

Impacts of Promoting Renewable Energy Technologies (RETs) on Local Economic Growth: What Makes RETs Necessary for Bangladesh

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Abstract

The paper attempts to provide theoretical as well as justified reasoning for adopting and promoting Renewable Energy Technologies (RETs) in a developing country like Bangladesh. This is a secondary data based research that investigates different countries' examples quantitatively in order to derive the generalized as well as triangulated impacts of promoting RETs on the local economic growth of a country. Based on the evidences, the study thereafter, foretells potential impacts of promoting the technologies on the economy of Bangladesh. This research reveals that RETs can reduce the import of expensive fossil fuels and hence the out-leakage of national capitals, in transposition, can enrich the local economy significantly through bringing external investments. In addition, RETs interventions may increase local employment opportunities, reduce energy costs (both at individual households, regional and national levels), promote local tourism, enhance income of local people as well as revenue of local government units from those external investments. In this nexus, Bangladesh - with its large-scale dependence on importing expensive fossil fuels and electricity - might be benefitted economically from promoting RETs in several ways. For instance, the adoption and promotion of the technologies would generate considerable addition to the gross domestic product of the country at almost zero local cost; growing disparities in regional growth could be minimized to some extent; local people's access to electricity could be increased and their expenditures for energy consumption could be decreased. This research - with such findings may help to produce decision-making tools for Bangladesh in developing renewable energy policies and/or strengthening the embryonic renewable energy governance for the country.

Key words: Bangladesh, Capital out-leakage, Energy security, Local economy, RETs.

1. Introduction

Energy consumption is intimately related to the advancement of human civilization. Provision of adequate and affordable energy, therefore, is argued as one of preconditions for achieving socio-economic improvement of the society (Cereceda et. al., 2013; Asif and Muneer, 2007). However, the fact of world population increase and simultaneous augment in per capita energy consumption entails innovation in the global energy production endeavor now-a-days. Over the period of 2002-2025, for instance, total consumption of marketed energy is expected to grow by 57% in the world (U.S. Energy Information Administration, 2005), while the fossil fuel based energy system has already started facing the dearth of resources due to the depletion of fossil fuel reserves. The phenomenon has led subsequently to the rising of energy cost as well as energy insecurity around the world. The present energy system, moreover, has largely been accused for invigorating environmental problems including global warming. Considering these issues attributed with the present fossil fuel led energy system, the challenge for the 21st century is evolved as to develop methods for generating energy that would be able to meet the needs of growing global population along with protecting the planet (Asif and Muneer, 2007; Dincer, 2000).

Renewable Energy Technologies (RETs), in this regard, could be the direct substitute for existing technologies as well as the most viable solution to the current energy crisis (Dincer, 2000). One of the most notable features of renewable energy is the diversity of technologies and resources that can- if adopted properly- reduce energy costs, enhance energy security as well as protect the natural environment to a great extent. Therefore, increasing the share of renewable energy in the total energy mix is high on the policy agenda in countries around the world (Gross et. al., 2003).

However, apart from contributing to the protection of the planet and ensuring global and/or national energy security, what specific economic benefits could renewable energy sources bring at national as well as regional levels are imperative to know. Presently, most of the nations- especially countries in the global south including Bangladesh are marching towards obtaining greater economic prosperity. In order to foster the adoption of RETs in those countries, therefore, it is essential to clarify both explicit and passive economic impacts- apart from the environmental benefits of the technologies.

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Numbers of research, for instance, Foxon et al. (2005), Chu and Majumdar (2012), Winfield et al. (2013), National Renewable Energy Laboratory (1997) etc have been conducted already on exploring economic benefits of RETs. Most of those researches, however, have taken the evidence from a single country case. Different countries might have incurred with mutually different costs and benefits from adopting the technologies. Therefore, while talking about promoting the technologies in a developing country, it seems necessary to justify all those costs and benefits from different countries' experiences and thereafter, produce the justified and comprehensive overview of the technologies to the policy making institution(s) of the country. This paper attempts to fulfill such objective by generalizing the impacts of RETs on the local economic growth of a country based on experiences of adopting and promoting the technologies in several countries. To be mentioned here, mostly developed countries' experiences are discussed in this paper since RETs, still now, have not been so extensively adopted in developing and least developed countries that could have been exemplified quintessentially.

