of waste materials, was the UKs' biggest renewable fuel in 2019. (https://www.ons.gov.uk/economy/environmentalaccounts/articles/aburningissuebiomassisthebiggestsourceofrenewableenergyconsumedintheuk/2019-08-30) Horse manure, dried sewerage (Japan), agricultural wastes, food (Wales) and coconut shells can all serve as suitable sources of biomass.

Wood biomass has been extensively used in mainland Europe to provide District Heating. Demolishing carbon storing living trees is clearly counter-productive. Consuming waste wood to supply local heat saves distribution costs, methane emissions from decaying wood, and liberates biodiversity.

Almost half Sweden's district heat is generated from forestry residues emitting far less CO2 than the previous oil fuel. Austrian sawmill waste fuels DH. Denmark lowered its global warming emissions by converting their District Heating Schemes from high carbon coal, to lower carbon wood. The Lot Department in rural France, uses palletised waste pallets in wood-burning chaudières. These supply heat via insulated underground pipe-runs of less than 4km, and provide 90-96% of the heat requirements of 1448 buildings spread across 15 communes
(https://syded-lot.fr/energie/bois-energie/mon-reseau)

Siting is crucial since bning wood releases particulate matter, NOx, and small amounts of Sox (https://wood-energy.extension.org/what-are-the-air-emissions-of-burning-wood/) In a rural area like the Lot valley, this is unlikely to be problem but will detrimentally affect the health of nearby residents in urban settings. (https://www.ruralenergy.co.uk/insight/biomass-emissions-regulations-and-legislation. Large boilers are most efficient; domestic stoves, least. But CO2 emissions should be compared against methane from rotting wood and wood ash can be used as compost (useful trace elements).

In Britain a Surrey Springbok Sustainable Wood Heat Co-op supplies a small housing estate, once heated with elderly inefficient oil boilers, with affordable heat from woodchip made from b rash in a small copse just yards away, that would otherwise be have been burnt emitting co2. Woodland management has seen the rare Wood White butterfly arrive in the copse for the first time. (P. Barkham. Surrey heating co-ops woodland scheme entices rare butterfly to return. (the Guardian 05.09. 2021).

Combined Heat and Power (CHP) a system more common in Europe than Britain, harnesses heat produced in the course of electricity generation that would otherwise be discharged into the atmosphere as waste heat, for heating nearby commercial and residential buildings via District Heating Systems. Deriving consumable heat as well as power from raw fuel sources significantly improves energy use efficiency. Clean cheap heat is produced for consumers and so long as the initial fuel is fossil-free.

The UK's best known scheme centred upon Battersea Power Station until the power plant closed. Limited government support for heat recovery from power plants, comprehensively detailed in the June 2020 Department of Business, Energy and Industrial Strategy call for evidence document; Combined Heat and Power: the route to 2050 includes exemption from the Climate Change Levy and the November 2011 Renewable Heat Incentive.

Operators and developers of Waste Incineration Plants (WIP) which have traditionally used steam for electricity generation have recently explored possibilities to convert plants to CHP. In east London, Cory Riverside Energy purports to be able to deliver affordable, low carbon heat to up to 10,500 Bexley homes in the largest plant of its kind in Britain. (K. Ross. Plans unveiled for major CHP heat network in London Smart Energy International. May 01, 2020) And Bristol intends to follow suit with a major waste incineration plant in Avonmouth connected to an existing heat network by a 20 kilometre pipeline. (A. Seabrook, Bristol's district heat networks could be fuelled by burning rubbish in incinerator: A huge 20-kilometre pipe is planned to run from an incinerator in Avonmouth to heat networks in the city centre. 17.12.2022)

