



**Mutah University**  
**College of Graduate Studies**

## **Effects of Covid-19 on Energy sector in Jordan**

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## **Dedication**

To my father's spirit, who died as a result of the Corona pandemic. and to my mother, who endured the agony of losing her second half.

## **Acknowledgement**

With the help and cooperation of many people, this thesis becomes a reality. I would like to express my heartfelt gratitude to each and every one of them.

First and foremost, I thank God Almighty for providing me with the power and ability to comprehend, read, and complete this study.

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## Table of Contents

### Content

	Page
Dedication	I
Acknowledgement	II
Table of Contents	III
List of Tables	V
List of Figures	VI
Abbreviations	VII
Abstract	X
Abstract in Arabic	IX
<b>Chapter One: INTRODUCTION</b>	<b>1</b>
1.1 Theoretical Background	1
1.2 Problem Statement of the Study	3
1.3 Research Objectives	3
1.4 Importance of the study	3
1.5 Research Questions of the study	3
1.6 Structure of the Thesis	4
<b>CHAPTER TWO: LITERATURE REVIEW AND THEORETICAL BACKGRPOND</b>	<b>5</b>
2.1 Background of the Study	5
2.2 The impact of old crisis on energy sector worldwide	5
2.3 The impact of the COVID-19 pandemic on the global economy	6
2.4 The impact of the COVID-19 pandemic on the Middle East	7
2.4.1 Slowing demand for oil and gas	7
2.4.2 Drop in export revenues	8
2.4.3 Partially suspended production	8
2.4.4 Energy projects have been postponed	9
2.4.5 Supply chains have been impacted	9
2.4.6 Restrictions on foreign labor	10
2.5 The impact of the COVID-19 pandemic on transport sector	10
2.6 The impact of the COVID-19 pandemic on Oil & Gas companies.	10
2.6.1 Jordan's Oil Sector Before Covid-19 Pandemic	13
2.6.2 Jordan's Gas Industry	14
2.7 The impact of the COVID-19 pandemic on Energy Sector in Jordan	15
2.7.1 Environment Indicator	15
2.7.2 Economic Indicator	15
2.7.3 Energy Indicator	18
2.8 Resorting to renewable energy instead of conventional energy	22
2.9 Integration to drive recovery	25

<b>CHAPTER THREE: Research Methodology and Finding</b>	<b>26</b>
3.1 Introduction	26
3.2 Summary of Effect of COVID-19 on businesses survey in Jordan conducted by United Nations Development Program (UNDP) and International Labor Organization (ILO)	26
3.3 Surveys Finding	28
3.3.1 As a result of Jordan's COVID-19 response initiatives, all of the surveyed businesses reported cash flow issues, decreased demand and supply, and value chain disruption (UNDP, 2020)	29
3.4 The policy measures in Jordan related to COVID-19 pandemic	30
3.5 Selections from the survey	32
3.5.1 Questionnaire	32
3.5.2 Data gathering (The ILO's business survey)	33
3.5.3 The (UNDP) business study	33
3.5.4 Restrictions	34
3.5.5 Five Characteristics of the Businesses Included in the Study	34
3.5.6 COVID-19's impact and business response measures	38
3.5.7 Status of operations	38
3.5.8 Economic impacts	39
3.6 The impact of the COVID-19 pandemic on travel and import restrictions for tourism and manufacturing	40
3.7 Energy and Electricity situation	41
3.8 The impact of the COVID-19 pandemic on National Electric Power Company	41
3.9 National Action Plan for Green Growth 2021-2025	42
3.9.1 Implementation Principles for Green Growth	42
3.10 The nuclear debacle	43
3.11 Oil shale in Jordan	43
3.12 Other challenges facing the energy sector's growth	45
<b>CHAPTER FOUR: RESULTS, ANALYSIS and DISCUSSION</b>	<b>46</b>
4.1 Discussion and Analysis	46
4.2 Recommendations	46
4.3 Limitations & Future Research Development	49
References	50
APPENDIX 1	55

