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NATIONAL POLICY ON BIOFUEL UNDER THE SCANNER

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ABSTRACT

The National Policy on Biofuels envisaged the biofuels to be the solution for India's containment of carbon emission control and energy vulnerability. Being derived from renewable biomass sources and less carbon emitting, they were trusted to be environmentally benign and cost effective. This can lead to lesser dependence on fossil fuel, which translates to lesser expenditure on the import of the same. Biofuel is also viewed as a catalyst for rural development and employment. The policy has also strategized and framed the technological, financial and institutional interventions and its implementation mechanism. The goal of the policy was to achieve a biofuel blending of 20% for biodiesel and bio-ethanol by 2017. Another goal of this policy was to ensure the availability of minimum level of biofuels in the market in accordance with the demands. The goals set so far are definitely not unachievable. In India lot of hope is lying with the second and third generation biofuels. But considering the importance of biofuels and the amount of dependability expected on the renewable energy sources, with time based on socio-economic conditions, it is needless to suggest that India needs to fulfill the biofuel targets. Taking into account the current unfulfilled targets and unevenness in the mandate and goals among the state policies in the country and considering the example of the other countries, there is a need for legislation and a strict mandate to be formulated.

Keywords: Biofuel, Biodiesel, Bioethanol, Biofuel Policy, Legislation

1. INTRODUCTION

The energy sector plays a key role in the economic development of a country; the worldwide increase in the consumption of energy has led to a scarcity of fossil fuels. This has resulted in the need for exploring other alternatives for energy resources commonly known as renewable resources yielding clean energy. Globally, 19% of the total energy sources are renewable and 14% of this is predominantly derived from biomass sources [1]. Though there is a continuous increase in total installed capacity but the gap between supply and demand is continuously increasing. This is expected to increase to approximately 33% by 2035 [2]. At the same time carbon emission due to the excessive use of fossil fuel has also become a great concern due to its effects on climate change.

India is the fifth largest primary energy consumer and fourth largest petroleum consumer in the world. India spends over 45% of their export earnings for importing energy [3].So naturally with regards to carbon emission it doesn't trail the line either. This is the price paid for rapid economic development.

In India RES currently contributes 9% of the total power generation of India [4]. RE can influence energy security by mitigating concerns with respect to both availability and distribution of resources, as well as to the variability of energy sources.

In India energy contributes more than 25% of total imports [5]. RE can stimulate development, locally economically and socially. In response to the financial and economic crisis many governments have included substantial spending on clean energy technologies in their stimulus packages [6]. RE in poor rural areas without grid access has shown to bring about potential cost savings compared to fossil fuels (such as diesel generators) [7].

India ranked eighth in the world for investments in renewable energy sector. Investment rose 25% to $3.8 billion, dominated by wind power projects ($2.3 billion), followed by $400 million each for solar and biomass power (including waste-to-energy) [8].

It is noteworthy that India with demonstrated high energy requirements from renewable resources, having a set target of 78.7 GW renewable capacity to be added during the period from 2007–2012 and 20 million rural lighting systems by 2022.

In analyzing the Indian scenario Shukla et al. (2008) found that the share of RE is higher in cases which included additional sustainability policies (47 versus 34% of primary energy)[9]. Effective policies and major investments in the area would help achieve a high penetration of modern energy [10].

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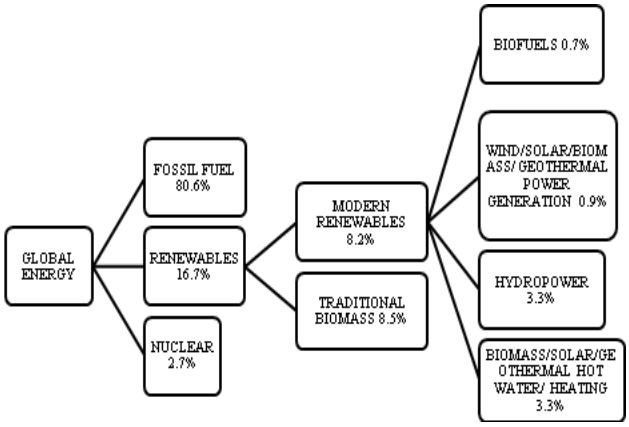

