

An Investigation of the Role of Renewable Energy in Iran for Climate Change Mitigation

Saeed Kardar¹, Ahmad Ahmadi^{1*}

1.Department of Environment, Islamic Azad University, Damavand Branch, Damavand, Iran

Corresponding Author email : a.ahmadi1989@yahoo.com

ABSTRACT: Renewable energy sources play a role in providing energy services in a sustainable manner and, in particular, in mitigating climate change. At the same time our heavy reliance on fossil fuel based energy sources dramatically increases CO₂ emissions, which are a main cause of global warming. GHG emissions associated with the provision of energy services are a major cause of climate change. We not only need additional energy supplies; the energy also needs to be clean. Ultimately we need to transform our energy system towards renewable energy solutions. Iran has a high amount of renewable energy sources: there are favourable conditions for the profitable use of wind energy, very good opportunities for the extension of water power use as well as an ideal setting for the use of solar energy. For renewable energy to make a major donation to economic development, job creation, reduced fossil fuel dependence, and lower greenhouse gas emissions, In this paper, the role of renewable energy and its impact on climate change and the Iran's government policy and different organization that are involved in renewable energy are discussed.

Key words : Climate Change, Renewable Energy, Iran, fossil fuel, global warming, Greenhouse Gases

INTRODUCTION

Efficient and reliable renewable energy sources would diversify and ensure supply without using up valuable oil and gas reserves. Such sources of energy have a strong potential to tackle the increasingly damaging environmental impacts arising from the use of fossil fuels in cities, as well as their contribution to climate change (Azad, 2010). Climate change is recognised as one of the key challenges facing the world in the 21st Century. It engages the energy sector particularly closely because energy is central both to the problem and to its resolution (World Energy Council, 2007). Greenhouse gas (GHG) emissions associated with the provision of energy services are a major cause of climate change. The AR4 concluded that "Most of the observed increase in global average temperature since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations." (IPCC, 2007a). Concentrations of CO₂ have continued to grow since the AR4 to about 390 ppm CO₂ or 39% above pre-industrial levels by the end of 2010 (Solomon, 2007; NOAA, 2010). The global average temperature has increased by 0.76°C (0.57°C to 0.95°C) between 1850 to 1899 and 2001 to 2005, and the warming trend has increased significantly over the last 50 years (Solomon, 2007). While this report focuses on the energy sector, forest clearing and burning and land use change, and the release of non-CO₂ gases from industry, commerce and agriculture also contribute to global warming (Solomon, 2007). Energy also accounts for around one third of the global emissions of methane, the second largest source of GHGs, in fugitive emissions, mainly from natural gas production; transportation; and coal production. In addition, energy contributes a small share of global emissions of N₂O, the third largest source, principally from biomass burning (World Energy Council, 2007).

Renewable energy policy is the principal driver of the growth in renewable energy use. Renewable energy policy targets exist in some 73 countries around the world, and public policies to promote renewable energy use have become more common in recent years. At least 64 countries have some type of policy to promote renewable power generation.

Extensive experience has been gained of policies and measures to combat climate change, especially since the late 1980s, when the issue first started to be recognised at global level. This led, in 1990, to the First Assessment Report of the Intergovernmental Panel on Climate Change, and in 1992 to the adoption of the United Nations Framework Convention on Climate Change. The Kyoto Protocol of 1997 was another major step, setting

emissions reduction targets for most developed countries. However, it is not the sole motivating force for climate change measures. Many countries have taken measures independent of any Kyoto obligations – some have not ratified the Protocol; some have no specific targets under the Protocol; some wish to go beyond those targets. Overall, it has been estimated by the International Energy Agency (IEA) that since 1990, over 1,000 policies have been introduced to combat climate change, whether under the umbrella of the Protocol or otherwise. It is clear that significant action is being taken. What is less clear is how effective this action has been – whether the policies and measures are meeting all their goals, and whether they are meeting them in a balanced way; what their cost has been and what benefits have resulted. This is the focus of the present Study. The Study does not try to cover the whole field of climate change; its terms of Reference (Appendix 1) deliberately restrict its scope to those matters falling within the expertise of the World Energy Council and its members. Thus the study will not attempt to judge the underlying climate science. Its concern is only with energy-related emissions (including energy used in transport) and it does not attempt to assess response measures in areas outside the energy sector, such as agriculture and forestry. Nor is it concerned to recommend particular ghg targets or regimes – the starting point is simply that it is desirable to reduce ghg emissions from energy production and use (World Energy Council, 2007).

