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Examining the Relationship among Economic Growth, Renewable Energy Consumption and Life Expectancy in Iceland

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Abstract
The aim of this study is to examine the renewable energy policies of Iceland and contribute to the existing literature by empirically analyze the relationship among economic growth, renewable energy consumption and life expectancy in the context of time series, using annual data for the years 1990-2021. For this purpose, firstly, ADF and PP unit root tests were performed for stationarity test. After confirming that all variables were stationary at their first differences, Granger causality analysis was applied. The results from this analysis indicate a unidirectional Granger causality relationship from economic growth to renewable energy consumption.

Keywords
Economic Growth, Renewable Energy Consumption, Life Expectancy, Renewable Energy Policies, Time Series Analysis, Iceland

INTRODUCTION

Energy is seen as an indispensable resource in the growth and development of every country. However, the use of fossil fuels, which has increased with the industrialization process and the acceleration of the industrialization process, the spread of globalization, and the increase in production has negatively affected living things and brought environmental problems. Hence, increased usage of fossil fuel has increased greenhouse gas emissions, polluted the environment, and exacerbated the climate crisis. These negative environmental effects threaten the ecosystems and human health, causing reduction or loss of biodiversity, and depletion of natural resources etc. As a result of these consequences, it has been suggested that the use of renewable energy should rise because it is accepted that the transition to renewable energy use will support general welfare by creating healthy environment. Besides, it is also accepted that the use of renewable energy sources play a crucial role in fostering sustainable development, thereby improving the quality of life for future generations.

According to many studies investigating the relationship between economic growth and life expectancy, life expectancy increases as economic growth increases. Because the increase in economic growth leads to an increase in income levels, consumption expenditures and health investments (Erdoğan and Bozkurt, 2008: 25). Also, the increase in life expectancy can support economic growth by improving the human characteristics of individuals. Increasing investments in areas such as health, education, and environment will increase the life expectancy (Özgün, 2024: 125-126). However, carrying out economic activities with fossil fuel energy resources bring with it many problems. In particular, negative effects caused by continuously increasing CO_2 emissions have devastating impacts on the environment, human life, and other living things.

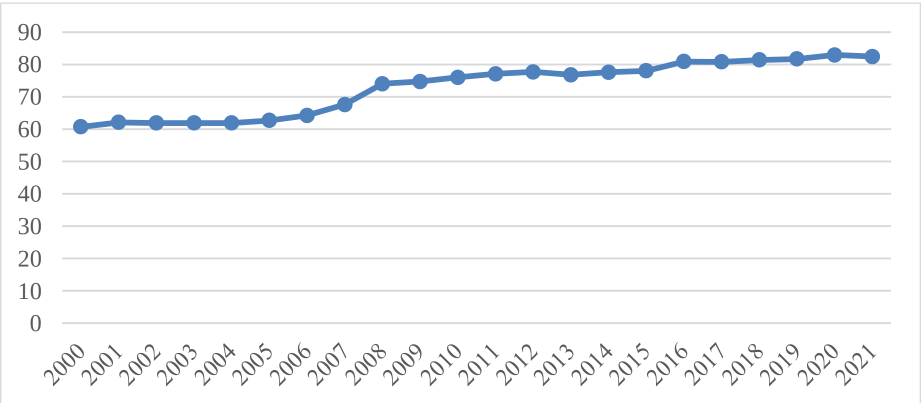
Energy resources have had strategic importance throughout history, but they have become even more important with the industrial revolution. Especially the mechanization and industrialization that occurred with the industrial revolution increased the use of energy in production. Besides, the growing population worldwide, migration from rural areas to urban centers, increasing industrial production, and the rise in the number of vehicles used in the traffic have rapidly increased the need and demand for energy. The increasing amount of output with the transition from agricultural society to industrial society has caused the demand for energy to increase considerably. Energy is an essential factor in today's production and consumption structure (Özer, 2022: 28; Kavcıoğlu, 2019: 210; Uslu, 2018: 730). The areas of use of energy are very diverse, and energy is needed in many areas such as the manufacturing industry, service sector, housing, transportation, communication etc. (Demir, 2023: 272). The need for energy is one of the most significant elements required for the production and continuity of economies, and the need for energy increases as the economy grows (Şimşek, 2024: 426). However, energy is imported to meet energy consumption in cases where energy production is not sufficient. Energy imports result in a current account deficit, which has a detrimental impact on economic growth (Çınar and Öz, 2017: 41). Besides, the widespread use of fossil fuel energy resources, especially the harm they cause to human health and the environment has become a global problem. At the same time, the importance of renewable energy sources has grown due to challenges such as damage to nature, resource depletion, reliance on external energy supplies, energy security concerns, and environmental degradation (Saad and Taleb, 2017: 127). The rapid depletion of fossil fuel energy resources and the serious impact of their use on the environment and human health underscores the need for international economies to turn to more sustainable renewable energy resources (Raihan and Tuspekova, 2023: 23). Some studies confirm that greater use of renewable energy leads to lower CO_2 emissions. The increased use of fossil fuels has led to higher CO_2 emissions, thus accelerated global warming and climate crisis. This has had detrimental effects on human health and life expectancy (Sodhi and Gök, 2022). Life expectancy, which is affected by a lot of factors such as economic, social, and environmental will be positively affected by the use of renewable energies. Because a cleaner environment is created by the use of renewable energy and diseases that can be caused by pollution can be reduced (Yılmaz and Şensoy, 2023).

