

NFLA Policy Briefing

No.195



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Subject: Powering our Ambition - what benefits could there be in developing a Scottish Energy Development Agency (and elsewhere)?

i. Introduction

This report has been developed by the NFLA Scotland Policy Advisor on the request of the NFLA Scotland Forum. It outlines the NFLA's thoughts on what the benefits may be, and the wider issues in developing a Scottish Energy Development Agency. Whilst this is part of a consultation which is being undertaken for the Scottish context, as the Scottish Government considers its next policy moves in promoting renewable energy and tackling the climate emergency, the comments made by the NFLA have relevance for England, Wales, Northern Ireland and the Republic of Ireland. All the governments of the British and Irish Isles should be considering the most effective ways to develop renewable energy at both the local, national and international level.

The NFLA welcomes this consultation and the opportunity to consider its wider views on taking decentralised energy further forward.

ii. Background to the consultation

Common Weal and the Energy Poverty Research Initiative are seeking the views of stakeholders on their proposals for a Scottish Energy Development Agency (SEDA).

The consultation document can be downloaded here: <https://drive.google.com/file/d/18V5ICwF-RJeVSOHKcGMdxKhNW2YIMdg3/view?usp=sharing>. This consultation runs until 5pm on **Friday 13th March 2020**.

The NFLA sincerely thanks Dr Keith Baker from Common Weal for explaining its views on this important policy matter, and the remit to this consultation, at the recent NFLA Scotland Forum seminar held in Glasgow City Chambers. The presentations from this meeting will be on the NFLA website imminently.

Common Weal and the Energy Poverty Research Initiative aim to analyse the responses to this consultation and publish a response paper in early April 2020. This paper will set out the points of agreement and disagreement on the proposals, and any areas where further work is needed. These conclusions will form the agenda for a stakeholder workshop to be held in Edinburgh in May / June 2020, which will be used to gauge the level of consensus on any areas of disagreement and flesh out the final details of the proposals.

1. Background - Powering our Ambition

At present local authorities, housing associations, communities and their partners compete nationally for funding for energy projects, a system which passes the need to gather evidence and quantify the benefits and co-benefits of any proposal to those who will deliver them. This is not only highly cost and resource inefficient but also introduces an element of inequality in terms of the levels and types of expert support the proposals attract, and subsequent weight of evidence included in them. This in turn means proposals from poorly-resourced communities where such projects may offer substantial co-benefits risk losing out to otherwise stronger competitors.

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The level of expertise in local authorities and other public bodies with regard to the types of energy schemes, geothermal, solar, small hydro, heat networks, etc, is variable but often low, and more needs to be done to share knowledge of anticipated costs and available funding. Achieving the Scottish Government's future goals for energy and climate change will require a greater level of technical support than is currently available within the existing arrangements.

The establishment of a Scottish Energy Development Agency (SEDA) as a strategic body directing and enabling the development of energy infrastructure, generation and sustainable fuel supply chains, would make it possible to identify new projects, explore the costs and finances and to prioritise those projects that offer the greatest benefits and co-benefits to local communities, and particularly those in areas of high fuel poverty. Where practical, local companies could, in the first instance, be invited to tender. If this wasn't possible the proposed Scottish National Energy Company (NEC) could develop these projects.

The Scottish Government has said it wants to establish an NEC before the end of 2021. Common Weal believes the NEC should be an owner and operator of both energy generation technologies and of infrastructure. But it should also develop and own heat infrastructure and micro-grids. A fundamental aim of the NEC should be to provide low-cost renewable and low carbon energy to the fuel poor and otherwise vulnerable householders.

The development of new district heating systems (DHS) needs to be part of a coordinated national strategy, rather than the current regionally competitive process, and that the NEC, in partnership with local authorities and housing associations, should be the developer of first resort for these projects. Common Weal is strongly of the view that the development of district heating systems (and fuel supply chains) should include a clear process of socioeconomic evaluation and no households should be financially disadvantaged by being included on a DHS.

In its initial stage SEDA would identify viable energy schemes across the country, drawing up a national plan of prioritised schemes.

The fundamental role of the NEC and SEDA should be to support the development and delivery of energy projects that will serve to build resilience amongst fuel poor, vulnerable, and isolated communities.