## **List of Tables**

<b>Table</b>	<b>Page</b>
Table 2.1: Summary of electrical demand from 2016 to 2020 during the time of movement restrictions orders (March, April, and May)	19
Table 2.2: Summary of electrical demand from 2016 to 2020 during movement restrictions orders in March, April, and May)	19
Table 3.1: Request got for salaries to be reduced by 50%	31
Table 3.2: Applications for closure of business	31
Table 3.3: Received application for a monthly wage reduction for workers	31
Table 3.4: State of interviews, according Table 3.5 Number of years the company has been in service by scale (percent)to the (ILO) survey	33
Table 3.5 Number of years the company has been in service by scale (percent)	36
Table 3.6: Existing financial obligations by company size (percent).	37
Table 3.7: Arrangements offered by companies based on their size (percent)	38
Table 3.8: COVID-19's economic effects by scale	40



## **List of Figures**

<b>Figure</b>	<b>Page</b>
Figure 1.1: Data on Jordan's Unemployment Rate from 2018 to 2021	2
Figure 2.1: Most countries are expected to be in recession. From 1871 to 2021,	7
Figure 2.2: Cases and Prices Data (Daily new case volatility)	11
Figure 2.3: Cases and Prices Data (Oil Price)	12
Figure 2.4: Cases and Prices Data (Natural Gas Price)	12
Figure 2.5: COVID-19 Cases and Prices Data (Coal Price)	13
Figure 2.6: The Arab Gas Pipeline Map	14
Figure 2.7: Monthly electricity demand (KWh) in Jordan's city center over the last five years, including during the current pandemic	18
Figure 2.8: Budget deficit in Jordan from 2016 to 2021	20
Figure 2.9: The Status of Public Finance (JD Million)	20
Figure 2.10: Budget Deficit to GDB Ratio	21
Figure 2.11: Public Debt to GDB Ratio	21
Figure 2.12: Energy Pyramid	22
Figure 2.13: Jordanian trade union sit-in to refuse to import gas from the Israeli occupation)	24
Figure 3.1: Ownership by business size (employee number) and sex (per cent)	35
Figure 3.2: Financial position of businesses prior to the COVID-19 crisis, by size (percent)	36
Figure 3.3: Shows the operational state of businesses based on their size (percent)	39
Figure 3.4: location of oil shale in Jordan	44

## Abbreviations

AREVA	French Nuclear Power Company
AES	Advanced Encryption Standard
BNEF	Bloomberg New Energy Finance
BRT	Bus Rapid Transit
BP	British Petroleum
CEGCO	Central Electricity Generation Corporation
CSP	Concentrated Solar Power
COVID-19	Coronavirus Disease
EE	Energy Efficiency
EU	European Union
EV	Electric Vehicles
Fofo	Institute For Labor And Social Research
GAM	Greater Amman Municipality
GDP	Gross Domestic Product
HVAC	Heating, Ventilation, And Air Conditioning
IEA	International Energy Agency
IMF	International Monetary Fund
ILO	International Labor Organization
IPP	Independent Power Provider
IRADA	Productivity Enhancement Centers Program
ISIL	The Islamic State In Iraq And The Levant
JAEC	Jordan Atomic Energy Commission
JITOA	Jordan Inbound Tourism Operators Association
JSF	Jordan Strategy Forum
JPRC	Jordan Petroleum Refinery Company
JPSD	Jordanian Public Statistics Department
KEPCO	Korea Electric Power Corporation's
LNG	Liquid Natural Gas
LRT	Light Rail Transit
MEMR	Ministry of Energy and Mineral Resources
MENA	Middle East and North Africa.
MSMEs	Micro, Small And Medium-Sized Enterprises
MODEE	Ministry Of Digital Economy And Entrepreneurship
MOU	The Memorandum Of Understanding
MPWH	Ministry Of Public Works And Housing,

NASDAQ	National Association Of Securities Dealers
NEPCO	National Electric Power Company
NGGP	National Green Growth Plan
NGOs	Non-Governmental Organizations
OECD	Organization for Economic Co-operation and Development
PAEM	Public Assistance Eligibility Manual
PPA	Power Purchase Agreement
Ppm	Parts Per Million
PV	Photovoltaic
RE	Renewable Energy
REEE	Renewable Energy & Energy Efficiency
SARS	Severe Acute Respiratory Syndrome
SDGs	Sustainable Development Goals
SEMED	Southern and Eastern Mediterranean
SWH	Solar Water Heaters
TOE	Tonne of Oil Equivalent
UNDP	United Nations Development Program

**Abstract**  
**Effects of Covid-19 on Energy sector in Jordan**  
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This study aims to analyze and know the impact of the COVID-19 pandemic on the energy sector in Jordan, where the COVID-19 pandemic has left huge threats in terms of energy and health and led to a significant decrease in economic output and a rise in unemployment. This study also aims to know the steps taken by the Jordanian governments and companies to mitigate the economic and financial impacts that would enhance the resilience of the energy sector.