The discussion, however, might provide some necessary information for the countries in global south about whether or not to adopt the technologies. This is because, countries in global south are more concerned of achieving faster economic growth; with such interest, they deem the economic benefits of a technology as one of the most important factors for adopting and promoting the technology. For instance, Chile - a developing nation of South America - is promoting RETs now-a-days with a view to overcoming its problems of price instability and insecurity of energy that hit directly the economic growth of the country (Ministry of Energy of Chile, 2014). Based on the analysis, in inference, the paper attempts to identify some economic reasons for adopting RETs in Bangladesh- one of the global south nations that also aims at achieving and sustaining "middle income country" status.

2. Methodology

This paper is absolutely secondary data based and descriptive in nature. Different scientific literatures including journal articles and sector specific official reports are reviewed scrupulously and analyzed for preparing this paper. The analysis, in transposition, has been analogical and triangulating with different countries' examples in order to come up with justified economic costs-benefits for adopting RETs at local, regional and national levels in a country.

3. Results and Discussion

Results of the study are discussed in two separate parts. In the first part (section 3.1), generalized impacts of promoting RETs on the local economic growth are discussed with examples of different countries' experiences. In the second part (section 3.2), thereafter, how these economic aspects of RETs can induce economic growth in Bangladesh is elucidated.

3.1. Adoption of RETs: Are They Good for the Local Economy?

In global south, adoption of an RET is largely influenced by its economic dimension. In this regard, what impacts RETs could bring upon the local economy of a country, are explained in this section with different countries' examples.

3.1.1. Injection of Investment into the Local Economy

Renewable energy plants- in most cases- are placed at the country sides away from urban centers. Generally, these plants at regional level are financed by external (e.g. national level/foreign) investors. For example, more than 90% of renewable energy plants in Chile are established under the investment of national level and foreign investors (Bennett, 2009). Around 55% of the investments made in RETs in USA are exclusively in rural areas and around 90% of the total investments are contained within the respective state's economy (OECD, n.d.). RETs projects, thus, being located at regional level could bring a chunk of investment into the regional economy.

However, as illustrated in Figure 1, these external investments contribute to the growth of local economy in different ways. For example, it creates job opportunities for the local people, increases earning of the local land-owners and revenue of municipalities, increases tourism potentials of the territory, and reduces energy costs. Thus, RETs, upon bringing investments from outside and keep them contained within the local economy contribute directly to the growth of economy.

3.1.2. Reduction of Capital Out-leakage

Importing fossil fuels or other forms of energy implies out-leakage of national capitals. This phenomenon is true for the countries that are dominantly contingent on importing energies from other countries for meeting national demands. For instance, Chile produces almost no fossil fuels and every year imports more than 60% of its energy in the form of oil, coal and liquefied natural gas (Ministry of Energy of Chile, 2014). Promoting RETs and thus achieving self-sufficiency in energy generation might reduce this national capital out-leakage. In Spain, for example, generation of renewable sourced electricity in 2008 allowed to avoid importing over 10 million tons of oil equivalent (toe) that saved Euro 2,725 million (USD 4,005 million) - approximately 0.25% of the country's Gross Domestic Product (GDP) (Spanish Renewable Energy Association, 2009). Increased adoption of RETs in Germany in 2012 saved the capital out-leakage of around USD 13.5 billion (around 0.38% of the country's GDP) by reducing import of fossil fuels (IRENA, 2014a).

Promotion of RETs, moreover, has very high potential of stopping/off-setting in-country regional capital leakage. For instance, when a country is characterized by centralized system of energy provision, leakage of capital off the locality as well as the region is inexorable. However, provision of RETs is more of decentralized nature. Even in a centralized country, RETs could be promoted at local/regional level through attracting private and/or public investments from the region itself. This may reduce the regional capital out-leakage since customer's payments for the energy are contained within the region⁴.

To explain with an example, in 1990, approximately 100,000 residents of the US Virgin Islands spent about USD 40 million on electricity consumption, 65% of which left the Virgin Island's economy. More than USD 26 million drained out of the territory's economic bucket that year for energy purchases, equivalent to about USD 260 per resident. However, now-a-days, increasing adoption of wind-power in the island is playing significant role in diminishing this leakage of regional capital (National Renewable Energy Laboratory, 1997).

