NFLA Policy Briefing No.175

Date: 16th May 2018

Subject: Decentralised energy and the climate change imperative - an update on progress across local government in the UK and Ireland

1. Introduction to NFLA report

This report is the Nuclear Free Local Authorities' (NFLA) third annual assessment of the 'state of play' amongst Local Authorities in the development of local, or decentralised, energy projects, strategies and policies. Whilst again providing a large number of best practice examples, the report also places the focus of such activity on the imperative of reducing carbon emissions in order to mitigate the worst effects of climate change. It has been developed by the NFLA Policy Advisor Pete Roche in conjunction with the NFLA Secretary. NFLA is strongly supportive of decentralised energy as one of the ways local government can play a role in the promotion of renewable energy, energy efficiency and energy storage, as well as tackling fuel poverty.

2. Introduction: the climate imperative

The UK's current long-term target is a reduction in greenhouse gas emissions of at least 80% by the year 2050, relative to 1990 levels. This 2050 target was derived as a contribution to a global emissions path aimed at keeping global average temperature to around 2°C above pre-industrial levels. The Irish Government has a similar target.[1]

The 2015 Paris Agreement aims to limit warming to well below 2°C and to pursue efforts to limit it to 1.5°C. To achieve this aim, the Agreement additionally sets a target for net zero global emissions in the second half of this century.[2]

Although the UK Government's official climate advisors, the Committee on Climate Change (CCC) agreed initially in 2016 that it was too early for the UK to set more exacting targets, and that it would be better to get on and plan how to meet existing targets, the Government has now decided that it will formally ask the CCC, to consider the "implications" for the UK of meeting the 1.5°C Paris target.

3. What does limiting temperature rise to 1.5°C really mean?

According to Claire Perry, the Minister for energy and clean growth, the UK will need to legislate for a net-zero emissions target at an appropriate point in the future.[3] Measures set out so far in the UK Government's Clean Growth Strategy[4] will only achieve 94% of the emi-

C/o Nuclear Policy, Level 5, Town Hall Extension, Manchester, M60 3NY
Tel: 0161 234 3244 E-Mail: s.morris4@manchester.gov.uk Website: http://www.nuclearpolicy.info

ssions reductions required by 2027 and only 90% by 2032 to keep us on the path to achieve the 80% target in 2050. In other words, further measures will be required even to meet the 80% target by 2050. [5] The Republic of Ireland has similar issues in meeting its targets.

4. So what are the implications of all this for local authorities?

An analysis by the C40 Cities group, which represents 25% of global GDP and more than 650 million citizens, gives a detailed pathway of what C40 cities' need to do to play their part in converting the Paris Agreement from aspiration into reality. C40 is a network of more than 90 of the world's megacities committed to addressing climate change. In the UK, London is the only member, and there are none in Ireland.

Their analysis – called *Deadline 2020* – shows that the C40 cities must undertake an unprecedented increase in the pace and scale of climate action, doing 125% more between 2016 and 2020 than they did in the previous decade.

To remain within a 1.5°C temperature rise, average per capita emissions across C40 cities needs to drop from over 5 tCO_2e per capita today to around 2.9 tCO_2e per capita by 2030. For wealthier, high emitting cities that means an immediate and steep decline. Many fast developing cities can maintain their current levels for up to a decade, and in a small number of cases there is some scope for emissions per person to rise slightly before they eventually fall to zero. But every city needs to diverge considerably from its current 'business as usual' pathway.

Between 2016 and 2050, over $1 trillion needs to be invested across all C40 cities to meet the ambition of the Paris Agreement through new climate action.

The report also concludes that if all cities with a population over 100,000 were able to adopt the ambition of the C40 cities they could save 40% of the emissions reductions required to achieve the 1.5°C limit by 2100.[6]

Clearly Cities face a formidable challenge. With limited resources this means that they should prioritise actions which can catalyse systemic change. A second report, published by the C40 group and written by the McKinsey Centre for Business and Environment, assesses the biggest opportunities for emissions reduction and what they will mean for different types of cities around the world.[7]

The C40 models suggest that by 2030 every city across the UK and Ireland should be powered by at least 90% renewable energy, to play their part in preventing catastrophic climate change. Although a challenge this promises huge economic, social and quality of life benefits. The low-carbon cities and regions of the future will be healthier, wealthier and more equal as a result of the climate action we are taking today.[8]

UK100 is a separate highly ambitious network of local government leaders, which seeks to devise and implement plans for the transition to clean energy that are ambitious, cost effective and take the public and business with them. It supports decision-makers in UK towns, cities and rural areas in their transition to 100% clean energy by 2050. It is the only network for UK local authorities focused solely on climate and clean energy policy.[9] There is at present no similar body in the Republic of Ireland – NFLA urges Irish Councils to consider the activity of UK100.

85 local leaders have already committed to 100% clean energy and more are signing up. The shift to clean energy is happening here in the UK. The leaders made the commitment as part of the momentum around the Paris Agreement in 2015, reflecting the leadership shown by mayors globally on climate change and clean energy. Turning those commitments into

reality is the goal of the network. UK100 connects local leaders to each other, to business and to national government, enabling them to showcase their achievements and learn from each other. It enables them to speak collectively on how to accelerate the transition to clean energy locally and nationally.

5. Decentralised energy – continuing progress across local government

In May 2017 the Nuclear Free Local Authorities (NFLA) published an update on the continuing progress of decentralised energy nationally and internationally. It reviewed innovative policy within this area which can help local government move forward with developing such projects.

This detailed help local authorities could receive from the Association for Public Service Excellence (APSE) and various ways local authorities could still proceed with renewable energy projects despite the fact that the UK Government had effectively removed financial incentives, and several different ways local authorities could finance projects.

These included, particularly with regard to solar projects:

1. Undertake all of the preparatory work on a solar project and then wait for the price of solar panels to fall. Grid parity when solar PV costs no more than fossil fuel generated electricity is not far away. We can expect the cost of solar panels to have fallen sufficiently over the next couple of years to make new projects viable.
2. Build a solar project now but boost the financial return by maximising the income from electricity generated by creating a private wire to a nearby user or the council's own premises to allow the solar electricity to be sold at the retail price rather than the lower wholesale price it might achieve if it were sold to the Grid or by entering into a sleeving operation to council premises elsewhere using the national grid – allowing the council to save the difference between the retail and wholesale price minus a fee for use of the Grid.
3. Using battery storage and selling power when it is most valuable at peak times via the National Grid or the Capacity Market, or simply allowing the council to use the electricity itself in the evening or when there is no sun;
4. Setting up an Energy Services Company (ESCO) and selling power at the retail price direct to domestic customers or local businesses or entering a white label deal with a pre-existing ESCO; A Green Power Purchase Agreement can also boost income. For instance council-owned Bristol Energy has a green plus tariff which sells electricity at a slightly higher price.
5. The easiest solution is for a council to use the power itself. It is then able to save paying, say 10p/kWh for each unit of power it consumes, rather than only receiving around 5p/kWh by selling it to the grid.