Hardly green solutions WIP exact heavy environmental costs in exchange for its cheap heat and notional green clothing. Greenhouse gas emissions damage the Planet and toxic ones pose high repository health risks for residents. For every tonne of waste incineration one tonne of CO2 is emitted plus N2 O (nitrous oxide), NOx (oxides of nitrogen) NH3 (ammonia) and Non-Methane Volatile Organic Compounds (NMVOCs). (https://www.ipcnggip.or.jp>public>gp>bgp>5_3_Waste_Incineration.pdf) But true emission levels are obscured because although IPPC calculations include emissions from fossil fuel carbon (ie. plastics from oil) ; “Biogenic “carbon, which makes up between 33% and 50% of what is burned, is not counted and ‘heterogeneous’ municipal waste is contains many waste components (food waste, wood, paper, clothing, etc) which is classed as “biogenic” carbon, so emissions are still carbon. Despite new 2019 emission monitoring and efficiency standards: “Best Available Techniques (BAT)”, introduced to help national authorities lower the environmental impact of the waste incineration sector in the EU.

(https://joint-research-centre.ec.europe.eu/jrc-news-and-updates/new-eu-environmental-standards-waste-incineration-2019-12-04_en) each tonne of MSW

incinerated **still** typically releases between 0.7 and 1.7 tonnes of CO2, including emissions from fossil CO2 (e.g. from burning plastics) and biogenic CO2 (e.g. from burning wood, paper and food).

WIP greenhouse gas emissions actually exceed those emanating from landfill sites . This negative carbon impact is predicted to intensify over the next 15 years. (Client Earth Communications commissioned report by Eunomia Research and Consulting into the medium and long-term impacts of incineration of waste on climate and air quality in the UK) 09.03.2021). Incineration is not a 'low carbon' technology. It's worse than sending waste to landfill. Even taking methane emissions into account, a typical 265,000 tpa incinerator built in 2020 would emit between 26,447 and 80,454 tonnes of CO2e per year more than sending the same waste directly to landfill. (ukwin.org.uk/files/pdf/UKWIN-2018-Incineration-Climate-Change-Report.pdf) Cory's own data confirms Riverside GHG emissions are between between 6.7m and 10.5m tonnes higher over 30 years, than emissions from sending the same waste directly to landfill. Converting incinerator plants to CHP doesn't lower emissions much. Worse. In some cases, it can have adverse climate change impacts. .

WIP are less efficient than traditional gas power plants at converting raw fuel sources into consumable power. Their typical "conversion efficiency of waste fuel into usable electricity is 25%compared to >70% for natural gas to electricity in CCGT".(Footnote 80 of the Government's Energy from Waste Guide) and also less efficient than truly renewable power generation, the carbon intensity of energy produced through waste incineration being more than 23 times greater than that for low carbon sources such as wind and solar, for example.

"Even the most modern burner designs are relatively inefficient at energy recovery, generating lower amounts of electrical power per tonne of fuel

burned when compared to high efficiency, combined cycle gas turbine systems (CCGT). Both power generating units are ultimately doing the same task: converting carbon-rich fuels into electricity...while sending atmospheric-polluting carbon emissions up the exhaust stack as a major environmental cost associated with the beneficial electrical power supplied into the local grid"(Keith Freegard ,Axion Polymers Director and Vice-chair of the British Plastics Federation Recycling Group)

Incineration destroys more than 50% of wastes that would be better recycled or composted. We ”are taking these materials, we are putting them in incinerators, we are losing them forever and we are creating carbon dioxide out of them.....incineration is not a good direction to go in.” Put differently, as Christian Shaible observes, there “is no place for waste incineration in a circular economy...Ultimately, Europe must prevent waste and stop burning precious resources. To embrace the zero pollution strategy, we need to replace waste incineration with clean heating alternatives.” (Burning questions about the new EU waste incineration satandards (European Environmental Bureau, 9 January 2020)]