To achieve the goal of the study, both methods of deductive and inductive analysis were used, which helped us to systematically consider the economic consequences of the COVID-19 pandemic, as government reports and reports issued by foreign organizations such as the International Monetary Fund, the Ministry of Energy and Mineral Resources, the World Bank and secondary data sources were included other relevant in our study.

The results of this study, the COVID-19 pandemic led to a significant decrease in energy consumption, a decline in economic growth, a significant rise in unemployment, an increase in market instability, and a decrease in the financial position of companies. The recommendations concluded that Jordan should begin to change its policies according to the new data, and take Measures to advance the energy sector by reducing fuel consumption and directing investment in energy saving policies and infrastructure equipment in parallel with the population boom in Jordan.

## الملخص

### تأثير جائحة كورونا على قطاع الطاقة في الاردن

رائد نهار حسين مياس

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تهدف هذه الدراسة الى تحليل ومعرفة تأثير جائحة كورونا على قطاع الطاقة في الاردن، حيث خلفت جائحة كورونا تهديدات هائلة على صعيد الطاقة والصحة وأدت الى انخفاض كبير في الناتج الاقتصادي وارتفاع في البطالة. وكذلك تهدف هذه الدراسة الى معرفة الخطوات التي اتخذتها الحكومات والشركات الاردنية للتخفيف من حدة الآثار الاقتصادية والمالية والتي من شأنها تعزيز مرونة قطاع الطاقة.

لتحقيق هدف الدراسة، تم استخدام كل من اساليب التحليل الاستنتاجي والاستقرائي، مما ساعدنا على النظر بشكل منهجي في العواقب الاقتصادية التي خلفتها جائحة كورونا حيث تم تضمين التقارير الحكومية والتقارير الصادرة عن المنظمات الأجنبية مثل صندوق النقد الدولي ووزارة الطاقة والثروة المعدنية والبنك الدولي ومصادر البيانات الثانوية الأخرى ذات الصلة في دراستنا.

نتائج هذه الدراسة، أدى الوباء إلى انخفاض كبير في استهلاك الطاقة وتراجع في النمو الاقتصادي ، وارتفاع كبير في البطالة، وزيادة في عدم استقرار السوق، وانخفاض في الوضع المالي للشركات، حيث خلصت التوصيات إلى ضرورة أن يبدأ الأردن في تغيير سياساته وفقاً للبيانات الجديدة ، واتخاذ إجراءات للنهوض بقطاع الطاقة من خلال تقليل استهلاك الوقود وتوجيه الاستثمار في سياسات توفير الطاقة ومعدات البنية التحتية بالتوازي مع الازدهار السكاني في الأردن.

