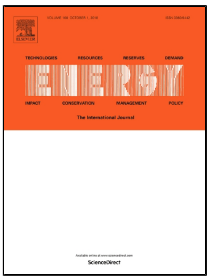
Accepted Manuscript



A Novel Renewable Energy Selection Model for United Nations' Sustainable Development Goals

Gülçin Büyüközkan, Yağmur Karabulut, Esin Mukul

PII:	S0360-5442(18)31751-1
DOI:	10.1016/j.energy.2018.08.215
Reference:	EGY 13691
To appear in:	*Energy*
Received Date:	17 March 2018
Accepted Date:	31 August 2018

Please cite this article as: Gülçin Büyüközkan, Yağmur Karabulut, Esin Mukul, A Novel Renewable Energy Selection Model for United Nations' Sustainable Development Goals, *Energy* (2018), doi: 10.1016/j.energy.2018.08.215

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

A Novel Renewable Energy Selection Model for United Nations' Sustainable Development Goals

Gülçin BÜYÜKÖZKAN[a,*], Yağmur KARABULUT[b], Esin MUKUL[a]

[a] Department of Industrial Engineering, Galatasaray University, Ortaköy, Istanbul 34349, Turkey, gulcin.buyukozkan@gmail.com*.

[b] Department of Business Administration, Galatasaray University, Ortaköy, Istanbul 34349, Turkey

*corresponding author

Abstract

In 2015, the United Nations announced the new Sustainable Development Goals (SDGs) to safeguard the earth and end poverty as the new global sustainable development agenda. One of these SDGs, Goal #7, is about affordable and clean energy. Despite the importance, there are few tools that guide policy-makers in aligning their domestic policies with these SDGs. The paper addresses this research gap and introduces a numerical decision-support method for identifying the most suitable renewable energy source (RES). RES selection according to SDGs can be a challenge for decision makers. This article presents an integrated multi-criteria decision-making (MCDM) method that is based on hesitant fuzzy linguistic (HFL) term set. The decision criteria are weighed with HFL Analytic Hierarchy Process (AHP), and the most appropriate RES alternative is chosen with the HFL COmplex PRoportional ASsessment (COPRAS) technique. The value of the method is demonstrated on a case from Turkey, and a comparative analysis. This approach constitutes a novelty by proposing a numerical model for SDGs that combines AHP and COPRAS in a HFL environment with group decision-making for the first time. The method can help policy-makers in better structuring local energy policies with regard to global efforts in a developing country setting.

Keywords: Renewable Energy; Sustainable Development Goals; Hesitant Fuzzy Linguistic Term Set; Hesitant Fuzzy Linguistic AHP; Hesitant Fuzzy Linguistic COPRAS; MCDM.

1. Introduction

Sustainable development requires collective efforts towards constructing an inclusive, sustainable and resilient future for the society and the earth. This means that the three core elements of sustainability; i.e. economic growth, social inclusion and environmental protection shall be harmonized. Governments, together with businesses and the civil society are mobilizing their resources to achieve the global sustainable development agenda by 2030 under the United Nations. Built on the achievements of the previous Millennium Development Goals, countries adopted 17 Sustainable Development Goals (SDGs) in 2015, which call for new and stronger action by all countries to reduce poverty while protecting the environment [1]. In this new global understanding, countries increasingly assume ownership of the issue and voluntarily set-up national mechanisms for achieving these comprehensive SDGs.

These ambitions are intertwined with many challenges, including new jobs, sustainable cities, industries, biodiversity, sustainable consumption and production, and climate change [2]. Energy is related to many of these SDGs, such as decent jobs, income, pollution and ecosystems, and is therefore central to many of these challenges and opportunities the world is facing. Countries are unable to power up their development without a dependable supply of energy, while one person out of five globally still does not have access to electricity. Addressing this enormous challenge, SDG #7 seeks "ensuring access to affordable, reliable, sustainable and modern energy for all" [3]. Countries can transform their energy systems towards this goal by increasing their share of Renewable Energy Sources (RES) and carefully planning the most appropriate energy sources to bolster their social and economic development [4] while also protecting the environment, which are described in detail in the SDGs. As presented in Table 1, SDG #7 walks Decision Makers (DMs) through a path of hard targets. One of these targets is growing the share of renewables in the global energy mix by 2030 [5]. This will eventually require the mobilization of trillions of dollars from domestic and international public and private sources. Despite

Download English Version:

https://daneshyari.com/en/article/10156231

Download Persian Version:

https://daneshyari.com/article/10156231

Daneshyari.com