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Review

South Africa's non-policy driven options for renewable energy development

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ABSTRACT

In recent years, more and more countries enact a variety of policy targets for future shares and amounts of renewable energy. This article explores existing policy directives on renewable literature and in so doing, it demonstrate policy gaps. In contribution to a plethora of existing literature on renewable energy policies it argues that there is more than one way of reaching policy targets. In carrying this forth it explores the South African renewable energy plan and its implementation. It proceeds to discuss case-studies of several independent power producers in South Africa, some parts of Africa and Indonesia, who go beyond governments' plans and offer renewable energy solutions. These case-studies are lessons to the South African government and the rest of the society that, with some innovation, more independent power producers could do more to assist the governments in achieving their policy targets. The article concludes by suggesting that, beyond policy directives, there is more scope for renewable energy development.

1. Introduction

Energy regulation has recently been in a state of great flux driven by economic, environmental, security, and social concerns. An explosion of energy policy changes around the globe are having a profound influence on renewable energy, both from explicitly promoting renewable energy and indirectly influencing incentives and barriers for renewable energy [1] These policies are, therefore, in the main designed to promote renewable energy, reduce emissions, and restructure power, distribution generation, transport biofuels, and rural electrification. Each policy reduces one or more key barriers that impede the development of renewable energy.

There are many barriers to renewable energy but the following are the most important:

a) Subsidies for competing fuels, high initial capital costs, and environmental externalities such as hydroelectric facilities that produce methane and carbon dioxide emissions from submerged vegetation.
b) Lack of legal framework for Independent Power Producers (IPPs), utility interconnection requirements and liability insurance requirements.
c) Lack of access to credit, perceived technology performance uncertainty and risk, lack of technical or commercial skills and information [1].

There are policies whose explicit goal is to promote renewable energy; Renewable Energy Promotion Policies They can be classified under three main categories:

a) Price-setting and Quantity-forcing policies, which mandate prices and quantities. To date, the two main quantity-forcing policies seen are competitively bid renewable-resource obligations and renewable portfolio standard. It is the competitive bidding, a quantity-forcing policy, which the South African government has decided to follow.
b) Investment cost reduction policies, which provide incentives for voluntary investments in renewable energy by reducing the cost of such investments. These include subsidies and rebates, tax relief, and pollution tax exemptions.

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c) Public investments and market facilitation activities, which offer a wide range of public policies that reduce market barriers and accelerate renewable energy markets [1].

As mentioned above, the South African government has chosen a quantity-forcing policy, the competitive bidding for renewable energy – [16]. It is a restrictive policy in the sense that it excludes some stakeholders and the targeted quantities might not be suitable to reach the required penetration levels. This article will highlight some of the efforts undertaken to side-step these short-comings in South Africa, and the rest of world. Several local South African examples that include Bethlehem Hydro [2], Darling Wind Farm [6], Pick n Pay rooftop PV installations and Vodacom rooftop PV installation will be discussed. Further examples in Tanzania, Mali, Zimbabwe, Namibia and Indonesia will be discussed to emphasize a plethora of possibilities that are available.

2. World-wide trends in renewable energy

There have been rapid changes in renewable energy markets, investments, industries and policies in recent years. Of the estimated 282 Giga Watts (GW) of globally added electric capacity in 2012 in the power sector, almost half (100 GW) was from renewables. By early 2012, at least 138 countries, more than half of which are developing countries, had renewable energy targets in place. These targets depend on countries renewable power generation policies, and by early 2012, at least 127 countries, two thirds of which were developing or emerging economies, had some type of renewable policy. The most commonly used policies in the power sector are the Feed-in-Tariffs) and renewable portfolios standards or Quotas. One of the highlights of 2011 was the rising of global new investment to a record US$257 billion, with China, United States, Germany, Italy and India as the top five investors. Renewable energy substitutes for fossil fuels power generation, heating and cooling, transport and fuels, and rural/off-grid energy services [15].