Iceland, an island country located in the North Atlantic Ocean and is a part of Nordic country is a developed and prosperous country. According to OECD data for 2023, Iceland's GDP per capita is 78.939 $ and is above the OECD average, making it the 6th country among OECD countries. Iceland which ranked 3rd in terms of human development index in 2022 plays also a significant role in the world when it comes to renewable energy.

The present study aims to empirically analyze the relationship among economic growth, renewable energy consumption and life expectancy in Iceland, using Granger causality test between 1990 and 2021. Although there are numerous studies examining the relationship between economic growth and renewable energy consumption, the fact that there are not many studies that include the life expectancy variable and that such a study is not found in the literature specifically for Iceland increases the importance of the study and makes it different from the studies in the literature. The study's originality adds valuable insight to the existing body of research and offers a basis for further exploration of similar relationships in other countries, thereby advancing the discourse on economic growth, renewable energy and life expectancy. The study is structured as follows: Iceland's renewable energy policies will be discussed in the following section. Then, hypotheses elucidating the connection between renewable energy and economic growth will be described, and prior empirical research on the topic will be summarized under the heading of theoretical and empirical literature. Afterward, the data set and econometric method used in the analysis will be introduced. Subsequently, empirical results derived from the application will be presented. The study will be completed with the conclusion section.

ICELAND'S RENEWABLE ENERGY POLICIES

Renewable energy use in Iceland began in the beginning of 20th century with the aim of improving living standards and enhancing energy security (Guðmundsdóttir et al., 2018). In 2018, nearly all of the country's stationary energy, and 86% of its primary energy is obtained from domestic renewables with electricity production being almost carbon-free (Ketilsson et al., 2021). Today, Iceland, a country with a high standard of living is among the leading countries in the world in the use of renewable energy (Ragnarsson et al., 2021; Cook et al., 2016). Indeed, Iceland's geography offers abundant renewable energy resources. Iceland currently produces the vast majority of its electricity using renewable energy. Electricity is provided mainly from hydroelectric energy and geothermal sources (Ministry of Finance and Economic Affairs, 2021; Cook, 2024). On per capita basis, Iceland is among the top producers of renewable energy worldwide (Cook, 2024).



Graph 1 Iceland's Renewable Energy Consumption (%), 2000-2021
***Source*:** https://databank.worldbank.org (Accessed: 30.10.2024)

Iceland relies heavily on renewable energy to meet its heating need (Aliyev et al., 2024: 230). Graph 1 shows Iceland's renewable energy consumption for the years 2000-2021 and it is observed that there is a rising trend during the period in question. As a matter of fact, renewable energy consumption increased by 35.75%. More specifically, the graph shows that while there was a faster increase in renewable energy consumption from 2000 to 2008, it increased more and followed a horizontal course from 2008 to 2021. According to World Bank data, the renewable energy consumption was %82.4 in 2021. Despite the slower rate of rise in the latter years, renewable energy consumption continued to rise steadily.

According to data from the International Energy Agency (IEA), when examined on a sectoral basis, in Iceland, the industrial sector had the largest share of total final energy consumption in 2022 with approximately 43%. This was followed by commercial and public services with about 16%, and residential with 15%. In 2022, Iceland's largest energy source in total final consumption was electricity with approximately 51%, followed by heat with 24.4% and oil products with 17.3%. In 2023, about 78% of Iceland's domestic energy production came from geothermal, wind, solar, etc. (IEA, 2025).

