

TOGETHER FOR CLIMATE ACTION

THE ROAD TO
NET ZERO

CAMPAIGN FOR
NET ZERO · COP26

INVESTMENT
STRATEGIES IN THE UK
ENERGY TRANSITION



Investment strategies in the UK Energy Transition

Elsa Barazza, Pei-Hao Li, Brunilde Verrier, Neil Strachan

Overview

- Meeting net-zero carbon emissions by 2050 requires substantial investments of up to £50 billion per year by 2030 in low-carbon technologies in the UK energy sector
- Different investors have different strategies when investing in low-carbon technologies
- New modelling approaches (e.g. agent-based models) are useful to capture investors' diversity and inform effective policies to encourage low-carbon investments
- A stable and strong policy regime, coordinated with the diversity of investors' strategies, is needed to support low-carbon investments, as well as new financing mechanisms to unlock finance for all investors
- Encouraging market diversification – including the growth of local investors – provides a valuable opportunity to scale-up investments in renewable energy technologies

What is the problem?

The energy transition is complex: substantial investments in low-carbon technologies are required from a range of different investors to achieve net-zero

Achieving net-zero by 2050 in the UK presents a substantial investment challenge, requiring investments of £50 billion per year by 2030 in low-carbon technologies and infrastructure [1] across different energy sectors (such as electricity, buildings and transport). In the UK electricity sector (where substantial decarbonisation efforts have already been achieved), increasing low-carbon investments will still be required to fully decarbonise the sector and to quadruple low-carbon electricity generation by 2050 [1] as more end-use sectors (such as transport and buildings) convert to electricity. Low-carbon investments in the buildings (e.g., heat pumps) and transport (e.g., electric vehicles) sectors, where relatively little decarbonisation has taken place to date in the UK, must be significantly scaled-up over the next few years.

In the UK electricity sector, incumbent utilities are major investors in new low-carbon power plants, and the “Big 6” utilities' portfolios significantly decarbonised from 2008 to 2018.

However, these incumbent utilities are facing disruptive forces and are being forced to adapt their business models, while new types of investors and local players (e.g. households and community energy initiatives) who invest in decentralised renewable energy are becoming increasingly important to help finance the energy system transition [2]. In the buildings sector, encouraging local investors to scale-up investments in local low-carbon heating could significantly contribute to meet the net-zero target. Local investors have different rationales for investing in renewable energy projects as compared to incumbents, and can be less driven by economic motivations and more by wider socio-environmental considerations [3]. These different private strategies and motivations for investing in low-carbon assets make the energy sector transition a complex challenge.

A key challenge for policy-makers is to understand the uncertainties posed on the UK pathway to net-zero by the different investment strategies of existing and new investors in low-carbon technologies in the electricity, buildings and transport sectors. This will help to inform policies that can create an attractive investment environment for investors. These policies should be effective from the 2020s as current investment choices will shape the energy sector over the next few decades and have a significant impact on whether net-zero is successfully achieved.

Key characteristics of the issue

Who finances the net-zero transition of the UK electricity sector and under what conditions?

New UCL modelling [4] illustrates the impacts on UK electricity sector decarbonisation pathways to 2050 of the investment strategies of different investors (local scale and national scale), and of the interventions of policy bodies (national government and regulator, and local authorities). The modelling considers how these factors affect 1) the speed and level of renewable energy development, 2) investment costs, and 3) changes in market structure in terms of investors' market shares. It also explores what type of investors could accelerate the net-zero transition in the UK electricity sector.