The final section of the 2017 report listed around 15 examples of projects in local authorities across the country still able to proceed.[10]

Since May 2017 the ground-breaking 10MW Clay Hill Solar Farm has been launched as the first to be built without any government subsidy support. Claire Perry pointed to it as proof of that the technology no longer needs financial support from tax payers. The site's owner, Anesco, has distanced itself from that specific claim and stressed that Clay Hill is a hybrid project that combines the generating capacity with battery storage. Nevertheless, the Company says the finance model used at Clay Hill does stack up and it is planning to launch as many as four more hybrid solar/storage farms this year.[11] Anesco now has 29 operational sites with 76 individual battery units, with a combined capacity of 87MW, and is planning a further 380MW by 2020.[12] Solar developer INRG has announced plans for a 120MW solar

farm with 50MW worth of battery storage on land adjacent to the British Steel works in Scunthorpe, and the Next Energy Solar Fund is planning others.[13]

A new report from the Solar Trade Association (STA), called *Leading Lights*, shows how local councils are leading the way on solar by building modern solar homes, developing 'subsidy-free' solar farms, master planning 'smart' neighbourhoods and using solar to save money and provide stable sources of revenue to fund services.[14]

Swindon Borough Council is an excellent example when it comes to embracing solar power technology, according to the report. Swindon's projects include:

- The establishment of the first ever tax-free solar ISA, for investment by local people, to fund a 5MW community solar farm;
- The site preparation for a huge 50MW battery storage facility, and
- The development of one of the UK's largest solar farms at 61MW on a former airfield, funded in partnership with other boroughs
- Overall the solar projects developed by Swindon Borough Council raise £647,000 every year which help to fund local services.

The report makes ten recommendations to local authorities to make solar work today. These include higher building standards, use of zero interest Salix Finance, going for high volume tenders and larger schemes to improve economics, granting solar business rate relief to state schools and community energy groups and including solar and storage alongside electric vehicle strategies.

Salix Finance Ltd. provides interest-free Government funding to the public sector to improve their energy efficiency, reduce carbon emissions and lower energy bills. Salix is funded by the Department for Business, Energy and Industrial Strategy, the Department for Education, the Welsh Government and the Scottish Government and was established in 2004 as an independent, publicly funded company, dedicated to providing the public sector with loans for energy efficiency projects. (See https://www.salixfinance.co.uk/)

The STA's new guide explains the unique powers and tools local authorities have to boost local solar energy and energy storage. It showcases common sense solar initiatives by local authorities today, as well as some of the most pioneering. It demonstrates that solar can provide reliable revenue streams today.[15]

Data suggests local authority action makes a big difference to solar uptake; proactive councils boast higher levels of solar capacity and a higher proportion of solar homes. The STA's guide aims to accelerate dissemination of the best practice happening now, both proven and pioneering, so that every region can better realise its solar potential.

Solar enables councils to turn unused land (even former landfill sites) and forgotten rooftops into valuable, revenue-earning assets. The case studies in the *Leading Lights* report illustrate, solar presents a low-risk investment option with wide social, economic and environmental benefits. Some key initiatives require no upfront expenditure at all.

Councils are now particularly well placed to deliver many applications of solar today without subsidy. Their uniquely long-term perspective, together with exceptional terms of both finance and power purchase security means that they are in the fortunate position of being able to make the economics work.

But tackling climate change isn't just about decarbonising electricity supply. The majority of the country's energy demand for heating and transport is still met with fossil fuels. Achieving

targets will also require big reductions in energy demand, the rapid rollout of electric and zero emission vehicles running on clean power, and renewable heating technology.

6. Local Authority Strategies and Plans

Nearly 100 UK local authorities now incorporate solar within their environmental strategies, from Aberdeen City Council's Sustainable Energy Action Plan to Nottingham City Council's 20% renewable energy by 2020 target, to Worcestershire County Council's Energy and Carbon Management Plan. A number of Councils in the Republic of Ireland are also considering the potential for developing solar and other renewables in their economic development plans.

Here are some excellent examples of such activity:

a) **Bristol City Council** has launched an international search for potential partners to help reach the city's goal of becoming carbon neutral by 2050. The council is looking to attract up to £1bn investment in Bristol's energy infrastructure over the next decade. A new prospectus, known as **City Leap**, has been released outlining a series of energy and infrastructure investment opportunities available to local, national and international businesses. The prospectus is designed to test the market and lays out big ambitions and opportunities, building on the work and innovative pilot schemes already taking place in the city. The largest investment opportunities are in the areas of heat networks (£300m) and domestic energy efficiency (£300m). Over the next decade the council hopes to expand the city's existing heat network and facilitate the development of a large-scale heat network from Avonmouth to Severnside. Domestic energy efficiency work will focus on addressing fuel poverty and enabling households to insulate their properties to reduce the costs of heating their homes.[16] As much as £40 million could be invested in the city's renewables capacity, particularly solar by 2027 as it bids to become carbon neutral by 2050. The prospectus references a study conducted in 2009 by the Centre for Sustainable Energy which identified the potential for more than 140MW of solar capacity in the city, split over installations on private housing (74MW), social housing (22MW) and commercial properties (46MW). A secondary study, compiled by The Energy Service, has reinforced the potential for installing solar on the council's social housing, identifying potential for around 22.8MW of solar worth an estimated investment potential of £28 million.[17]

