

Sustainable Energy Generation: What are the Perspectives

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Abstract. The world is hungry for energy and we are consuming around 11 billion ton oil equivalent energy whereas 80 per cent of this demand is covered by non-renewable fossil fuels. Crude oil, gas, and coal are depleting sources, their prices are almost always growing and environmental conditions are getting worse since global warming is provoked by rising greenhouse gas emissions. As per estimation of International Energy Agency there was a rise in carbon emission by more than 40 per cent between 1990 and 2008 in comparison with the figures of earlier decade. This paper is analyzing current tendencies in energy sector highlighting the importance of reducing the dependence over fossil fuels and transition to renewable energy generation sources. It is argued that any gradual passage from conventional to non-conventional energy generation process is inefficient unless governments enforce strong political and financial measures for switching energy generation process from one to another. On the basis of this analysis, it is further argued that reliance only on fossil fuels is leading to unstable market condition, constant price fluctuations, exchange rates instability, deposited rate changes, etc. The passage from one energy generation system to environmentally friendly renewable energy generation is solution for building sustainable energy generation system in the long-term future.

Keywords: Energy, Fossil Fuel, Renewable Energy.

1. Introduction

Energy hungry world consumes 11 billion ton oil equivalent energy: 80 per cent of this energy demand is covered by fossil fuel sources such as oil, coal and gas. It is expected that the demand and thus further production of fossil fuels shall rise to almost 16 billion ton oil equivalent by 2030. According to estimations crude oil is required in transportation sector by more than 57 per cent, whereas gas is basically irreplaceable cheap and available energy source for heating and heavy production industries. Coal as energy generating unit is primarily used in Asian market due to its vast availability whilst it is also meeting the demand for energy in rapidly growing production industries of the region. As per recent assessment, coal is covering global demand for energy by more than 76 per cent in production sector [1]. In the scale of great demand for energy and relative easy availability of fossil fuels, market is keeping focus on development only these energy industries despite the fact those resources are depleting and emitting world with CO₂ destroying ecosystem globally. It is indicated by International Energy Agency that there was a rise in emissions of CO₂ by more than 40 per cent between 1990 and 2008. Finally, it should also be noticed that availability of fossil fuels in separate regions and countries gives ground for political turmoil leading to market distortions as fluctuating price impacts immediately on vital economic tools such as interest rates, exchange rates, deposit rates, etc.

How to achieve sustainable energy for all? What alternatives might be offered to substitute fossil fuels? How to introduce new energy generation principles to the market? Will it cover existing demand and shall it be capable covering rising demand in the future? These are the questions that must be addressed when evaluating the perspectives of development of sustainable energy. The thesis presented in this paper is looking into existing market conditions evaluating different approaches in developing renewable generation. The critical factor in building sustainable energy generation system is strong enforcement of political and financial mechanisms promoting renewable energy production and reducing investments into fossil fuels production. The continues and growing production of fossil fuels has devastating economic and environmental effect in mid and long term future.

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2. Renewable Energy Generation

The basic argument supporting the idea of developing non-renewable energy generation is to achieve sustainable energy production. According to statistical data of 2007 from IEA, crude oil has almost 38 per cent share in global energy production whereas the contribution of renewable energy sources in this process is around 13 per cent [6]. The market is based on the notion that economies are relying on commodity markets and deriving energy from non-renewable sources leading to great inflationary pressure as these energy sources are depleting. It must be stressed that rising price for commodities is the direct result of decreasing availability of resources whereas this trend is characterizing long term market perspective. The growing demand for energy from emerging markets as well as pertaining requirement from developed nations is reducing the available resources of the planet subsequently putting pressure on prices and destroying environmental ecosystem almost in all regions of the planet [22]. Rising emission of greenhouse gases is causing destruction of protection layer of the atmosphere allowing sunlight to enter freely into atmosphere [7]. It is estimated by IEA that two-third of greenhouse gases is the consequence of energy related CO₂ emissions [10].

The development of renewable energy generation during last decade has been very slow as there is lack of clear plan for developing of this sector of economy. The investment into this market segment has increased by 30 per cent from 2007 to 2009 whilst the overall investment now equals to 243 billion US dollars. The biggest rise was observed in solar power energy generation with an increase in usage by more than 70 per cent in 2010 in comparison with previous year. Solar power is now producing more than 40 gigawatts of energy whereas the leading role is for hydro power generation with 1,005 gigawatts of electric energy production [20]. On the contrary, during mentioned period, subsidies in petroleum products sale rose from 259 billion US dollars per annum to 740 billion US dollars by 2010 [5]. This comparison demonstrates that apart from economic and environmental costs of production of fossil fuels, it is also burden for taxpayers as well as government to sustain consumption of petroleum products.

The potential problem requiring serious attention and efficient solution is the fact that solar power works during day whereas the demand for electricity is rising in the evening time when there is no sunshine. The limitation of hydro power energy generating units is in the location choice as it is restricted only to river benches, lakes or at least some kind water reservoirs. The dependence on wind power does not also provide clear answer to the question of how to maintain stable electricity supply since changing weather conditions may fundamentally alter the reliance on this type of energy generation model. Considering these facts, there must be developed the system which is capable to capture energy for certain period of time and then release it at the time when it is mostly required. One ambitious idea keeping the pace of constant production of electricity is proposed by Danish architecture Gottlieb Paludan. It is argued that by building artificial islands, the water left between two islands shall be emptied and when there is need for electricity during peak hours, seawater shall be allowed back into reservoir driving turbines to produce electricity [26].