3.1.3. Local Job Creation

Renewable energy projects installed at local levels may create employment opportunities for the local people. Around 2 million direct jobs were created worldwide from renewable energy manufacturing, operations and maintenance by the period of 2005 (World Watch Institute, 2006). Moreover, there is possibility of creating around 2.1 million jobs in wind energy, 6.3 million in solar, and 12 million in bio-fuel related agricultures and industries worldwide by 2030 (OECD, 2011).

Taking an example of USA, RETs generated full-time and stable employment opportunities for around 612,000 persons by 2012 (IRENA, 2013). Only a wind energy project in Illinois State - consisting of 23 firms with installed capacity of generating 3334.91 Mega-watts (MWs) of electricity - created 19,047 full-time equivalent (FTE)⁵ jobs during its construction period with a total payroll of over USD 1.1 billion by 2012. Moreover, 814 permanent jobs were created by the project in respective rural areas (Loomis et. al., 2012). In Germany, on the other hand, renewable energy sector employed around 160,500 people in 2004 and 367,000 in 2010 - more than doubled within six years (Sopher, 2014).

However, it is very conspicuous that these new employment opportunities are being created by RETs through shutting down some job positions at conventional energy sector. This is because, conventional sector is (and/or will be) facing constriction due to the growing adoption of non-conventional renewable energy technologies (Cheeseman, 2014). Question arises, therefore, that how beneficial the RETs are over the conventional energy sector in terms of employment generation. An estimate in this regard shows that renewable energy projects create around 3.2 times more jobs per dollar invested than fossil fuel technology based projects (UCS, 2013a; National Renewable Energy Laboratory, 1997). Thus, RETs are more advantageous over the conventional technologies- at least in terms of generating employment opportunities.

⁴ RETs are financed by complete external investments, leakage of regional capitals could not be stopped since a big portion of profit from the energy project would end up outside the region. However, the technology can attract external investments into the region and can generate more monetary benefits than non-renewable energy projects directly accruing to the local economy, and thus, can off-set the extent of out-leakage of regional capitals (Natural Resources Defense Council, 2013).

⁵ One full time equivalent (FTE) job a year is 2,080 working hours in a year (Loomis et al., 2012).