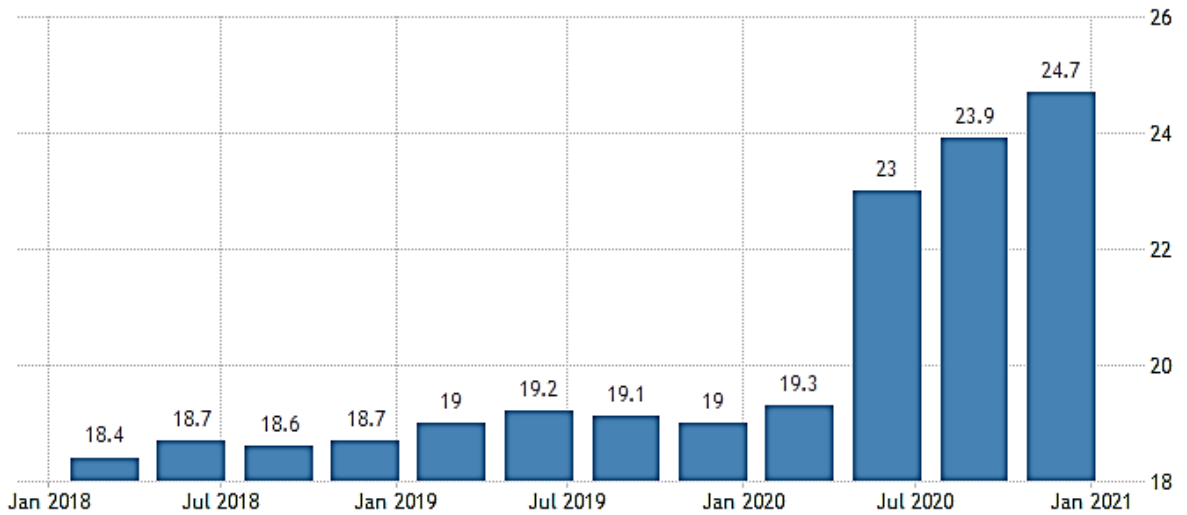
# CHAPTER ONE

## INTRODUCTION

### 1.1 Theoretical Background

In late 2019, the coronavirus SARS-CoV-2 was discovered in Wuhan, a Chinese city of 11 million persons Hubei province. In late January and February 2020, the number of cases of COVID-19 disease in China increased by tens of thousands a day. Since then, the disease has developed into a pandemic with large outbreaks in South Korea, Iran, and the United States. Thousands of infected patients and deaths, in total. The Jordanian government imposed a national lockdown on March 21, 2020, in an effort to halt the virus's spread, resulting in severe economic consequences for the region. During the lockdown, the government enforced precautionary measures around the nation. This included not only compulsory population quarantine, the closure of schools and mosques, stores, hotels, and grocery shops, but also the cancellation of national and international airlines, the closure of non-essential ports and airports, and the closure of non-essential businesses and sectors.

This resulted in lower electricity consumption and, as a result, lower average demand in the energy market. In Jordan, the COVID-19 interventions had an immediate effect on energy demand, which was expressed in regular profiles and consumer prices. In particular, as compared to daily pre-lockdown consumption curves, the forced shutdown of factories and tertiary operations greatly flattened the working hour consumption curves. Despite the fact that many people were working from home by smart working, the increase in residential usage did not compensate for the overall decrease in demand (Emilio Ghiani, 2020). The COVID-19 pandemic has claimed thousands of lives around the world and poses an unprecedented threat to public health, food supplies, and the workplace. The pandemic's economic and social consequences are devastating: tens of millions of people are at risk of living in extreme poverty around the world, at the same time, the JPSD (Jordanian Public Statistics Department) issued a report showing an increase in the unemployment rate in Jordan to 24.7% in the fourth quarter of 2020% (Amer Jamal, 2020).



**Figure 1.1: Data on Jordan's Unemployment Rate from 2018 to 2021 (JPSD, 2021).**

Beyond its immediate health consequences, the current crisis has far-reaching implications for global economies, energy consumption, and CO<sub>2</sub> emissions. Countries in full lockdown have a weekly decrease in energy demand of 25%, while countries in partial lockdown have a weekly decrease of 18%. Data collected on a regular basis for 30 countries, covering more than two-thirds of global energy consumption, shows that demand declines depending on the length and severity of lockdowns (IEA, 2020). Jordan is an emerging country and does not have natural resources like other neighboring countries, and there is no doubt that the Covid-19 pandemic has created enormous obstacles to the Jordanian economic system and energy sector, Consequently the government was advised by His Majesty King Abdullah to continue to strengthen the strategic reserve of oil derivatives and to take advantage of low prices throughout the current time , so the government has quickly implemented a strategy to increase storage capacity by 20% in 2030, according to international standards (Alnuimat, 2020).

From rom this point of view arose the study problem, which can be summarized by the following main question:

What is the direct and indirect impact of the COVID-19 pandemic on the energy sector in Jordan?

Where the need for this study appeared to find out the damages caused by the COVID-19 (on the energy sector in particular and on the economy in general) and to study the measures that have been taken to reduce the risk resulting from it, and then work to build a fortified sector that can respond to a possible pandemic that may come in the future.