b) The **Greater London Authority** Mayor, Sadiq Khan**,** has presented the final version of the capital's ambitious 2050 Environment Plan to the London Assembly. The strategy envisions London becoming a 'zero carbon' city by mid-century. Achieving this target will require a significant overhaul in the way London builds homes and offices and operates transport routes.[18] Detailed plans include investment of £34m in a range of new services and programmes designed to boost energy efficiency and improve access to clean power across the capital. Khan announced that a new £2.5m package would help address fuel poverty, offering households up to £4,000 in Warmer Home grants to fund improvements such as new boilers, heating controls and insulation. The Mayor's Office said these new projects included plans for a new whole-house 'eco refurbishments' initiative, which would pilot extensive green upgrades to 10 homes; a £10m commercial boiler scrappage scheme which will start in the Spring and will offer capital grants to businesses switching to more efficient heating systems; and an on-going plan to deliver 1GW of solar capacity across the capital by 2030, including a £4.5m programme to install solar on Transport for London (TfL) buildings.[19] Solarcentury has won the highly sought-after reverse auction to install solar in London under the mayor's flagship solar strategy. Solar Together London was launched in five London boroughs – Brent, Ealing, Kingston, Merton and Sutton – as part of the Mayor of London's solar strategy. The scheme

invited homeowners in those five boroughs to express their interest in installing solar. That pool of homes was then grouped together, and installers invited to tender for that work under a reverse auction designed to deliver collective savings. And the scheme's design has seemingly worked, with more than 3,500 homes to have signed up now being offered solar systems at an average discount of 35% on market rates.[20]

c) The **Greater Manchester Combined Authority** Mayor, Andy Burnham, has unveiled a raft of new environmental goals. He has pledged to ensure Greater Manchester achieves 'carbon neutral' status by 2040 at the latest. He confirmed plans to deliver a zero emission bus fleet and invest up to £50m over three years in new cycle lanes and paths. In addition, he confirmed a range of new green building commitments, including plans for a new energy efficiency retrofit programme and proposals to include a new zero carbon homes and buildings target in the Greater Manchester spatial framework.[21] The Greater Manchester Combined Authority has also launched a £15m loan scheme designed to make it easier for property and infrastructure developers to incorporate renewables as part of their projects. Backed with funding from the European Regional Development Fund, the Greater Manchester Low Carbon Fund will offer loans to fund projects that would not attract traditionally commercial finance due to the relatively new technology involved, or projects that would be improved through the fund's expertise.[22]

d) The **Northern Ireland Renewables Industry Group** (NIRIG) has published its ambitious Energy Strategy, setting out plans to decarbonise the energy sector by 2050. The group also wants reach a 70% renewable electricity target by 2030.[23] The Strategy includes developing an Electric Vehicle charging network; planning and designing integrated schemes for low-carbon urban transport; encouraging active participation in low carbon cities initiatives; exploring low carbon heat networks in urban communities; identifying and develop opportunities to reduce or utilise energy waste from industrial processes.[24]

e) **Tipperary County Council** formally adopted its Sustainable Energy Action Plan (SEAP) in 2017. This plan was created following Tipperary's commitment to The Covenant of Mayors, the world's largest movement for local climate and energy actions. This plan explains the steps that need to be taken to reduce Tipperary's CO_2 emissions by 30% by 2020. That same year, Tipperary Energy Agency, announced that the European Investment Bank (EIB) is to support the actions of the SEAP. This action plan includes 32 actions which will reduce Tipperary's energy related CO_2 emissions by 2020. These actions cover a wide range of sectors including agriculture, education, planning, residential, local authority and the commercial sector. The Tipperary Energy Agency has identified a €500m sustainable energy opportunity for the county and will continue to work to accelerate the transition of Tipperary to a low carbon future. One of the Agency's projects involved the installation of solar photovoltaic (PV) panels on 9 Tipperary Local Authority buildings including 3 Civic Offices, 2 Fire Stations, 2 Libraries, a Machinery Yard and a Leisure Centre. The role of Tipperary Energy Agency was from initial feasibility studies and project creation, through to procurement and project management. Tipperary Energy Agency worked closely with the contractors and Tipperary County Council to ensure the project was delivered to a very high standard.[25]

7. Delivering new-build low-carbon homes, commercial and public buildings

Local government retains tremendous powers to stipulate a proportion of energy used on developments that must come from renewables under the Planning and Energy Act. Some examples of what local authorities are doing include:

a) **Bristol City Council**: All new developments at all scales are expected to incorporate sufficient renewables to reduce carbon emissions by at least 20% over current national buildings standards, once energy efficiency measures have been optimised.[26]

b) **Sheffield City Council** requires all 'significant developments' (five or more dwellings, or more than 500m^2 floor space) to meet a minimum of 10% of the predicted energy needs of both new and converted buildings from renewable or low carbon energy. Solar PV is the preferred technology for achieving this, except in the town centre where developments commonly connect to Sheffield's extensive district heating network.[27]

c) **Milton Keynes**' Local Plan requires new homes to be carbon neutral. This can be achieved by a 10% carbon reduction from onsite renewables, and the use of carbon offsetting contributions, which the council reinvests to insulate older homes. In future developers will be required to review opportunities for energy storage.[28]

d) **Cambridge City Council** has developed a Sustainable Housing Guide which it encourages social housing developers and those developing on council land to use. The Council is building its first council homes in 20 years. These will include solar power to reduce energy bills in an area of the UK where housing costs are generally very high.[29]

e) **London Borough Councils** should ensure that all developments maximise the opportunities for on-site electricity and heat production from solar technologies from solar in the latest move by Mayor Sadiq Khan to promote the technology. Khan was elected on a pledge to expand the use of solar across the city and following the launch of the community energy fund for solar projects, the new draft London Plan outlines a series of policies designed to boost the deployment and efficacy of solar in the capital.[30]

8. Developing New Revenue Streams for Services

A number of Councils are looking at decentralised energy in terms of the development of new revenue streams, having both the benefit of promoting lower carbon energy solutions and generating some much needed income.

