



Top down strategy for renewable energy investment: Conceptual framework and implementation



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ABSTRACT

Electricity market is undergoing a tremendous transformation throughout the world. A drastic reduction of carbon emission cannot be realized if renewable energy resources are not increased in share of generation mix. Currently, most of the traditional mechanisms, including regulatory policies, fiscal incentives and public financing, are initiated from and heavily relied on policymakers and governments. However, not only these schemes do not necessarily align with business interests of investors, but also the motivations for renewable energy developments are always initiated by governments. In order to realize the full potential of renewable energy investment, an innovative approach is necessary to motivate investors and lessen government expenditures.

In this paper, we present a top down strategy for renewable energy investment. The proposed approach is a three-step framework. By applying the approach, renewable energy global market leaders and trends will be identified and analyzed that included: (1) economics and renewable energy policy, (2) specific renewable energy sectors that presents the most attractive investment opportunity, (3) and finally the most promising renewable energy investment vehicles for investors. Other stakeholders can also use the developed framework, such as consumers and policymakers, to make socio-economic decisions and assess renewable energy investments.

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1. Introduction

World energy demand is expected to growth briskly. Oil, coal and nature gas will have to supply much of that in order to meet our demand unless we can make renewable and clean alternatives more attractive to replace them. To avoid catastrophic damage to our planet and human race, it is inevitable to move to an environment with low-carbon and extensive sustainable energy sources. To fulfill environmental goals, massive financing is predicted. Concerning with limited budget from government, public, private and institutional investors play an important role for future sustainable developments. Undoubtedly, it is challenging for policymakers to create the conditions to make renewable energy attractive to investors and utilities without slowing down the attainment of other equally important developments or placing an inequitable share of the cost burden on tax payers [1].

In the past, penalty and reward schemes are the commonest instruments used by policymakers to promote renewable energy developments [2]. However, not only these schemes do not necessarily align with business interests of investors, but also motivations for renewable energy developments are always initiated by governments [3]. The global financial crisis in 2008 represents a good example to reveal the problems. According to New Energy Finance, total clean energy investment in the second half of 2008 was down 23% from the second half of 2007 [4]. During the phase in 2010, several European governments announced incentive cut for solar energy due to acutely economic recession. In late 2011, the European sovereign debt crisis started to spread out. The supply of debt for renewable energy projects in Europe was dramatically decreased, as banks had to respond to sharp increases in their cost of funding and upgrading their assessments of the risks involved in lending to borrowers in Italy, Spain and other affected countries [5]. Sound and prudent strategy is, therefore, extremely important to create a robust environment for government, investors and public. On the one hand, government can attract more foreign investments, lower its expenditure and improve budget planning. On the other hand, investor enjoys a better risk-reward investment profile and public enjoys improvement of social welfare benefits.

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In this paper, Section 2 presents a brief review of existing renewable energy investment. Section 3 introduces the overview of top down approach. The proposed framework of the proposed approach is described in Section 4. The framework is divided into three parts and discussed one by one in this section. Finally, a conclusion is drawn in Section 5.

2. Current status of renewable energy investment

In both developed and developing countries, stakeholders have expressed concerns about the environmental impacts of electricity production and use. The regions of Asia and Oceania have attracted more than one-third of total new investment since 2009 [5]. Within the regions, Australia and New Zealand set ambitious goals and aim to achieve 100 percent and 90 percent of renewable electricity shares in 2030 and 2025 respectively [6,7]. As the countries enjoy enormous renewable energy resources in the form of sunshine, wind, biomass, hot rocks and waves, they stay on track to achieving their goals. China and India, on the other hand, are benefited from capital inflow in renewable energy [8–10]. With the help of fast growing economy, the two developing countries dedicate to promote renewable energy development and utilization. China has pledged to improve total renewable energy consumption to 9.5 percent of the overall energy consumption mix by end 2015 [11]. Meanwhile, India aims to derive 15 percent of its energy requirements from renewable energy sources by the year 2020 [12].

