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INVESTIGATING THE USE OF RENEWABLE ENERGY IN IRAN'S VILLAGES TO IMPROVE PUBLIC HEALTH (CASE STUDY OF MEYBOD - YAZD)

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Abstract

The untapped use of energy resources with a lot of hazards such as greenhouse gases, reducing public health, ending fossil fuels and socioeconomic changes, and reducing revenues resulting from the conversion of this valuable substance to other materials and value added Much higher. A wide range of studies have been conducted on the impact of BB on greenhouse gas emissions and its various effects around the world. This trend is also evident in urban and rural communities of Iran. On the other hand, it is necessary to pay attention to the basic needs of the villagers based on sustainable development and the use of renewable energy. Meybod city is one of the industrial and economy poles of Yazd province. Due to the growing trend of fossil fuel consumption and increasing the city's pollution on the one hand and the use of BB in rural residential houses, the overall health level is reduced, Therefore, new conditions and a wider spectrum of new energies that are renewable, cheaper, safer, cleaner and more accessible are needed to be considered. When using biomass energy to provide part of cooking, lighting and heat in residential and agricultural areas, it is possible that part of the energy consumption of BB, which is extremely polluting, is effective in improving the health status of the people. Therefore, in this paper, the potential of biogas production to provide part of the energy needed by the Meybod city Reviewed.

Keywords: Renewable Energy, Biogas, General Health, Biomass, Emission Factor.

Introduction

The use of energy in the advancement of civilization is essential and fundamental to life (OECD, IEA, Energy Poverty, 2010). A Hong Kong study found that demand for limited energy resources such as coal, oil, and natural gas is increasing for global economic growth. The rapid growth of fossil fuels and its impact on the environment have been two important and effective factors on human life throughout history (Teschner *et al.*, 2011).

The untapped use of these resources causes a lot of risks, such as environmental pollution and greenhouse gases, the end of fossil fuels and socioeconomic changes, and the reduction of revenues resulting from the conversion of this valuable material to other materials and much higher value added. Ultimately, all of the above factors will reduce the urban and rural development and the unsustainability of living conditions and public welfare. So reducing greenhouse gas emissions is one of the major concerns among countries (Pittel and Rübbelke, 2008).

On the other hand, biomass burning (BB) is a significant source of air pollution that has global, regional and local effects on air quality, public health and climate. Worldwide, a wide range of studies have been conducted on the implications of the BB aspects, including its specific types, on greenhouse gas emissions and its various impacts.

Traditionally, in rural households, collecting and storing residual biomass, weeds, branches and leaves are used as irreplaceable fuel for cooking or heating, and there are still rural areas that This action continues.

Estimates based on observed data and simulation of the CMAQ model in China showed that burning biomass fuel had generated 37% of PM2.5 in the harvesting period (Cheng *et al.*, 2014).

An online study of water-soluble potassium ion (K^+) in PM_{10} and the detection of gases contamination showed that BB had a significant effect on air quality in Shanghai over time (Li *et al.*, 2010). Varied research in China also showed that the burning of agricultural residues threatened the region because of a significant amount of greenhouse gases such as CO_2, CO and hydrocarbons, other pollutants such as SO_2 and NOx, and smoke particles that are carcinogenic They distribute large sizes (Li *et al.*, 2007; Zhang *et al.*, 2008; Zhang *et al.*, 2011; Li *et al.*, 2016; Sun *et al.*, 2016).

Another study found that one of the carcinogens of the respiratory system, particulate matter and PAH hydrocarbon gases is the burning down of the remaining three agricultural products in China (Zhang *et al.*, 2011). BB has been particularly concerned in recent years, due to its link with climate change, because it releases a significant amount of low-temperature substances such as carbon black (Gustafsson *et al.*, 2009; Ramana *et al.*, 2010; Lack *et al.*, 2012; Victor *et al.*, 2015).

World Energy Consumption

According to forecasts, the share of primary demand for the consumption of all types of renewable energy in the world will increase from 18% for 2013 to more than 25% by 2040. According to the International Energy Agency's estimate, by 2040, the share of fossil fuels will be reduced and will be added to the share of renewable energy. The share of pollutants in the agriculture and forestry sector is 24% and the industry, transport and construction sector is more than 41% (OECD, IEA, Energy Poverty, 2013). Therefore, most countries in the world have been considering the plans for the energy sector.

