



# The multiple roles of state investment banks in low-carbon energy finance: An analysis of Australia, the UK and Germany

Anna Geddes<sup>a,b,\*</sup>, Tobias S. Schmidt<sup>b</sup>, Bjarne Steffen<sup>b</sup>

<sup>a</sup> Climate Policy, Department of Environmental Systems Science, ETH Zurich, Universitaetstrasse 22, 8092 Zurich, Switzerland

<sup>b</sup> Energy Politics Group, Department of Humanities, Social and Political Sciences, ETH Zurich, Haldeneggsteig 4, 8092 Zurich, Switzerland

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## ABSTRACT

Low-carbon energy technologies (renewable energy and energy efficiency) are considered essential to achieve climate change mitigation goals, so a rapid deployment is needed. However there is a significant financing gap and many policymakers are concerned that investment for the large-scale deployment of low-carbon technologies will not materialise quickly enough. State investment banks (SIBs) can play a key role in closing this finance gap and leverage additional private finance. Based on 52 interviews, this paper presents empirical evidence on the role of three SIBs in addressing the barriers to financing low-carbon energy projects; the Clean Energy Finance Corporation (CEFC) in Australia, the Kreditanstalt fuer Wiederaufbau (KfW) in Germany and the Green Investment Bank (GIB) in the UK. We investigate the activities and financial instruments offered by SIBs and compare these to the need for such from low-carbon developers when sourcing finance. Findings show that aside from capital provision and de-risking, SIBs take a much broader role in catalysing private investments into low-carbon investments, including enabling financial sector learning, creating trust for projects and taking a first or early mover role to help projects gain a track record.

## 1. Introduction

Mitigating climate change will require a rapid and significant transition of our energy system in order to reduce CO<sub>2</sub> emissions (IPCC, 2014). The development and deployment of new technology, especially of renewable energy and energy efficiency technology is considered key to this transition and so there is a need for policy to speed-up and re-direct this technological change (Pizer and Popp, 2008; Schmidt et al., 2012). But there is a significant ‘financing gap’ for the low-carbon energy projects required to reduce global CO<sub>2</sub> emissions to target levels and many are concerned that investments for the large-scale diffusion of renewables will not materialise fast enough (IEA, 2014, 2016; IFC, 2010; SE4ALL, 2014). The International Energy Agency estimates annual global investments in low-carbon technologies will need to total USD 730 billion by 2035, more than doubling the 2015 figure of USD 290 billion, and will then need to reach over USD 1.6 trillion a year from 2030 to 2050 to meet global climate targets (IEA, 2014, 2016; Shlyakhtenko and La Rocca, 2012). However, public support and utilities’ balance sheets are currently constrained and, given the necessary scale of investment, new private finance is required (FS-UNEP and BNEF, 2016, 2017; GIBC, 2010; Mathews et al., 2010).

Although finance plays an important role along the entire

innovation chain, it is especially downstream finance for commercialisation that is important for the rapid deployment of low-carbon technologies (Bürer and Wüstenhagen, 2009; Grubb, 2004; Karltorp, 2015; Mazzucato and Semieniuk, 2017). While, due to innovation, the cost of low-carbon technologies has significantly fallen in recent years (Huenteler et al., 2015; Schmidt and Sewerin, 2017; Trancik et al., 2015), many projects are still perceived as risky by investors and are not financed (CPI, 2013; Hall et al., 2015; Jacobsson and Jacobsson, 2012; Jacobsson and Karltorp, 2013; Karltorp, 2015; Lang et al., 2015; Ondraczek et al., 2015; Sadorsky, 2012). The period post 2008 also saw a drop in low-carbon project investment activity in many countries due to the financial crisis and new reserve requirements for banks (IEA, 2009). Barriers to sourcing finance faced by developers differ by technology type, project size and context conditions (CPI, 2013; Hall et al., 2015; Kann, 2009; Polzin, 2017; Richards et al., 2012). Furthermore Waissbein et al. (2013) and Schmidt (2014) have shown that when the perceived investment risk is high the resulting increase in financing costs deteriorates the competitiveness of low-carbon vis-à-vis fossil fuel based projects. With many developers still facing barriers to sourcing finance the limited public finance that is available is being called on to leverage in private sector finance (Jacobsson and Jacobsson, 2012; Karltorp, 2015; Mathews et al., 2010; Schmidt, 2014; Steffen, 2017).