2. District Heating, Electric Heating or Hydrogen

The Common Weal Common Home Plan is sceptical about relying on the conversion of the gas grid to hydrogen, partly because hydrogen is currently very expensive and could increase household heating bills by a factor of seven or eight. Even if prices come down, it says: "hydrogen will always be an expensive way to heat a house". And moving to electric heating would roughly increase by a factor of five peak load on the grid which would require significant upgrades to cope. It prefers instead the idea of building district heating networks which can deliver heat from solar thermal, geothermal and industrial waste heat recovery.

The Common Weal's 'Just Warmth' report discusses how the NEC should operate in partnership with SEDA and a public National Energy Service (NES) to maximise the benefits of investment in new District Heating System (DHS) projects.

Evidence from successful projects elsewhere shows that using multi-technology approaches, particularly those combining large scale solar thermal with sustainable biomass and inter-seasonal heat storage and heat recovery technologies, must become a central theme in the future development of DHS in Scotland. This multi-technology approach model now gaining traction across Europe provides a highly replicable, flexible and cost-effective technological option for the development and deployment of heat networks and should be central to delivering a Scottish DHS revolution.

Denmark leads the world in developing sustainable DHSs, and has set an example for others to follow. The country now has six large central district heating areas, with a total heat production of approximately 60 petajoules (PJ) per year. There are also around 400 smaller decentralised district heating areas, supplying an additional 75PJ per year. The Danish Energy Agency notes

that the inclusion of heat storage in all district heating areas has been central to its many successes. Another critical factor in Denmark's DHS revolution has been the adoption of a succession of Heat Supply Acts (HSAs), beginning as far back as 1979, when local authorities were first required to zone areas for the development of new networks.

3. The role of solar energy

If the NEC is to have an impact on tackling fuel poverty it needs to become a developer of new infrastructure, particularly for district heating (including using large scale solar thermal) and energy storage (including thermal storage infrastructure such as boreholes and covered reservoirs as well as batteries and hydrogen). The NEC could also work to address the urgent need to tackle the lack of progress on the deployment of domestic solar thermal and PV panels (there is currently 188 MW of solar PV capacity in Scotland compared to 8,700 MW across the UK), which have significant benefits for tackling fuel poverty. The Solar Trade Association has estimated that achieving a capacity of 2GW across Scotland by 2020 (a tenfold increase on 2016) is a reasonable target. Solar also has the benefit of being viewed very favourably by the public, with a 2014 survey finding 84% of Scottish householders would be happy or unconcerned about living next to a solar farm.

The NEC is an ideal vehicle for bringing about a Scottish solar revolution by enabling the development of largescale solar thermal installations contributing to district heating as part of mixed technology systems using locally and sustainably-sourced biomass, inter-seasonal thermal storage, and heat recovery (the latter two being critical for maximising the benefits of such systems). Examples of such installations, which have proved highly effective in decarbonising energy supplies and tackling fuel poverty, include Dronninglund (26MWth), Marstal (23MWth) Grasten, and Braedstrup (both 13 MWth) in Denmark. Braedstrup uses water stored in boreholes for thermal storage whilst Dronninglund and Marstal use gravel-lined covered reservoirs. Even in Norway, which has been traditionally reliant on electric heating powered by its vast hydropower capacity, there has been a renewed focus on coupling solar thermal with DHS, exemplified by the development of an installation at Lillestrøm.

Common Weal is strongly of the view that the establishment of the NEC creates a number of significant and substantial opportunities for enabling the decarbonisation of Scotland's energy supplies, tackling fuel poverty, creating new and skilled employment opportunities, enabling social and economic regeneration of deprived communities (particularly in rural and remote areas), and a number of other co-benefits.

4. Heat Storage

An essential component to these successful DHS schemes has been inter-seasonal heat storage which serves to maximise the energy demand that can be met throughout the year by solar thermal arrays. Typically, heat is stored in gravel-lined covered tanks, reservoirs, boreholes, earth banks or aquifers.

Scotland's aspiration is to achieve 11% of non-domestic heat demand from renewable sources by 2020, 1.5TWh of Scotland's heat demand to be delivered by district or communal heating, and to have 40,000 homes connected by 2020. In 2012 the total heat demand of Scotland was 82,722GWh and, though declining, 1.5TWh (1,500 GWh) will be somewhere between 10 and 20% of total demand in 2020. Denmark was supplying over 30% of its heat demand from DHS as far back as the 1970s, and now supplies over 60%.