Some good examples include:

a) **West Sussex County Council** is building a subsidy-free 7.4MW (p) solar farm on a closed landfill site at Westhampnett which will open in 2018. This is the second solar farm scheme to be developed by this pioneering County Council, but the first one used Feed-in Tariffs. The new solar farm incorporates battery storage. The council estimates the scheme will pay back in 15 years and generate £7.9 million net income. With its own 'White Label' local energy tariff now available across Sussex, the authority also has plans to supply its residents with energy generated in the county. (Financed through the Public Works Loan Board)[31]

b) **The City of Cardiff Council** included a 143kW(th) solar thermal system as part of its £5.5 million regeneration of a leisure centre, featuring a 25-metre swimming pool. The 155m^2 evacuated tube array, by Kingspan Environment Ltd, feeds two 1,000 litre hot water cylinders with hot water. It will save 30% on annual energy costs compared to gas heating.[32]

c) **Perth and Kinross Council** involved renewable energy specialists, iPower Energy, to masterplan the development of a new council-owned business park. The first

phase of construction features 75kW(p) of ground mounted solar and 50kW(p) of roof mounted solar to supply the businesses with clean power. The ground-mounted solar is connected via a private wire to the premises and the energy is sold by Perth and Kinross Council to the business tenants. (The business park is financed out of the council's capital expenditure budget with solar costs recovered mainly through Power Purchase Contracts with tenants.)[33]

d) **Highland Council** is to invest £2.3 million in building a range of small solar farms across its estate after agreeing on a scheme that aims to make more than £4 million for the council over 20 years. The council's current plans would see 2.5MW of solar built, comprising ten 250kWp arrays built on land that could not be used for anything else. A total of 37 locations throughout the council estate have been identified, with the final sites yet to be selected. Highland Council will enter into long term borrowing agreements with 'cheap' interest rates in order to make a profit.[34]

e) **Highland Council** has also unveiled plans for a giant hydroelectric Archimedes screw to generate electricity to be used to power local attractions. The 100kW turbine will control the water flow from the River Ness near Inverness and be able to generate enough power for 150 homes and generate an income for the local authority of about £90,000 to £120,000 at present prices. The electricity that is generated by the turbine at Whin Park Lade could also be used to supply council buildings in Inverness and local venues such as the Aquadome and the archive centre, generating further savings.[35]

f) **Leicestershire County Council** is taking forward plans to finance and construct its own 10MW solar farm, which it hopes will generate £720,000 per year once completed while mitigating the council's emissions by over 100%. Subject to approval, the scheme will be developed for £7.76 million on land owned by the council near the town of Quorn. It will be funded from the Asset Investment Fund as identified in the council's Medium Term Financial Strategy (MTFS) 2018/19-2021/22. Along with the commercial units also under consideration by the council for rent, the entire scheme is expected to lead to an annual yield of 5.8% once business rates and operational and maintenance costs associated with the management of all four sites (£200,000 pa) are taken out.[36]

9. Modernising the Local Authority Estate

A number of Local Authorities are using opportunities to develop and improve their estate with schemes to increase low carbon energy generation.

Some excellent examples include:

a) **Portsmouth City Council** is investing heavily in commercial scale solar PV on its own buildings portfolio as well as offering Power Purchase Agreements (PPAs) and project management for other authorities and clients. The Council uses borrowing from the Public Works Loans Board to fund its investment in PV, with competitive rates of return achieved. The council has now installed over 4.8MW (p) of solar capacity across 300 sites, with the vast majority of installs between 10 and 50kW (p). (Financed through the Public Works Loan Board.)[37]

b) **West Sussex Council** has secured £3 million of capital funding to finance solar across 50 schools following a successful pilot on eight schools. It is making use of Portsmouth's highly efficient solar tendering programme, to deliver a phased programme of solar installations with the first phase due to complete by March 2018. The schools will contract to purchase the solar electricity from the council-owned solar through a Power Purchase Agreement, at a lower price than retail, which avoids

the need for upfront investment. Meanwhile, through a combination of power sales and FIT revenue, the council will recover its capital expenditure in 12 years. (Financed through PWLB with cost recovery via FITs and PPAs.)[38]

c) **Hounslow's** Western International Market's 1.7MW(p) rooftop solar scheme combines with four 60kW(h) lithium batteries, to generate and supply half of the electricity requirements for West London's largest wholesale market for flowers and fresh produce. [39]

d) **Chelmsford City Council** has installed solar PV across its main council buildings, including two leisure centres, the main council offices and its operational services depot. All four 50kW(p) schemes were funded out of the council's own capital funds and will pay for themselves within five years and offer a source of income for many years to come. (Financed from capital funds.)[40]

e) **Calderdale Council** has used Salix Finance to provide an interest-free loan to fund 95% for a 13kW(p) rooftop solar PV project on a school at Sowerby Bridge. The Salix loan will be repaid over eight years from the expected savings to the school's energy bill.[41]

f) **Scottish Border Council** has awarded a contract to design and install over 400kWp of solar on schools and the offices. Eleven schools will see solar arrays installed on their premises ranging from 3.85kWp at Gordon Primary School in Berwickshire up to a 48.6kWp system at Hawick High School. The council is already leading the way with a number of major energy saving projects around street lighting, electric vehicles and energy use in the community.[42]

g) **Nottingham City Council** has begun work to expand its solar portfolio with the launch of a new framework that could see tens of millions of pounds spent over the next four years on new solar installations in the city and surrounding regions. The council, which has previously installed 1.5MWp of solar across 40 sites, has already committed at least £3 million over the next four years to a pipeline of domestic and commercial solar. This figure could rise to a maximum of £27.5 million of spending by the council depending on its future plans and interest from other local authorities which will have access to the framework to spend additional funds.[43]

h) **Glasgow City Council** has installed 350kW of solar PV across seven schools as part of its Carbon Management Plan. In addition to contributing to the City's carbon reduction plan of 30% by 2021, the schools have also been able to gain further educational value out of the systems providing a practical teaching resource for pupils.[44]

10. Building Smart Energy Neighbourhoods

An important element of new energy programmes is the development of 'smart' energy schemes which seek to use energy when it is needed, and encourage energy storage schemes to supplement such solutions. Local authorities around the country are particularly interested in such schemes, as they are not as cost intensive as some other projects, and funding for them is more extensive.