\* Corresponding author at: Climate Policy, Department of Environmental Systems Science, ETH Zürich, Universitaetstrasse 22, 8092 Zurich, Switzerland.  
E-mail address: [anna.geddes@hotmail.co.uk](mailto:anna.geddes@hotmail.co.uk) (A. Geddes).

In recognition of this issue, some governments have appointed state investment banks (SIBs) to close the financing gap and help green their economies. The UK's Green Investment Bank (GIB) and Australia's Clean Energy Finance Corporation (CEFC) were both founded in 2012 with government funding and a similar remit: to assist their country's transition towards a more sustainable economy by mobilising private sector capital into low-carbon energy projects (CEFC, 2016a; GIB, 2016b). Germany's Kreditanstalt fuer Wiederaufbau<sup>1</sup> (KfW), while originally established as the country's development bank, has also been very active in low-carbon energy financing (KfW, 2015a).

Recent work by the OECD reported that SIBs leverage private investment into green infrastructure (OECD, 2015, 2016, 2017). Other reports analysed models for the creation of green investment banks in light of receding government support (Berlin et al., 2012) and investigated the potential role of such banks in scaling up climate finance in emerging markets (NRDC, 2016). Mazzucato and Penna (2016) determined that SIBs 'shape and create' markets, rather than solely fix their failures and that KfW and BNDES<sup>2</sup> play a 'mission-oriented' role, making key investments in new sectors to address 'grand societal challenges', such as climate change (Mazzucato and Penna, 2015). More recently Mazzucato and Semieniuk (2017) found that public owned entities invested heavily in some high-risk renewable energy projects. However literature also discusses the concern that public financial intervention might crowd out private investment, which could lead to capital allocation inefficiencies<sup>3</sup> (Cumming and MacIntosh, 2006; Hall et al., 2015; Stiglitz, 1993).<sup>4</sup> More generally, Campiglio (2016) discusses the potential role of banking and monetary policy in expanding credit creation to finance the energy transition and Hall et al. (2016) examine how the industry structure of the banking sector can shape ownership structures and technology choices of energy transitions.

The literature to date falls under one of two categories; general public sector finance in energy transitions, or the general role of banking and finance in energy transitions. There is little empirical work on the role of SIBs specifically in overcoming barriers to mobilising finance. There is also an absence of detail on which instruments, channels and activities employed by SIBs have been effective and why, and little understanding of the mechanisms which allow SIBs to help mobilise private finance into the low-carbon energy sector. Our work in this paper aims to address this research gap by asking the research question: *What is the role of SIBs in addressing the barriers faced by low-carbon project developers in sourcing finance?*

To answer this question we investigate the instruments and activities supplied by SIBs and compare these to the actual demand for such from low-carbon energy developers in the context of the barriers they encounter in sourcing finance. We examine both how and how well SIBs address these barriers and in doing so we identify the roles taken by SIBs that successfully address developers' needs. We also investigate evidence for crowding-out and supply of inappropriate provisions. We present empirical evidence sourced from 52 interviews with 56 interviewees in Australia, Germany and the UK. With this work we aim to improve the understanding of the role of public finance in overcoming

barriers to the energy transition.

The remainder of the paper is structured as follows: Section 2 introduces our cases, extending on the literature advanced in the introduction by presenting background to the three SIBs and their country contexts, and describes our method and data. In Section 3 we present and discuss our results, and we conclude with policy recommendations in Section 4.