In 2017, approx. 4,800 GWh of renewable heat was generated in Scotland. This was 5.9% of non-electrical heat demand. Therefore, non-electrical heat demand was 81,356 GWh. (11% of this would be 8.947 GWh). If the aim was to produce, say, 60% of heat demand by renewable district heating, by 2045 this would DHSs to deliver closer to 49TWh (48,813 GWh). (1)

Wherever possible, new DHS and heat network projects should seek to maximise the use of waste heat, minimise heat losses using heat recovery and energy storage technologies, and capitalise on the availability of local renewable heat sources, such as geothermal hotspots, flooded mine-workings, and major water bodies. A Scottish Heat Supply Act could provide local authorities with a legal instrument to require significant producers of waste heat to connect to a

heat network, to direct the development of new heat networks to where their benefits will be greatest, and to direct planning authorities to prioritise the co-location of new domestic, public and commercial buildings with sources of waste and renewable heat. The SEDA would serve to prioritise and commission the most promising projects, and ensure that the funding, resources, and necessary enforcement powers fully meet the needs of all those involved in developing and delivering these projects.

However, these are highly site-specific resources and it is likely that many new projects will need to source significant proportions of their heat from, in order of preference: small and large scale solar thermal; combined heat and power (CHP), anaerobic digestion (AD), and thermal hydrolysis plants fuelled by sustainable, locally-sourced biomass and biofuels; and, where the only other option is landfilling, energy from waste (EfW) plants.

Whilst wherever possible DHS and heat networks should maximise the use of renewable energy technologies and the recovery of waste heat it is likely, as per the Danish experience, that a substantial proportion of projects will require new fuel supplies. Therefore, Scottish Land-Use Strategy and the production of biomass need to dovetail with Scottish Heat Strategy.

5. Rural Heating strategy

It is generally thought that district heating is not a viable option for rural areas. This is true for very remote properties, but in fact the cost for installing rural district heating is not substantially higher than urban district heating schemes. This is because, while the distances are greater, the necessary pipework is easier to install because access is easier. There is therefore no reason district heating cannot supply a solution to much of rural Scotland. However, there will remain properties and communities for which this is not an option - and that may be as high as 40 per cent of rural properties. In these cases, the solution is likely to be bioLPG, wood biogas or biomass boilers, potentially in combination with building-mounted solar thermal. Electric heating may be appropriate to some communities where there is excess local electricity generation from renewable schemes.

6. NFLA Comment on the consultation

The consultation paper is seeking views on the establishment of a Scottish Energy Development Agency (SEDA). But there appears to be an underlying assumption that SEDA's role will be to organise a major Scottish District Heating Revolution. In the NFLA view this is a debate which still needs to be won. There is an apocryphal story about a Scandinavian Engineer giving a presentation to a group of UK councillors on a new DH scheme introduced in a town in Sweden. The engineer said all households signed up to be connected to the new system. When one councillor asked how they persuaded householders to sign up, he said rather confusedly "it was the obvious thing for householders to do". Not surprisingly there was a great deal of scepticism from the UK councillors about whether it would be that easy to persuade UK householders to sign up.

Clearly some UK energy experts are expecting conversion of the gas grid to hydrogen to be the way forward, (2) whilst others might be expecting the installation of individual household heat pumps, perhaps in conjunction with heat batteries to dominate.(3) The most likely outcome is probably a combination of all three.

Whatever method of heat provision is going to dominate there will also need to be much more discussion about how Scotland's conversion to low carbon heat is going to be financed, and how the transformation can be done in an equitable way.

It is not clear whether SEDA would have any role in the implementation of Energy Efficiency programmes, conversion of the gas grid to hydrogen or installation of heat pumps.

The proposed DHS revolution in Scotland appears to rely quite heavily on the introduction of new solar thermal district heating systems which are practically unknown in Scotland. When Greenpeace started to promote offshore wind in the late 1990s, it arranged to take the relevant Minister, Michael Meacher, on a tour by Greenpeace ship of a Danish offshore wind farm. A

similar study tour for key local authority and Scottish Government actors might be worthy of consideration (taking into account the carbon implications of travelling to Denmark).

Whilst NFLA would in general be very supportive of a low carbon heat transformation, dominated by solar thermal district heating, it is felt that all the relevant information needs to be on the table first.

