



Green Energy Initiatives: Learnings from European Countries

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ABSTRACT

Global energy scenario is undergoing a shift from hydrocarbon ridden energy landscape. The menacing impacts of climate change are pushing us to rethink about the present energy order. The major share of carbon emission, which is the major cause behind the global warming, comes from the dependency on fossil fuels for our energy requirements. It is not a hidden fact that energy consumption represents the largest source of greenhouse gas emission by human activities worldwide. It is to be noted that around two-thirds of global greenhouse gas emissions are related to the burning of fossil fuels for heating, power, transportation and industrial use. The Paris agreement, 2015 aimed to limit the global average temperature rise below 2°C. This target This target is ambitious and cannot be accomplished without a significant restructuring of the global production and consumption of energy. The large scale development of renewable energy and technological advancement are the major ways for a sustainable society and environment. In this context, this research paper attempts to study the various green initiatives in energy sector in selected European countries.

Keywords: Green energy, European way, Climate change, Green initiatives

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Introduction

The energy transmission is not only the installation of renewable energy systems, but it consists of energy efficiency measures, sustainable urban planning, research and development on renewable energy. It also includes the business models, technological advancement in storage sector and integration of end use sectors for efficient usage of clean energy. Owing to their rapid decrease in capital costs, solar and wind energy systems are at the frontline. But in developing countries, energy transition is still focused on the power sectors. The end-use sectors stand crucial in almost every nation's energy landscape. Some nations look effectively at these sectors and aides to reduce the emissions. (Beatley, 2012) [1].

In the European Union, several countries are opting for clean energy for an adequate supply of energy, resulting in low carbon emissions and marching towards sustainable development. It won't be considered exaggerated if we say that the EU stands at the forefront of the green energy development worldwide. Renewable sources for Electricity sector and heating/ cooling domestic purposes, usage of biofuel and electric vehicles in transport sectors are some path-breaking measures EU countries have adopted for a greener future. It must be appreciated that who were the highest carbon emitting nations once during industrialization, are now leading the march towards reducing the carbon emission. Their highly flourished economic sector as well technological advancement have been helping them for adopting these clean energy measures, which is a model for all other countries globally. Abundant research, backed with adequate financial support and the will power of government are the driving force behind the wide scale development of renewable energy in the European Union. Along with the oil crisis of 1973, geopolitical dimensions and environmental factors together contribute to the rethinking of European nations to begin a sustainable energy approach. The experiences of these nations are influencing the green transition of countries of different parts of the world. An overview of the energy transition process in European countries will be useful to assess and evaluate the potential and prospects of the energy landscape in other parts of the world, especially in developing countries. In this context, author has attempted to study and analyze the energy transition process in Germany, Iceland, Sweden, Denmark and Norway.

Objectives of the study

1. The Study seeks to comprehend the various initiatives towards green energy in selected European countries;
2. The study also aims to analyze the transition in energy sector as an attempt to limit the impact of climate change in selected countries;

Methodology

The author has employed analytical and descriptive methods of research in this study. The data for the purpose has been collected through secondary sources. The author has rigorously reviewed various reports, research papers, new reports, agreements, working papers, books, etc. for data to be used in this study.

Analysis

In this section, we will discuss the facts and findings about the process of energy transition in each selected EU nations separately.

Germany: Germany is one of the leading countries in the world in terms of production and usage of renewable energy. Energiewende, the policy of transition to low carbon and nuclear free nation, transformed it as a clean energy friendly country. As a nation, it accepted the Problems of climate change and the dangers of nuclear energy. Wind and solar are the major green energy sources for the country. The Fukushima disaster of Japan in 2011 led to a quick decision by the German Government to shut down the country's 17 nuclear reactors by 2022. Out of the 17 reactors, 10 have already been closed. Now they are not encouraging any new power projects in this sector. Although the demand for shutting down the nuclear plants had been there in Germany since the coalition government of Alliance 90 / The greens came to the power. It was decided for nuclear plants to be phased out before 2020. However, the new government overrode this decision in 2009. But the Fukushima Incident, which fueled a civil resistance in Germany, compelled the then government to reintroduce the Act and vowed to shut the nuclear reactors by 2022.

The German Energiewende is a guiding line to the world. Economically viable, stable and clean energy is the motive behind this programme. The research and innovation in the field of renewable energy are promoted by the programme. The renewable base electricity generation increased from 36.2 billion kWh of year 2000 to 216.3 billion kWh in 2017 (BMW, 2017) [2]. The country has a target of 60% in 2050 for total consumption and 80% for electricity sector. There are also policies to reduce energy consumption through energy efficiency and to promote efficient technologies, industries, buildings etc. Financial support for all these efforts is a major feature for the Energiewende programme. Storage is the other factor in energy issues of Germany. The excess energy from wind and solar is being used to split water and the resultant hydrogen is used to produce electricity. Efficient storage options and intelligent power grids are also a part of the German 'energy transition' programme, around 180 universities and 120 research institutions are contributing for the cause of the country's clean energy scenario (BMBF, 2017) [2].

Germany's electricity sector is transitioning towards a greener way and its share of clean energy is on the rise year on year. The total share of renewable energy in energy sector of Germany has rose to 46% in 2019 [3]. 237.4 terawatt hours (TWh) out of last year's total power production of 515.6 TWh, were produced through solar, wind, biomass and hydroelectric generation. In last three years, the green energy output has been at year on year rise of 7% with 38.2% in 2017, 40.6% in 2018. A research study conducted by the Fraunhofer Organization of Applied Science, says that this significant increase of green energy in the share of total energy production is due to ongoing capacity expansion of renewable energy generation. It should also be noted that green power is given priority entrance to Germany's grid system in comparison to electricity generated from fossil fuels.