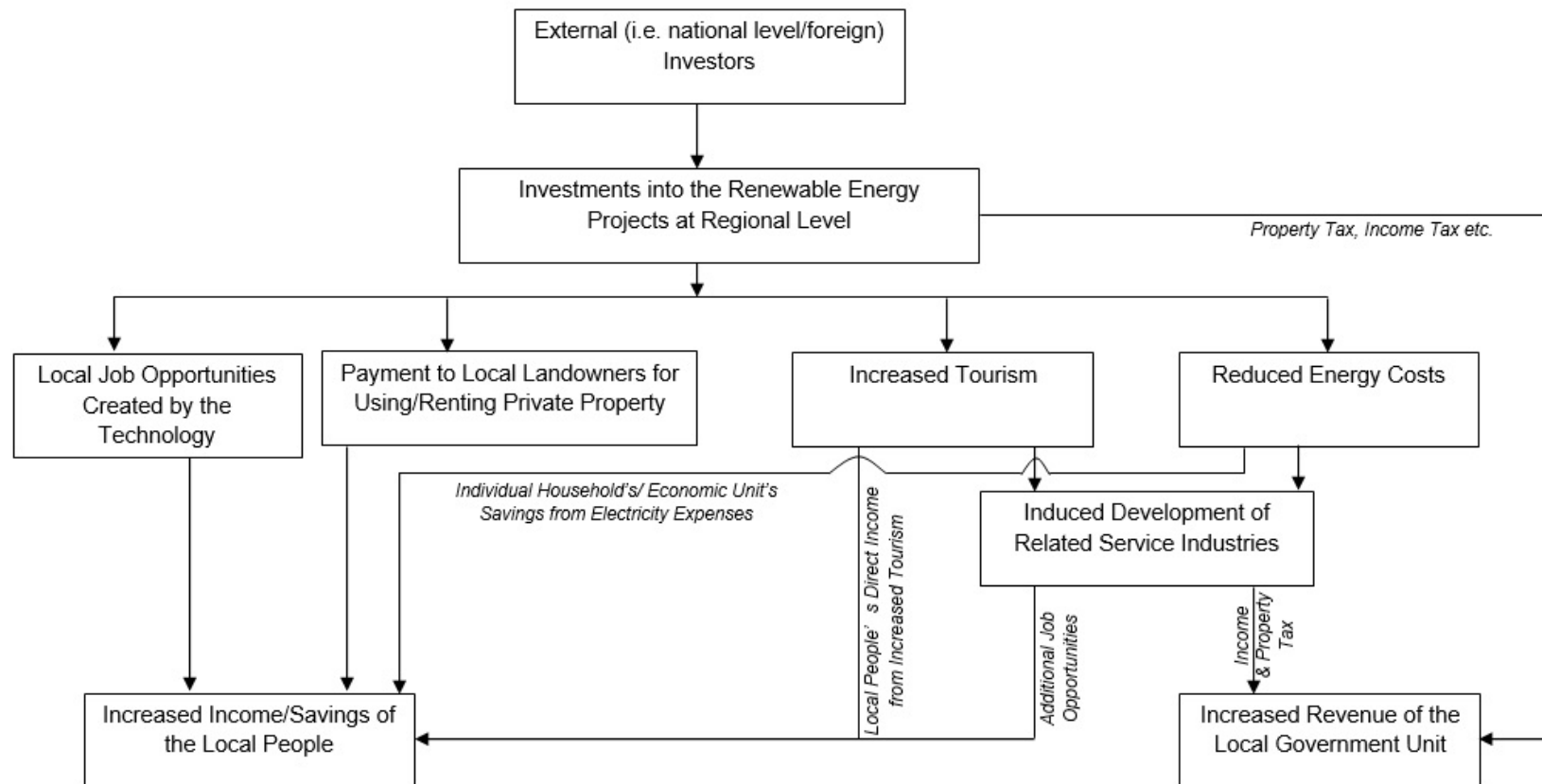


Figure-1: Impacts of adopting and promoting RETs on the local economy

Source: Author's Construct, 2015.

Renewable energy plants, however, mostly being located at regional level offers those newly created employment opportunities exclusively to the local people. Many OECD countries, therefore, see the renewable energy sector as a promising sector for creating valuable and stable jobs for local people and thus, contributing directly to the local economy (OECD, 2011). For example, when renewable energy plants (e.g. wind turbines, hydro-power plant) are installed on privately owned land, the land owners typically receive payments in the form of lease, royalty, or right-of-way payments (UCS, 2013a). These payments can be an important source of income for rural families. The 23 wind energy firm project in Illinois, for instance, generates USD 13 million annual extra incomes for local landowners who lease their land to the wind farm developers (Loomis et. al., 2012).

3.1.4. Energy Cost Reduction

It is obvious that RETs would require less cost for generating each unit of electricity in comparison to the conventional fossil fuel based energy technologies. This is because, conventional non-renewable energy technologies need expensive fuels to generate energy; and with time, the price of the fossil fuels is roaring high due to several factors, such as, increased depletion in the fossil fuel reserve, rising demand for energy etc (Asif and Muneer, 2007).

RETs, on the other hand, require upfront investments to build. Once built they operate at very low cost and, for most technologies, the fuel is free. As a result, renewable energy prices are relatively lower as well as stable over time (UCS, 2013b). A research shows that RETs could generate electricity at about half the cost of fossil-fuel based methods (Fuller et. al., 2011). For example, renewable energy investments in Minnesota of USA lowered electricity prices for local customers by 0.7% from 2008 to 2009 (UCS, 2013a). Another study conducted by Chowdhury and Aziz (2014) finds solar energy at household level as a robust instrument for reducing energy related expenditures of the families. This reduced energy cost brought by RETs at local level could enable local people as well as entrepreneurs to use energy at lower price and thus, to gain greater earning.

