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Nick Matthews, Editor of T&CP,
Town and Country Planning Association,
17 Carlton House Terrace,
London, SW1Y 5AS.
020-7930 8903
nick.matthews@tcpa.org.uk

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Luke Jones, Jon Selman, Stephen Essex and Olivia Wilson

Luke Jones, MSc Human Geography Research student, School of Geography, Earth and Environmental Sciences, University of Plymouth, Drake Circus, Plymouth, PL4 8AA. luke.d.jones@students.plymouth.ac.uk

Jon Selman, Low Carbon City Officer, Strategic Planning and Infrastructure, Plymouth City Council, Ballard House, West Hoe Road, Plymouth, PL1 3BJ. jonathan.selman@plymouth.gov.uk

Dr Stephen Essex, Associate Professor (Reader), School of Geography, Earth and Environmental Sciences, University of Plymouth, Drake Circus, Plymouth, PL4 8AA. Stephen.essex@plymouth.ac.uk

Dr Olivia Wilson, Lecturer in Spatial Planning, School of Geography, Earth and Environmental Sciences, University of Plymouth, Drake Circus, Plymouth, PL4 8AA. Olivia.wilson@plymouth.ac.uk

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Introduction

Given the urgency presented by climate change and global warming, local planning authorities have become active agents in the low carbon energy transition. This transition has been defined as “a radical, systemic and managed change towards a ‘more sustainable’ or ‘more effective’ patterns of provision and use of energy” (Rutherford and Coutard, 2014, p.1354). It is associated with a shift from centralised fossil fuel production and distribution of energy (such as coal, gas and oil) to more decentralised renewable energy production (such as solar and wind), which is consumed on-site or locally. Alongside other government policy interventions, such as carbon emission reduction targets, renewables obligations, feed-in tariffs, voluntary codes and capital grants, local authority planners can provide strategic direction through policies formulated in local development plans (Local Plans) as well as by influencing technological innovation in the built environment through development management decisions on planning applications (Williams, 2010). The aim of this paper is to evaluate the outcomes of Plymouth City Council’s planning policy CS20 Sustainable Resource Use (based on the ‘Merton rule’), which was implemented between 2007 and 2019, and had the purpose to increase the amount of renewable energy delivered as part of developments that came forward during this time period (and so to reduce carbon emissions).

Role of planning in the low carbon energy transition

National government legislation has explicitly recognised the role of planning in the low carbon energy transition. The Planning and Compulsory Purchase Act of 2004 placed a duty on local planning authorities to contribute to the mitigation and adaptation of climate change in Local Development Plans (Section 19, Para. 1a). The guidance in the revised National Planning Policy Framework of 2021 continues to require that Local Plans should take a proactive approach to the mitigation and adaptation to climate change (MHCLG, 2021, Para 153). In addition, under amendments to the General Permitted Development Order, 2015 (as amended), many microgeneration schemes have been classified as permitted development (and so did not require planning permission). The Act also supported the inclusion of the ‘Merton rule’ in local plan policies, pioneered in the London Borough of Merton in 2003, which required at least 10 per cent of the energy requirements of new non-residential development above a threshold of 1,000 m^2 be provided from onsite renewables. The policy was subsequently extended to include residential development of ten plus homes by the London Borough of Croydon (Wilson, 2009). It has been estimated that about 170 local authorities have adopted a similar policy in their own Local Plans (Rydin, 2010).

The widespread adoption of ‘Merton rule’ local policies has had both advantages and disadvantages for the low carbon transition. The recognised advantages include that the policy was a relatively simple one, which was easy to understand (Rydin, 2010); provided developers with greater certainty; encouraged the private sector to fund, build and operate low carbon infrastructure; acted to shape the market in terms of demand, supply chains and skills; and generated public interest (Williams, 2013). However, the implementation of the rule did introduce extra costs and technical challenges for developers, which was often in opposition to the more positive narrative of the planners. At the Examination in Public for the inclusion of the policy in the London Plan in 2007, the real world and pragmatic perspective of the development industry argued that the Merton rule was uneconomic and technically impossible. The cost of renewable energy, the viability of energy generation from combined heat and power infrastructure and the practicalities of solar panels on tall buildings were arguments used by developers against the adoption of the policy. The rebuttal of these arguments by the Planning Inspector in favour of the planners’ narrative was a significant moment in the advancement of this policy (Rydin, 2010).