We run three scenarios, the first one with lower cost of capital and national as well as local scale investors (local investors – 6% cost of capital), the second scenario with the same cost of capital but only national investors (national investors – 6% cost of capital), and the third one with a higher cost of capital and national and local investors (local investors – 12% cost of capital). While both scenarios with a lower cost of capital meet the 2050 decarbonisation targets (the scenario with a higher cost of capital falls short of it), Figure 1 shows how local investors (regional utility companies and households)

help significantly boost the uptake of renewable energy both to 2030 and to 2050, as compared to the scenario where only national investors are active. This is due to the fact that local actors are willing to accept lower returns from renewable energy investments as they are also driven by socio-environmental considerations in their investment decisions. Lower interest rates charged on the loans taken out to fund the projects – a lower cost of capital – further help to scale up renewable energy investments in the UK electricity sector faster and deeper, as shown by the scenario with a 6% cost of capital where the share of total electricity produced through renewables reaches 85% in 2050 (Figure 1). Hence, despite leading to slightly higher total investment costs (Figure 2), having more diversity in investors would bring about a higher deployment of renewables and a reduced reliance on nuclear. This could be considered an advantage, especially if there were societal concerns over nuclear technology. Figure 3 shows how a stronger market diversification can be achieved through a lower cost of capital (local investors- 6% cost of capital scenario), which helps local actors to flourish and dominate the future 2050 electricity sector with an aggregated market share of 71% (Figure 3). In contrast, a higher cost of capital (local investors - 12% cost of capital scenario) favours incumbents and slows market diversification down, especially to 2030 when incumbents still dominate the electricity sector.

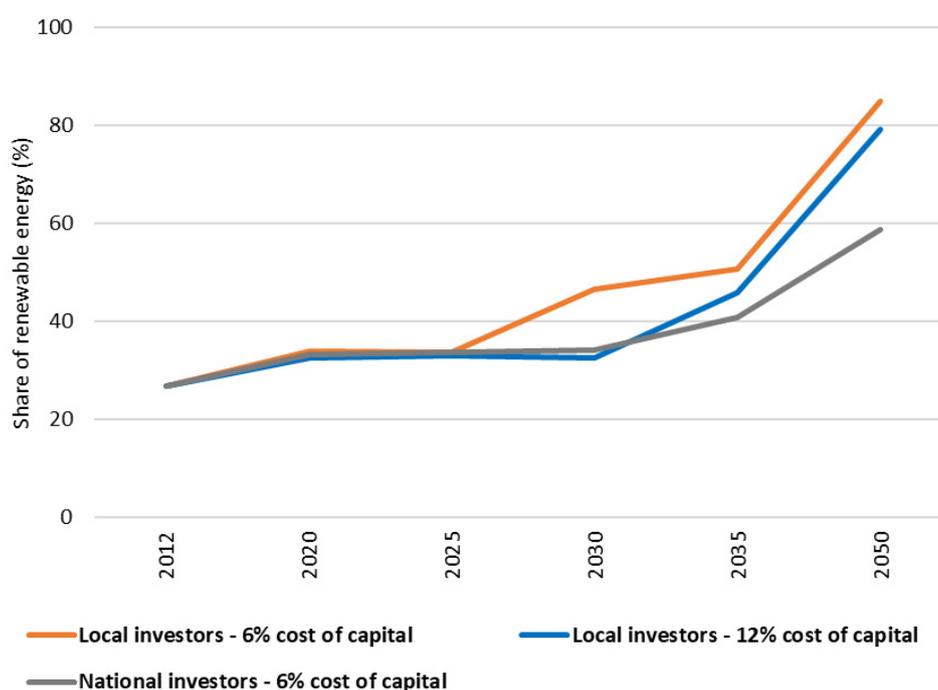


Figure 1 - Share of renewables in total electricity production in UK electricity sector decarbonisation scenarios