Sustainable development and adaptation

Sustainable development and climate change are closely linked with each other. The adverse impacts of climate change are among the contributory factors why sustainable development efforts of the developing countries are not successful as expected. This challenge, however, can be addressed if climate change adaptation strategies are mainstreamed in sustainable development plans of the country (Huq et al., 2003). Following the release of the IPCC's Fourth Assessment Report, it has become increasingly apparent that climate change will have far reaching consequences for poverty reduction efforts including the achievement of the Millennium Development Goals (MDGs). There are two distinct perspectives on how to approach adaptation in developing countries: one focuses on responding to specific predicted climate impacts and managing risk (McGray et al. 2007). The other is more concerned with reducing vulnerability and building resilience and adaptive capacity. Between these two extremes is a continuum of interventions from 'pure' adaptation measures on the one hand to 'pure' development activities on the other. In practice, most interventions fall somewhere between these two extremes. It is increasingly recognised however that successful adaptation will require interventions which address the range of challenges along the whole spectrum i.e. all three dimensions of sustainable development to be effective and moderate the impact of climate change both in short and long term (Bajracharya, 2013).

Renewable energy and its role in development /adaptation

The literature provides several definitions of RE. Twidell and Weir (2006) define RE as “energy obtained from the continuing or repetitive currents of energy occurring in the natural environment”. The Dictionary of Energy edited by Cleveland and Morris (2006) says renewable energy is “any energy source that is naturally regenerated over a short time scale and either derived directly from solar energy (solar thermal, photochemical, and photoelectric), indirectly from the sun (wind, and photosynthetic energy stored in biomass), or from other natural energy flows (geothermal, tidal, wave, and current energy).”

Renewable Energy Main Policies In Iran

Iran's renewable energy consumption is negligible. With 9% of the world's oil reserves and 17% of its natural gas reserves, Iran has an abundant supply of fossil fuel resources, which tends to discourage the pursuit of alternative renewable energy sources.

Providing sustainable and accessible energy to the poor and isolated areas in order to bring about improvement in life condition, and social development

Creating renewable energy research centers to enhance technology performance and therefore reducing the initial cost of renewable systems.

Laying foundation for renewable energy development by continual mapping of renewable resources which is important for defining priorities and policy making for both public as well as private sectors

Encouraging private sector to invest in the field of renewable energy by preparing power purchase agreements for all renewable energy resources (Azad, 2010).

Iran's Energy Policy: Challenges and Choices

Iran is facing serious challenges in the area of energy policy. To define the problems and possibilities that these challenges represent one must first turn to Iran's energy consumption patterns as well as the energy policy of the Iranian government. . The increase in energy usage in Iran is clearly out of proportion with the rate of the

country's economic productivity. Some of the negative structural characteristics of this consumption pattern are an above average energy intensity, an increase in energy consumption in the traffic sector, a high growth rate in the use of electric energy and an inordinate amount of stress on the environment (Atabi, 2004).