However, in Germany RETs could not play any significant role in reducing energy price across the country yet. In last few years, Germany experienced increased electricity price even when RETs are flourishing. This price hike, however, has taken place for ascribing very high renewable energy surcharge on consumers. It is anticipated that Germany would also have the benefit of lowered energy price due to promoting renewable energy in near future (Frondel et. al., 2009; SPIEGEL, 2012).

3.1.5. Increased Tourism

Adoption and promotion of RETs could create two-fold positive impacts on tourism sector of an area. RETs, such as wind energy plants and hydro-power dams placed in the country-sides could attract tourists making the area a potential tourist spot. For instance, Denmark's "Horns Rev" is one of the world's largest wind farms in the North Sea that boosts the local economy significantly by attracting a large number of tourists throughout the year. A wind farm established near the sea in the United Kingdom enhanced tourism levels in the nearby "Scroby Sands" town significantly right from its operation year (Prinsloo, 2013).

Moreover, adoption of RETs could reduce local energy cost that might enable the area to offer tourist services at cheaper rate. A transition to renewable energy could allow cheaper accommodation as well as better environmental footprint in the area. The cost of air conditioning and water heating from RETs, for instance, is considerably lower than using electricity generated from diesel for the same services. Therefore, RETs have huge potentials to transform an area to a "qualitative tourism" site (IRENA, 2014b; Michalena, 2008).

However, RETs with spatial dimension may create some negative impacts on local tourism-especially through destroying the natural landscape. This phenomenon has been one of the most important factors fomenting people's Not-in-My-Backyard (NIMBY) attitude towards the infrastructural renewable energy projects around the world (Rana, 2015; Wolsink, 2000). For instance, scattered wind turbine development on a touristic sea beach or within an area with natural beauty may reduce the tourism potentials of the area. Nevertheless, planned development of renewable energy projects could resolve the problem substantially as evidenced by many countries including England and Denmark (Prinsloo, 2013).

3.1.6. Development of Related Service-Industries

Growth in renewable energy industry can create positive economic “ripple” effects. For example, when RETs are promoted in an area, industries in the renewable energy supply chain as well as other local businesses could be benefitted greatly (UCS, 2013b). As illustrated in Figure 1, lowered energy costs can attract small and medium scale service industries into the vicinity, which might offer additional job opportunities to the local people as well as increased earning to the local entrepreneurs.

As anticipated by the US Department of Energy, for instance, from 2007 through 2030, the cumulative economic activities generated by RETs and related service-industries would exceed USD 1 trillion in net present value terms in USA benefitting mostly the local (rural) economy. Taking a micro-level example, the 23 wind energy firm project in Illinois is expected to generate economic benefits of USD 5.98 billion over the life of the projects within the state (Loomis et. al., 2012).

3.1.7. Increased Revenue of the Local Government Unit

Renewable energy projects pay property and income taxes that might enhance the revenue of the local government units (UCS, 2013a). For example, the 23 wind energy firm project in Illinois supports local economies of the state by generating USD 28.5 million property taxes in a year (Loomis et. al., 2012) that is equivalent to almost 3.27% of the states’ total property revenue collected in 2012 (Illinois Department of Revenue, 2015). Moreover, wind projects in USA are expected to generate additional local tax revenues exceeding USD 1.7 billion annually by 2030 (U.S. Department of Energy, 2015).

In Germany, on the other hand, it is estimated that a typical 2 MW wind-power project generates total tax payments of around USD 0.42 million to the local municipality during the project’s lifetime of 20 years (IRENA, 2014b). However, apart from directly paying tax to the local government units, RETs could expand the revenue generation options by inducing related service industries into the area as illustrated in Figure 1.

3.2. Adoption and Promotion of RETs in Bangladesh

Increased environmental awareness of people and relative socio-economic benefits of RETs over conventional energy sources make the technologies popular in developed nations. Germany, for example, has doubled its renewable electricity production since 2000 and has already significantly exceeded the minimum target of 12.5% set for 2010 (Frondel et. al. 2009). Moreover, the country targets to generate 100% of its energy from renewable sources by 2050 (Sopher, 2014). In USA, now-a-days, RETs contribute 14.3% of the country’s total electricity demands (Bossong, 2014). USA has set a target to meet 20% of its national electricity demand with renewable energy technologies by 2020 (Revell, 2013; Parnell, 2013).

