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The large-scale solar feed-in tariff reverse auction in the Australian Capital Territory, Australia

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HIGHLIGHTS

- Evolution of the reverse auction process in the Australian Capital Territory.
- Analysis of the outcomes of the first Australian feed-in tariff reverse auction.
- Identification of the major drivers of the low FiT prices achieved in the auction.
- Identification of major issues that emerged in the auction.

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ABSTRACT

Feed-in tariffs (FiTs) offer renewable energy developers significant investor certainty but sometimes at the cost of being misaligned with generation costs. Reverse FiT auctions, where the FiT rights for a predetermined capacity are auctioned, can overcome this problem but can be plagued by non-delivery risks, particularly of competitively priced proposals. In 2012 and 2013 the Australian Capital Territory (ACT) Government in Australia conducted a FiT reverse auction for 40 MW of large-scale solar generating capacity, the first such auction undertaken in the country. The auction was highly competitive in relation to price and demonstrating low delivery risks. Proposal capital costs, particularly engineering, procurement and construction costs, as well as internal rates of return, were lower than expected. The auction process revealed limited land availability for large-scale solar developments in the ACT as well as a significant perceived sovereign risk issue. The auction process was designed to mitigate non-delivery risk by requiring proposals to be pre-qualified on the basis of delivery risk, before considering FiT pricing. The scheme is likely to be used by the ACT Government to support further large-scale renewable energy development as part of its greenhouse gas reduction strategy which is underpinned by a 90-per cent-by-2020 renewable energy target.

1. Introduction

Despite Australia receiving the highest average amount of solar radiation of any continent on earth (Lovegrove and Dennis, 2006), it has been slow to develop large-scale solar generating capacity. The first independent large-scale (>2 MW) solar generator in the country was the 10 MW Greenough River Solar Farm (located in Western Australia) that began generating in 2012. A 9 MW solar thermal booster for the Liddell coal-fired power station (located in New South Wales, eastern Australia) also began generating in 2012.

Since 2001, Australia has had a national Renewable Portfolio Standard (RPS) support scheme that supports large-scale renewable energy generation – the Renewable Energy Target scheme that applies to electricity retailers – but it does not include either carve-outs or banding features. This has resulted in the scheme mainly supporting lower-priced large-scale wind development leaving it with a narrow renewable energy generation base that has excluded large-scale solar generating capacity (Kent and Mercer, 2006; Buckman and Diesendorf, 2010; Nelson et al., 2013).

The current levelised cost of energy (LCOE) for large-scale on-shore wind and biomass in Australia is lower than that of all other large-scale non-hydro renewable energy technologies in the country with the current mid-range non-tracking solar photovoltaic LCOE being around 80 per cent higher than for the mid-range on-shore wind LCOE (Bureau of Resources and Energy Economics, 2013a). Small-scale solar generation in Australia, however, has been supported by a range of national and jurisdictional support schemes and by the end of 2013 had a total installed capacity of around 3 GW with more than one million small-scale photovoltaic

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systems now installed in the country (Sunwiz, 2013; Clean Energy Regulator, 2013). This large growth has resulted in some urban suburbs having a larger collective solar generating capacity than the Greenough River Solar Farm. By August 2013, around 12 suburbs in Australia, most located in Queensland (north-eastern Australia), had total installed rooftop photovoltaic capacity greater than the 10 MW Greenough River generator (Access Solar, 2013).

Two initiatives that have supported some specific types of large-scale solar development in Australia have been the Commonwealth (national) Government's Solar Flagships program, a capital grant scheme, and the Australian Capital Territory's (ACT's) Large-scale Solar Auction Feed-in Tariff scheme. The inconsistent management of the Solar Flagships program and its uncertain evolution have compounded the disincentive to develop large-scale solar generators created by Australia's RPS scheme. The Solar Flagships program was announced by the national government in 2009 and originally aspired to develop around 1000 MW of large-scale solar capacity (photovoltaic and solar thermal) with $A1.6 billion in national government funding over six years (Department of Energy, Resources and Tourism, 2010). However, the program was plagued by funding reductions and the inability of potential solar developers to secure power purchase agreements (offtake agreements) with electricity retailers. Only 155 MW of large-scale photovoltaic capacity, to be built in two locations in western New South Wales, will result from the Solar Flagships program. The two solar farms are due for completion by the end of 2015 and have been supported by $A167 million in national government funding and $A65 million in New South Wales (state) Government funding (AGL, 2014).

This paper is concerned with the ACT's Large-scale Solar Auction scheme, the first initiative under the ACT's Electricity Feed-in (Large-scale Renewable Energy Generation) Act 2011 (the Act) designed to support a range of renewable energy technologies for development in the ACT and surrounding region. The ACT is a territory of approximately 2300 km^2 in south-eastern Australia (surrounded by New South Wales) that incorporates the nation's capital, Canberra, and which has a population of around 380,000 people.