Amongst some of the most extensive are:

a) **Nottingham City Council** is supporting a project to develop low-carbon smart homes around an ESCO-owned and operated community-level micro-grid, including storage. Phase One of 45 homes has been constructed (and sold) – eventually there will be 500 homes. A community-scale battery (the largest for community use in

Europe) will store solar energy to meet peaks in use and draw cheap power from the grid at night. An urban solar farm will be developed alongside this new neighbourhood whilst under construction. The work is supported by £6 million of grant funding from Innovate UK via two Energy Programmes – The Energy Research Accelerator (ERA) and Project SCENe (Sustainable Community Energy Networks).[45]

b) **Nottingham City Council** and Nottingham City Homes are also the first Local Authority outside of the Netherlands to pioneer the Energiesprong ('energy leap') approach to retrofitting homes, with ten homes completed in early 2018. Energiesprong uses innovative procurement and business models to stimulate the market for offsite manufactured retrofitting solutions for existing homes. The result is ultra-low energy, warm, homes, featuring an entire solar roof by Viridian Solar. The works complete very quickly, without the need for residents to move out. Various councils are bidding for European funding to enable the next phase of development on over 200 homes.[46]

c) **Manchester City Council** has used funding from the Horizon 2020 European Union 'Smart Cities and Communities' Programme to develop 'smart', low carbon and energy saving solutions. With €9m funding, a number of notable installations have recently taken place, including a new Siemens Building Energy Management system (BEMs) installed at Manchester Art Gallery. Combined with Siemens' expert advice on setting the parameters, it is hoped that the new system will help the Gallery to achieve significant energy and cost savings. At Manchester Metropolitan University's Birley Campus, a 157kw solar PV panel installation has significantly increased the amount of renewable generation on campus. This will complement not only the existing power infrastructure at the campus, but also allow the campus to reduce its energy consumption at peak times as well as reducing costs.

d) In addition, **Manchester City Council** has received £16m from the Department of Media, Culture and Sport to cooperate in a 21 partner consortium, consisting of public and private partners, and a number of SME's to develop a smart energy scheme called 'City Verve'. This scheme aims to radically overhaul how a city's services are provided to its citizens focusing on four themes, one of which is Energy & the Environment, by using the 'Internet of Things' technology to facilitate 'smart' improvements for those that live, work and study in the 'Corridor Manchester' area. Innovative technology solutions are being deployed to reduce building costs, energy consumption and improve sustainability. Examples of the installations taking place include a 'Next Generation Building Management System' (BMS) within City Labs, which uses smart technology attached to existing BMS systems to monitor and forecast using external information sources and to manage building conditions dynamically. The software also allows building managers to help manage the grid through controlling demand within the building. This will also see the installation of an energy storage battery at the Bright Building to store surplus energy from the building. The Building Retrofit uses a "smart box" to allow building owners to connect existing equipment along with new technologies and sensors to allow better management and energy efficiency. The Manchester Town Hall Extension will shortly trial Workplace Occupancy Sensors, to provide real time Occupancy, Noise and Temperature data for Estate Management. This will also allow informed decisions on space usage and employee working conditions, and lead to significant energy cost savings. In his local role for Manchester City Council, the NFLA Secretary has recently presented a report on such matters to the Council's Neighbourhoods and Environment Scrutiny Panel.

e) **Cambridgeshire County Council** expects to secure funding to build a solar carport of nearly 1MW(p) – the largest in the UK – on one of their park and ride sites. Construction will take several months. The carports are part of a mini grid, including 200kW(h) of battery storage, which will provide charging for electric vehicles, CCTV and LED lighting. Surplus power will be sold locally via a Power Purchase Agreement.[47]

f) **Swindon Council** is set to be home to one of the largest battery storage facilities in the UK, with a capacity of up to 50MW(h). The scheme, which has planning consent, is on a brownfield site next to an electricity sub-station. The unit will be able to deliver balancing services to the grid. Storage technology helps to reduce the need for expensive grid upgrades by smoothing demand peaks, helping to reduce energy costs for consumers in the long run.[48]

g) **The Isle of Canna** off the west coast of Scotland has secured £1.3m to largely ditch diesel power generators in favour of a new community-owned renewable electricity system based on solar PV, wind, and battery storage technologies. Construction of the off-grid renewable energy system was due in April 2018 and to take around seven months to complete, after which profits from the power generated will be used to cover operation and maintenance costs, and reduce bills for local homes and businesses. The existing diesel generators will continue to be leased to islanders, but it is hoped that upwards of 90 per cent of their electricity needs will be met by the PV panels and six small onshore wind turbines being built on the island. The community has established its own enterprise – Canna Renewable Energy and Electrification Ltd (CREEL) – to own and operate the new equipment.[49]

h) **North Ayrshire Council** has approved a plan to install rooftop solar on up to 500 properties in its housing stock to save residents up to £115 within the first year. An initial consultation on the £1.6 million solar panel initiative identified 1,100 council properties in North Ayrshire which could benefit from the installations. The council will now contact these homes again to gauge their interest, with additional properties considered for inclusion on a first-come, first-served basis up to a limit of 500 installations.[50]

i) **The Isles of Scilly** is to have almost 450kW of solar PV deployed across the Islands as part of a landmark Smart Energy Islands project. The multi-million pound European Union funded initiative is set to provide the isles with a new smart energy system, using new software platforms to manage supply and demand and double renewables capacity to 449kW. This will be done through the deployment of solar PV across 74 domestic properties and six larger sites, one being a 48kW ground mount array at the Isles of Scilly airport. The largest solar project included is a 63kW rooftop installation at the Porthmullen waste facility.[51]

j) **Gateshead Council** has installed a 3MWh battery storage scheme for its energy project which provides heat and electricity to public buildings via a network of underground pipes and “private wire” electricity cables. The council plans to supply local businesses, too.[52]

11. Supporting Community Energy Schemes

The first ever Community Energy ‘State of the Sector’ report reveals that a total of 222 community energy organisations are operating renewable energy schemes – solar, wind and hydro - in England, Wales and Northern Ireland boasting collective capacity of 121MW, or the equivalent to the domestic consumption of 85,500 homes. When that capacity is combined with Scotland’s estimated community energy capacity of 67MW, it means the UK

community energy sector has a capacity of 128MW and can power 130,000 homes, or as many households as there are in Cardiff or Coventry, according to the report.[53]

Local authorities are essential partners in community energy projects by, for instance, making council-owned assets, particularly roof spaces, available to communities. In addition, councils can help by offering financial support, officer skills and time, and facilitation of financing options, like bond offers. The credibility of local authorities standing behind community efforts helps them to achieve their objectives.