However, RETs, with its promising economic benefits are getting growing attention in developing countries also. India, Chile and Mexico are three leading developing countries in this regard. At present, RETs contributes to around 6% of the total energy mix in India which, furthermore, is targeted to be more than 15% by 2025 (The Economic Times, 2015). Mexico generates around 7% of its energy from renewable sources- mostly related to biomass and geo-thermal (Alemán-Nava et. al., 2014). Chile producing only 6% of its energy from small-scale renewable energy sources has set up an ambitious target to mount up the figure to 20% by 2025 (Ministry of Energy of Chile, 2014).

Nevertheless, Bangladesh with its immense potentials to generate renewable energy is still thriving in promoting RETs in the country. In the fiscal year of 2013-14, RETs produced only 1.9% of the country’s total electricity mix (Mujeri et al, 2014). Apart from this, only 50 MW of electricity is recorded to be generated by other small-scale renewable energy (i.e. solar, wind turbine, biomass and biogas) technologies. Most of these small scale productions, however, are used at individual households and economic entities that make this amount hardly adding to the national electricity mix (Hasan et al., 2013 cited in Ahmed et al., 2014). Moreover, with time, the electricity system of the country is getting more non-renewable focused; more emphasis are being put on the coal and gas-based generation and electricity import now-a-days. Such endeavors are making the almost constant generation of hydro-power growingly underrepresented in the national electricity mix. For instance, contribution of the hydro-power in country’s total electricity mix was 2.8% in the fiscal year 2010-11 that has dropped to 1.9% in 2014 (Mujeri et al, 2014; BBS, 2014).

In section 3.1, however, some promising economic benefits of RETs have been discussed with reference to several countries' experiences. How those aspects make RETs necessary for the economic growth of Bangladesh are discussed succinctly in the current section. Before continuing with the discussion, a short profile of the energy situation of Bangladesh is presented in Table 1.

Table 1: Basic energy profile of Bangladesh

Country Population	153.6 million (as of year 2013)
% of People Having Access to Electricity	Around 68% of the total population (as of year 2013)
Demand of Electricity	8,349 Mega-watts (Maximum); 42,922 Million kilo-watt hour (as of year 2013)
Amount of Electricity Generation	6,675 Mega-watts (Maximum); 38,229 Million kilo-watt hour (as of year 2013)
Annual % Growth in Electricity Demand	8.10% (over the last 10 years period)
Annual % Growth in Electricity Generation	6.32% (over the last 10 years period)
% Share of Different Energy Sources	Renewable: 1.9%; Non-renewable: 95.6%; Import: 2.5% (as of fiscal year 2013-2014)

Source: BBS, 2014; Ministry of Finance of Bangladesh, 2011; IAEA, 2013; Mujeri et al, 2014.

3.2.1. Achieving National Economic Growth

The economy of Bangladesh grew at the average rate of 5.64% between 1990 and 2013. Growth has spread across sectors and that has positioned Bangladesh to achieve the longing "middle-income country" status meanwhile. In order to maintain this status, the country requires to have sustained economic growth of 7 to 8% per annum in coming years (Helal and Hossain, 2013). In obtaining that growth, on the other hand, around 12% annual increase in the electricity demand has been projected in the Power Sector Master Plan (Ministry of Finance of Bangladesh, 2011). In be more specific, increasing the GDP by 1 unit stipulates the generation of almost 603 MW of electricity in Bangladesh (Rahman, 2011).

The country, however, imports around 2.5% of its electricity as well as considerable portion of its energy in different other forms, e.g. coal, crude oil etc (Mujeri et al, 2014). For example, the country as a net importer of petroleum, imported crude oil and petroleum products of value Bangladeshi Taka (BDT) 3946.67 billion in the fiscal year 2012-13, which is equivalent to around 38% of the country's GDP (at current market prices) (BBS, 2014). Another study reveals that this petroleum and coal imports, and related out-leakage of the capital cause a remarkable disruption in the GDP as much as 2% annually (Bhuiyan et al., 2013). Not to forget, the country already is lacked of almost 1,600 MW of electricity in meeting its national demand as showed in Table 1. To meet this current deficit, the government decides to import electricity and gas from the neighboring India, Nepal, Bhutan and Myanmar (Ministry of Finance of Bangladesh, 2011). Importing more from neighboring countries would cause more out-leakage of national capitals. This out-leakage of capital should be stopped in order to achieve the sustained economic growth of the country. RETs could be one of the viable means for Bangladesh in this regard.