In Europe, overall binding target of 20 percent share of renewable energy sources in energy consumption by 2020 is set [8]. Each member country has its specific target. Renewable energy in Nordic regions contributes significantly in total energy production. All Nordic countries have set their individual targets higher than that of European target. For instance, Denmark, Norway and Sweden have set their targets up to 50 percent, 67.5 percent and 50 percent of energy from renewables respectively by 2020 [13,14]. In South-East Europe, Albania, Bosnia and Herzegovina, Montenegro and Kosovo also set ambitious targets which are 38 percent, 40 percent, 33 percent and 25 percent of energy from renewables by 2020 respectively [15–19]. Relatively, the use of renewable energy in Western Europe is less popular. Particularly in UK, renewable energy contributes only 6.5 percent of total energy consumption and the target is 15 percent which is less than that of European target [20]. Among the Western Europe, Germany is much more aggressive and commits target of 25 percent, 50 percent and 80 percent of energy from renewables in 2020, 2030 and 2050 respectively [8].

Renewable energy in the United States (US) accounted for 11 percent of produced electricity in 2012 [8]. California is the leading state and has around 20 percent of California's electricity generated from renewable sources while Delaware is the least contributor and has only around 1.7 percent of electricity generated from renewables [21,22]. Instead of setting a national target, US has adopted Renewable Portfolio Standard (RPS) which sets standards and requirements at state level. For example, according to the RPS, Colorado requires 30 percent renewable energy from eligible resources for investor-owned utilities and 10 percent for electric cooperatives and municipal utilities by 2020. Additionally, net metering, tax incentives, loans and grants are promoted to create enabling investment environment [21].

In Middle East and North Africa (MENA) region, contribution to renewable energy is far from satisfaction. Almost all of MENA countries contribute less than world average. Some of them, such as Oman and Qatar, even produce zero percent of energy from renewables [23]. Only Tunisia is higher than world average, which produces 16.1 percent from renewables [23]. Situation is, hopefully, not getting worse, as some of MENA counties have launched renewable energy development plans. For example, Morocco and Egypt plan to

generate 40 percent and 20 percent energy from renewables by 2020 respectively [24]. As one of the most important emerging markets, South Africa has launched an Integrated Resources Plan since 2010. This milestone program envisages about 42 percent of electricity generated from renewable resources by 2030 [25].

Renewable energy is abundant in South America region, including solar, wind, geothermal, biomass and hydro. Argentina, Brazil, Chile and Peru have promoted renewable energy dedicatedly. Argentina aims to reach 8 percent of total national consumption of electric energy from renewable energy sources within 2016 [2]. Incentives are provided, including deferred value-added tax payment and 15-year tax stability, so as to promote renewable energy development [26]. Brazil has adopted Programme of Incentives for Alternative Electricity Sources (PROINFA) which aims to promote the expansion of power generation through renewable sources in the past decades. The program is successful. Nowadays, more than 80 percent of electricity is generated from renewables in Brazil [8]. On the other hand, Chilean government is stricter. It has imposed a law which requires new energy generation contracts to include 5 percent generated from renewable sources starting in 2010. The quota of renewable energy will then be increased, starting in 2014, by 0.5% each year through to 2025 so as to secure 10 percent of power generated through renewables [27]. Peru generates electricity mainly from hydro power which supplies 48 percent of total electricity and is already beyond the ministry's stated goal [27].

3. Overview of top down approach

There are two major analytical approaches available in literature for predicting return, which are top down and bottom up. Top down and bottom up are strategies of information processing and knowledge ordering. In top down forecasting, analysts use macro-economic data to produce return expectation. By contrast, bottom up forecasting begins with the microeconomic outlook for the fundamentals of individual companies to produce return expectation.

Fig. 1 shows a typical top down framework. Top down approach is a deductive reasoning and essentially breaks down of a system to gain insight into its detailing subsystems until the lowest level. A top down investing involves breaking economy and financial world into finer details. After looking at the big picture, different industrial sectors are analyzed in order to select those that are expected to outperform the market. Specific companies, projects or investment vehicles are further analyzed and those that are expected to be successful and valuable to investors are chosen as investments.

To save effort and rule out discrepant options, it is usual to define objectives and constraints at the beginning. An Investment Policy Statement (IPS) or other similar statements is common to use. It documents the procedures, investment philosophy, guidelines and constraints to be adhered to by all the parties [28]. Therefore, those markets, sectors and investment vehicles, which do not align with objectives or violate constraints, can be discarded immediately.

3.1. Global market analysis

As top down approach begins at the top, the first step is always to analyze the world economy. At this level, we compare markets all around the world. To be more effective, it is not uncommon to establish a classification for different countries before the start of comparison. For instance, we may classify countries by geographical locations (Asia, America, Europe, Middle East and Africa), economic status (developed and developing countries) or market structures (regulated and deregulated market). Once we complete

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