For instance:

- What is the most up-to-date estimate of the cost of heating a house with hydrogen compared with methane gas?
- How feasible is it to produce all of Scotland's hydrogen requirements via electrolysis?
- If SMR produced hydrogen in conjunction with CCS would be required what would be the carbon emissions implications?
- Worcester-Bosch, who have just announced the development of a hydrogen boiler, claims that heat pumps would be ineffective in a property with an EPC lower than C (where the EPC is not artificially inflated by the installation of a gas condensing boiler). Is this correct?
- What are the most up-to-date estimates of the cost of heating a house using various heat pump technologies, using off-peak electricity tariffs in conjunction with heat batteries?
- What are the likely costs of heating a housing using a DH system?
- If the final outcome is likely to be a combination of hydrogen, DHS, and households heat pumps, what are the economics of converting a much-reduced gas grid to hydrogen?
- What is the likely public reaction going to be to being offered/persuaded or even forced to accept heat from a DHS; or change their boiler to hydrogen or install a heat pump?
- What assurances will SEDA and/or utilities be able to give the public about future heating costs?

7. References

- (1) Scottish Government Annual Energy Statement 2019 <https://www.gov.scot/publications/annual-energy-statement-2019/pages/3/>
- (2) Times 4th Jan 2020 <https://www.thetimes.co.uk/article/hydrogen-boilers-may-be-only-choice-for-homes-by-2025-2rw5t3tpt>
- (3) Dave Toke's Blog 4th Jan 2020 <https://realfeed-intariffs.blogspot.com/2020/01/why-uk-government-may-be-encouraging.html>

8. NFLA Response to Consultation Questions

1. The scope of the SEDA's operational structure, powers and roles and responsibilities will be based on those of the Scottish Environmental Protection Agency (SEPA), only as applied to the strategic planning and development of low carbon and renewable energy. This will limit the need to reinvent the wheel by adopting a proven and successful model, as well as allowing these to be easily mapped between the two agencies and the remits of policy officers in government and stakeholder organisations / companies.

Q. Do you agree that this is a reasonable model to be adopted for the SEDA?

A. Don't know.

Comments:

Working in partnership with the relevant local authority and other stakeholders is only mentioned in the case where no suitable company is available or the tenders submitted are excessive so the NEC steps in to develop and manage a project. SEDA needs to have safeguards built in to ensure local democratic input and control of projects.

We remain to be convinced that SEPA is the correct model.

2. As an agency, the SEDA will support the development of any new legislation and regulations necessary for it to carry out its roles and meet its organisational objectives. One of its first acts will be to support the passing of a Heat Supply Act, based on the successful legislation that has been implemented by Denmark since 1979 [see refs 2 and 3 above]. This will need to be staged

in to allow sufficient time for stakeholders to adapt their policies and practices, and so the SEDA will direct the revision of this Act over a timetable to be agreed following further consultation.

Q2a Do you support this proposal to develop and introduce a Heat Planning Act?

A Yes.

Comments:

What would be the minimum target for the provision of heat by DHSs to make establishing a SEDA worthwhile? Would SEDA have any role if the focus was converting the gas grid to hydrogen or switching households to heat pumps?

Q2b If yes, do you agree that the SEDA would be the most appropriate government body for coordinating the implementation of such a Heat Planning Act?

A Yes.

3. As a central strategic planning body, the SEDA will enable significant cost and carbon-cost efficiencies, as well as rectifying inequities in the current system, by identifying and specifying projects which have the greatest potential to result in the greatest benefits and co-benefits to Scotland's environment, society, and the long term economic planning needed to ensure its climate change targets will be met. The specification will include the location of the projects, the properties to be served, the benefits to be leveraged and, in many cases, the technological options to be employed (including identifying existing and / or potential suppliers in their fuel supply chains). These projects will then be put out to tender (depending on local capacity), with appropriate safeguards in place to represent and protect the interests of local communities, and to empower them to realise their full benefits.

Q. Do you agree with this proposal?

A Yes.

4. The SEDA's operations will include a heavy focus on the strategic planning and development of local and sustainable fuel supply chains, including directing the locating of new solar farms, thermal and electrical storage facilities, and supplies of biomass and biofuels (working in partnership with the Scottish Government and existing agencies such as SEPA and the Forestry Commission). The latter will include engaging with the Forestry Commission, landowners, and other stakeholders, to develop new forests and woodlands to supply wood fuel and leverage their associated co-benefits – job creation, carbon sequestration, recreation and tourism opportunities, enhancing biodiversity, etc.

Q. Do you agree with this proposal?

A Yes.