Decisions over planning applications involving renewable energy follow the priorities in the National Planning Policy Framework (MHCLG, 2021) and the so-called ‘energy hierarchy’. The first priority is to reduce energy consumption (use less energy – be lean), which might be through improving energy performance of buildings (insulation and materials) and/or behavioural interventions (to ensure innovations are used and useable by users). Second, energy must be supplied efficiently (be clean), which focuses on infrastructure systems, including decentralised generation, technology, transport and SMART cities. The third priority is to use renewable energy (be green) and represents the need to shift from centralised fossil fuel production to decentralised/local renewable energy. The capacity and preparedness of the UK's planning system to accommodate and promote new green energy technology, and the resulting new urban forms, through policies and development management is critical to the achievement of a low-carbon future (Crawford and French, 2008).

Case Study: Plymouth

Plymouth City Council was one of the local authorities that adopted a variation of the 'Merton rule'. In 2007, the rule was adopted in the Local Development Framework Core Strategy as Policy CS20 Sustainable Resource Use, which required all proposals for non-residential developments exceeding 1,000 square metres of gross floorspace and new residential developments of ten or more units to incorporate onsite renewable energy equipment to offset at least 10 per cent of predicted carbon emissions to 2010 and then rising to 15 per cent for 2010-17 (PCC, 2007). In the authority's Joint Local Plan with South Hams and West Devon Councils in 2019, the policy requirement was furthered strengthened to offset at least 20 per cent of predicted carbon emissions (Policy DEV32) (PCC, 2019).

This research focused on the outcomes of the original CS20 policy over a five-year period between 2012 and 2017. During this period, there were 123 planning applications that complied with the CS20 policy. Using the authority's online planning application register, a database of the expected emission reductions delivered through the development associated with this policy was compiled from the documents submitted as part of the planning application (including the planning condition discharge report). The compilation of the database was a time-consuming exercise, as each application took c.20 minutes (so over 40 hours in total) to process and some information was not found in all planning applications. Some approved developments were not built out, so the valid sample was reduced to 87.

For some variables, the valid sample was even smaller because of missing information in the planning application documentation. For example, the expected emission reductions were based on a sub-sample of 62, mainly because some approved planning applications did not include data on carbon emission reductions to be delivered. In total, 91 planning applications included an energy statement (73.9%). The energy statement is a local mandatory element of the planning proposal and key to assessing the energy efficiency of the proposed development through the Standard Assessment Procedure (SAP). In total, 78 or 63.4% energy reports featured information regarding regulated emissions, which refers to emissions that are part of the design of the building (e.g. heating system, ventilation, hot water and fixed lighting) and so can be predicted. Unregulated emissions, which refers to emissions from electrical appliances within the building, is not predictable until the building is in use and was much less commonly stated in the energy statements (Walker *et al.*, 2015). Only 30 or 24.3% of the planning applications contained information about unregulated energy. The government changed the definition of carbon emissions in residential development in 2011 to exclude unregulated energy, although it can represent up to 40 per cent of emissions (Norton, 2015).

The original intention had been to check the reality of the expected delivery with site visits, but this part of the research proved to be impossible because of the Covid-19 restrictions. The use of aerial photographs as part of 'Google Maps' and 'Google Street' to indicate any external renewable energy infrastructure also proved to be problematic, because of the variable spatial and temporal coverage of this source. Only 48 locations of planning applications could be located on Google Maps and it was only possible to identify the installation of renewable energy technology in 25 of these cases. It is clear that, while the monitoring of such policies sounds relatively easy and straightforward, it is in reality much more complex than expected and fraught with limitations, not least from changes in national policy.