Fig.1. Renewable Energy share of Global Final Energy Consumption, 2011. Source: Renewables 2012, Global Status Report, REN 21

Government of India in its capacity is trying to solve the vital problem of energy crisis. India in the 1970's was the country to establish a separate ministry for Renewable Energy [11]. The establishment of Commission for Additional Sources of Energy (CASE) as a part of the Department of Science and Technology in 1981[12] marked the initiation of what today is known as the Ministry of New and Renewable Energy. Starting 6th five year plan under the planning Commission reports, the governmental programs, laws and policies has been of continuous occurrence. India even was party to the Kyoto Protocol I. Despite all the efforts and plans, India has failed terribly in achieving its renewable energy goals. Biofuel related goals being no exception. Glimpses of the resultant of such failure were very evident in the mass 20 state blackout on the 31st of July. Its occurrence poses a warning of what lies ahead if the targets still remain unfulfilled.

2. THE NATIONAL BIOFUEL POLICY INDIA

2.1 Preamble

The Preamble of the Biofuel Policy clearly highlights the negativities of the extensive use of fossil fuel by mentioning them as limited, non-renewable, polluting and thereafter underlining the necessity for its prudent use. At the same time labeling renewable energy as indigenous, non-polluting and virtually inexhaustible which is not technically completely correct as not all sources of renewable energy are non polluting, they are less polluting but definitely not non polluting [13]. Virtually inexhaustible is also not correct as the source of renewable sources for bio-fuels itself is not inexhaustible, not even virtually.

It is a known fact regarding the insufficient crude oil supply of the country and its dependency on the import of the same. Thus it can be said that the energy security of the country is highly vulnerable. The Policy envisages the renewable fuels as the solution. The policy finds the use of biofuel compelling in view of the tightening automotive vehicle emission standards to curb air pollution.

But the current availability and statistics regarding the same doesn't reflect the compulsion [14].

India does focus on the extraction of biofuels from the non-food feedstock grown on wasteland keeping in mind the conflict of fuel vs. food security in focus unlike in the US where the major source of biofuel is corn [15]. But regarding this there are some serious land issues which the interest entrepreneurs are facing [16].

2.2 Vision and Goals

The policy envisages the biofuel playing the lead role in the energy and transportation sector of the country in the coming decade. The use of biomass is growing rapidly due to its possibility of sustainable development, carbon recycling capacity and undeniable economic advantage considering the accelerating rise in the price of fossil fuels [17] as it is being used more intensively to produce electricity and as feedstock for making transport fuels. It aims to accelerate the cultivation, production and use of biofuels. It has identified the transport sector as one of the main polluting sectors and thus aims to replace petrol and diesel use in this sector leading to contributing in the area of energy security and climate change mitigation.

The policy goal is to ensure the availability of biofuels in minimum levels in the market, enough to meet the demand and 20% mandatory blending of both bio-diesel and bio-ethanol by 2017 to achieve the required targets.

But though made mandatory in many states of India, Some of the states still lag behind and even the mandatory blending is not followed [18].

2.3 Scope

In the Policy the scope of the policy includes bio-ethanol, biodiesel and other biofuels.

"Bioethanol is the ethanol produced from biomasses such as sugar containing materials like sugarcane, sugar beet, sweet sorghum, etc; starch containing materials such as corn, cassava, algae etc.; and cellulosic containing materials such as bagasse, wood waste, agricultural and forestry residues etc.

Biodiesel: a methyl or ethyl ester of fatty acids produced from vegetable oils, both edible and non-edible, or animal fat of diesel quality and other biofuels: biomethanol, biosynthetic fuels etc." [19].