## 2. Cases, methods and data

### 2.1. Case selection

Our study focuses on three cases from different industrialised countries with SIBs that are either primarily or heavily involved in financing low-carbon energy projects: Australia and the CEFC, Germany and the KfW Group and the UK and the GIB. The OECD (2015) reports on 13 'green' investment banks (GIBs) or GIB-like entities (such as funds) operating globally as of 2015. We selected the CEFC and GIB because they operate on a national level, perform more operations and activities than a fund and have a longer operating record (5 years). We excluded institutions from our study that operate solely as a fund, whose operating record is too short or that operate on a sub-national or regional level only. We include KfW in our study because, although not exclusively a 'green' state investment bank, it is mandated to support Germany's energy transition and was the biggest development bank investor in clean energy projects globally from 2007 to 2012 (Louw, 2013). Hence this case offers a large amount of empirical evidence to observe how SIBs address barriers to low-carbon finance.

In the following section we describe the policy context and financial sector background for each country and introduce background information to each bank. Table 1 provides renewable capacity and % total generation statistics for each country to indicate the relative level of development of each country's low-carbon sector. Table 2 summarizes each SIB's background information.

### 2.2. Australia and the Clean Energy Finance Corporation

#### 2.2.1. Policy context

In contrast to the UK and Germany, Australia's low-carbon sector (beyond rooftop solar) remains in its infancy<sup>5</sup> (Table 1), with most technologies still considered to be new to the country and its actors, especially its financial system. Various context conditions have posed a challenge to sourcing finance for the deployment of low-carbon projects (Cheung and Davies, 2017; Kann, 2009; Nelson et al., 2013). Firstly electricity is generated in Australia under a fully commercial market-based system where historically developers have sourced power purchase agreements (PPAs) from commercial retailers (Kann, 2009). Secondly, apart from the Renewable Energy Target (RET) scheme,<sup>6</sup> there has been limited federal policy support for low-carbon technologies (Cheung and Davies, 2017; Talberg, 2013). Finally, long-term renewable energy and climate change policy uncertainty has been created through a lack of bipartisan support, on-going federal debate and policy change<sup>7</sup> (Cheung and Davies, 2017; Kann, 2009; Nelson et al., 2013, 2012). While policy uncertainty existed around Australia's RET, retailers were no longer prepared to enter into long-term PPAs. Financiers were then unwilling to fund such projects and investment in large-scale projects dropped 88 per cent in 2014 compared to the

<sup>5</sup> As of end 2014 there were only 5 operating large-scale (> 1 MW) solar PV plants, with a total installed capacity of 44 MW, well behind similar international markets (CEC, 2014, 2015).

<sup>6</sup> The Renewable Energy Target (RET) is a certificate-based scheme for large-scale renewables implemented in 2001.

<sup>7</sup> The country's carbon pricing scheme was repealed within 2 years of its launch by an incoming government (Taylor, 2014) and in 2012 and 2014 the same government reviewed and revised the RET scheme.

<sup>1</sup> Translates to Reconstruction Credit Institute.

<sup>2</sup> The Brazilian Development Bank.

<sup>3</sup> Note there are various debates around public intervention in markets to support new technologies, including whether there is justification for any policy intervention at all, and around the level of specificity of such interventions in markets (Hall et al., 2015; Schmidt et al., 2016). Literature has extensively reported on a wide range of market failures (including structural barriers, information asymmetry, project finance markets differing to high frequency traded markets etc.) for low-carbon technology implementation and associated project finance markets, as well as co-ordination/ system failures, justifying policy intervention (Gillingham and Sweeney, 2010, 2012; Hall et al., 2015).

<sup>4</sup> In the context of SIBs 'crowding out' refers to public institutions investing in the place of private financiers, displacing and/or reducing private investment participation, and thus inhibiting the development of an effective and robust private sector market for financing (Cumming and MacIntosh, 2006).

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