Talking about energy security, Bangladesh depends mostly on natural gas for producing electricity. Around 78.12% of electricity in the fiscal year 2012-13 was produced from natural gas (BBS, 2014). Reciprocally, around 37% of the total amount of natural gas resources is used for electricity production. This overdependence on natural gas could lead to a serious break-down in electricity generation in near future as the gas reserves are depleting fast (Islam, 2011). RETs could be an effective fuel diversification tool in this regard for achieving energy security and thus sustained economic growth.

In achieving the aforementioned 7% GDP growth, the peak electricity demand is projected to soar up to around 10,283 MWs in 2015; 17,304 MWs in 2020; and 25,199 MWs in 2025 (BPDB, 2011). The government of Bangladesh has initiated a "Power and Energy Sector Development Roadmap 2010-2021" to achieve its socio-economic development goal. The initial pledge is to produce 11,500 MWs by 2015 and 20,000 MWs by 2021 (Ministry of Finance of Bangladesh, 2011). Only a proposed

nuclear reactor at Ruppur of Ishwardi and three hydro-electricity projects (two new projects and one improvement project) are capacitated to generate in total 815 MW of “green” electricity in the country (Ahmed et al., 2014). Moreover, geographic location of the country puts it in auspicious situation to harness solar and wind power at large scale. The government, in this nexus, has already launched a “500 MW Solar Power Mission” for the country (Ministry of Power, Energy and Mineral Resources of Bangladesh, 2013). Realization of the aforementioned renewable energy projects could enable the country in obtaining a sustainable and self-dependent energy regime as well as achieving more than 2 units of additional growth in the national GDP (Rahman, 2011).

3.2.2. Balancing Mutual Regional Economic Growth

As discussed previously, RETs, as one of the rudimentary forces for economic growth have much potential to contribute to the regional economy by creating both direct and induced effects within the region. Bangladesh is characterized by highly central tendency of economic flow; therefore, there is growing disparity in regional economic growth in the country (Balisacan and Ducanes, 2006). The regions with competitive advantages get regional capitals leaked out from other relatively lagged regions. RETs, in this regard, could be seen as an effective tool to off-set the prevailing disparities as well as boost the economy of the lagged regions. For example, if a slow growing region is promoted with RETs, local economy would be boosted directly by the external investments; moreover, other sectors of economy would likely to be concentrated into the region due to reduced energy prices, increased energy security and better natural environments. Thus, local economy of the region would gain and in medium or long term, the regional economy would be able to achieve the competitive advancements.

3.2.3. Reducing Energy Cost

In order to ensure energy security and sustainable social and economic developments, people need to be provided with access to electricity with affordable price. Every year, the government of Bangladesh provides a large amount of subsidy in the power sector that creates an indirect tax burden on customers (Unnayan Onneshan, 2014). Moreover, increased import of fuels and depletion of natural gas reserve result the cost for electricity generation soar high. For instance, just at a year interval, in 2013, per unit electricity price doubled in the country (Mujeri et al, 2014).

Renewable energy could be a viable tool in reducing this growing electricity price. If the rural households are capacitated with self-reliant generation of solar energy, their spending on electricity would be reduced highly (Chowdhury and Aziz, 2014). Apart from this micro-level impact, if large-scale renewable energy projects are implemented at regional/national level, electricity generation cost could be reduced in long term since RETs require one-time investment and free-indigenous resources to produce electricity for a longer period of time. A number of rural households with solar energy cells are enjoying such benefit of lowered expenditures for electricity use for their households as well as for rural irrigation (The World Bank, 2015). Even in urban areas, the promotion of solar energy is seen to have positive impacts on reduction of energy related costs in tannery industries (Cabeza et al., 2011). In promoting RETs at national level, however, foreign/private investments should be attracted so that the government does not need to put higher surcharge on consumers for developing renewable energy infrastructures.