As an example, the EU has set its goals by producing at least 20% of gross final energy from renewable energy

sources by 2020, which part of the 20-20-20 strategy includes a 20% reduction in greenhouse gas emissions E and 20% improvement in EU energy efficiency. In this regard, the agricultural sector has a special place. Because this sector can be described primarily as a problem with the release and consumption of energy, and on the other hand as a biomass source (Sutherland *et al.*, 2015).

Meybod city is also one of the industrial and economical fields of Yazd province, which has been growing rapidly in the industry, to remain developing countries in the direction of

Sustainable development is not in a good condition. Increasing consumption of energy and high volumes of pollutants on the one hand, and decreasing or stagnation of the subsurface

Green space has intensified this issue. Therefore, it is necessary to examine the new conditions and planning to use a broader spectrum of renewable energies, cheaper, more reliable, cleaner and more accessible.

Biogas Energy

Among the diverse and renewable energy sources, biogas is a blend of gaseous fossil fuels (*Garcilasso et al.*, 2011), a promising alternative to waste repairs (He, 2010). Often, biogas produced from agricultural waste is used for the domestic fuel of farms, livestock and neighboring farmers, and a small amount of biogas for power generation (Fazli *et al*., 2011). According to a study in Iran, it was determined that the amount of energy from biomass depends to a great extent on the conditions of that region (Mirmijidi *et al.*, 2009). On the other hand, there is no practical experience in this area in Yazd province (Mirmijidi *et al.*, 2009).

In this research, the possibility of using renewable biomass energy to be used to provide part of cooking, lighting and heat in residential and agricultural areas has been studied in order to reduce the proportion of fossil energy consumption in villages and to replace them. As a result, the amount of pollutant emissions in the city will be reduced.

Analysis Method

In this research, the amount of agricultural production (agricultural and horticultural sector) was assessed according to official statistics of Jihad-e-Agriculture Organization. Then the 10-year tenure of city energy consumption, especially natural gas, was extracted from the official statistics of the regional oil company. The natural gas consumption potential of the city over the next ten years was predicted with the aid of the Airline Model series of time and by SAS9.2, a powerful statistical software.

Also, the amount of debris and gardens that have potential for biomass and biogas energy utilization have been calculated with the help of previous Iranian studies conducted according to IPCC global standards. The amount of emission of pollutants in case of maintaining the current trend is calculated with the help of the coefficients of the global organizations available in this field. According to researches, the energy content of dry matter residue for blue wheat was 16.86 gig / t dry matter and 16.56 giga watts

Ton dry matter is determined (Mohammadi *et al.*, 2011). To calculate the potential of arable and garden biomass in the city, the coefficients obtained in previous research were obtained (Mohammadi *et al.*, 2011)..

Therefore, the pomegranate residue was 0.25 of its production, with a potential of 450 m3 of biogas per ton of residue and energy. The resulting biogas is about 20 megajul.

The weight of pistachio remains is 0.42, and the amount of biogas production and its production energy is like pomegranate. And in another study, each m ^ 3 biogas generates kwh6 of thermal energy. And the ability to produce electricity per cubic meter of biogas for generator-generating generators is 8 MJ.

However, when biogas is converted into electricity in a biogas electric generator, about 2 kWh of power can be generated, and the rest is converted into heat that can be used for heating applications. 2 kWh, enough energy for a 100 Watt light bulb for 20 hours or a 2000W grape dryer for 1 hour (Lund, 2007).

On the other hand, the agricultural sector has a potential emission of around 24% of global greenhouse gas emissions that needs to be managed (Lior, 2002). And one of the effective ways to deal with it is to transform the remains into biogas. Which will replace the consumption of natural gas as well as the BB substitute for the rural sector, which will lead to a decrease in the emissions issue in the region. Also, for each cubic meter of natural gas, 1,875 kg of CO_2 will be released in space (Lior, 2002).

