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Small streams, diverse sources: Who invests in renewable energy in Finland during the financial downturn?

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ABSTRACT

This article addresses the investment gap in renewable energy sources identified by several authors. Examining the case of a country, Finland, which introduced policy measures to diversify its renewable energy portfolio, we analyse the development of investments in renewable heat and power in response to new policy measures and contextual factors during the downturn period 2009–2013. We investigate investor heterogeneity, i.e., the diversity of logics employed by different types of RES investors. In spite of a severe financial recession, we find an emergence of new sources of investment. Among these new investor types, we find diversity in investment drivers and available options. These include investors mobilized by the feed-in-tariff to seek profitable targets and investors such as real estate owners investing in heat pumps for their own use and benefiting from low interest rates. We find that the diversification of investors supports the diversification in RES sources, and brings in new investors undeterred by the financial downturn. Our findings imply that policy-makers should recognize that the responses to distinct incentives and pressures vary by investor types. This also means that a mix of policies is required to maximize the contribution of different sectors to filling the renewable energy investment gap.

1. Introduction

The role of private investment in bridging the renewable energy funding gap has raised research and policy interest. Summarizing several assessments, Jacobsson and Jacobsson (2012) concluded that in order to reach the EU 2020 targets, investments of €500–700 billion are required for renewable energy supply (RES), and a further €600 billion for transmission and distribution networks. They argue that this gap is not likely to be bridged, since the business logic of the financial sector favors short-term speculative investments rather than renewable energy projects. One partial solution to this problem might be to attract new investors that are not driven by financial-market logics, which might also enhance the social acceptance of RES (Wüstenhagen et al., 2007).

Policy is considered an important driver of renewable energy investment, alongside technological improvements and cost reductions (Bürer and Wüstenhagen, 2009; Wüstenhagen and Menichetti, 2012). Research has focused on which policies (e.g. feed-in-tariffs vs. quota-based) are more effective in directing investment toward renewables (e.g., Menanteau et al., 2003; Dinica, 2006; Barradale, 2010; Marques et al., 2010; Fagiani et al., 2013; Aguirre and Ibikunle, 2014; Polzin et al., 2015). Shared understanding exists on the importance of economic instruments (Polzin et al., 2015), stable policy schemes (Barradale, 2010; Polzin et al., 2015), as well as on the need for tailored technology-specific instruments for emerging technologies (Johnstone et al., 2010; Polzin et al., 2015). While these studies have sought to explain national differences and differences between technologies, less is known about potential differences between different investor types.

Wüstenhagen and Menichetti (2012) have reframed the question as one of policy impact on investors' perceived risks and expected returns (see also Bürer and Wüstenhagen, 2009). They argue that different investors can react to policies in different ways, due to cognitive biases and preference for particular business models (Loock, 2012), i.e., different *investor logics*. An emerging body of research shows that world views, beliefs, policy preferences and attitudes toward technological risk influence investor behaviour in renewable energy (Masini and Menichetti, 2012; Chassot et al., 2014).

In this context, investor segmentation has been identified as an important research agenda for renewable energy policy (Wüstenhagen

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and Menichetti, 2012). While most of the existing research has focused on institutional or professional investors (Wüstenhagen and Menichetti, 2012; Masini and Menichetti, 2013; Polzin et al., 2015), for instance Bergek et al. (2013) have studied the diversification of investors in renewable electricity in Sweden hence focusing on a wider set of different investor types. Alongside conventional utility-type investors, emerging investors include independent power producers, diversified companies, project developers, farmers, associations, governmental organizations and sole traders. Many of these are not likely to follow an energy-economic logic of levelized lifetime cost. Mignon and Bergek (2012) have identified four main types: (1) profit-driven investors, often independent power producers with large project portfolios, (2) technology-driven investors, who did not compare their investment to other options but were committed to a particular technology, (3) solution-driven investors, who invested in order to solve problems, for example divert taxable income into real assets and (4) efficiency-driven investors, who invested in order to develop existing assets (e.g., farmland, water or biomass). Different types of investors are also associated with different RES technologies; Polzin et al. (2015) find that biomass-based technologies have benefited from institutional support and direct investments by local public actors, whilst wind power has benefitted from measures directly influencing the competitiveness of the technology, and Bürger et al. (2008) argue that investments in heat provision have more local premises than investments in power production.

In addition to policy and investor-specific characteristics, investment in RES is also influenced by the investor's context. For example, Wüstenhagen and Menichetti (2012) discuss the path-dependence of renewable energy investments due to investors' previous experiences, and Mignon and Bergek (2012) mention the other (real and perceived) options available for investors. However, there is little research connecting the behaviour of heterogeneous investors in response to policy instruments and the conditions created by the timing of policies vis-à-vis other institutional and market (i.e., contextual) factors influencing investor behaviour (Bergek et al., 2013). Such other factors can include the logic of financial markets and market responses to financial cycles (Jacobsson and Jacobsson, 2012; Eleftheriadis and Anagnostopoulou, 2015). Hence, the existing knowledge base calls for better understanding of how policy measures *and investor contexts* influence investments by different categories of investors following different logics. This article aims to address this research gap with empirical data from Finland.