3.2.4. Local Employment Generation

The rate of unemployment in Bangladesh in 2013 is only 4.30 percent (BBS, 2013 cited in Trading Economics, 2015). However, like other countries, Bangladesh is also marching towards achieving zero unemployment rates; promoting RETs-especially at regional level could be one viable means in obtaining the goal as well as balancing the existing regional employment disparity. This is because, as discussed in section 3.1.3, RETs through their direct and induced impacts could create more than triple employment opportunities than conventional energy sector might contribute. Moreover, such benefit of the technology, would directly be accruing to the rural communities as the plants are supposed to be located in the rural vicinities (OECD, 2011). Furthermore, as the whole country has potentials for producing renewable energy using different technologies, government could promote some slow growing regions to attract renewable energy investments from external sources (Ullah et al., 2012). If slow growing regions could be promoted with RETs, more employment opportunities would be created there upon giving the region with competitive advantages.

3.2.5. Increasing Revenues for Rural Municipalities

In Bangladesh, the local government bodies have very limited capacity to raise revenues and to keep pace with the national economy because of the overall poverty condition of the country (Samad, 2009). Promoting RETs could be a source of revenue for those rural municipalities as renewable energy plants- in most cases are placed at country-sides and they have much potentials of generating significant amount of revenues to the respective municipality. However, in a highly centralized country like Bangladesh, these types of property and income taxes are generally subject to leak-off the region. Proper energy governance should be developed in this regard in order to minimize the trend.

3.2.6. Enhancing Tourism

Kaptai dam is one popular tourist spot in Bangladesh which is built in the downstream of 230 MW hydro-power project on the Karnafuly River in Chittagong. Two more hydro-power projects with lower generation capacity are proposed to be built on the Sangu and Matamuhuri Rivers (Ullah et al., 2012). These proposed hydro-power projects, if managed properly, also could be turned into popular tourist spots. Moreover, promoting RETs based electricity generation may also help reducing service costs at the touristic places due to the reduced energy price.

Finally, based on the above discussion, the benefits of RETs in the context of Bangladesh are abridged in Table 2 along with pointing out how the technologies could help in achieving those benefits. The table, at a glance, provides a comprehensive overview on the economic necessity of RETs in Bangladesh.

Table 2: Benefits of RETs in the context of Bangladesh

Benefits of Promoting RETs	How RETs could Help to Achieve the Stated Benefits
Achieving National Economic Growth	Diminishing national capital out-leakage through reducing fossil fuel and electricity import dependence; Achieving energy security; Allowing GDP growth by more than 2 units.
Balancing Mutual Regional Economic Growth	Bringing external investment into the regional economy; Offering the slow growing regions with competitive advantages.
Reducing Energy Cost	Reducing dependence on depleting natural gas resource; Reducing energy expenditures for rural agriculture, individual households as well as small to medium scale factories.
Local Employment Generation	Offering employment opportunities at construction and operation periods; Generating more than triple employment opportunities than conventional energy sector; Inducing other sectors of economy in the region that might generate further employments.
Increasing Revenue for Rural Municipalities	Paying property and income tax to the corresponding municipality.
Enhancing Tourism	Reducing energy costs and thus reducing the costs for tourism services; Bettering the landscape.

Source: Author's Construct, 2015.

4. Conclusion

Increasing share of renewable energy in the national energy mix is one of the most important indicators for achieving the "green economic growth" (OECD, 2011). Developing countries moving towards greater economic prosperity could definitely rely on promoting RETs in meeting their goal. This is because, RETs produce more benefits than conventional energy sources in almost all categories such as systemic investments, macro-economic impacts and externalities (Natural Resources Defense Council, 2013).

RETs requiring indigenous resources can reduce the import of expensive fossil fuels and hence the out-leakage of national capitals. In transposition, it can enrich local economy significantly through bringing external investments into the regional economy. In advance, it can increase local employments, reduce energy costs (both at local households and national levels), promote local tourism, enhance income of local people as well as revenue of the local government units from those external investments. The technologies, moreover, being a viable force for the economic growth, could be availed as a tool to boost as well as balance the economic growth in different regions in developing countries - especially in Bangladesh where disparities in regional economic growth are highly manifest.

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