Iceland: Every nation has its own potentials and limitations. Iceland is a geologically and volcanically active country as well as suffered from poverty and colonial rule for a long period. However, the country recognized its potential as geothermal and hydel energy sources for their sustainable development. Renewable sources are contributing to 80% of Iceland's energy needs. Fossil fuels are used in transportation and for industrial purposes. Iceland is a small

country with around 3.4 lakhs people, but its 100% electricity comes from renewable sources. Since 1940s it started its geothermal energy usage in a structured manner. The district heating purpose is also completely done by renewable sources. Seasonal meltdowns of glaciers of the country provides hydro sources and active volcanic zones contribute the geothermal power. The increasing oil prices and unstable supply influenced the local farmers to use domestic energy sources. The Municipalities, districts and government began to support these initiatives gradually and made effort to build a long term energy infrastructure. They succeeded in their effort and now only the transport sector depends on non-renewable sources (ORKUSTOFNUN (6) 2017 The country hosts the geothermal department of the united Nations for the research of new development in renewable energy an assists other countries with their practical experiences (MFA Iceland 2018) [4].

The Iceland government provides low interest loans to communities for geothermal development such as for drilling to obtain hot water from underground are there is an option for cost recovery also the community based hydro projects are also common in Iceland. Large scale development of renewable energy helps to increase the international cooperation and trade. Now the energy intensive industries have been translocating to Iceland for sustainable growth. Hydrogen development is also a major initiative from the part of Iceland. Hydrogen research and experiments are conducted here and a hydrogen fueling station has also been established here.

Earlier, Iceland was a country depended upon on imported coal and peat for energy requirement. Now it is the only country with 100% electricity consumption from renewable sources. Public willingness, cooperation and support among state government as well as local authorities, and the mutual assistance between people helped to develop community based energy projects. So, the local empowerment and the public participation are key factors in the development of Iceland's energy initiative. Long term perspectives for a better energy alternative of the government from the beginning of the traction period contributed a lot to its energy sector. The government's politics, action and legal frameworks supported the achievement. Every country has its Own resources, but the matter is how it can be utilized by them Iceland used its opportunity and developed a green energy nation becoming a role model for other countries.

Sweden: Sweden is a leading European Union country in terms of renewable energy usage. Oil crisis was the primary factor behind Sweden's search for alternative energy sources. The country's electricity generation depends on renewable sources by 57% and nuclear sources by 41% (IEA 2017). it implemented energy tax (7) on electricity and fuels and CO2 taxation" since 1991. It has been working for the target of 50% renewable energy by 2020 in the total energy usage and at least 10% achievement in port sector also. It has comparatively low emission than the higher per capita energy usage countries. The high dependence on nuclear power is a major criticism against Sweden's energy sector. But now they raised the nuclear energy tax, stopped all new nuclear power plants and Plans to close the existing plants.

Energy efficiency is another matter of significant buildings. for industries and buildings, even for privately owned building houses or flats, the individual can approach energy advisors and build the home according to expert advice. The growing investment in renewable sector is a vital feature in Sweden's energy landscape. It achieved its 50% renewable energy target in 2012 itself in almost all the sectors including, electricity, transport and heating the nation

maintains a significant proportion of green energy. The transport sector is the only area which is dominated by fossil fuel. However, in 2017 Sweden achieved a 20.8% biofuel used in transport sector. The country used HVO biodiesel which is hydro treated vegetable oil produced from different bio raw materials. As the catalyst hydrogen is used for HVO production instead by methanol, it cleaner and environment friendly. Green electricity certification (9) is another feature Sweden's energy consumption and it was started since 2003. research and development in wind energy and ethanol are rapidly growing nowadays. Fossil free transportation by 2030 and heating by 2020 are the main energy policy targets of Sweden. The Green electricity and biofuels have been helping them to achieve its longer term goal of 100% renewable for its total energy usage. The usage of HVO biofuel, tax exemption for biofuel dependent transportation, and energy efficiency initiatives are the most meritorious achievement for Sweden.

Denmark: Denmark has achieved 43% of power production from wind in 2016 [5] and eyeing to achieve the target of 50% usage of renewable energy of total energy needs by 2030. Denmark plans to phase out coal producing electricity before 2030. Government supports all clean energy initiatives with research and finance. The country is trying to reduce coal powered plants and now the energy scenario is driven by bioenergy and wind. Electric powered vehicles with efficiency in all dimensions of transport sectors are important in Denmark. Wind is the major energy source and there are certain wind farms which are owned by several local entrepreneurs to their agricultural needs. Stakeholders can get loans at lower interest and also get enabling supports from the government which is pushing the wide acceptance of the renewable sector. The supply of bioenergy through waste management mechanism is ensured in Denmark.

Norway: Norway possesses the largest number of per capita electric cars with plug in facility. The electricity comes from hydel power. Clean transport sector is a nearby goal for Norway. It is an inspirational initiative from the government side and the buyers are exempted from import tax and VAT for the electric vehicles. The reduction of road tax and low price of electricity are influencing factors for buyers. Government provides a lot of facilities for electric car owners. out 98% of the electricity of Norway comes from renewable sources and hydropower of the energy sector.

Discussion and Conclusions

Considering the experiences of green energy initiatives in the selected EU countries, it would not be exaggerated to say that EU stands at the forefront of the green energy development. The strong growth of renewable energy development across the European region is the result of the adoption of long-term targets and supporting policy. Germany's Energiewende can be certainly a good guide for the developing countries for their transition towards clean and green energy. Experiences in these countries show that political will along with a consistent policy is required for the rapid deployment of large volumes of renewables. Rest of the world, especially the south and south-east Asian countries have much to learn from EU countries.



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