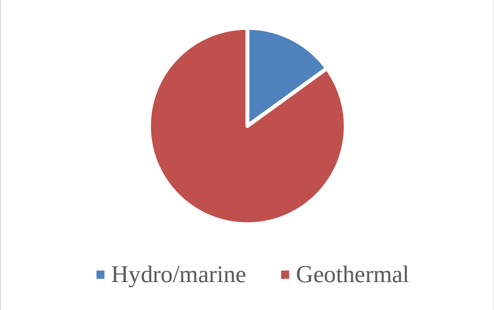


Fig. 1 Iceland's Renewable Energy Supply in 2021
***Source*:** IRENA, 2024

According to the report of IRENA, Iceland's total energy supply in 2021 constituted nearly 92% of renewables, 6% of oil and 1% of coal and others. From this point of view, Fig. 1 shows Iceland's renewable energy supply in 2021. When the figure is examined, it can be seen that the renewable energy supply in Iceland consists mostly of geothermal and hydro/marine resources.

Table 1 Electricity Generation in Iceland in 2022

	GWh	**%**
Non-renewable	3	0
Renewable	20.123	100
- *Hydro and marine*	14.196	71
- *Solar*	5	0
- *Wind*	6	0
- *Bioenergy*	0	0
- *Geothermal*	5.916	29
Total	**20.126**	**100**

***Source*:** IRENA, 2024

Nearly all of Iceland's power and district heating comes from renewable sources, making it one of the countries with the largest percentages of renewable energy in its energy mix. Hydropower and geothermal energy are Iceland's two main renewable energy sources, and together they account for virtually all of the country's electricity production (Guðmundsdóttir et al., 2018). As shown in Table 1, the majority of electricity generation in Iceland in 2022 came from renewable energy sources. Here again, it is seen that hydro and marine and geothermal energy have the highest rate.

The government of Iceland aims to raise the renewable energy resources share in the road transportation sector and maritime industry by 2030. In addition, by 2040, the policy of the government is focused on achieving carbon neutrality and a fossil fuel-free Iceland (Ministry of the Environment, Energy and Climate, 2024: 6). The Icelandic government has published an Energy Policy for 2050, which outlines that all energy production should come from renewable sources by 2050, and developed in a sustainable and socially beneficial way. The main target of the Energy Policy is to develop a diverse energy system that is resistant to shocks and resilient to natural disasters, and the impacts of climate change. The sustainable energy is aimed for the transition for land, sea, and air uses which will allow the country to become independent of fossil fuels (Ministry of Finance and Economic Affairs, 2021). Besides, the Icelandic government planned to develop solar and wind energy along with hydrogen and methane (https://aenert.com).

THEORETICAL AND EMPIRICAL LITERATURE

The link between economic growth and renewable energy consumption has been an important area of research. It is especially important to look into which way these two variables are causally related because it can provide valuable information for policy makers (Apergis and Danuletiu, 2014: 579). In the existing literature, the causal relationship between economic growth and renewable energy is explained by four main hypotheses. These hypotheses explore the potential directions of causality between the variables in question. These hypotheses include the growth, conservation, feedback, and neutrality hypothesis. The growth hypotesis is based on the fact that there is a unidirectional causality relationship from the consumption of renewable energy to economic growth. The conservation hypothesis, on the other hand, posits a one-way causality relationship from economic growth to renewable energy consumption. The validity of the feedback hypothesis is supported by a bidirectional causality relationship between the variables in question. Lastly, according to the neutrality hypothesis, there is no causal link between the consumption of renewable energy and economic growth (Singh et al. 2019: 4; Fotourehchi, 2017: 62).

If we mention about some empirical studies on the subject, Apergis and Danuletiu (2014) investigated the relationship between economic growth and renewable energy. For this purpose, Canning and Pedroni long-run causality test was applied for 80 countries. The years from 1990 to 2012 was taken into account in the analysis. The empirical findings have shown that there is an interdependence between the variables.

Irandoust (2016) used the VAR model and Granger non-causality test to analyze the relationship between CO_2 emissions, economic growth, renewable energy consumption, and technological innovation in four Nordic countries. The period 1975-2012 was taken into account in the study. The findings indicate a one-way causality running from growth to renewable energy. However, no evidence was found to support a causal link from renewable energy to growth.