2.4 Strategy

To achieve the set goals the policy strategizes in such a way that the fuel vs. food security is not relevant at all. Cultivators, landless laborers, even corporate are encouraged to undertake plantation. Such plantations will have the supported through the "Minimum Support Price for the non edible oil seed production. Introduction of subsidies and proper research and development and demonstration are enabled to meet the various ends necessary for the proper implementation of the policy.

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2.5 Intervention of enabling mechanism

The policy also intervenes in the processes of plantation, processing, distribution and marketing, financing, financial and fiscal incentives and research and development demonstrations.

2.5.1 Plantation

The policy has identified over 400 species of trees bearing non edible oil producing seeds. Depending on the availability of proper technology and finances the policy aims to explore the potentials of all these trees. Plantation issues regarding to land use will be undertaken by the local communities. The primary instrument of support as indicated in the policy is the Minimum Support Price for oilseeds with periodic revisions. Its mechanism to be worked out after government consultation. Employment will be governed under National Rural Employment guarantee Program.

2.5.2 Processing

Bio-ethanol is produced in the country from molasses. Molasses are the by-products of the sugar industry. Thus the dependence of bio-ethanol production on crop productivity is unavoidable. The rate of blending though mentioned in the policy the states are given the independence to decide their individual policy and goals. The policy does mention the possibility of setting up mandatory targets in due course, which has not taken place till date. To take care of the productivity fluctuations Oil Marketing Companies will be allowed to store the surplus.

The policy intends to encourage the setting up bio-oil expelling/extraction units. The blending of ethanol will have a set protocol to be followed and has to conform to BIS specification and standards. To take care of availability related issues the govt. will allow the OMCs to bank the excess amount of biofuel

2.5.3 Distribution and Marketing of Biofuels

OMCs will bear the responsibility of marketing and distribution. This infrastructure is subject to up gradation depending on the market demands of biofuels. The policy also provides the necessary mechanism for setting the MPP, by the Biofuel steering committee and the National Biofuel Co-ordination Committee. For financing the plantation and setting up of oil processing units is a priority through Indian Renewable Energy Development Authority (IREDA), Small Industries Development Bank of India (SIDBI) and other financing agencies. Multilateral, bilateral and carbon financing opportunities are explored. Investment and joint ventures are encouraged. Biofuel technologies are allowed 100% foreign equity through automatic approval route to attract FDI for domestic use only.

2.5.4 Financial and fiscal incentives

The policy suggests the foundation of a National Biofuel Fund for providing financial incentives when necessary. Bioethanol is given a concessional excise duty of 16% and biodiesel is exempted from excise duty.

2.5.5 Research and development and Demonstration

The thrust area of this policy is the research and development of biofuel innovations and demonstration of the same in the fields. Research and development focuses on plantation, extraction, processing and production of the technologies. The policy also proposes extensive research and developmental works in areas such as biofuel feedstock production, biomass to liquid (BTL) fuels etc. For this purpose grants will be provided to academic institutions, research organizations, specialized centers and industries. Transfers of know-how, linkages between companies are encouraged in order to facilitate better commercialization.

2.6 Quality Standards

The quality of the biofuel and percentage of blending all have to be conducted following a set protocol and has to conform to the BIS standards. BIS with time will review, update and develop new standards depending on its requirements.

2.7 International Cooperation

In accordance to the policy, international scientific and technical co-operation in the area is in accordance to national priorities and socio-economic strategies and goals. Technology transfer and Partnership will be facilitated where necessary.

2.8 Import and export of Biofuels

As per the policy, National Biofuel Coordination Committee (NBCC) has the call on the import and export of biofuels. Free Fatty Acid oil import is not permitted and biofuels can be exported only after meeting the domestic requirements.

2.9 Role of States

For proper implementation of the program the policy suggests extensive State Government participation. The creation of nodal agencies for the development and promotion of biofuel in the states is also desired under the policy. Most of the States currently does have a functional nodal agency.