## **1.2 Problem Statement of the Study**

The main problem of this study is to study the effects of lockdown measures imposed across the country due to the COVID-19 pandemic, which have exacerbated the weak abilities of companies to operate in the area, and so the capacity of families to pay for life's basic needs. It also led to a decrease in energy sector investments, causing liquidity challenges to finance new energy projects. Combined with disruptions in supply chains, maintenance delays, and delays in establishing new projects, these factors together are likely to lead to further electricity shortages, so this study aims to understand the factors affecting the energy sector and support them with available recommendations.

## **1.3 Research Objectives:**

The main goal of this research is to determine the impact of the COVID-19 pandemic on Jordan's energy sector, along with this main purpose, the following objectives will be achieved:

- A) Draw attention to the alternatives that can be accessed to legalize energy consumption and improve its efficiency, and encourage everyone to follow it.
- B) Draw attention to natural resources and the exploitation of clean energy, as it has proven its effectiveness and success in light of the COVID-19 pandemic.
- C) Reviewing in-depth research on the energy sector in Jordan.

## **1.4 Importance of the study**

The trend toward renewable energy (RE) was accelerating at the time of the COVID-19 crisis. Renewables accounted for nearly two-thirds of new power plant capacity added last year, and renewable energy capacity has grown at an annual rate of over 8% for the past ten years. Despite huge improvements in renewables' cost-competitiveness over the last decade, clean energy investments are still falling short of what is required to put the world's energy system on a sustainable path. (Imperial College, 2020).

## **1.5 Research Questions of the study**

The research questions are constructed and stated as follow:

- A) What are the economic and energy effects of the Covid19 pandemic in Jordan in recent months?
- B) What are the key options for dispensing with the import and production of electric energy so that they gain independence and overcome the potential pandemic in the next few years as a result of the Corona pandemic or any other potential pandemic?



## **1.6 Structure of the Thesis**

This thesis also includes four other chapters, which are listed below:

**Chapter TWO, LITERATURE REVIEW:** In this chapter, we will look at what has already been written and researched about the Covid-19 pandemic and its impact on the energy sector:

**CHAPTER THREE, RESEARCH METHODOLOGY:** This chapter introduces the methodology used to conduct this study. The research methodology, thesis framework, and model are all described and presented. The hypotheses that will be tested later in this study are also presented in this chapter. It also covers data collection techniques and the results of previous analysis tests such as "reliability and co-linearity tests."

**RESULTS, ANALYSIS and DISCUSSION IN CHAPTER FOUR:** This chapter documents the research findings and conclusions, as well as possible recommendations.

## **CHAPTER TWO**

### **LITERATURE REVIEW AND THEORETICAL BACKGRPOND**

#### **2.1 Background of the Study**

We are currently living in a COVID-19 world, with a post-COVID-19 world on the horizon. Good social research will lead to a better understanding of not only COVID-19's current social impact, but also any future or new impacts. The findings will have immediate and long-term implications for policy and service delivery and development to better support the public as they deal with and recover from the numerous challenges to their way of life and health status that they are experiencing. They will also suggest strategies for dealing with and managing new large-scale health crises in an ethical and effective manner (Madhusudan Subedi, 2020).

The existing literature on COVID-19, pandemic, Jordan's energy sector, electricity consumption, oil and gas, and renewable energy will be reviewed in this chapter.

#### **2.2 The impact of old crisis on energy sector worldwide:**

The financial crisis of 2008 and the Great Recession that followed had a significant negative impact on the oil and gas industry, contributing to a sharp drop in oil and gas prices as well as a credit contraction. Oil and gas producers have seen their profits decrease as prices have fallen. Oil prices fell from a high of \$147 in July 2008 to a low of \$33 in February 2009. Liquid natural gas (LNG) prices dropped from \$14 to \$4 during the same time span. The big influence on the industry was the reduced price of oil and gas due to the financial crisis. Thus, oil rates dropped due to a decline in consumption, a contraction in loans to make transactions, and reduced business profits, resulting in layoffs and rising unemployment (INVESTOPEDIA, 2020).

The effect of energy crisis in Jordan (MEMR, 2015).

- A. Jordan's economy is being hammered by high energy prices. (A \$ 1 increase in international oil prices has a negative impact of \$ 40 million on the Jordanian budget per year).
- B. Imported energy accounts for 28 percent of GDP value (US\$ 6.3 billion in 2014).
- C. Subsidies from the government for petroleum products and electricity totaled approximately US\$ 2.5 billion.
- D. Providing appropriate funds for investments in the growth of the energy industry and its installations under timeframes to satisfy energy needs (Jordan requires an investment of US\$18 billion in the energy sector by the end of 2020).