Saad and Taleb (2017) examined the relationship between economic growth and renewable energy consumption in 12 EU countries over the short and long run. Panel data analysis for the years 1990-2014 was employed. The results showed a one-way causality relationship from economic growth to the consumption of renewable energy in the short run. In contrast, in the long run, a two-way causality relationship was observed between the variables in question.

Šimelytė and Dudzevičiūtė (2017) investigated the connection between trade, labor, capital, economic growth, and renewable energy consumption in 28 EU countries taking into account the period 1990-2012. The results demonstrated that renewable energy consumption stimulates the economy in 12 of these countries. Additionally, it was discovered that the neutrality hypothesis was valid in 2 countries, while the conservation hypothesis was valid in 6 countries.

Özer (2022) analyzed the relationship between economic growth and renewable energy in Denmark between 1990 and 2018 using the fractional frequency Fourier ADL cointegration test. As a result, a unidirectional relationship from renewable energy to economic growth was identified.

Kilci (2023) studied the relationship between economic growth and the consumption of renewable energy for Austria, Belgium, Finland, Germany, Italy, Portugal, Spain, and the Netherlands. Covering the years 1990-2020, panel causality test that takes structural breaks into account was used. The findings for the panel revealed a unidirectional causality relationship from economic growth to renewable energy consumption. Besides, it was discovered that in Italy, Spain, and the Netherlands, there was a unidirectional causality relationship from economic growth to renewable energy consumption. But in Finland, a unidirectional causality relationship was revealed from the consumption of renewable energy to economic growth. However, no causal link for Austria, Belgium, Germany, and Portugal was found between the variables.

Wang et al. (2023) used panel data analysis to examine the connection between life expectancy, renewable energy consumption, and economic growth in selected 121 countries. The study covers the period 2002-2018. The result of the study demonstrated that the consumption of renewable energy has a double threshold effect of GDP per capita on life expectancy. Furthermore, a positive link between life expectancy and renewable energy consumption was found. However, the relationship between life expectancy and renewable energy differs across income groups. It was found that in high-income countries, consumption of renewable energy is more helpful in rising life expectancy.

Aliyev et al. (2024) used Toda-Yamamoto test in order to determine the causal relationship between renewable energy consumption and economic growth for Iceland and Azerbaijan, taking into account the period 1990-2020, and found a bidirectional causal relationship in both countries.

When the existing empirical literature is evaluated in general, it is seen that different result are obtained taking into account different periods and methods for the country or country group considered.

DATA SET AND ECONOMETRIC METHOD

This section analyzes the relationship among economic growth, renewable energy consumption and life expectancy using Granger causality test, which was put forward by C. W. J. Granger in 1969. In this study conducted specifically for Iceland, annual data for the period 1990-2021 were used. Logarithms of the variables included in the analysis were taken. The analysis was carried out using Eviews program. The model to be estimated in the study consists of three variables. These are; economic growth, renewable energy consumption and life expectancy. Within this framework, the variable representing economic growth in the analysis is GDP (constant 2015 US$) and is shown as GDP in the model. The variable representing renewable energy consumption is renewable energy consumption (% of total final energy consumption) and is expressed as REC in the model. Lastly, the variable representing life expectancy is life expectancy at birth, total (years) and is denoted as LE in the model. A causal relationship may exist between the variable taken into account in the study. All variables included in the analysis were accessed from the World Bank (WDI) database. The reason why the analysis starts from 1990 is that the renewable energy consumption variable is available from this year.

The time series approach was used as econometric method in the study. Therefore, in order to decide which method will be used to analyze the connection among the variables considered in the study, the first step is to assess whether the variables contain a unit root or not. Therefore, two well-known unit root tests in the literature, namely Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were used. Diagnostic tests were then performed to test the estimated model's stationarity, stability and reliability. Finally, Granger causality analysis was conducted to explore whether any causal relationship exist among the variables. And if there is such a causal relationship, the analysis is also aimed to identify the direction of this causality.