Some notable cooperative agreements include:

a) **Swindon** Public Power Solutions (PPS) developed Chapel Farm Solar Park on a former landfill site. PPS devised the unique blend of public sector and community investment for the 5MW(p) scheme which was financed with a £3 million investment from Swindon Borough Council and the remaining £2.4 million from investors drawn from within the local community and across the UK. This was done through the first renewable energy bond eligible to be held tax-free in an Innovative Finance ISA, structured by Abundance Investment.[54]

b) **Bristol City Council** helped the community-owned Bristol Energy Co-operative (BEC) to build a 4.2MW(p) solar farm, transforming an under-used site at the junction of the M5 and M49 motorways for the benefit of the local community.[55]

c) **London** has launched a community energy fund for solar projects, offering £400,000 over four years to support community energy groups overcome the challenges in getting projects off the ground. The plans were proposed as part of a draft solar action plan which remains out for consultation until November however City Hall has moved ahead with the London Community Energy Fund 2017/18 ahead of its close. The fund offers grants of up to £15,000 per project to support a range of project feasibility and scoping activities.[56]

d) **Ireland** has 124 communities which are now part of the Sustainable Energy Authority of Ireland's (SEAI) Sustainable Energy Communities network, a rapidly expanding national movement towards a cleaner energy future. The communities have committed to developing long-term energy plans with the assistance of SEAI. The network has doubled in size in 2017, as momentum gathers in the move to more sustainable energy systems. SEAI Chief Executive Jim Gannon says €28 million grant funding for community energy projects in 2018 will see communities working together to use less energy in their homes and buildings.[57]

12. The Development of District Heating Projects

An area of decentralised energy that Local Authorities are particularly interested in developing is around building district heating networks. Decarbonising heat is as important as developing renewable forms of electricity in the wider aim of reducing carbon emissions.

Some good recent examples include:

a) **Leeds City Council** has cut the ribbon on a 'revolutionary' £35m heat network, which will deliver low-carbon heat and water to thousands of homes and businesses. Tenants in 23 Leeds apartment blocks are expected save on energy bills by between 10% and 25% a year through the heat network connection.[58]

b) **Glasgow**: Scientists are finalising plans to exploit the vast reservoir of warm water that fills a labyrinth of disused mines and porous rock layers underneath Glasgow. They believe this subterranean store of naturally heated water could be used to warm homes in the city. If the system proves successful, such water could then be

exploited in other cities and towns across Britain, they say. The £9m project will initially involve drilling narrow boreholes filled with instruments to survey temperature, seismic activity, water flow, acidity and other variables to establish the state of the water in the rocks below the city. The aim will be to establish whether this warm water can be extracted for long periods to heat Glaswegian homes.[59]

A heat pump project being planned in the Gorbals will harvest heat from the River Clyde. The Renewable Heat Incentive provides appropriate support for lower carbon techniques to be utilised if one wants to. Heat pump uptake has though been very low. The Low Carbon Infrastructure Transition Programme is supporting key Scottish projects with funding to get the difficult ground breaking projects moving therefore showing they are technically achievable.[60]

c) **Bristol City Council** owned utility Bristol Energy has formed a new partnership with anaerobic digestion experts GENeco. GENeco, the company behind the UK's first bio-bus powered by sewage and liquid organic waste, is now supplying Bristol Energy with biomethane from sewage waste collected from the homes of a million people in the local area. GENeco now treats 75,000,000m3 of sewage waste every year, enough to power more than 8,000 homes with green gas. Customers who sign up to Bristol Energy's My Green Plus tariff will receive 15 per cent green gas and 100 per cent green electricity, compared to a national average of 0.1 per cent. As well as using sewage to create green gas, GENeco also collects food waste as feedstock. Last October GENeco launched the first vehicle in the UK to both collect and run on commercial food waste. The Bio-Bee truck collects food waste and takes it to GENeco's anaerobic digestion plant, where the waste is processed to remove any plastic and then turned into low carbon biogas.[61]

d) **Bridgend Council** has been awarded £6.5m in EU funding to transform an old coal mine into a green heat generator. The Council is investigating how water in the colliery's underground workings, which has been heated by the earth and is a geothermal source of energy, could be extracted using heat pump technology and a network of pipes to warm around 150 nearby homes. Additional funding for the £9.4 million pound project, which is a demonstrator project for the UK Government-led Smart System and Heat Programme, will be made up by the UK Government, Energy Systems Catapult and Bridgend County Borough Council.[62]

e) **West Dunbartonshire Council** will own, operate and maintain a district heating system, promising reduced tariffs for customers at Queens Quay. The pioneering energy scheme will use river heat to power homes and businesses on the 80-acre Queens Quay development in Clydebank. Gas boilers will also be included as a back-up to cover emergency or peak demand. The £250 million project seeks to transform the disused John Brown's shipyard site into a new business, leisure and residential district. The area will be served by a heat network that draws power from the waters of the Clyde with specialised pumps. Developers say this will be the "largest and most ambitious" district heat network in the country and will make the West Dunbartonshire town "the greenest town in Scotland". The carbon-free system is designed on a modular basis to allow expansion, and could eventually take in the nearby Golden Jubilee Hospital and wider Clydebank area.[63]

f) **Manchester City Council** has secured £2.87m of grant funding from the Government's national Heat Network Investment Project, for the Manchester Civic Quarter Heat Network. Manchester is one of only nine local authorities to have won funding for their projects. The scheme has been designed with expansion in mind and as the network grows and more customers are connected, further capacity can be installed and the benefits increased. Vital Energi, who are one of the country's

best known providers of sustainable and renewable energy schemes, have been appointed as preferred bidder to deliver the scheme, which will include the creation of a low-carbon energy centre and 2km district heating network – connecting several iconic Manchester buildings, including Manchester Town Hall & Extension, Manchester Central Convention Centre, Central Library, Manchester Art Gallery, The Bridgewater Hall, and Heron House.[64]

13. Renewable Transport Projects

Along with decarbonising electricity and heating, the third area where decarbonisation is essential is in the area of transport. Financial support is available for such work and a number of local authorities are pursuing innovative new schemes in this area.

a) **A report from 10:10 and Imperial College** shows how we could be powering our trains with solar. 20% of the Merseyrail network in Liverpool, as well as 15% of commuter routes in Kent, Sussex and Wessex could be solar powered. There's scope for solar trams in Edinburgh, Glasgow, Nottingham, London and Manchester too. There are a few solar stations – Blackfriars Bridge being by far the coolest – and some trains in India even have solar panels on their roofs, but that's just to power equipment like lights and fans. No one's moving the trains themselves with solar. Yet.[65]

b) **Nottingham City Transport (NCT)** has unveiled a new fleet of buses that run on biomethane. The £17m double-decker bus fleet will be powered by a biogas produced by sewage and waste. NCT engineering director, Gary Mason, said: 'We are hugely proud of our new biogas buses."[66]