Results

The results, nevertheless, provide some valuable and interesting insights into the effect of planning on delivering the low carbon transition (Figure 1). In Plymouth, photovoltaic panels were clearly the most practical form of renewable energy in the built-up area by a good margin. A total of 76 of the developments (or 87 per cent of planning applications) featured photovoltaic panels. The next most common technologies used were heat pumps (7 schemes or 8 per cent); district heating networks and combined heat and power (CHP) (3 schemes or 3 per cent each). In an earlier study in London, combined heat and power technology was the dominant renewable energy source delivered by a similar policy in the London Plan (Day *et al.*, 2009). This difference reflects the economic viability of CHP technology in a more densely populated urban environment as well as the practicalities of solar panels on tall buildings. It demonstrates that the energy transition is likely to be based on technologies that are place-dependent, which will require place-specific planning policies, albeit that might change over time as the economics of renewable energy evolves.

From the 69 proposed developments with stated expected regulated carbon emissions, a total of 12,711 tonnes of carbon emissions per annum were predicted. On average, each development therefore accounted for about 184 tonnes of carbon per annum. In terms of the expected emission reductions from this development based on the 10-15 per cent policy target at this time, a total of 2,194 tonnes of carbon savings per annum was predicted (i.e. 17 per cent of total emissions). In order to provide some equivalent measure of these figures, one source indicated that the average household in the UK emits 2.7 tonnes of carbon dioxide per annum from heating (Citu.co.uk). On this basis, 2,194 tonnes of carbon savings would equate to the annual carbon emissions of 813 households – roughly the number of households on the Stonehouse peninsula in Plymouth.

Despite solar panels being the dominant form of renewable energy associated with these developments, higher average reductions of carbon were achieved by technologies involving wind turbines (one project; 50% reductions); waste energy recovery (one project; 27.6% reductions); combined heat and power (one project; 19.5% reductions); and heat pumps (two projects, 15.6%). Photovoltaic panels achieved an average carbon emissions reduction of 15.8 per cent from 64 developments (Figure 2).

In terms of meeting policy targets, over two-thirds of developments exceeded the policy target. A total of 59 per cent of developments exceeded the 15 per cent policy target, while 9 per cent of developments exceeded 20 per cent. These findings raise the question as to whether the expected carbon emission reductions reflect the limits of technology, compliance behaviour by the developers and/or the effects of economic viability and deliverability (under neoliberal conditions). As technology evolves and costs are reduced, it is likely that the expected carbon reductions can be stretched further. Since the approval of the Joint Local Plan in 2019, the current policy target has been increased to 20 per cent of predicted carbon emissions (DEV32).

Discussion and Conclusion

Despite concerns about whether planning policy would be successful in requiring developers to provide renewable energy technology as a standard part of new developments, the CS20 (and later DEV32) policy in Plymouth appears to be delivering its objective. The progressive up-scaling of targets from 10 to 20 per cent between 2007 and 2019 is an indication that the requirement has contributed to a market for new energy technologies and an opportunity to develop new planning practice, skills and expertise in this area. The technologies adopted in these new developments, especially photo-voltaic panels, have been locally appropriate responses to the character of the city as well as the local conditions for the economic viability of development schemes.

These achievements are important for future advances in carbon reductions which will be increasingly dependent upon local action. The Climate Change Committee (2020), as part of their Sixth Carbon Budget, has recognised that the exclusion of local authorities in the national strategy as a significant gap. Local authorities have been left to their own devices to deliver net zero emissions despite limited funding, resources, expertise and "… piecemeal policy and communications from Government" (Evans, 2020, p. 6). Local authorities should be given more powers and resources in order to move faster, within a clearer national strategy.

There are, nevertheless, barriers to the realisation of the potential of local authorities in this policy area. National planning policy is not changing fast enough to support this agenda. The direction of policies related to climate change in the revised National Planning Policy Framework in July, 2021 remain unchanged. The low carbon energy transition is, nevertheless, subject to a rapidly changing policy environment, which means that static planning policy, enshrined within Local Plans at the point of approval, can quickly become out-of-date. The Core Strategy policy CS20 led directly to the subsequent Joint Local Policy DEV32. Notwithstanding the adoption of the Plymouth and South West Devon Joint Local Plan in March 2019, which set a plan-wide target of 50 per cent carbon reduction by 2034, the local Climate Emergency Declaration in March 2019 led to an informal review of the Local Plan policies to align them with the 2030 declaration, updated in December 2019, to achieve net zero carbon by 2030. Politics can move faster than approved plans, which can make local policies and targets soon become out-dated. More responsive and flexible Local Plan policy processes are required.