- E. The energy shortage is having an adverse effect on social life. (Poverty, unemployment, unequal wealth distribution, and a feeling of injustice).

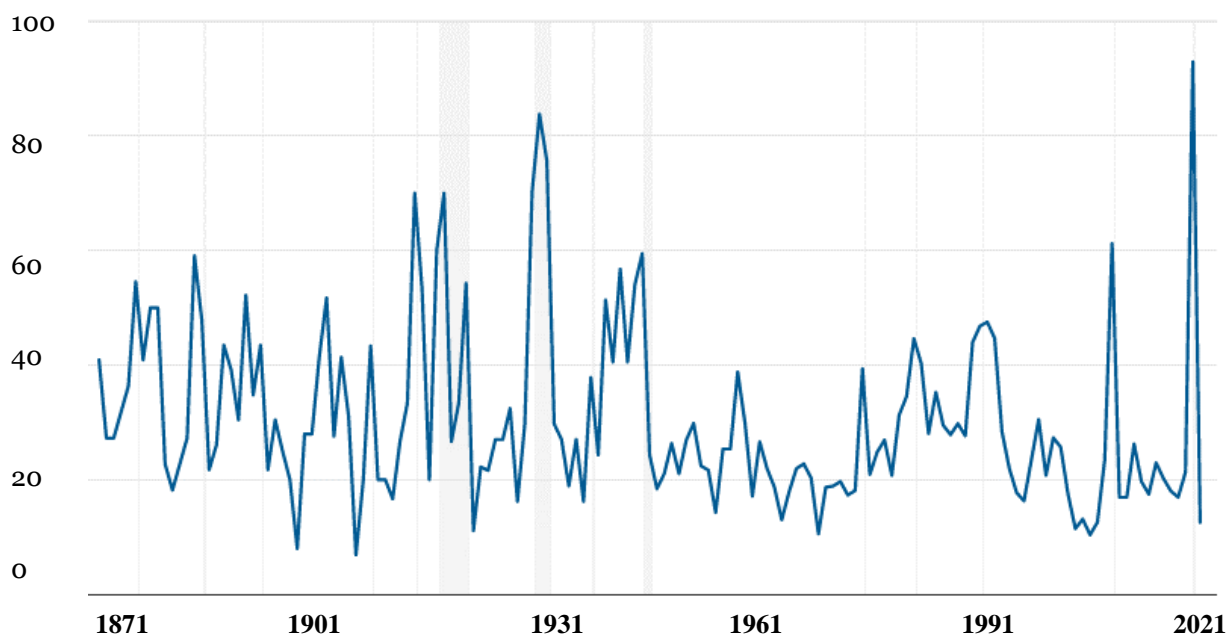
### **2.3 The impact of the COVID-19 pandemic on the global economy:**

The Corona pandemic erupted immediately after governments around the world began implementing their general budgets for the year 2020, and since the beginning of 2020 the world has witnessed an unprecedented health crisis, as the Corona pandemic affected most economies in the world, which was reflected in multiple precautionary measures in their monetary and financial policies. In order to alleviate the repercussions of this pandemic, which led to the world entering into an economic recession and a significant decline in most economic activities (worldbank, 2020).

The crisis emphasizes the need for immediate action to mitigate the pandemic's health and economic effects, protect vulnerable populations, and lay the groundwork for a long-term recovery. Strengthening public health systems, addressing the challenges posed by informality, and implementing reforms that will support strong and sustainable growth once the health crisis has passed are critical for emerging market and developing countries, many of which face daunting vulnerabilities (worldbank, 2020)..

Most countries are expected to enter recession as a result of the pandemic in 2020, with per capita income falling in the largest percentage of countries since 1870. The advanced economies are expected to contract by 7%. As a result of this weakness, emerging market and developing economies are expected to contract by 2.5 percent this year as they deal with their own domestic outbreaks of the virus. This would be the group of economies' worst performance in at least sixty years (worldbank, 2020).

The crisis emphasizes the need for immediate action to mitigate the pandemic's health and economic effects, protect vulnerable populations, and lay the groundwork for a long-term recovery.