Findings

Agricultural situation of the city Major agricultural products in the city of Meybod are divided into major divisions. Average annual wheat production was 3500 tons per year and about 500 tons per year. Also, pomegranate production is about 20000 tons / year and pistachio is about 1000 ton / year, which has been almost constant in recent years.

Biomass

The annual amount of wheat remains over 1.2 million tons of barley more than 380 thousand tons, which has been almost stable. Also, the amount of garden debris is about 4,900 tons for pomegranate and more than 300 tons for pistachios. Releasing or burning this volume of residues (BB) is one of the most effective emitters.

City Energy Consumption

The energy consumption of Meybod County includes kerosene, petrol, natural gas (LPG & NPG), gasoline and gasoline, which has seen a steady decline in the consumption of all natural gas in the period from 2006 to 2013. Growth of more than 5 times the consumption of natural gas will increase emissions and reduce the general health of the community. Therefore, it seems necessary to review the energy consumption of the city.

Meybod city energy consumption forecast for the next ten years

The forecast of natural gas consumption in the city was examined using different models and according to various parameters, the Airline Model was used to perform this prediction.

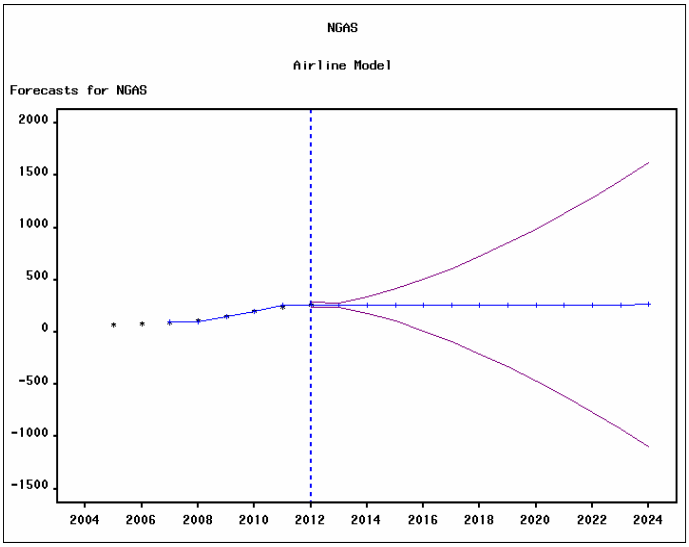

Fig. 1 : Forecast for natural gas consumption (2013-2024).

According to the forecast by the Airline's time-series model, if the current consumption of natural gas is maintained, it could increase consumption by up to 10 million cubic meters

There is. Regarding the amount of natural gas used in 1396, 479.815 million tons of CO_2 were released, due to the increasing consumption of natural gas,

This amount is also rapidly increasing and will have many destructive effects. This release, along with the burning of biomass in rural areas, will greatly affect public health. Meanwhile, the use of this fossil fuel is only part of the pollution of the city, and due to the small size of the city and the addition of industries such as steel in the coming years, this volume of consumption and pollution will be irreparable.

Therefore, countries such as China, which began to promote the use of rural biogas as a way to solve part of the two major problems of rural energy shortages and widespread environmental pollution, began to work since the beginning of the year. And uses biogas that has advantages beyond the expansion of energy production (20.21).

The release of pollutants is due to the traditional biomass in Meybod.

According to the calculations, at least the emissions of pollutants from the cereals at the city level are about 480 tons per year, along with the burning of debris

The garden, which is also more than 5,000 tons, in addition to BB-related diseases, is a major contributor to the level of the village. Another factor caused by

The spread of pollutants in the urban environment and the countryside is the consumption of natural gas, which is estimated at more than 500 thousand tons in the statistical year, and according to forecasts, by 1404, it will be more than six times the base year. Which needs to replace various renewable energies, one of which is biogas.

Estimated biogas of Meybod city

To predict the potential of lost energy amount due to biomass of crops in the region, a ten-year process of production of agricultural crop residues from the year 2004-2013 was calculated and then, using the SAS9.2 statistical software, Log Damped Trend Exponential Smoothing was selected for time series analysis.