The underlining importance of renewable energy generation in terms of carbon gas emission reduction and less dependence on fossil fuel has become primary target for many governments [28]. It is stressed that cost and price calculation is vital in defining future growth perspective of this industry. The study of cost based model in its pure perception presumes that factors such as social cost, externalities, etc. must be taken into account when comparing two system of energy generation (renewable and non-renewable sources of energy). It is demonstrated that in case of production and utilization of fossil fuels the social costs is much higher than in renewable energy generation side. However, considering that renewable energy generation is at the initial stage of development, the industry primarily relies on subsidies and therefore the major cost is derived from public money. Nevertheless, it must be pointed out that rent cost including royalties, taxes, etc. are the same in both energy generating systems.

There must be drawn several conclusions from this review. Although, the share of renewable energy generation has been growing in line with rising investments into the industry, it is lagging far behind fossil fuel energy generating industry. There are natural limitations in development of renewable energy and therefore there is requirement for consistent and efficient financial flow into this sector of economy in order to build a system where energy demand shall totally be covered by renewable sources. The dependence on

subsidies is significant factor distracting finances from this segment of the market as parties do not see future value in investments. Therefore, the basic and only policy approach in building sustainable energy policy based on renewable sources should be investments with long term goal to make it profitable. It shall gradually reduce level of subsidies, become more efficient and more environmentally friendly in comparison with fossil fuel energy generation.

3. Sustainable Energy Policies

The problem of building sustainable energy generation model, releasing the dependence over fossil fuels and more reliance on renewable energy has been under focused discussions within last several decades. There are a number of specific issues attributable to individual countries which must be taken into account when analyzing development sustainable energy generation production. The case of European Union and Denmark demonstrates certain weaknesses of current sustainable energy generation policy presenting at the same time option for basically new approach to the issue.

3.1. European Union

According to Energy Directive of the EU Commission 2009/28/EC member states must reduce energy consumption by 20 per cent until 2020. Although, it might be assumed that there is firm commitment to establish renewable energy generation system, the targets are flexible for revision as no penalties or fines are presumed for not meeting targets on time. The commitments made by major car producers such as Peugeot Citroen, Renault, Fiat and General Motors and German led producers BMW, Mercedes-Benz and Volkswagen's Audi in 2008 to reduce CO₂ emissions to 95 g/km is now under discussion since companies under current financial burden are not ready to invest into innovation technologies [17]. Therefore, the issue of efficiency in this case concerning implementation of the projects and further control is coming into the front line of evaluation analyses. It is argued that energy saving might be achieved through more consumption of renewable energy [9]. It is further stressed that while electricity is produced from fossil fuel, 2.5 units of primary energy are needed to produce one unit of electricity. On the other hand, hydro, wind and solar power converts one unit of primary energy to one electricity unit. It means that the efficiency in case in electricity generation from renewable sources is 100 per cent. Thus, in the long term project, in the frame of energy saving project of the EU, the target might be achieved once more renewable energy generation shall be used for production of electricity. In addition, this policy presumes reduction in pollution by 8 pounds of sulfur dioxide, 5 pounds of nitrogen oxides and more than 1400 pounds of carbon dioxide through generation of electricity from solar power subject average consumption of 830 KWh electric energy during a month [12].

3.2. Denmark

The case study of development of wind power generating units in Denmark reveals some very interesting results not only in terms of clean energy production, but, also it does shed some light on the approach of evaluation efficiency of green technologies. If social costs and reduction of greenhouse gas emissions are not put into the front line of analyses, there would not be true assessment of the development of sustainable energy generation [16]. It is estimated that the cost saving analyses might be done only in case CO₂ emission reduction is considered in the analyses. Furthermore, no feasibility analyses might be made in current market conditions with high cost of energy production from non-renewable energy sources.

4. Conclusion

Sustainable energy is achievable target in the mid-term perspective and necessity for long term future. There are two primary targets in building industry relying on sustainable energy generation. In the first place, there must be developed renewable energy generation to the extent of full release from fossil fuels. Secondly, the passage from conventional energy generating process to renewable should not undermine the necessity in crude oil, gas and coal production for other industries. The main aim is to reduce CO₂ emissions through less consumption of fossil fuels in certain industries and totally liberate electricity generation and transportation industry from dependence over fossil fuel. Thirdly, the gradual and soft transition to sustainable energy generation is not addressing overall problem of the industry. While the price of fossil fuels is fluctuating and falling from time to time, the dependent industries are making profit and therefore alternative energy

industries are getting into stumbling block position since it is becoming no longer profitable to produce energy from renewable resources.

The policy adopted by governments or political institutions such as the European Union Commission must be tough towards companies working in relative industries. There must be set up targets radically changing entire industry through combination of taxation policies of transportation units working on fossil fuels, investments into research and development of renewable energy generating companies and finally setting up mid-term subsidized consumption programme for final receivers.

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6. References

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