Governments, given an economy's dependence on energy, are required to have clear policies for national energy supply. These government energy policies and regulations apply to fuels, heat, and electricity and it is electricity that attracts most attention. This bias will also be shown in this article. Whether provided by a government or private utilities, electricity supply is now considered an essential service. As a consequence, whether in public or private ownership, government regulation is essential. This regulation in the case of South Africa is not internal within government, but resides with an independent body without immediate government control, called the National Energy Regulatory of South Africa (NERSA). Established in terms of Section 3 of the National Energy Regulator Act, 2004 (Act No. 40 of 2004) the Regulator is empowered to prevent market abuse, ensure good service and transparency of essential information, limit unjustified company profit and reduce environmental harm.

Over several years, significant experience of various policy mechanisms to increase renewable energy supplies has been gained worldwide. The most accepted *modus operandi* is for private companies to benefit from installing and managing new technology, governments to benefit from not having to fund new investment and the public to benefit from the environmental and sustainability improvements. Within this model, the cost to consumers is regulated either directly within government or an empowered Regulator [18]. There are four main classes of policy mechanism used to increase renewable energy generating capacity and supplies as obligated (enforced) by governments:

a) 'Feed laws' – obligated fixed-rate tariffs for generators to sell generators to sell renewable energy to networks.
b) 'Quotas' by amount or proportion (called Renewables Portfolio Standard –, in the USA) – obligated for electricity suppliers and perhaps assisted by a market in 'green certificates'.
c) 'Financial incentives' – tax and fee exemptions and/or grants.
d) 'Competitive Tendering' for government contracts for generation – usually linked with obligations on supplier to purchase the renewable electricity at a premium price and pass the cost to consumers as levy [1].

It is this fourth mechanism, used by the South African government that will be discussed further in this article.

3. Overview of the South African electricity industry – sources of power

According to the Department of Energy (DoE), electricity market grew by $1.4 billion in 2009 to reach $5.6 billion [13]. Eskom, South Africas power utility, has a nominal installed capacity of 44 175 MW. South Africa needs over 40 000 MW new generation capacity by 2025 (according to Eskom, the South African power utility, we need more than 50 GW by 2028), which must come out of Eskom and Independent Power Producers (IPPs). Approximately 93% of power in South Africa is generated from coal-fired power stations, 5% from nuclear power, and only less than 2% from hydroelectric power stations. The DoE is mainly responsible for electricity planning via Integrated Resource Planning), which determines South Africa's long-term electricity demand and detail how it should be met in terms of generation capacity, type, timing and cost. The 2010 version [7] of this plan represents a trade-off between least investment cost and consideration for economic growth, climate change mitigation, diversity and security of supply, job creation, and sustainable development.

It stated in part:

> "…it is government's intention to increase independent power generation in South Africa in the future. This will be through renewable energy generation, self-generation, cogeneration, and more conventional forms generation. This move of involving IPPs will come with key benefits including the relative speed at which they can be brought to steam, the alleviation of resource burden on Eskom (financing and building new facilities), and improvement of South Africa's renewable energy profile (the largest part of IPP Program is intended to facilitate the introduction of 'green' power)" (IRP, 2010:27).

For IPPs, the technology status and application will play an important role in decision-making regarding investment. Table 1 below indicates the renewable energy options:

From Table 1, it is suggested that IPPs must concentrate on technologies that are already commercially tested, especially wind and solar. Given that the main driver of electricity demand is gross domestic product (GDP) growth, a forecast of GDP growth in the range of 5% for the next 17 years (up to 2030) is likely to lead to an electricity demand projection of 5% per annum. This will require an increase in existing capacity (44 175 MW) to about 81 724 MW in 2030 (44 175 × 5% × 17), i.e., about 2210 MW per year. The contribution done by the renewable energy is currently (2013) only 1%. According to IRP 2010, 42% of the energy must be from renewables, i.e., 34 324 MW (81 724 × 42%). That means 33 980 MW (343 MW representing 1% already generated) of new generation [8].