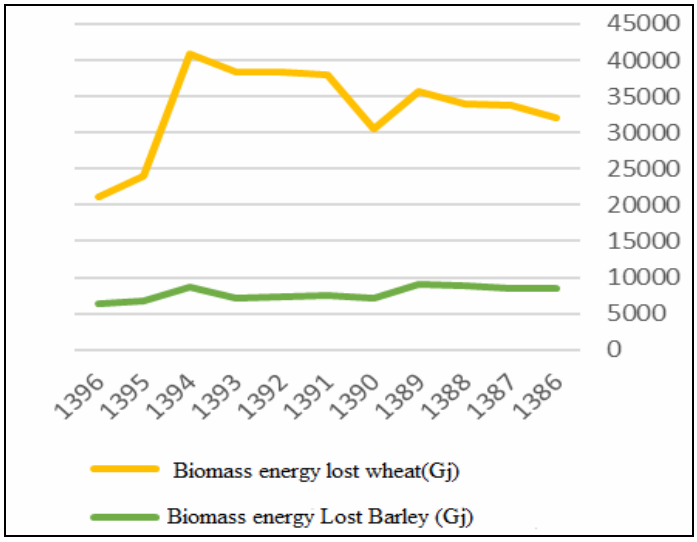

Fig. 2. Biofuel Potential of the Lost Crop.

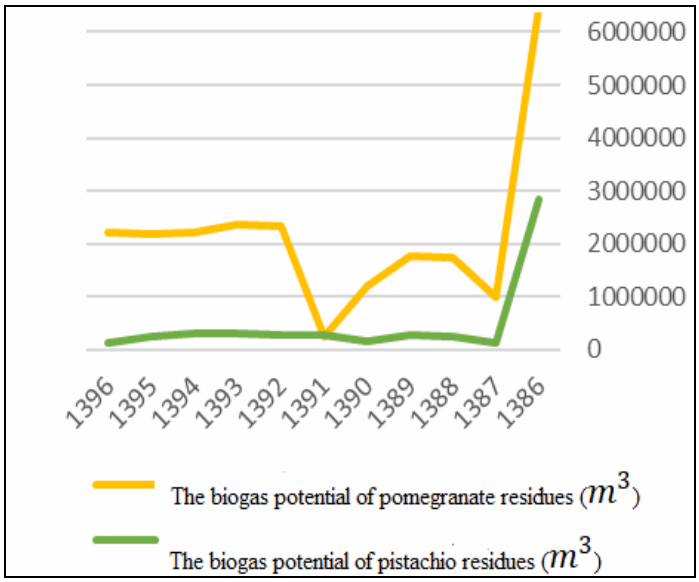

Fig. 3. Biogas potential from garden gardens (cubic meters).

The biomass energy from the crop residues has been over 26,000 gigawatts per year, which has been lost (Fig. 2).

Also, this amount of energy lost due to the incorrect use of garden debris is equivalent to more than two million cubic meters of biogas (Fig. 3).

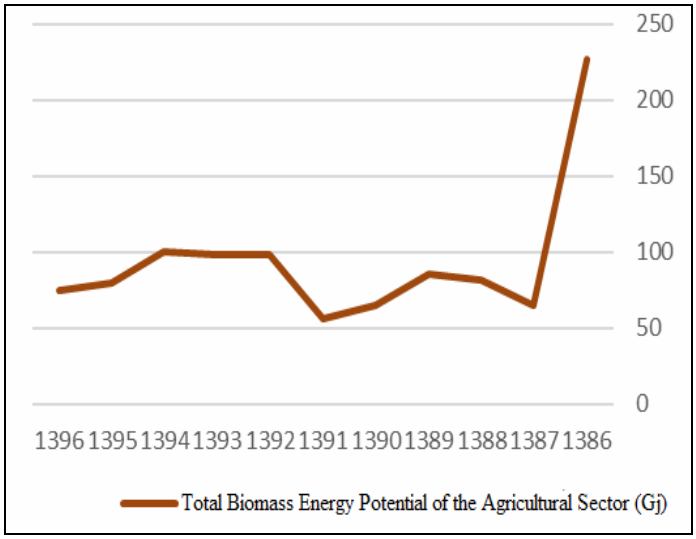

Fig. 4. The total annual biogas potential of the Meybod County Crop and Gardens.

