



## Iran's achievements in renewable energy during fourth development program in comparison with global trend

Payam Nejat<sup>a</sup>, Abdul Kasir Morsoni<sup>c</sup>, Fatemeh Jomehzadeh<sup>a</sup>, Hamid Behzad<sup>b</sup>,  
Mohamad Saeed Vesali<sup>c</sup>, M.Z.Abd. Majid<sup>a,\*</sup>

<sup>a</sup> Faculty of Civil Engineering, University Technology Malaysia, UTM-Skudai, Malaysia

<sup>b</sup> Department of Electronic, Shahrood University of Technology, Shahrood, Iran

<sup>c</sup> Department of Electronic, Ferdowsi University of Mashhad, Mashhad, Iran

### ARTICLE INFO

#### Article history:

Received 13 July 2012

Received in revised form

22 January 2013

Accepted 23 January 2013

Available online 15 March 2013

#### Keywords:

Renewable energy

Iran

Energy production

Policy

### ABSTRACT

Since the beginning of the last century, energy affairs have always been taken into global consideration due to their effects on economies, policies, security and the environment. Fossil fuels have been the first recourse for global energy supply needs (80% of total energy consumption); nonetheless, owing to the production of greenhouse gases, they are gradually being replaced with renewable energy resources. In addition, renewable energy resources are perpetual, unlike fossil fuels, which may be exhausted in less than one century. From 2005 to 2010 (coinciding with Iran's fourth development program), renewable energy resources enjoyed a double-digit global growth rate as a result of environmentally friendly perception and a reduction in equipment price. Some policies and strategies were globally adopted to support renewable energy resources (Feed-In-Tariff, subsidies, etc.). Iran began utilizing renewable resources from the early 1990s and set targets and policies for renewable energy resource utilization in the fourth development program. However, Iran's trend has not aligned with global trends, and it appears that its enormous fossil fuel reserves overshadow the growth of renewable energy resources in the country. In this paper, the status, achievements and policies of Iran during the fourth development program will be discussed and compared with global trends.

© 2013 Elsevier Ltd. All rights reserved.

### Contents

1. Introduction . . . . .	562
1.1. Fossil fuel resources of Iran . . . . .	562
1.2. Capacity of electricity generation in Iran . . . . .	563
2. Supporting policy for renewable energy . . . . .	563
2.1. Non-application of human resources in an appropriate manner . . . . .	564
2.2. Problems related to administrative and supervisory structure . . . . .	564
2.3. Discord between identified targets and management talents . . . . .	565
3. Solar power . . . . .	565
3.1. Solar power in Iran . . . . .	565
4. Wind . . . . .	566
4.1. Wind energy in Iran . . . . .	567
4.2. Manjil site . . . . .	567
4.3. Binalood site . . . . .	567
5. Hydro power . . . . .	568
5.1. Hydro power in Iran . . . . .	568
6. Geopower . . . . .	568
6.1. Direct use . . . . .	569

\* Corresponding author. Tel.: +60 197536100; fax: +60 7 5566157.

E-mail addresses: [jomehzadeh@live.utm.my](mailto:jomehzadeh@live.utm.my) (F. Jomehzadeh),

[vesali202@gmail.com](mailto:vesali202@gmail.com) (M. Saeed Vesali), [hamidbehza@gmail.com](mailto:hamidbehza@gmail.com) (H. Behzad),

[Akasir@gmail.com](mailto:Akasir@gmail.com) (A.K. Morsoni), [mzaimi@utm.my](mailto:mzaimi@utm.my) (M.Z.Abd. Majid).

6.2. Geopower in Iran ..... 569  
 7. Biomass power ..... 569  
 7.1. Iran's status ..... 569  
 8. Conclusion ..... 569  
 References ..... 569

**1. Introduction**

Nowadays energy plays a significant role in the global economy, as well as in security and politics. Every nation must tend to the sources, policies and environmental aspects of their energy affairs in order to achieve developmental targets [1–3]. Apart from global population and economic growth, energy consumption has considerably increased worldwide, from the equivalent of 6630 million tons of oil in the early 1980s to 11,295 million tons in 2008 [4,5]. Since the 2008 global economic crisis, the growth of energy consumption has revived at a 5.4% annual rate [6]. There are estimates that show certain fossil fuels, such as crude oil and natural gas related to members of the Organization of Petroleum Exporting Countries (OPEC), will be exhausted in 79 and 131 years, respectively [7] and that average depletion times for world fossil fuel reserves such as of oil, coal and gas are approximately 35, 107 and 37 years, respectively [8,9]. In addition, fossil fuels are the primary cause of greenhouse gas emissions, which are currently the most perilous threat to the environment [10–12]. Total global carbon dioxide emissions in 2010 were more than 33.1 gigatons—33% more than in 2000 (24.8 gigatons) [13,14].