This article aims to answer the following research question: What policy and contextual factors influence the diversification of investments in renewable energy production? We have selected Finland as a case country which has a traditionally large share of renewable energy production by the pulp and paper industry (i.e., a strong element of path dependence), but where it has been recognized that new sources of investment are needed to meet the country's RES targets (Kosenius and Ollikainen, 2013). Finland is a small, unitary country enabling a relatively granular case study. It is also a country where important policy measures were introduced at a time (2009–2013) when the country was suffering from low investment levels following the financial crisis (Banerjee et al., 2015).

Our contribution is fourfold: (1) We break down total RES investment development by energy source and investor type in a yet unexplored country context. Following Wüstenhagen and Menichetti (2012), we do so by examining financial investment flows rather than installed capacity. (2) We examine the drivers and contexts for RES investment by new investor categories during a period when new policy measures were introduced in a financial downturn (2009–2013) (3) We extend the analysis beyond power production by including heat-provision technologies, and (4) We examine how public policy *in combination with other contextual factors* has influenced investment in renewable energy by new investor categories. The following sections present our research context and methodology. We present our results in Section 4, discuss their contribution and limitations in Section 5 and provide policy implications in Section 6.

2. Research context: Finnish energy market and policy

Finnish energy policy has been industry oriented (Kivimaa and Mickwitz, 2011) and has favoured large players while excluding small ones (Snäkin et al., 2010). Bioenergy is the only renewable energy source that has consistently featured on the policy agenda since the 1970s (Kivimaa and Mickwitz, 2011), due to the abundance of forest resources. Bioenergy – in particular from black liquor and forest residues used by the pulp and paper industry – has made up a fourth of the country's total energy supply (Kosenius and Ollikainen, 2013). Additional growth has been expected in small-scale plants for heat or CHP production (Kosenius and Ollikainen, 2013), due to years of low domestic investment in pulp and paper production.

In response to the Renewable Energy Directive (2009/28/EC), Finland committed to raise the share of renewable energy from the 2007 level of 25–38% by 2020, which requires increased deployment of other renewable sources than bioenergy (Kosenius and Ollikainen, 2013). The target is to increase annual wind power production to 6 terawatt hours (TWh) and ambient energy from heat pumps to 8 TWh (NREAP, 2010), both of which represent more than tenfold growth from 2005 levels. Increase and diversification of bioenergy investments is also envisaged. The use of wood chips is expected to more than double through subsidies for harvesting and chipping of small-scale thinning wood, a feed-in-tariff (FIT) to compensate for the cost difference between wood chips and other fuels, and a FIT for small CHP plants (NREAP, 2010).

Policies to promote renewable energy have mainly relied on investment subsidies distributed by the Ministry of Employment and Economy and its regional units. In recent years, greater subsidies (25–30% of investment costs) have been offered for "more innovative" technologies, such as solar energy and biogas (MoEE, 2014). Smaller subsidies (15–20%) are provided for investments in biomass-powered heating plants and in the fuel supply chain (biomass harvesting, distribution and processing).

Finland was comparatively late among European countries to introduce a FIT for renewable electricity, which represented a paradigm shift from a technology-neutral and least-cost policy to proactive promotion of new energy sources. In 2010, a FIT scheme was introduced for wind power (with a premium for the first three years to accelerate construction) and power plants using biogas and wood-based fuel (Energy Authority, 2015), yet excluding small plants (< 100 kVa) (Snäkin et al., 2010). At the same time, and partly to support the FIT, energy taxation was changed resulting in a cost increase for fossil fuels (especially natural gas) and small electricity consumers (Parkkonen, 2011; IEA, 2013).

Small-scale investment, in particular by households or small businesses, has not featured prominently in Finnish energy policy (Snäkin et al., 2010). Unlike other European countries, Finland has not introduced a FIT for solar power. The combined share of solar heat and power was less than 0.01% of inland energy consumption (Motiva, 2014) and there is no national target for increasing this share (Hirvonen et al., 2015). While for example German investments in PV built on long-term policy support and learning effects since the early 1990s (Seel et al., 2014), Finnish experts remained skeptical about the potential of solar energy (Pesonen, 1996), although the mainstream view is gradually changing (Nissilä, 2015; Tekes, 2012).

Some interest in households' investment is visible in the NREAP's (2010) expectations of a sharp increase in ambient energy from heat pumps. This is mainly left to the market, but there has been a small government grant (15% of investment cost of ground source heat pumps, bioenergy boilers and solar collectors) for homeowners, as well as a tax deduction for the installation costs of new heating systems (Heiskanen et al., 2013).