The hypothesis created for unit root tests is expressed as follows:

H_0: Series are not stationary, there is a unit root
H_A: Series are stationary, there is no unit root

Granger causality analysis was first proposed by Granger in 1969 and has been widely used in the literature since then. Granger causality analysis is used to determine whether there is causality between the variables, and if so, the direction of the causality. In order to apply Granger causality analysis, it is essential that all series are stationary at the same order of integration. If the series are not stationary, then the differences of the series should be taken and they should be made stationary. The equation of Granger causality analysis can be written as follows (Granger, 1969):

$$X_t = \sum_{j=1}^{m} a_j X_{t-j} + \sum_{j=1}^{m} b_j Y_{t-j} + \varepsilon_t,$$

$$Y_t = \sum_{j=1}^{m} c_j X_{t-j} + \sum_{j=1}^{m} d_j Y_{t-j} + \eta_t,$$

Four different results can be obtained from Granger causality analysis: one-way causality from X to Y, one-way causality from Y to X, bidirectional causality between X and Y, or no causality between X and Y.

EMPIRICAL FINDINGS

Firstly, descriptive statistics and normality test were performed in the study and are presented in Table 2. The results of the Jarque-Bera test, shown in the Table indicate that all the probability values for all the variables used in the study are greater than 0.05. Based on this, it can be concluded that all variables have a normal distribution.

Table 2 Descriptive Statistics and Normal Distribution Test Results

	GDP	LE	REC
Mean	23.33730	4.393280	4.198686
Median	23.42502	4.398219	4.150182
Maximum	23.75485	4.420837	4.417635
Minimum	22.88673	4.356509	3.956996
Std. Dev.	0.287584	0.021267	0.160710
Skewness	-0.232419	-0.354848	-0.000630
Kurtosis	1.703486	1.764250	1.410384
Jarque-Bera	2.529361	2.707662	3.369175
Probability	0.282329	0.258249	0.185521
Sum	746.7937	140.5850	134.3580
Sum Sq. Dev.	2.563836	0.014021	0.800657
Observations	32	32	32

Fig. 2 shows the graphical representation of the variables (GDP, REC and LE) used in the analysis. When the figure is evaluated as a whole, an upward trend is seen in all variables during 1990-2021 period. This generally shows that Iceland has experienced improvements in these three variables in the period considered in the study.

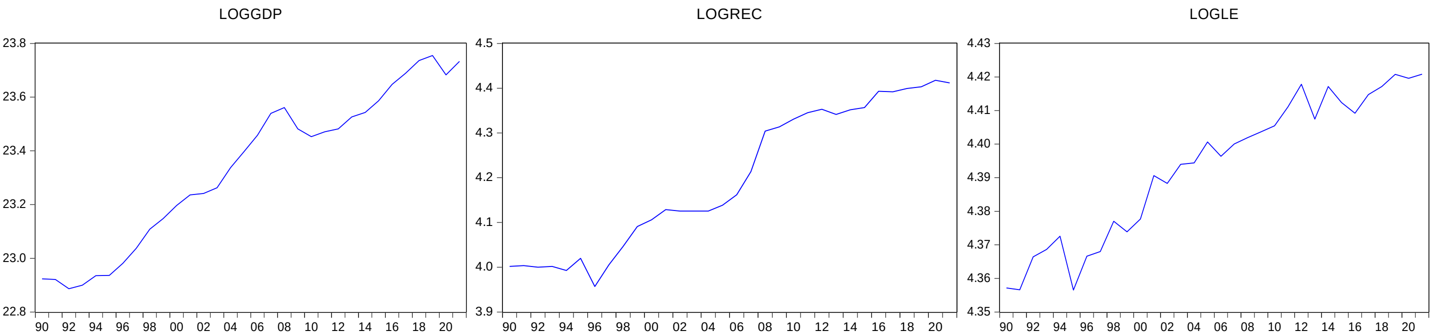


Fig. 2 Graphical Representation of Variables (GDP, REC and LE) in the Data Set

The stationarity properties of each series (GDP, REC and LE) in the study have to be investigated. The ADF and PP unit root tests were employed to ascertain whether a unit root existed in the series. These tests' outcomes are displayed in Table 3. Accordingly, both unit root tests gave parallel results. As a matter of fact, it is seen that neither series are stationary at level. The series become stationary after taking their first differences. Consequently, the stationarity of all the variables is confirmed as I(1).