The importance of having relevant Local Plan planning policies approved was illustrated in a successful appeal by developers against a proposed climate change planning condition to reduce operational carbon of new dwellings by Swale Borough Council (Kent) in April, 2020. As the new plan had not been approved, the Planning Inspector and Minister decided that, although the proposed policies were important principles to address climate change, it was not possible or desirable for developers to have to predict what policies might apply in the future (MHCLG, 2020, IR 11.95).

There is also the potential for a blurring between development management and building control to achieve greater carbon reductions. Under the pending legislation for the Future Homes Standard from 2025, all new homes might be required to produce 75-80 per cent less carbon emissions in their construction and energy use than homes under current legislation. Under this legislation, ‘Merton rule’ styled planning policies might become redundant or operate to secure the remaining 20-25 per cent of emissions.

There are, nevertheless, challenges in monitoring the effects of planning policy mechanisms to achieve a low carbon energy transition, which appear to be rooted in the inconsistencies of documentation required when submitting a planning application. Submitted Energy Statements were inconsistent in the inclusion of calculations, and were even named differently, which can add to the difficulties and confusion in finding relevant information for monitoring. The expected reductions in carbon emissions included in Energy Statements were not always recorded in consistent standardised units and there remains the problem of how to record the actual emission-reductions delivered in reality. A monitoring template, containing key information about each development, including whether it was approved and constructed, might be attached to each planning application record to facilitate monitoring. While planning has contributed to the delivery of a ‘public good’ in the form of carbon savings in this case, there remain uncertainties in quantifying these benefits. Further, there are calls for the measurement of carbon performance of housing to include energy use from day to day living (which unregulated emissions would go some way to assess) as well as building design, to include occupiers as well as architects and developers (Walker *et al.*, 2015). While a focus on carbon reductions from development is important, it should not be at the expense of other natural resources such as water that should be conserved to promote sustainability (Pickerill, 2017). While these factors appear to represent a missed opportunity for planning to demonstrate its clear contribution to sustainable development, the monitoring of planning policies to promote a low carbon energy transition is much more complex and problematic than might initially be expected.