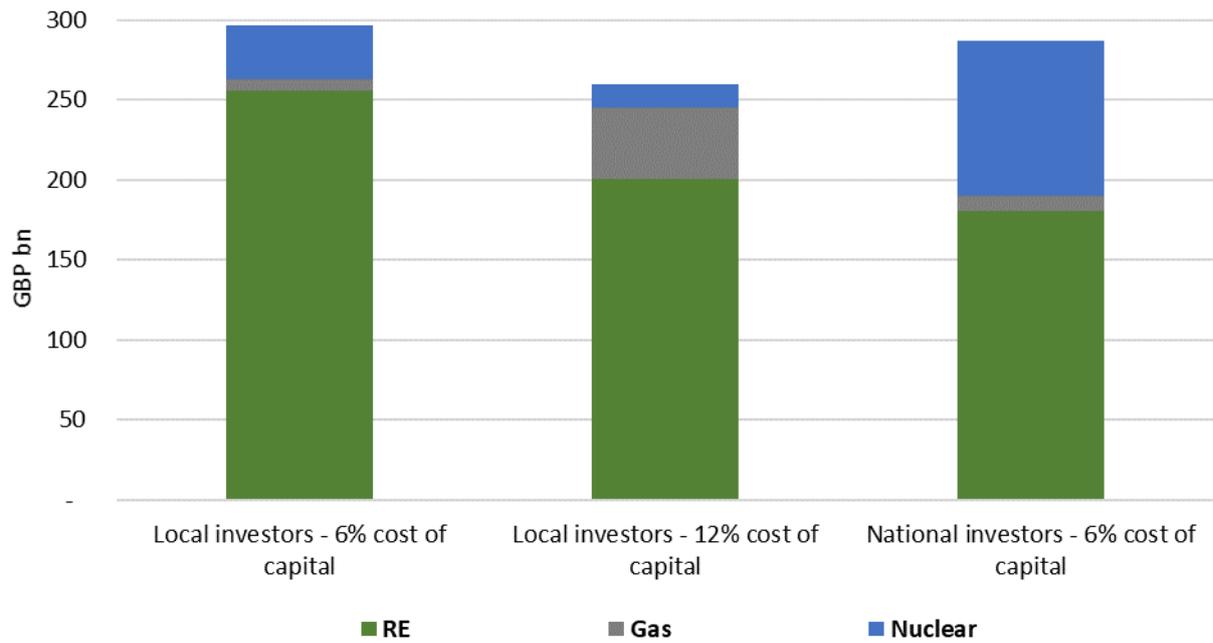


Figure 2 - Cumulative investment costs (2012 - 2015) in UK electricity sector decarbonisation scenarios