Conclusion

Given that the thermal value (HHV) per cubic meter of natural gas is 36.12 MJ, this volume of biomass production could be replaced with more than 2000 cubic meters of natural gas in 2017. Also, this substitution will reduce the city's BB volume and reduce pollutant emissions in the rural sector by approximately 48 tons.

Regarding the sustainable development strategy of most developed countries in the field of energy, which includes three major technological changes: energy saving from the aspect

Demand (Afgan and Carvalho, 2004), improved energy efficiency (Wang *et al.*, 2015), and the replacement of fossil fuels by various sources of renewable energy (Li *et al.*, 2009), and because

One of the major sources of renewable energy in the world is biomass and biogas, and in some regions and countries, the share of renewable energy has grown considerably over the last few decades. For example, in Denmark, after the 1973 oil crisis, with more than 14% of fossil fuels being properly regulated by renewable energy, it has been replaced.

Therefore, for cities like Meybod, which have a great potential for the use of renewable energies, long-term strategies must be defined and implemented by developed countries, such as the 20-20-20 Strategy, in order to replace part of fossil fuels.

Meybod city has a production potential of more than 2 million cubic meters of biogas, which is equivalent to 16 electricity transmissions, or equivalent to 100 gigawatts of heat energy, due to the level of agricultural and garden production. This amount of energy can be replaced by consuming more than 2,000 cubic meters of natural gas at the city level. As a result, it will play a very important role in the rural economy.

On the other hand, as suggested in a study in China, BB has had a significant impact on the decline of Shanghai's air quality during harvesting (Li *et al.*, 2010). Another study in Shanghai found that BB increased the chemical composition of PM2.5 to over from three bubbles has been erased in days (Fallahnejad Tafti *et al.*, 2016). Another study also found that the burning of agricultural residues threatened China as a significant amount of greenhouse gases such as CO_2, CO and hydrocarbons, other pollutants such as SO2 and NOx, and smoke particles that carcinogens Distribute a large size (Li *et al.*, 2007; Zhang *et al.*, 2008; Zhang *et al.*, 2011; Li *et al.*, 2016; Sun *et al.*, 2016).

Therefore, improving the health status of the rural community will help with the replacement of BB with biogas and the reduction of emissions from burning of debris and natural gas to more than 48 tonnes of CO_2 at the village level.

Therefore, converting plant residues into renewable energy sources such as biogas will have the following advantages for villagers:

1. Saving energy sector 2. Improving general health of villagers 3. Increasing relative welfare 4. Increasing sustainable development of the region.

Table 1: Natural gas consumption forecasts for 2013-2024).

Forecast Data Set
NGAS
Airline Model

DATE	ACTUAL	PREDICT	U95	L95	ERROR	NERROR
2005	67.5000	.	.	.	.	.
2006	81.0000	.	.	.	.	.
2007	90.0000	94.5000	131.1658	57.8342	-4.5000	-0.2405
2008	112.4460	96.2082	124.9650	67.4515	16.2378	1.1067
2009	151.5645	148.5540	174.7268	122.3813	3.0105	0.2254
2010	202.7075	197.1071	222.2292	171.9850	5.6004	0.4369
2011	241.6500	260.4784	285.1538	235.8030	-18.8284	-1.4955
2012	255.9015	262.0091	286.4969	237.5213	-6.1076	-0.4888
2013	.	258.1561	282.5196	233.7926	.	.
2014	.	258.6300	337.6510	179.6091	.	.
2015	.	259.1040	413.9413	104.2667	.	.
2016	.	259.5779	505.5629	13.5929	.	.
2017	.	260.0519	610.1527	-90.0490	.	.
2018	.	260.5258	726.2347	-205.1831	.	.
2019	.	260.9997	852.7559	-330.7564	.	.
2020	.	261.4737	988.9120	-465.9647	.	.
2021	.	261.9476	1134	-610.1662	.	.
2022	.	262.4216	1288	-762.8334	.	.
2023	.	262.8955	1449	-923.5218	.	.
2024	.	263.3694	1619	-1092	.	.

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