Comments:

It should be borne in mind that natural regeneration rather than planting trees is sometimes the most effective way of restoring habitats and sucking carbon out of the atmosphere. Removing livestock or controlling deer numbers and allowing trees to return by themselves, rather than plantations, whose purpose "bioenergy with carbon capture and storage" it has been argued can be the most appropriate response to the climate emergency.

5. Enabling an effective operational relationship between the SEDA and local authorities will be critical to its success as they will be partners in many of the projects it will deliver. Therefore, the roles of the SEDA will include ensuring funding that for these projects is ring-fenced, and that LAs have the necessary enforcement powers and capacities to deliver on their responsibilities.

Do you agree with this proposal?

Yes.

Comments:

Safeguards for local democracy will need to be built in to the structure of SEDA.

6. As a government agency, the SEDA will provide a hub of specialist technical expertise, overseen by an internal supervisory body which will include representative from SEPA and the relevant professional associations (ICE Scotland, RICS, CIBSE, RIAS, CIWEM, etc), and be able to draw on expertise from independent academics and professionals.

Q. Do you agree with this proposal?

A. Yes.

Comments:

Consideration should be given to the inclusion of local authority planning and housing experts as well.

7. The creation of this hub counters the problem of local authorities not being able to retain such highly specialist technical staff on long-term contracts. Furthermore, and where not prevented by conflicts of interest, the hub will enable knowledge exchange between government and the private sector, facilitated by the roles and responsibilities of SEDA staff being mapped directly to those of staff at the Scottish National energy Company and the Scottish National Infrastructure Bank. Staff based at the hub will be assigned (long-term) as needed to support the development and management of energy projects and, by being directly accessible to the consortia delivering the projects, enable the gathering and retention of both tacit and explicit knowledge within the public sector.

Q. Do you agree with this proposal?

A. Yes.

Comments:

Not much has been said about where the finance for energy projects is going to come from. SEDA might do well, for instance, to facilitate discussion between local authority finance officers and climate change officers.

8. To support this goal, and drawing on evidence from members of the supervisory body, the SEDA will also advise on Scottish Government policies on education and training to deliver skilled staff to the many industries within its operational remit, and will be a statutory consultee to these. Making the SEDA a statutory consultee of bodies involved in promoting education and training sets a boundary for assessing its performance as a public body, which should not depend on being able to support the delivery of a function that is peripheral (but important) to its main engineering-orientated functions.

Q. Do you agree with this proposal?

A. Yes.

9. The SEDA's remit will necessary include ensuring consumers are protected through appropriate regulation, and therefore it will need to have some form of formal relationship with the new Consumer Scotland. As such, this element of the SEDA will need to be fully defined once the details of CS have been finalised in 2020.

Q. Do you agree with this proposal?

A. Yes.

10. Ensuring that the SEDA is governed by appropriately qualified and experienced technical experts will be critical to its success, and so another role of the internal supervisory body would be to vet members of its executive board. The board will be required to include a number of representatives from government and statutory consultees (e.g. Consumer Scotland, SEPA, Home Energy Scotland) but with a two-thirds majority of members (including the Chair) being required to have chartered status or similarly appropriate qualifications and experience in relevant engineering or scientific disciplines.

Q. Do you agree with this proposal?

A. Yes.

Comments:

Local Government should also be represented on the board.

11. The SEDA's performance, and that of the projects it develops will be monitored and periodically evaluated by an independent reviewer to be appointed by competitive public tendering. The collection and reporting of key performance data will be designed into the SEDA's operations from its inception (specific proposals for the evaluation of district heating systems are included in our 'Just Warmth' policy paper).

Q. Do you agree with this proposal?

A. Yes.

12. We propose that one of the outcomes of the meeting to be held following this consultation exercise will be an organisational development plan for the SEDA, to be approved by ministers, so that the organisation would have a roadmap against which its performance can be judged. This would enable the roles, responsibilities, capacities and operations of the SEDA to be staged in, and to give stakeholders room to adapt their practices over time. We would intend for this process to take no more than 2-3 years from inception to full operation, and to be managed in-step with the development of a Heat Supply Act.

Q. Do you agree with this proposal?

A. Yes.

13. Are these proposals, as they stand, something your organisation / company are willing to support in principle?

A. Yes.

14. Would you, or a representative of your organisation / company, be willing to attend the meeting to be held in Edinburgh following the completion of this consultation process?

A. Yes.

15. Do you have any more comments that you wish to make?

See above.