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Figures

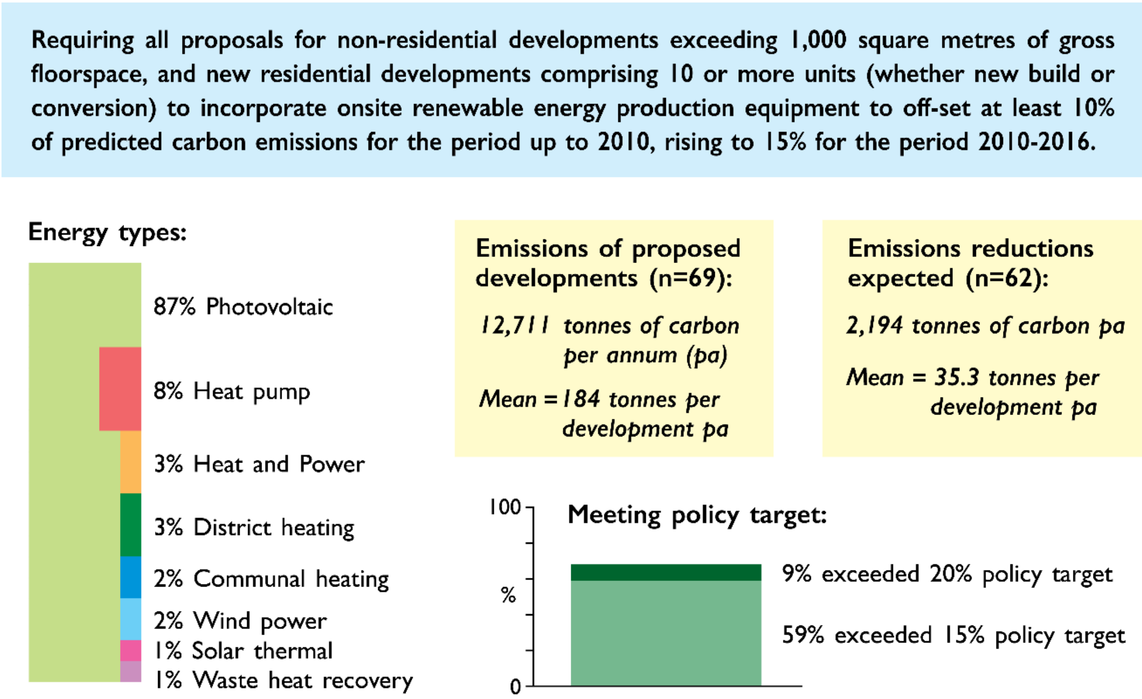

Figure 1. Summary of the key outcomes of Plymouth's CS20 policy, 2012-17
SOURCE: Jones (2021)

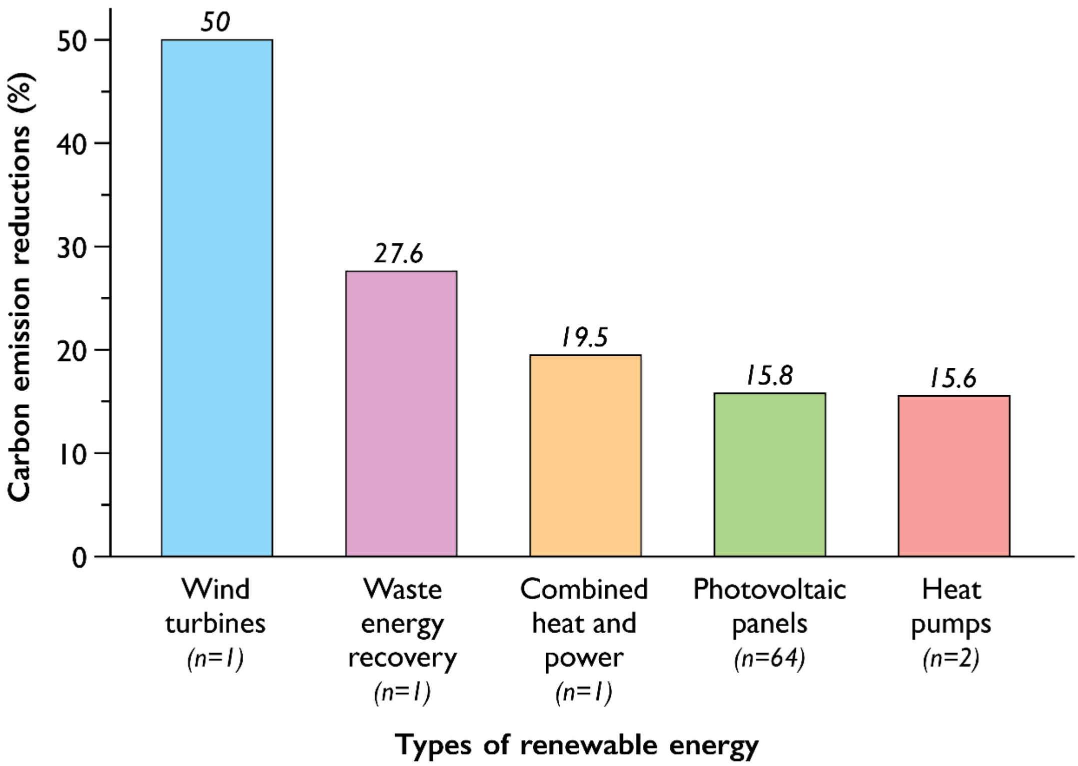

Figure 2. Average carbon reductions per form of renewable energy as a percentage of total emissions for new developments
SOURCE: Jones (2021)