Table 3 ADF and PP Unit Root Test Results

Intercept					
Variables	ADF Test Statistic		Test Critical Values		
	t- Statistic	Prob.	1%	5%	10%
GDP	-0.495525	0.8791	-3.661661	-2.960411	-2.619160
D(GDP)	-3.758692	0.0081	-3.670170	-2.963972	-2.621007
REC	-0.294472	0.9148	-3.661661	-2.960411	-2.619160
D(REC)	-4.859125	0.0005	-3.670170	-2.963972	-2.621007
LE	-1.332841	0.6010	-3.670170	-2.963972	-2.621007
D(LE)	-8.879456	0.0000	-3.670170	-2.963972	-2.621007
Variables	PP Test Statistic		Test Critical Values		
	Adj. t-Stat	Prob.	1%	5%	10%
GDP	-0.495525	0.8791	-3.661661	-2.960411	-2.619160
D(GDP)	-3.705145	0.0092	-3.670170	-2.963972	-2.621007
REC	-0.294472	0.9148	-3.661661	-2.960411	-2.619160
D(REC)	-4.886108	0.0004	-3.670170	-2.963972	-2.621007
LE	-1.377296	0.5804	-3.661661	-2.960411	-2.619160
D(LE)	-11.40293	0.0000	-3.670170	-2.963972	-2.621007
Trend and Intercept					
Variables	ADF Test Statistic		Test Critical Values		
	t- Statistic	Prob.	1%	5%	10%
GDP	-2.630676	0.2704	-4.296729	-3.568379	-3.218382
D(GDP)	-3.707052	0.0374	-4.296729	-3.568379	-3.218382
REC	-2.332879	0.4048	-4.296729	-3.568379	-3.218382
D(REC)	-4.757530	0.0033	-4.296729	-3.568379	-3.218382
LE	-2.056568	0.5479	-4.296729	-3.568379	-3.218382
D(LE)	-4.967743	0.0021	-4.309824	-3.574244	-3.221728
Variables	PP Test Statistic		Test Critical Values		
	Adj. t-Stat	Prob.	1%	5%	10%
GDP	-1.958898	0.6000	-4.284580	-3.562882	-3.215267
D(GDP)	-3.639785	0.0431	-4.296729	-3.568379	-3.218382
REC	-2.151253	0.4986	-4.284580	-3.562882	-3.215267
D(REC)	-4.789188	0.0031	-4.296729	-3.568379	-3.218382
LE	-3.380839	0.0725	-4.284580	-3.562882	-3.215267
D(LE)	-15.73053	0.0000	-4.296729	-3.568379	-3.218382

Within the context of information criteria, the optimal lag length for the VAR model to be established after the variables are made stationary should be determined. The result of optimal lag length is presented in Table 4. According to these criteria, the model's optimal lag length was identified to be 1.

Table 4 Determining the Optimal Lag Length

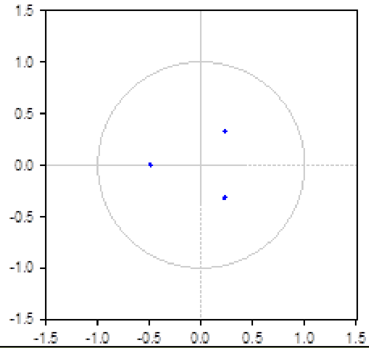
Lag	LogL	LR	FPE	AIC	SC	HQ
0	217.5533	NA	4.44e-11	-15.32523	-15.18250*	-15.28160
1	228.9212	19.48794*	3.77e-11*	-15.49437*	-14.92343	-15.31983*
2	233.3539	6.649062	5.36e-11	-15.16814	-14.16898	-14.86269
3	240.5399	9.239125	6.52e-11	-15.03857	-13.61120	-14.60221

Diagnostic tests are essential to asses whether the estimated model is stationary, reliable and consistent. Table 5 shows diagnostic test results. According to the information in the Table, since all the inverse roots of the AR characteristic polynomial are located within the unit circle and the modulus values are less than 1, it can be concluded that the model does not exhibit any stationary issues. Nevertheless, the probability values of autocorrelation is higher than 0.05, and similarly the heteroscedasticity probability value is also greater than 0.05 (0.7557>0.05). Therefore, it can be said that the model does not contain these problems. These findings confirm that the model is significant and satisfies the stability condition. In this way, since the appropriate requirement for Granger causality analysis is provided, Granger causality analysis can be carried out.

Table 6 shows the result obtained from the Granger causality analysis. When the findings are examined, a unidirectional causality relationship is identified from economic growth to renewable energy consumption. This is evidenced by the probability value of 0.0068, which is less than 0.05. However, no Granger causality relationship was observed between economic growth and life expectancy, and between renewable energy consumption and life expectancy.

