Energy Policy 61 (2013) 697–706

Contents lists available at ScienceDirect

Energy Policy

journal homepage: www.elsevier.com/locate/enpol

The solar photovoltaic feed-in tariff scheme in New South Wales, Australia

Nigel Martin [a,*], John Rice [b,1]

[a] Research School of Accounting and Business Information Systems, ANU College of Business and Economics, NEW CBE Building 26C (Room 3.20), The Australian National University, Acton, Canberra ACT 0200, Australia
[b] Griffith Business School, Higher Degrees by Research Convenor, Department of International Business and Asian Studies, Gold Coast Campus, Griffith University, Parklands Drive, Southport, QLD 4215, Australia

HIGHLIGHTS

- Describes the design of a feed-in tariff policy for solar PV electricity exports.
- Exposes a A$1 billion payment overrun and weaknesses in policy controls.
- Identifies policy design flaws and opportunities to improve future tariff designs.
- Discusses the importance of developing nationally integrated feed-in tariff policies.

ARTICLE INFO

Article history:
Received 21 February 2013
Accepted 11 June 2013
Available online 9 July 2013

Keywords:
Electricity exports
Feed-in tariff policy
Solar PV system

ABSTRACT

Solar Photovoltaic (PV) electricity systems are part of Australia's energy supply matrix. In the case of New South Wales (NSW), the state government has had to deal with a complex policy problem. In order to play its role in the federal Small-scale Renewable Energy Scheme, the NSW government initiated the 7 year Solar Bonus Scheme in 2010. However, in attempting to maximise community investment in small-scale solar PV systems, it relied on faulty financial modelling that applied a generous Feed-in Tariff (FiT) and underestimated the level of investor participation and installed capacity. Consequently, the scheme has resulted in very high public costs that will require policy changes that bring investors and energy retailers into conflict, and unpopular electricity retail price adjustments. This paper uses a structured case and stakeholder analysis to critically analyse the FiT policy, while also highlighting important lessons for policymakers engaging in FiT design.

1. Introduction

Feed-in Tariffs (FiT) have been championed as instruments for creating Renewable Energy (RE) supplies (Couture et al., 2010; Mendonca et al., 2010; Bull et al., 2011). The benefits of FiT policies include stimulating investment in RE generation, improving energy security, developing RE industries, and meeting the challenge of climate change (Mendonca et al., 2010). In the absence of electricity market failure, or economic problems, it might be argued that FiT policies are a *“force for environmental, social and economic good”* (Mendonca, 2007a, 2007b; Solangi et al., 2011; Zhao et al., 2011). In essence, FiT policies are a key enabler of sustainable energy supplies (Couture et al., 2010; Mendonca, 2011; Solangi et al., 2011).

However, can we say that FiT policies will only lead to good sustainability outcomes? Our response is ‘Maybe not'. As an example, in 2007 the volumetric and temporal underestimation of solar Photovoltaic (PV) energy supply systems deployment in Spain saw less positive outcomes emerge for its manufacturing sector, RE industry employment, and public costs related to RE subsidies (del Rio and Gual, 2007; Cornfeld and Sauer, 2010). So, while FiT policies form part of the economic framework required to achieve RE and carbon emissions reduction targets, in some cases the results may be less than ideal (Frondel et al., 2008; Buckman and Diesendorf, 2010).

In this paper, we argue that policy design is critical and, under highly accelerated solar PV system deployments, coordinated governmental actions and controls should lead to better outcomes. In our subject case, we critically analyse the Solar Bonus Scheme (SBS) for small scale solar PV energy systems initiated by the New South Wales (NSW) state government in Australia (NSW Government, 2009). In doing this, we examine the financial modelling that was used for scheme design, identify the critical

* Corresponding author. Tel.: +61 2 6125 9793; fax: +61 2 6125 4310.
E-mail addresses: nigel.martin@anu.edu.au (N. Martin), j.rice@griffith.edu.au (J. Rice).
[1] Tel.: +61 7 5552 7646; fax: +61 7 3735 3900.

0301-4215/$ - see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.enpol.2013.06.038

underestimations and subsequent governmental actions to stabilize the scheme, while highlighting important lessons for FiT design and future solar PV systems growth.

In a practical sense, we follow Mendonca et al. (2010) who argue the merits of using FiT policies as a tool for RE expansion and a weapon in the fight against climate change. Accordingly, we have two aims for the research. First, we are interested in assessing what elements of the FiT policy design are problematic, particularly in relation to public costs, scheme governance and investment confidence. Second, we are seeking to determine how FiT policy problems and difficulties might be addressed and rectified. We support the assertion that the growth of RE systems is seen as an important building block in the global push to arrest climate change and environmental degradation (Solangi et al., 2011; Zhao et al., 2011). Importantly, the results of the study should inform better and more effective public policies.

Foundation studies suggest that FiT policies are powerful economic tools that can elicit strong investor response, enable the widespread deployment of RE systems, and lead to positive growth in the RE industry (Komor and Bazilian, 2005; Rowlands, 2005a; Ringel, 2006; Jager-Waldau, 2007; Rickerson et al., 2007). Our intention is to extend these policy considerations and analyses and include the key stakeholder positions and communications in the evolving policy environment, coupled with a discussion of complementary policy levers. We argue that this will make a valuable contribution to our understanding of FiT and RE policy mechanisms, particularly in the light of growing global environmental awareness and activism. The balance of this paper will discuss some of the literature surrounding FiT and associated public policies and processes, the policy research context and method, a discussion of the major issues, results and observations, and our concluding remarks on the lessons that might be applied to future FiT policy design.

