Isra University

Authorization Form

I, Mohammad Basheer Alkadri, authorize the University of Isra to supply copies of my Thesis to libraries or establishments or individuals on request, according to the University of Isra regulations.

Signature:

Date:

LEGISLATION AND ENERGY POLICY FOR GREENING ELECTRICITY IN MIDDLE EAST COUNTRIES.

(Case study: United Arab Emirates)

By

Eng. Mohammad B Alkadri

Supervisor

Dr. Walid M Emar

This Thesis was submitted in Partial Fulfilment of the Requirements for the Master's Degree of Engineering Project Management

Faculty of Graduate Studies

The University of Isra

February, 2018

COMMITTEE DECISION

This Thesis (LEGISLATION AND ENERGY POLICY FOR GREENING ELECTRICITY IN MIDDLE EAST COUNTRIES, (Case study: United Arab Emirates)) Was Successfully Defended and Approved on ----------

Examination Committee	**Signature**
Dr. Walid Emar (Supervisor) Assoc. Prof. Of Electrical Engineering	……..
Dr. Faiq M.S. AL-Zwainy (Member) Assoc. Prof. Of Civil Engineering	……..
Dr. Zayed Huneiti (Member) Assoc. Prof. Of Electrical Engineering (Al-Balqa` Applied University)	……..

Acknowledgment

Praises be to Allah, who empowered me to do this research. I am very grateful to my principal supervisor, Dr.Waild Emar for his guidance on my research and his deep remarkable suggestions. He was always friendly, supportive, helpful and modern in his teaching approach. I would like to extend my thanks to the faculty members who have enriched my knowledge and have added great value to my perspectives of scientific research.

I owe to my parents for their ceaseless support. Unforgettably, I highly value the great sacrifice and support of my wife, Engineer Esraa Alabdoh, and my daughter Mira, which have heightened my determination to pursue this study. As well as contributed tremendously for the successful completion of this work.

I would like to convey my immense thanks and sincere appreciation to my friend Mr.Mousa Abu Sbeih, who has encouraged me to pursue my master degree. Also, my immense thanks and great appreciation also goes to Mr.Khalil Alajarmeh for his support during the study period.

Table of Contents

List of Tables

List of Figures

LIST OF ABBREVIATIONS OR SYMBOLS

GIS	Geographical information system
GDP	Global domestic product
EMRC	Energy & Minerals Regulatory Commission
MEMR	Ministry Of Energy and Mineral Resources
GWh	Giga watt hour
EPA	United States Environmental Protection Agency
MCDM	Multi-Criteria Decision Method
DNI	Direct normal irradiance
CSP	Concentrated solar power
PV	Photovoltaic
OPEC	Organization of the Petroleum Exporting Countries
IEA	International Energy Agency
UNFCC	United Nations Framework Convention on Climate Change
toe	Tonne of oil equivalent
GHG	Greenhouse gas
ADEREE	Agency for the Development of Renewable Energies and Energy Efficiency
MASDAR	Future Energy Company
mtCo2e	Metric tons of carbon dioxide equivalent
IPP	Independent Power Producer
DEWA	Dubai electricity and water authority
ADPC	Abu Dhabi Power Corporation
RSB	Abu Dhabi regulation and supervision Bureau
IWPP	Independent water and power producers

ADWEA	Abu Dhabi Water and Electricity Authority
SBM	Single Buyer Model
ADWEC	Abu Dhabi Water and Electricity Company
BOO	Build Own Operate
PWPA	Power Purchase Agreements
IWPP	Independent water and power producers
TRANSCO	Abu Dhabi Transmission and Dispatch Company
ADDC	Abu Dhabi Distribution Company
LCOE	levelized cost of energy
AADC	Al-Ain Distribution Company
ADNOC	The National Oil Company
JV	Joint Venture Model
FIT	Feed-in-Tariff

LEGISLATION AND ENERGY POLICY FOR GREENING ELECTRICITY IN MIDDLE EAST COUNTRIES.

(Case study: United Arab Emirates)

By

Eng. Mohammad B. Alkadri

Supervisor

Dr. Walid M. Emar

ABSTRACT

In recent years, countries have begun to reduce the consumption of fossil fuels and replace them with renewable energy sources in an effort to mitigate the effects of fossil fuels on the environment and save money as well as increase energy security. There is no doubt that the regulatory component represented by policies and legislation are the most important means to achieve the desired goals and strategies. The UAE does not yet have a renewable energy law and is still working on the Electricity law No.2 of 1998, which did not address the issue of electricity production from renewable sources and treat with electricity generated from sustainable sources as electricity produced from fossil fuel sources and what implies high coast compared to non-renewable source in short term. As besides, the UAE did not produce a map representing the best locations for installing large-scale renewable energy projects. There are few studies that touched on renewable energy legislation in the Arab world and in the UAE in

particular. During this study, the Electricity Law of the UAE was analyzed and special recommendations were made for renewable energy legislation in the light of these analyzes. The experience of the State of Jordan, Palestine, Morocco and some Western countries such as Germany in the field of renewable energy policies was used as recommendation for UAE's policy makers. It was concluded that the UAE does not encourage the private sector to join renew renewable energy projects due to its application of the joint venture model with the private sector, and government subsidies on household sector are not an incentive for individuals to implement renewable energy projects. The proposed solution is the implementation of some incentives and mandatory policies in the field of renewable energy such as Feed-In-Tariff , Wheeling policy and Net-Metering in conjunction with the quota policy, as well as the exploitation of the lands of the Empty Quarter to establish renewable energy projects and through the establishment of free zones, exempted from taxes and customs duties, allowed the activates of generating green electricity inside and wheeling it outside The thesis has developed the suitability map for the installation of large- scale CSP projects among United Arab Emirates using GIS data and Multi-Criteria Decision Method (MCDM) technique. the suitability map is composed of multi-maps (layers) of solar irradiation (Direct Normal irradiance (DNI) component), land slope, protected areas, land use, proximity to water bodies and power grid as well as the roads. This thesis has highlighted the most-suitable location as well as the non-suitable location among UAE to install CSP projects using ArcGis software. The study has shown that UAE have multi-hotspot locations that can be used for CSP projects installation as well as great solar energy potential that could attract more investments in the same sector.