FiTs are a type of price-based renewable energy support mechanism that are often argued to be effective at reducing risk for renewable energy developers (Mitchell et al., 2006; Butler and Neuhoff, 2008; del Rio, 2008; Lesser and Su, 2008; Couture and Gagnon, 2010; Mendonca et al., 2010; Dong, 2012; Kim and Lee, 2012). If poorly designed, the reduced risk delivered by the mechanism can come at the expense of overly generous levels of subsidy (del Rio and Gual, 2007; Frondel et al., 2010; Stokes and Lee, 2012; Stokes, 2013). Australia has experienced this in its small-scaled solar generation support schemes (Martin and Rice, 2013). However, this does not mean that oversubsidisation is an inherent feature of FiTs. Robust FiT design involves balancing the need to provide income security to renewable energy developers with that of avoiding overly generous subsidies (del Rio and Gual, 2007; Stokes, 2013) but if the balance is poorly struck there is either insufficient developer security or higher than required subsidisation. The balance can be particularly challenging to determine when renewable energy capital costs are experiencing significant declines which has recently been the case with solar photovoltaic costs. Like similar schemes that have been employed in the United Kingdom, China, South Africa, India, Brazil and California, the ACT reverse auction FiT scheme mitigated the risk of overly generous subsidisation by using a competitive process to award its FiT entitlements to those proposals that demonstrated best value-for-money, subject to financial and technological risk assessment and demonstration that the bidder had the experience and capacity to develop its renewable energy proposal.

Non-competitive FiT schemes involve governments setting a FiT price, and renewable energy markets determining what level of renewable energy production will be delivered at that price, whereas an RPS scheme involves governments setting the amount of renewable energy production and renewable energy markets determining the price it will be delivered at. A FiT reverse auction involves governments setting the amount of renewable energy capacity required and renewable energy markets determining the FiT price. Like all FiT schemes, a FiT awarded by a reverse auction process delivers revenue certainty, and therefore greater investment certainty to a renewable energy developer, relative to an RPS scheme.

The generators supported by the feed-in tariffs (FiTs) awarded under the ACT's Large-scale Solar Auction scheme will connect to the area's distribution network and will increase the country's distributed generation. Historically, Australia has had a low amount of distributed generation especially when compared with Europe. Advantages associated with this increase will include reduced use of electricity networks, more efficient conversion of primary energy sources to useful energy services, reduced peak demand, reduced electricity greenhouse gas emissions, a downward force on wholesale electricity prices, and reduced wholesale price volatility (Lilley et al., 2012; Commonwealth Scientific and Industrial Research Organisation (CSIRO), 2009). However subsidy payments for small-scale FiT schemes in the country, that are passed through to energy consumers, have been material, and are forecast to grow, nationally, to approximately four per cent of residential electricity retail prices by 2015–2016 (Australian Energy Market Commission, 2013).

There have been several investigations of the design and implementation of non-competitively determined FiTs in specific countries and particular settings (Mitchell et al., 2006; del Rio, 2008; Doherty and O'Malley, 2011; Yatchew and Baziliauskas, 2011; Drechsler et al., 2012; Jenner et al., 2013; Leepa and Unfried, 2013; Yasun et al., 2013; Eyre, 2013). This paper contributes to knowledge by presenting contemporary results and analysis of the implementation of the FiT reverse auction scheme used in the ACT. To date, analysis of reverse auction processes used around the world has been largely confined to the United Kingdom's Non-Fossil Fuel Obligation that operated between 1990 and 1998 (Mitchell, 1995; Mitchell and Connor, 2004; Cozzi, 2012).

This paper analyses the design features and outcomes of 40 MW of large-scale solar capacity awarded in the ACT though a reverse auction scheme that operated from January 2012 to August 2013. It references data collected by the scheme's administrators, the Environment and Sustainable Development Directorate (ESDD) (2013), an agency of the ACT Government.

Section 2 of this paper outlines the evolution of the ACT large-scale solar auction scheme and its major design elements; Section 3 details the results of the auction; Section 4 discusses constraints and issues of the auction process and Section 5 concludes by discussing the policy implications of future possible applications of the ACT reverse auction process.

2. Evolution of the ACT solar auction scheme and major design elements

Historically, the ACT Government has provided support to solar energy generators in the form of a gross FiT scheme that operated between 2009 and 2011, for small to medium scaled solar generators of up to 200 kW capacity, that was the most generous in Australia in terms of total subsidy over scheme lifetime (Martin and Rice, 2013). In 2010 the ACT Legislative Assembly (the ACT parliament) passed the *Climate Change and Greenhouse Gas Reduction Act* that legislated a 40 per cent reduction in local greenhouse gas emissions on 1990 levels by 2020, an 80 per cent reduction by 2050 and zero net emissions by 2060. These targets are significantly more ambitious than the current national greenhouse gas reduction target for Australia that aims to