c) **Fife Council,** in partnership with locally based not-for-profit firm Bright Green Hydrogen, and Japanese technology giant Toshiba has established Levenmouth Community Energy Project (LCEP), based at Methill docks. It utilises renewable electricity produced locally by a wind turbine and solar panels to create hydrogen from water. Some of the hydrogen is then used to run a fleet of 17 low-emission refuse trucks and vans, while the rest is stored in fuel cells and can be called upon to generate low-carbon electricity when output from the renewables devices is poor.[67]

d) **Transport for London (TfL)** is to install 1.1MW of new solar capacity on a variety of its buildings after awarding Engie a contract to carry out the work following a competitive tender process. The £4.5 million refurbishment programme will see the transport operator expand its solar power usage and install energy efficiency measures across a variety of TfL owned buildings, including bus stations and offices.[68]

e) **Orkney Islands Council,** the EU, and a range of other public and community investors, have financed an electrolysis machine to turn surplus energy into hydrogen by splitting water. The resulting hydrogen is stored as compressed gas to be used at a later date in fuel cells which reverse the electrolysis process to produce electricity. The power is used as a substitute for fossil fuels in ships docked in Kirkwall, the capital of Orkney, reducing local pollution and carbon emissions.[69]

f) **Birmingham City Council** is inviting bus operators to bid for the contract to operate, manage, and maintain a fleet of at least 20 hydrogen buses. The seven-year contract would commence on 1 March 2018 and run to 28 February 2025. The buses will be delivered in March 2019.[70]

14. Conclusion and recommendations

The STA says: "*Leadership on solar in the UK today comes from local councils.*" Increasingly this can apply to other forms of renewable energy, as well as low carbon heat and transport.

The top 10 local authorities have invested more than £80 million in solar projects, with Forest Heath District Council in Suffolk topping the list, though there is significant variation in take-up of solar. Peterborough tops the league for the highest proportion of homes with solar panels at around 11%.

Measures that can make solar work include using planning powers to demand higher standards on new developments, making use of interest-free finance from Government-funded Salix Finance, large-scale schemes and putting solar and storage alongside electric vehicle infrastructure, the STA said.

Despite cuts in government support for renewable energy and energy efficiency, there are still ways to make carbon saving projects economic. The message from the STA to councils – and this should apply to other projects as well as solar - is don't wait on national Government; there is a lot you can do today. There is now only just over 30 years to go before we need to achieve zero carbon emissions, and just over 10 years before our cities need to be powered by 100% renewable energy. We need to get on with it. But this transition shouldn't be seen as a burden, but an opportunity which promises huge economic, social and quality of life benefits. The low-carbon cities and regions of the future will be healthier, wealthier and more equal as a result of the climate action we are taking today.

This report has provided a number of leading examples, but there are many more it could have included if space allowed. NFLA strongly support the development of all these projects as clear evidence of the important, if not critical, role Local Authorities can play in the promotion of low carbon energy and in decarbonising the economies of the UK and Ireland. With the stark challenge of dealing with climate change becoming ever more pressing, and at a time of real financial stress in local government, this report still shows that Councils are not just seeking to tackle these critical factors, but are providing responsible local leadership in cooperation with other key players. NFLA commends this report to its members and all Councils across the UK and Ireland and encourages non-members to consider joining with it in playing the vital role in climate change mitigation that all Local Authorities need to play.

NFLA recommends this report is shared with Council Leaderships, Executive Members for the Environment and relevant Council Officers engaged in low carbon projects and climate change mitigation. The list of references below provides further detail. NFLA sees decentralised energy as the future for local government energy policies and a central part of why a focus on renewable energy, rather than new nuclear or fossil fuels, should be prioritised. If non-member Councils are interested in the work of the NFLA, please contact the NFLA Secretary, Sean Morris on s.morris4@manchester.gov.uk.

15. References

[1] National Climate Policy, Dept of Communications, Climate Action and Environment, https://www.dccae.gov.ie/en-ie/climate-action/topics/climate-action-at-a-national-level/Pages/default.aspx

[2] UK Climate Action following the Paris Agreement, CCC 2016 https://www.theccc.org.uk/wp-content/uploads/2016/10/UK-climate-action-following-the-Paris-Agreement-Committee-on-Climate-Change-October-2016.pdf

[3] Business Green 4th May 2018 https://www.businessgreen.com/bg/news-analysis/3031681/net-zero-government-hints-at-2050-target-date-for-ccc-review

[4] Clean Growth Strategy, BEIS, 12th October 2017 https://www.gov.uk/government/publications/clean-growth-strategy

[5] Business Green 25th April 2018 https://www.businessgreen.com/bg/news/3030868/a-very-bad-joke-labour-slams-governments-utter-failure-to-face-net-zero-emission-challenge
[6] Deadline 2020: How Cities Will Get the Job Done, C40 2016
http://www.c40.org/researches/deadline-2020
[7] Focused acceleration: A strategic approach to climate action in cities to 2030, C40 November 2017
http://www.c40.org/researches/mckinsey-center-for-business-and-environment
[8] Leading Lights: How local authorities are making solar and energy storage work today, Solar Trade Association, April 2018
https://www.solarpowerportal.co.uk/blogs/leading_lights_the_uk_solar_revolution_looks_to_local_regional_leaders
[9] See https://www.uk100.org/
[10] NFLA Briefing No.160, Decentralised energy update – continuing progress across local government, NFLA May 2017 http://www.nuclearpolicy.info/wp/wp-content/uploads/2017/05/A273_NB160_Decentralised_energy_update.pdf
[11] Solar Power Portal 28th Feb 2018
https://www.solarpowerportal.co.uk/news/hybrid_solar_plus_storage_economics_stacking_up_as_anesco_dismisses_capacit
[12] Solar Power Portal 14th May 2018
https://www.solarpowerportal.co.uk/news/anesco_quadruples_battery_storage_pipeline_sets_380mw_in_its_sights_by_2020
[13] Solar Power Portal 11th Jan 2018
https://www.solarpowerportal.co.uk/news/inrg_in_pursuit_of_perfect_answer_for_subsidy_free_solar_economics
[14] Leading Lights: How local authorities are making solar and energy storage work today, Solar Trade Association, April 2018 https://www.solar-trade.org.uk/about/leading-lights/
[15] Solar Power Portal 23rd April 2018
https://www.solarpowerportal.co.uk/blogs/leading_lights_the_uk_solar_revolution_looks_to_local_regional_leaders
[16] Bristol City Council 9th May 2018
http://news.bristol.gov.uk/bristol_launches_search_for_partners_to_help_build_sustaina
[17] Solar Power Portal 10th May 2018
https://www.solarpowerportal.co.uk/news/bristol_city_council_seeks_40_million_renewables_investment_in_carbon_neutr
[18] Business Green 11th May 2018 https://www.businessgreen.com/bg/news-analysis/3032118/mayor-khan-presents-final-draft-of-zero-carbon-environment-plan
[19] Business Green 1st February 2018 https://www.businessgreen.com/bg/news/3025757/energy-for-londoners-mayor-powers-up-gbp34m-solar-and-energy-efficiency-plan
[20] Solar Power Portal 9th May 2018
https://www.solarpowerportal.co.uk/news/solarcentury_wins_sought_after_london_solar_strategy_tender
[21] Business Green 22nd March 2018 https://www.businessgreen.com/bg/news/3028996/plastic-free-and-carbon-neutral-manchester-maps-out-bold-green-vision
[22] Business Green 9th March 2018 https://www.businessgreen.com/bg/news/3028105/greater-manchester-gbp15m-low-carbon-fund-to-deliver-green-building-renewables-boost
[23] Energy Voice 24th April 2018 https://www.energyvoice.com/otherenergy/169623/northern-ireland-sets-out-strategy-for-70-renewable-electricity-by-2030/
[24] http://www.ni-rig.org/wp-content/uploads/2017/02/NIRIG-2050-Energy-Strategy.pdf
[25] See https://tippenergy.ie/about-us/
[26] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[27] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[28] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[29] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[30] Solar Power Portal 30th Nov 2017
https://www.solarpowerportal.co.uk/news/sadiq_khan_gives_solar_priority_in_draft_london_plan