Table 5 Diagnostic Test Results

Inverse Roots of AR Characteristic Polynomial		
Root	**Modulus**	
-0.488014	0.488014	
0.229543 - 0.322459i	0.395815	
0.229543 + 0.322459i	0.395815	



Autocorrelation Test				
Lags	**LRE Statistic**	**Prob.**	**Rao F Statistic**	**Prob.**
1	7.469804	0.5883	0.832414	0.5897
2	8.100832	0.5240	0.908075	0.5255
3	3.441131	0.9442	0.369395	0.9445
4	13.17604	0.1548	1.549365	0.1562
5	8.720543	0.4635	0.983232	0.4651

Heteroscedasticity Test		
Chi-sq	**df**	**Prob.**
29.83835	36	0.7557

Table 6 Granger Causality Analysis Results

Dependent Variable: D(GDP)				
Variables	**Chi-sq**	**Prob.**	**Decision**	**Direction of Causality**
D(LE)	0.644991	0.4219	H_0 Accepted	There is no Granger causality
D(REC)	2.411812	0.1204	H_0 Accepted	There is no Granger causality
Dependent Variable: D(LE)				
Variables	**Chi-sq**	**Prob.**	**Decision**	**Direction of Causality**
D(GDP)	0.000124	0.9911	H_0 Accepted	There is no Granger causality
D(REC)	0.054598	0.8152	H_0 Accepted	There is no Granger causality
Dependent Variable: D(REC)				
Variables	**Chi-sq**	**Prob.**	**Decision**	**Direction of Causality**
D(GDP)	7.311954	0.0068	H_0 Rejected	There is a Granger causality: GDP → REC
D(LE)	2.911689	0.0879	H_0 Accepted	There is no Granger causality

CONCLUSION

Developments in the field of energy used by countries are important for policy makers. Renewable energy which is a type of energy that can be used continuously thanks to natural renewal cycle, without being dependent on a limited resource like fossil fuels is gaining more and more importance in the energy policies of countries (Demir, 2023: 273-279). This study examined Iceland's renewable energy policies and then empirically analyzed the causal relationship among economic growth, renewable energy consumption and life expectancy using Granger causality test, spanning the years from 1990 to 2021. To test the stationarity of the series, ADF and PP unit root tests were conducted and it was determined that both variables had the same degree of stationary, that is, all series were stationary in their first differences. Afterward, diagnostic tests were applied and it was determined that there was no problem with the model estimated in the study. Ultimately, a one-way causality relationship from economic growth to renewable energy consumption was determined by Granger causality analysis. This result obtained for the years 1990-2021 in Iceland supports the conservation hypothesis. This result is consistent with the studies in the literature by Irandoust (2016), Saad and Taleb (2017) and partially Šimelytė and Dudzevičiūtė (2017) and Kilci (2023). The study found no Granger causality relationship between economic growth and life expectancy and between renewable energy consumption and life expectancy.

Environmental problems and concerns, especially with the acceleration of the industrialization process and the spread of globalization have created discussions on the necessity of using renewable energy resources. Renewable energy resources, which generally are accepted as cleaner energy resources are considered to have a positive influence on life expectancy as they reduce harmful greenhouse gas emissions. Iceland is one of the leading countries worldwide in the use of renewable energy. According to the graphs, it is clearly seen that Iceland's renewable energy use has increased by years. In 2021, Iceland's energy supply mostly consisted of renewable energy sources. It has been seen that the renewable energy supply is mostly made up of geothermal and hydro/marine sources. In other words, it can be said that Iceland's primary sources of energy are hydroelectric and geothermal power. In addition, electricity generation in Iceland in 2022 came mostly from renewable energy sources. Iceland, which predominantly ensure its electricity from hydroelectric energy and geothermal sources, and has made remarkable strides in harnessing its abundant resources to meet its energy needs has also set future targets related to renewable energy. Ultimately, Iceland already uses high levels of renewable energy. And continuing to increase the use of renewable energy is important for the country's economy, welfare and sustainability.

The originality of this study is that it is addressed in the Icelandic context and that life expectancy variable is included in the model. Because it has been observed that life expectancy, as a health indicator has not been addressed sufficiently in the studies examining the relationship between these variables. This study has the potential to advance the discourse on sustainable development, the connection among renewable energy, life expectancy and economic growth, and to inspire further research in these interconnected fields. In future researches, studies can be conducted for other countries or country groups, using different methods and adding other health indicators, and thus contributing to the literature. As a matter of fact, these future studies can help refine the findings, and contribute further to the growing body of literature on the nexus among the variables in question.

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