2. Feed-in tariffs for renewable energy schemes

In this study, we focus on the use of FiT policies as mechanisms that support the continuing development of RE production and supply. The extant literature provides a strong set of policy driven advantages for FiT mechanisms. Importantly, research studies suggest that the installation of functionally simple, stable and efficient FiT policies can drive RE industry and manufacturing development, innovative commercial research and development, technical skills development, and enhanced employment opportunities (Menanteau et al., 2003; Haas et al., 2004; Komor and Bazilian, 2005; Jager-Waldau, 2007; Rickerson et al., 2007; Butler and Neuhoff, 2008). Also, at the individual investor level, investigations show that FiT policies and programs can enable high volume investment responses, lower perceived investment risk, enhance transparency of energy use and costs, and assist in carbon footprint reductions (Rowlands, 2005a; Mitchell et al., 2006; Jager-Waldau, 2007; Butler and Neuhoff, 2008; del Rio Gonzalez, 2008; Fouquet and Johansson, 2008; Couture and Gagnon, 2010). Complementary studies demonstrate that FiT arrangements can support energy diversity and security, enable increased RE installed capacity, assist in reducing electricity prices, and create conditions for electricity markets expansion (Jager-Waldau, 2007; Rathmann, 2007; Cornfeld and Sauer, 2010; Couture et al., 2010; Diez-Mediavilla et al., 2010; Frondel et al., 2010). In addition, further studies support the use of variable FiT rate policies for non-dispatchable energy resource development (e.g. solar PV, wind, hydro), challenging RE supply targets, and enhanced small scale RE systems growth (Haas et al., 2004; Pietruszko, 2006; del Rio Gonzalez, 2008; Naci Celik et al., 2009; Bull et al., 2011; Mabee et al., 2012). However, while the body of literature explicates these FiT policy advantages, there are also disadvantages that should be considered in any balanced discussion.

Important studies show that FiT can lead to significant costs, particularly in relation to increasing public costs and government expenses, high capital equipment and installation charges, uncertain investment returns, and windfall profits and margins for energy retailers (Haas et al., 2004; Komor and Bazilian, 2005; Ringel 2006; Frondel et al., 2008; Dusonchet and Telaretti, 2010; Lipp, 2011; Yatchew and Baziliauskas, 2011). Indeed, some studies have been critical of the FiT instrument demonstrating that limited economic development, employment growth and emissions reductions have emerged (Frondel et al., 2008). Overall, we observe that while the balance between the tariff rates, electricity prices and RE quotas or targets can be difficult to attain (Mitchell et al., 2006), policy makers are often confronted by inadequate behavioural changes in relation to energy use and demand management (Tamas et al., 2010), limited RE dispatch processes, rules and policies (Ritger and Vidican, 2010; Yatchew and Baziliauskas, 2011), and some forced RE deployments in suboptimal geographic locations (Rowlands, 2005a; Butler and Neuhoff, 2008; Frondel et al., 2010). Hence, the use of FiT policies is not without problems and challenges.

In the broader sense, we also found that the implementation of a FiT scheme must reflect sound systemic designs (De Shazo and Matulka, 2009; Couture et al., 2010; Mendonca et al., 2010). Positive design features should include equitable grid access; sufficient grid strength at the transmission and distribution network layers; appropriate long term tariff rates, RE quota ceilings (or caps), and scheme cost and participation adjustment protocols; and streamlined administrative processes (Pietruszko, 2006; Mendonca, 2007a, 2007b; De Shazo and Matulka, 2009; Couture et al., 2010; Mendonca et al., 2010; Bull et al., 2011). Also, successful FiT programs have been designed to include large scale commercial and off grid RE systems, access gross tariff structures for faster investment returns, take account of energy demand profiles and shaping, and cover energy production costs (Zahedi, 2006, 2009, 2010; Fouquet and Johansson, 2008; Plater, 2009; Mendonca et al., 2010; Ritger and Vidican, 2010). In essence, we would contend that FiT policies should be designed with a view to building community support, industry collaborations, and investment confidence (Rickerson et al., 2007; Couture and Gagnon, 2010; Lipp, 2011).

In closing our review of relevant literature, we acknowledge that FiT come with intrinsic advantages, disadvantages and design intricacies (Rowlands, 2005a, 2005b; De Shazo and Matulka, 2009; Couture et al., 2010; Mendonca et al., 2010). Indeed, the abundance of inexpensive fossil fuels as a dispatchable source of energy provides a significant barrier to RE investment, particularly within the Australian context (Owen, 2006; Lesser and Su, 2008; Papadopoulos and Karteris, 2009; Ritger and Vidican, 2010). However, ultimately, all tiers of government must take on these difficult issues and craft integrated policies that enable the successful attainment of sustainable energy goals (Rowlands, 2005b; Couture et al., 2010).

3. Research context

Investigations of RE generation in Australia showed that earlier federal governments had adopted a wary approach (Kent and Mercer, 2006). Specifically, the first national Mandatory Renewable Energy Target (MRET) was set in 2001 and sought a modest nominal 2% of RE supply by 2010 (i.e. 9500 GW h of electricity from renewable sources) (Kent and Mercer, 2006). Further studies argued that national RE supply developments and investments were small in number and could benefit from repricing electricity to take account of carbon pollution from fossil fuel power generators (Owen, 2006).

In 2008, having achieved 15,000 GW h of RE, the Australian government, in partnership with its states and territories (through the Council of Australia Governments (COAG)), floated the concept of an expanded MRET (Commonwealth of Australia, 2008).