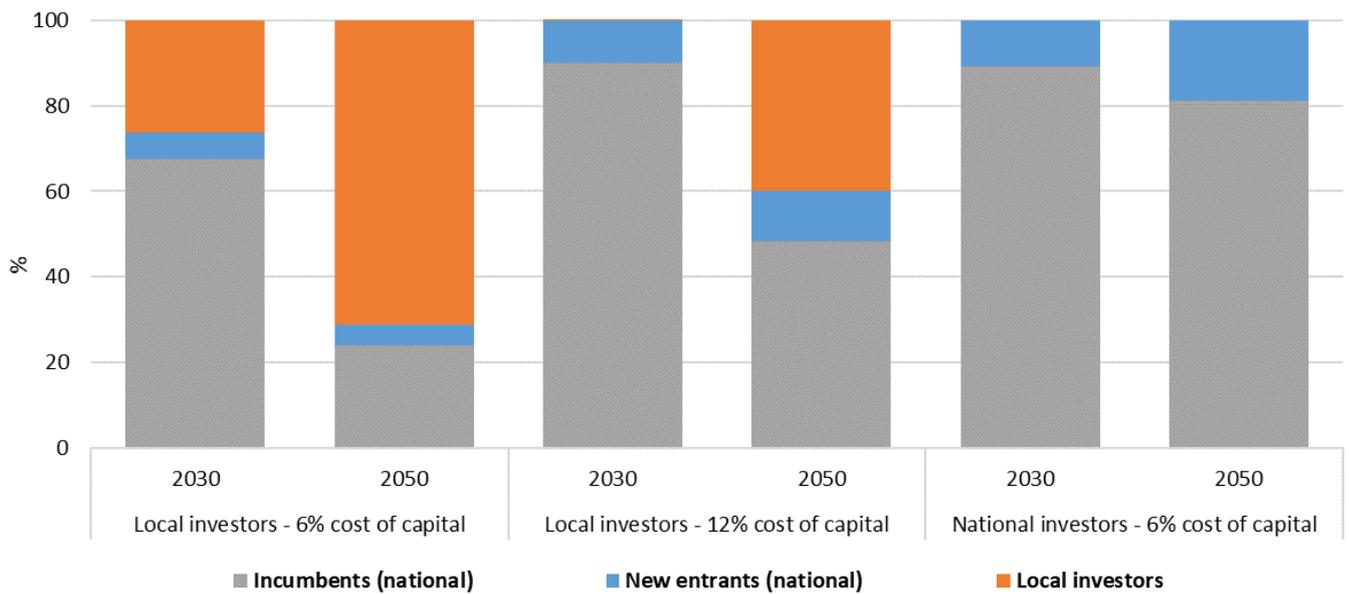


Figure 3 - Investors' market shares in UK electricity sector decarbonisation scenarios

What is the solution?

Insights from new agent based modelling approaches capture the risks and opportunities which investors' different investment strategies in low-carbon technologies pose to achieving net zero. Acknowledging the diversity of investors' strategies can help to inform policies able to:

- provide a stable and strong policy regime with subsidies to renewable energy, to maintain and increase investment levels and to mitigate the risks of non-optimal investment behaviour
- provide a favourable investment environment to de-risk low-carbon investments, with low capital costs to engage a variety of key investors
- support and encourage the growth of local investors (through subsidies, grants and loans with favourable cost of capital)

What is stopping the solution being implemented and how can these barriers be removed?

The UK energy market currently remains very centralised, with regulations and policies mainly focused on large-scale projects and national-scale actors, while the growth of local energy infrastructure (physical infrastructure, as well as data), which is needed to enable new market entrants and new business models, is not properly supported by policy. There is also a lack of financing mechanisms appropriate to local actors [5] in the UK, who given their size and insufficient experience have difficulties in accessing bank loans to finance the riskier and more expensive initial low-carbon infrastructure project stages.

Those policy and financial barriers could be removed by introducing programmes and incentives to support investments in small-scale renewable energy generation plants, and by introducing innovations in financing mechanisms (grant funding by public sector, "ethical" finance companies, alternative finance options) [5]. Moreover, the growth of new business models, and the involvement of public sector investors such as local authorities, could see increased involvement of investors interested in the

environmental and social aspects of the energy system transition. The participation of these kinds of investors should be encouraged to further scale up low-carbon investments in all sectors of the energy system in a timely manner to achieve net-zero.

Conclusion

Moving towards net-zero greenhouse gas emissions in the UK by 2050 requires unprecedented levels of investment in renewable and other low carbon technologies across the electricity, buildings and transport sectors. Policy makers should support market diversification, including the growth of local actors and of new business models, through a stable and strong policy regime with subsidies to low-carbon investments, coordinated with the diverse investment strategies of the different types of investors. They should also introduce new financing mechanisms to unlock or underwrite finance for all actors.

References

1. CCC (2020), “The Sixth Carbon Budget - The UK’s path to Net Zero”, <https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf>
2. IRENA (2019), “Business models: innovation landscape” https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jul/IRENA_Business_Models_Collection_2020.pdf
3. Busch et al. (2017) “Scaling up local energy infrastructure; An agent-based model of the emergence of district heating networks”, Energy Policy, <https://doi.org/10.1016/j.enpol.2016.10.011>
4. Barazza and Strachan (2020), “The impact of heterogeneous market players with bounded-rationality on the electricity sector low-carbon transition”. Energy Policy, 138, <https://doi:10.1016/j.enpol.2020.111274>
5. UKERC (2018), “The evolution of community energy in the UK”, https://d2e1qxpsswcpqz.cloudfront.net/uploads/2020/03/ukerc-wp_evolution-of-community-energy-in-the-uk.pdf