Because carbon-based fuels will be nearing their end and they are the primary source of greenhouse gas emissions, attention has been drawn to renewable energy resources like solar, wind, geothermal and hydropower, which are perpetual, infinite and offer negligible (indirect) CO<sub>2</sub> production [15]. Today's worldwide share of renewable energy may not be considerable (18% of global energy consumption; see Fig. 1) [16], but its growth rate is notable—over 20% in the past 5 years (except hydro and geothermal energy).

Nearly half of the 194 GW of electric energy added to world capacity in 2010 was due to renewable energy resources, and almost 20% of global electricity generation in that year was related to different types of renewable resources (Fig. 2).

In 2010, 118 nations provided policies and targets in the employment of renewable energy—twice more than in 2005. Some policies, such as Feed-In-Tariff, subsidies, grants and taxes, have been defined and employed to support the development of renewable energy plans worldwide [18–21]. The global growth rate of renewable energy between 2005 and 2010 (coinciding with the fourth development program of Iran) was 49% in solar PV, 27% in wind power, 4% in geothermal, and 3% in hydro power (Fig. 3).

In addition, the total global investment in renewable energy considerably increased from \$22 billion US in 2004 to \$211 billion US in 2010 (Fig. 4) [6,22].

Iran, as a developing country with a population of more than 70 million, had a total energy consumption equivalent to 1164 million barrels of oil (including oil, gas, coal and other resources) in 2009 [23]. The total expenses of Iran's energy consumption in 2007 reached US \$47.8 billion, whereas in 2000 it was US \$32 billion; at this rate, it may surpass US \$157 billion by 2020 [24].

Apart from enormous fossil fuel consumption, Iran also suffers from greenhouse gas emissions and their environmental impacts (producing 558 million tons—1.7% worldwide). Since Iran has great potential in renewable resources, more attention is being paid to replace fossil fuels with renewable energy [25].

**1.1. Fossil fuel resources of Iran**

Iran currently enjoys 78 oil fields, of which 62 are onshore; the remaining fields are offshore. The total crude oil reserves were 151.17 billion barrels in 2010, and it has been estimated that the remaining lifespan of Iran's oil is approximately 94 years. Iran is considered as the third largest oil reserve holder in the world after Saudi Arabia and Venezuela [26]. The total annual production of crude oil was 1433 million barrels in 2009, of which 800 million barrels were exported. The total natural gas reserves in that year

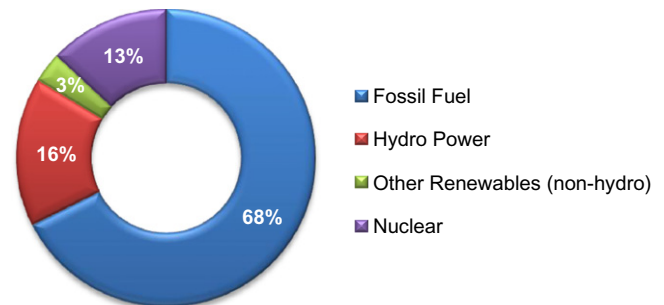


Fig. 2. Share of different sources of energy in Global Electricity Production [6].

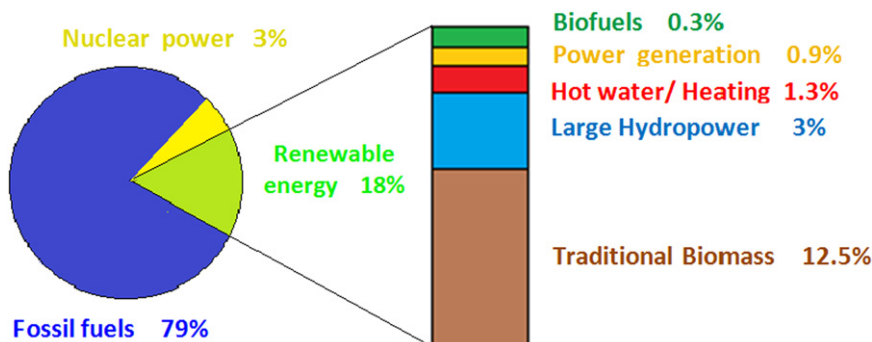


Fig. 1. Global Energy Consumption [16].

Download English Version:

<https://daneshyari.com/en/article/8122281>

Download Persian Version:

<https://daneshyari.com/article/8122281>

[Daneshyari.com](https://daneshyari.com)