[31] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[32] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[33] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[34] Solar Power Portal 9th March 2018 https://www.solarpowerportal.co.uk/news/highland_council_aims_for_4_million_return_from_building_its_own_solar_farm
[35] Times 14th September 2018 https://www.thetimes.co.uk/edition/scotland/a-eureka-moment-for-green-energy-in-inverness-s0lbc3v0l
[36] Solar Power Portal 26th April 2018 https://www.solarpowerportal.co.uk/news/leicestershire_council_planning_10mw_solar_farm_to_mitigate_all_its_emissio
[37] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[38] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[39] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[40] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[41] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[42] Solar Power Portal 10th April 2018 https://www.solarpowerportal.co.uk/news/campbell_kennedy_to_deliver_solar_schools_to_scottish_borders
[43] Solar Power Portal 20th Dec 2017 https://www.solarpowerportal.co.uk/news/nottingham_city_council_opens_up_multi_million_pound_solar_framework
[44] Solar Power Portal 31st August 2017 https://www.solarpowerportal.co.uk/news/glasgow_council_installs_350kw_of_solar_on_local_schools
[45] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[46] Energiesprong 31st August 2017 http://energiesprong.eu/nottingham-first-to-adopt-revolutionary-housing-approach/
[47] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[48] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[49] Business Green 19th March 2018 https://www.businessgreen.com/bg/news/3028670/scottish-islanders-secure-gbp13m-for-community-renewables-system
[50] Solar Power Portal 29th March 2018 https://www.solarpowerportal.co.uk/news/council_turns_to_solar_to_tackle_fuel_poverty_for_500_households
[51] Solar Power Portal 13th Dec 2017 https://www.solarpowerportal.co.uk/news/hitachi_opens_450kw_solar_tender_for_smart_energy_project_on_isles_of_scill
[52] FT 5th Nov 2018 https://www.ft.com/content/f937a10c-c072-11e7-b8a3-38a6e068f464
[53] Business Green 20th June 2017 https://www.businessgreen.com/bg/news/3012277/report-community-energy-powering-130-000-uk-homes
[54] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[55] Leading Lights, STA, April 2018 https://www.solar-trade.org.uk/wp-content/uploads/2018/04/local-authority-solar-guide-WEB.pdf
[56] Solar Power Portal 13th Oct 2017 https://www.solarpowerportal.co.uk/news/london_open_for_business_as_new_solar_community_energy_fund_is_launched

[57] Sustainable Energy Authority of Ireland, 27th November 2017 https://www.seai.ie/news-and-media/over-120-sustainable-ener/
[58] Edie 23rd March 2018 https://www.edie.net/news/6/Leeds-cuts-ribbon-on--revolutionary---35m-heat-network/
[59] Observer 8th April 2018 https://www.theguardian.com/environment/2018/apr/08/energy-home-heating-uk-cities-geology
[60] Herald 29th March 2018 http://www.heraldscotland.com/business_hq/16118731.Commercial_focus__Star_Refrigeration___Prime_pump_technology/
[61] Business Green 18th April 2018 https://www.businessgreen.com/bg/news/3030387/bristol-energy-taps-poo-bus-creators-to-run-city-on-sewage
[62] Business Green 19th January 2018 https://www.businessgreen.com/bg/news/3024785/scheme-to-transform-welsh-coal-mine-into-green-heat-source-wins-gbp65m and Aberdeen Evening Express 19th Jan 2018 https://www.eveningexpress.co.uk/news/welsh-valleys-village-to-lead-the-way-in-geothermal-heating-using-mine-water/
[63] The National 21st December 2017 http://www.thenational.scot/news/15784925.Clydebank_power_point_plan_to_make_it__the_greenest_town_in_Scotland_/
[64] About Manchester 7th Nov 2017 http://aboutmanchester.co.uk/funding-boost-gives-green-light-to-manchesters-civic-quarter-heat-network/
[65] Guardian 14th Dec 2017 https://www.theguardian.com/science/political-science/2017/dec/14/in-10-years-time-trains-could-solar-powered
[66] Local Government 19th May 2017 https://www.localgov.co.uk/Nottingham-unveils-world's-largest-biogas-bus-fleet/43102
[67] Scotsman 14th June 2017 https://www.scotsman.com/news/environment/pioneering-green-energy-project-switches-on-at-methill-docks-1-4475876
[68] Solar Power Portal 31st Jan 2018 https://www.solarpowerportal.co.uk/news/tfl_to_install_1.1mw_of_solar_with_tender_winner_engie
[69] FT 8th Jan 2018 https://www.ft.com/content/f5e8c5aa-d8ee-11e7-9504-59efdb70e12f
[70] Transport Xtra 8th Dec 2017 https://www.transportxtra.com/publications/local-transport-today/news/55515/city-seeks-hydrogen-bus-operator