District Heating Ownership and Control

District Heating (DH) systems otherwise known as Heating Networks, are usually employed to distribute clean heat to meet the space and water heating requirements of residential, commercial and industrial locations customers. All are developed close to heat sources and this decentralised heat production and distribution facilitates local democratic control. In Western Europe DH generally falls under local authority management and control. In Eastern Europe it is governed centrally. Swedish municipalities retain ownership of 60% of all District Heating Scheme and some are now re-acquiring shares lost after liberalization. t “In Hungary, DH distribution networks are mostly owned by the public sector, Fötav for example is fully owned by the municipality of Budapest, which believes public sector services are best served by non-profit making organisations” (DHCAN). Stadtwerke Munchen in Germany, the third largest German DH system, is owned entirely by the city of München. Austrian Fernwarme Wein, operator of DH in the city, is 100% public owned. Helsinki

Energie which operates the scheme that covers the whole Finnish city. Danish municipal ownership is extensive in cities outside of which local consumer co-operatives are in control regardless of the size of the scheme. Larger schemes quite often bulk-buy heat from CHP plants. 60% of houses are serviced by 430 DH companies – municipal ownership cover 15% of them; consumer-owned companies 85%. The Paris Urban Heating Company (CPCU) is 33% owned by the City, meaning it can set a maximum tariff for its heating, and deliver a special low tariff to the social housing projects it covers.

UK regulations favour larger generators although DHCAN insists that carbon abatement would "would be better delivered by small CHP/renewable embedded generators" (DHCAN District heating Systems Ownership Guide (https://projects.bre.co.uk/dhcan/pdf/OwnershipManagement.pdf)

Clean Heat Network Power

District Heating Schemes all use a certain amount of electricity which needs to be green if schemes are to be 100% clean. Not the place to extemporise upon clean green power, we nonetheless make limited observations that certain green electricity generation is well, some less well, suited to local district heating,

Electricity generated from local energy sources synergises perfectly with systems that exploit local sources of heat. But continuity of supply is necessary and wind and solar cannot be stored despite weather dependency.

Tidal, sewerage and hydro power all suit because they are locally generated, clean and not weather dependant although Tidal power, generated on a larger scale than sewage and hydro is probably best developed and administered by a regional, not a local, authority. But sewage heat and power is generated from essentially local supplies from the very districts that need

them and hydro has been developed by a Community organisation and available in a great many more locations than is commonly believed.

Both hydro and sewerage power have large unexploited potential. 1676MW of hydro power is produced annually; 2860MW more from pumped storage systems: totalling 4536MW per annum - 30-40% of renewable UK power. But another 2GW of capacity lies wasted in the UK. Hydro is highly efficient in the conversion of raw to consumable energy – electricity – it rarely achieves a rate under 80% - twice that of steam turbines. Installations are sustainable and cost-efficient. Most are small and rural using pumped, river run, tidal range, canals and water treatment work sources. Its the cheapest electricity source in the UK and possesses an 80 year life span – nuclear only 35, wind, solar and AD, 25%. (British Hydro Association. Hydrofacts). A well-known commercially-funded community hydro scheme exists in West Oxfordshire on the Osney river Thames lock.

Clean Heat Jobs.

We plan urgent research into the clean heat employment prospects a transitional UK economy will offer. Jobs will clearly be created in heavy industry manufacturing turbines. Many clean heat systems utilise turbines, (some hydro turbines) in whose manufacture Britain boasts a proud history - the first turbines were constructed in the 1889s and in whose manufacture around 7,400 were employed in 2015. Expanded demand affords significant job opportunities for job creation in a transitional economy. Geothermal heat and power development would expand transitional opportunities for those Direct and Indirect drilling occupations currently in fossil- fuel industries – around 26,000 at present. And new opportunities will be created in developing, managing and installing sewerage heat recovery. New hydro and tidal power will mean other new jobs.

Our newsletters and website will feature discussions about critical employment and transition issues of importance to the workforce, trade unions and transition.

We hope this Clean Heat Special Newsletter scheduled for distribution not long before annual Conference where energy issues will be under scrutiny, has been of interest. We invite you to get in touch and follow our labour movement research and information services.

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