2.10 Awareness and capacity building

Support will be provided for creation of awareness to popularize its use in the domestic market. Significant thrust will be provided for capacity building under this policy.

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2.11 Institutional Mechanism

The policy clearly defines the institutional mechanism and is divided under the heads: National Biofuel Co-ordination Committee and the Biofuel Steering Committee. The Ministry of New and Renewable Energy, chaired by the prime Minister is responsible for co-ordinations concerning biofuels. The planning commission and MNRE along with other Ministries such as Ministry of Environment and Forests, Ministry of Petroleum and Natural Gas, Ministry of Rural Development and Ministry of Science and Technology are allocated different aspects of biofuel development and promotion. The Secretary, Ministry of New and Renewable Energy is the Convener of this National Biofuel Coordination Committee. The Biofuel Steering committee headed by the Cabinet Secretary and comprising of Secretaries of concerned departments, provide effective guidance and to oversee implementation of the policy on a regular and continuing basis.

3. CURRENT INNOVATIONS IN THE AREA OF BIOMASS BASED BIOENERGY INVENTIONS

Globally liquid biofuels and co- generation are the focus areas of bioenergy inventions. There is a greater emphasis now on technologies which provide uncomplicated operations, are relatively effortless in utilization and harmless to the environment. For this purpose, patent application data was analyzed to understand the technology trends in biofuel inventions. In this context the two categories of inventions i.e., solid biofuels and liquid biofuels,

Biofuels can be classified according to source, type, and technological process of conversion under the categories of first, second, third and fourth generation biofuels. First generation biofuels are biofuels made from biomass consisting of sugars, starch, vegetable oils, animal fats, or biodegradable output wastes from industry, agriculture, forestry, and households using conventional technologies. Second generation biofuels are derived from lignocellulosic biomass to liquid technology, including cellulosic biofuels from nonfood crops such as the stalks of wheat, corn, wood, and energy-dedicated biomass crops, such as miscanthus. Many second generation biofuels are under development such as biohydrogen, biomethanol, dimethyl furan, dimethyl ether, Fischer–Tropsch diesel, biohydrogen diesel, mixed alcohols, and wood diesel. Third generation biofuels are in the nascent stage of development and are derived from low input/high output production organisms such as algal biomass. Fourth generation biofuels are derived from the bioconversion of living organisms (microorganisms and plants) using biotechnological tools [20].

3.1 Patent Data Analysis

The analysis of data of patent applications filed from the year 1994 to 2010 indicates that there is more work going on in the liquid biofuel (34 Indian+27 Foreign=61 applications) area than in the solid biofuel area (26 Indian+13 Foreign=39 applications) (Fig2). It is also indicative of the fact that more innovations are been filed by Indians than by foreign filers. Thus it can be concluded as lesser penetration of foreign technologies.

In granted patents it is observed that very few patents have been granted in both the areas (Fig 3). Thus it is indicative of the slow granting process and lesser number of grants in the areas.

