



Economic Evaluation of Solar Energy Usage (A Case Study in Iraq)

A Thesis

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DEDICATION

This work is dedicated to my parents Eng. Abdul-Kareem G. Al-Adhami and Sanaa H. Ahmed. All I have and will accomplish in my life would be impossible without their love and sacrifices.

Also, this work is dedicated to my brother Eng. Omar A. Al-Adhami and my sister Haneen A. Al-Adhami, who have been a great source of motivation and inspiration.

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Authorization Form

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Economic Evaluation of Solar Energy Usage (A Case Study in Iraq)

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Abstract

This thesis investigates the potential of solar energy usage in Iraq for electricity generation and explains the environmental risks of using fossil fuels. The study focuses on using solar panels to compensate for the actual deficit in the electricity sector in Iraq. The government building, which located in west of Baghdad, Iraq will be taken as a case study. The choice of this building was due to the availability of accurate information about the electricity of the building and as it provides suitable space for installing solar panels. In this thesis, it was proposed to establish a solar system that is not linked to the government electricity grid (off-grid), as an alternative option for the current system (generators and government electricity), which consumes annually large amounts of money and diesel.

This study shows that the proposed solar system is a good solution, both economically and environmentally. Economically, through financial analysis, the proposed system will save \$ 1,053,150 in 40 years, and the net present value for the current system is higher than the net present value of the proposed system (PV system) by \$ 289,828. Furthermore, the simulation program shows that the proposed solar system can meet the needs of the building of electricity, but the building needs to be operated eight hours daily on the government electricity grid. Environmentally, the proposed system will prevent 15,603.2 tons of CO₂ over its life time period of 40 years.

Keywords: Solar Energy, Renewable Energy, PV System, Energy Management, Simulation, Economic Evaluation, Solar Panel.

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List of Abbreviation

Ac	Alternating Current
A	Ampere
ASEAN	Association of Southeast Asian Nations
CSP	Concentrating Solar Power
CO ₂	Carbon Dioxide
DC	Direct Current
EU	European Union
GW	Gigawatt
GWh	Gigawatt-hour
GHGs	Greenhouse Gases
kWh	Kilowatt-hour
KWp	Kilowatt-peak
Mtoe	Million Tons of Oil Equivalents
Mbpd	Million Barrels Per Day
MtCO _{2e}	Million Tons of Carbon Dioxide Equivalent
MW	Megawatt
MWh	Megawatt-hour
MWp	Megawatt-peak
PV	Photovoltaic Panel
°C	Celsius Degree
g	Grams
kg	Kilograms
µg	Micrograms