Global environmental concerns: Opportunities for Iran

Climate Change is an expected phenomenon due to the emissions of green house gases mainly from burning of fossil fuels, coal, oil and gas. Renewable energy offers zero-GHG-emissions alternative. The sixth meeting of the Conference of Parties (COP6) was held in the Hague. The parties were countries that agreed on the Framework Convention on Climate Change (FCCC) at Rio in 1992. Thus the COP negotiations deal with the future of our domestic energy and its policies. In the climate change debate it is also pointed out that unsustainable consumption patterns of the rich countries account for 70% of fossil fuels. This was recognized in FCCC and a differentiated responsibility for different countries was accepted. Therefore, the convention offered several benefits to the Developing Countries (DCs) such as access to global environment facility to fund their projects on renewable energy; presents technology transfer and costs of capacity building, reporting and country studies. This is a good opportunity for Iran. Subsequently, the Clean Development Mechanism (CDM) was proposed in the Kyoto Protocol. This can mobilize private investment in the developing countries (DCs) for more efficient use of fossil fuels and therefore cleaner development by bringing much needed capital and new technology. In return, the investors would claim some emission reductions for their countries. Thus CDM offers developing countries finance and technology. Since the cost of reducing emissions is much lower in developing countries compared to Industrialized Countries (ICs), the latter would provide incentive to appropriate technology and finance (UNDP, 1997). Technology Transfer (TT) promised in the FCCC at Rio could now be linked with CDM so as to ensure wider adaption of the technologies beyond the CDM project. That is, the "CDM project" should have a programmatic context of a long-term nature. Another way to obtain financial assistance and another opportunity for Iran is through the Global Environment Facility (GEF), which encourages fossil fuel substitution and promotion of renewable energy.

Challenges in promotion of Renewable Energy Technology in Iran

The Iran lacks policy frameworks that stipulate provision of energy for sustainable development. This poses a great challenge to promote Renewable Energy Technology (RET) in the country. Appropriate policies are required to successfully implement RETs. Although policy directives have been issued in Iran, stakeholders have not been advised on how to implement them as strategies and long-term policies, i.e., implementation guidelines are lacking. The contribution of RE to the total energy mix is still small, due to lack of knowledge about their potential and insufficient social and environmental policies and programs to encourage their use / implementation. Iran has found it difficult to implement the existing policies and enforce the laws due to lack of infrastructure. The diffusion of RETs has been hampered by lack of training, maintenance and capacity to purchase the technology. Majority of governments in developing nations rely on bilateral or multilateral funding to support RE activities. The external financial aid is not guaranteed and is sometimes tied to meeting donors' conditions, which vary from country to country. The policies that require more attention are those that restrict dissemination of RETs. The present policies in Iran have serious shortcomings as they lack provisions on standards to ensure quality in the provision of energy. The techno-economic boundary conditions, lack of infrastructure, capital and the tradition of technical standards, represent severe restrictions to rapid expansion of RETs. There has been a tendency by policy makers to compare RE with conventional sources of energy in terms of amount of energy generated. These collective conditions and restraints have made the Islamic Republic of Iran unable to implement the RETs (Atabi, 2004).

CONCLUSION

Energy technology has to continuously redefine it in order to adapt to the new and emerging situations and circumstances. Renewable technologies are of no exceptions. It is time to think about the likely scenarios in the Five-Year National Development Plan of Iran and how renewable energy can establish itself in the changing environment. First we need to ask what are the criteria that determine choices of the energy technology. Moreover, as we review this progress during last decades, the renewable sources have not captured even 1% of energy market in Iran. New contexts have emerged recently, as outlined below:

1. How does renewable energy help to replace conventional energy? First, with time, people have more incomes and demand more convenient forms of energy. These energy systems require investment and management. Second it is desirable to switch to better energy forms.

2. How renewable energy can claim higher share of the conventional energy market? Limited availability of fossil fuels and ever increasing environmental concerns would enhance the market share of the renewable energy.
3. What are the environmental concerns both in terms of local and global scale, which would make renewable energy preferable? What opportunities do they offer?
4. Over the years, subsidies have made conventional fuels favorable. Moreover, general population has got used to receiving subsidies in the energy sector.
5. Urban areas need energy on a large scale. Their desire for reliability (24 hours availability) is of extreme importance.

Concluding Remarks

Lack of finances, poor installation and lack of maintenance are the major hindrances to the ongoing adoption of RETs in Iran. Therefore, RETs offer huge opportunities for social and economic development of Iran. The biggest change required is to place environmental objectives at the top of global, national, and personal priorities. This shift definitively does not mean ignoring country's basic needs satisfaction, or its economic and social advancement. But satisfaction of Iran's objectives must be made compatible with environmental goals. This means far greater transfers of financial resources, technology and know-how from industrialized countries to developing ones for environmentally friendly progress.

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