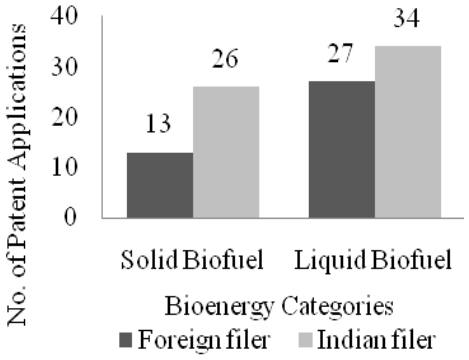

Fig.2. Category wise Distribution of Patent Applications

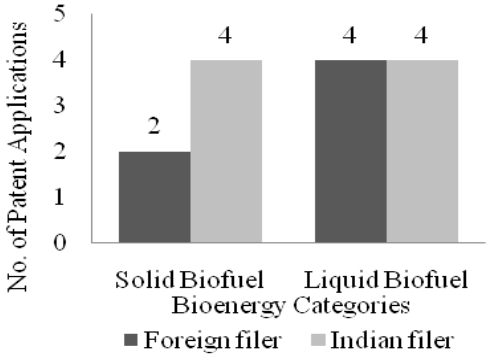

Fig.3. Category wise Distribution of Granted Patents

3.2 Inventions in the area of Solid Biofuels

In the beginning the focus of innovations were more based on the processing technologies and the basic agro residues. But the current focus is much more on the crop specific or algae derived biofuel as can be inferred from the application "Solid Bio-Fuel from One or More Legumes" (2606/MUM/2008). It is very interesting to note that all the crop specific inventions have been filed by the same Indian company Abellon Bioenergy Limited. The foreign filers have filed in the areas such as Biocell (1037/DEL/2006). It is very interesting that of the 39 applications filed in the area of solid biofuels, 9 applications belong to Abellon Bioenergy Limited.

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3.3 Inventions in the area of Liquid Biofuels

The liquid biofuels are a very recent area of innovation. The first patent application in the area can be traced back to as early as 2000. The innovations in the area of biodiesels are majorly in the sectors relating to purifications, filtrations, stability and enhancement of products. This can be explained by citing the example of innovations such as "Method for enhancing cold flow properties of biodiesel" (1174/MUM/2007) or considering the innovation "Method of increasing the oxidation stability of biodiesel" (619/CHE/2006) and the like.

4. SUCCESSFUL INTERNATIONAL BIOFUEL UTILIZING COUNTRIES

Germany's biggest infrastructure modernisation project the "Energiewende" (Energy Transition), centre on energy efficiency and renewable energy sources, along with massive energy infrastructure investments, sets a great example for many countries. Globally in Europe Germany is among the top users of renewable technologies in the sectors of transport, heating and power. Renewable sources provide 12.2% of its energy consumption, 20% of electricity consumption (up from 11.6% in 2006), 10.4% of heating demand (up from 6.2%), and 5.6% of transport fuel (excluding air traffic). It is one of the few countries who are trying to use biofuel in the aviation industry. Solid biomass fuels provide a significant and growing amount of heat worldwide. During 2010 half of the total heat produced by solid biofuels was consumed in France, Germany, Sweden, and Finland [21]. District heating accounted for almost 11% of this total, mainly in Sweden, Finland, Denmark and Austria. As per data available for 2011, in Europe liquid biofuels were the sources for heating in countries such as Germany, Portugal and Sweden. Germany is presently placed second globally, with 3.2 billion liters of biodiesel production per year [22]. Australia has plans of increasing the rate of biofuel utilization to 2.5 times by 2015. Denmark passed legislation and is working towards 100% renewable energy by 2050. It is intriguing to note that all the countries mentioned to be currently succeeding in implementing the use of biofuel in the transport sector and other sectors for heat and power generation possess a Renewable Energy Act in place.

5. CONCLUSIONS

India faces an unstable bio-ethanol production due to its dependency on the sugarcane molasses. The year in which there is less production of sugarcane the productivity of bio-ethanol automatically reduces.

The other main concern of this policy is the state independency. States are given the liberty to have their own biofuel policy and set targets of their own. This has resulted in a varied response in different states. States such as Karnataka, Rajasthan has taken off with a good start, and at the same time there are states which are yet to make a landmark.

Thus there is a requirement of a uniform policy. Proper availability of product in market along with proper price and incentive control are also a necessity for the policy.

From the technological perspective it can be concluded that the penetration of new and innovative technologies in this area is very slow. This can be concluded by the fact that despite the number of available patents in the area and the gradual increase in the technological aspects, however slow, when the government is providing the technologies for the general use at a subsidized rate at the rural areas, we find the old technologies being still dispensed. This low rate can be attributed to lesser innovations and slower patent granting mechanisms. All this leads to a much lesser commercialization of technologies which indirectly hamper the overall use and national biofuel targets set by the Government.

In the light of the above discussion it can be concluded that India very urgently needs a renewable energy act in order to develop an infrastructure for attaining the competitive targets set by the Government of India.

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