**Figure 2.1: Most countries are expected to be in recession. From 1871 to 2021 (worldbank, 2020).**

## **2.4 The impact of the COVID-19 pandemic on the Middle East:**

The energy sector in the Middle East is facing emergency risks as a result of recent energy market fluctuations and economic uncertainty caused by the outbreak of the "Corona" virus in various parts of the world, which will have a negative impact on the sector's vitality as it will have negative repercussions on the region's energy supply chains, including production. The following are the most obvious indicators:

### **2.4.1 Slowing demand for oil and gas.**

Most countries around the world are continuing to take precautionary measures such as restricting travel and movement of people, as well as suspending international aviation, in an effort to contain the spread of the "Corona" virus. This coincides with the closure of many companies and production units, resulting in a drop in consumption. Oil and natural gas are examples of global energy (IEA, 2020).

As such, expectations go that global demand for crude oil will decrease in 2020 by at least 3 million barrels per day, and other scenarios indicate that global consumption may contract sharply by more than 10 percent, equivalent to 10 million barrels. This is in the event of the continuation of health emergencies imposed by many countries of the world until the end of this year (IEA, 2020).

Undoubtedly, the region's oil exports will be severely effected in light of recent events, as consumer demand for crude is expected to decline significantly this year, and some of them have already postponed or

rescheduled previously agreed-upon oil shipments.

In the same vein, liquefied gas exports from the region are expected to slow significantly in 2020, owing to the expected contraction of the global industrial and transportation sectors. In the first preliminary indications in this regard, Indian and Chinese energy companies - among their most important suppliers are Middle Eastern countries - declared a case of force majeure in importing liquefied gas, implying that there are force majeure conditions that prevent the import of crude.

#### **2.4.2 Drop in export revenues.**

Oil prices have been doubling in recent months due to a fall in worldwide demand for raw oil as a consequence of the emergence of the corona virus, as well as the failure of the OPEC+ alliance to reach an agreement on production cuts. The continued decline in oil prices will put significant strain on the revenues of Middle Eastern oil exporting countries. According to the Institute of International Finance, if the average price of a barrel of oil is \$ 40, oil exporters in the Middle East and North Africa will lose \$ 192 billion in revenue, or 11% of GDP, which will have disastrous consequences on the region companies (Future for Advanced Research & Studies, 2020).

#### **2.4.3 Partially suspended production.**

Despite the crisis caused by the "Corona" virus outbreak, oil and natural gas production in the Middle East region has remained relatively stable. However, given the drop in domestic consumption, some regional governments have had to reduce the production capacity of some oil and gas fields. In the transportation and industrial sectors, to gas and oil derivatives, which may expand as the crisis worsens (Future for Advanced Research & Studies, 2020).

Due to lower domestic gas consumption and restrictions on economic and commercial activities in the country, the Tunisian Ministry of Energy reduced the production of the Nawara gas field to 800 thousand cubic meters per day, much lower than the project's production capacity of about 2.7 million cubic meters per day (Future for Advanced Research & Studies, 2020).

Iran's oil production was estimated to have decreased by nearly 83 thousand barrels per day in the first three months of this year as a result of the "Corona" virus outbreak and sanctions, reaching nearly 1.9 million barrels per day, which coincides with a decrease in consumption. Gasoline has increased by more than a third since the virus outbreak (Future for Advanced Research & Studies, 2020).

#### **2.4.4 Energy projects have been postponed.**

Due to global energy market fluctuations and economic uncertainty caused by "Corona." As a result, governments and energy companies have decided to postpone plans to develop oil and natural gas production until the crisis has passed. The Lebanese Ministry of Energy and Water, for its part, has decided to push back the deadline for submitting applications for the second licensing round for oil and gas exploration in Lebanese waters in the Mediterranean from April to June (Future for Advanced Research & Studies, 2020).

Many government energy companies in the region have been forced to reduce their expenditures and postpone many of their investment projects in 2020 as a result of the current circumstances, such as the Algerian company "Sonatrach," which has decided to cut its investment expenditures this year by about half to \$ 7 billion from \$ 14 billion. Dollars in the first case (Future for Advanced Research & Studies, 2020).

It should also be noted that recent events have had an impact on the work of foreign energy companies in the region, as evidenced by the British company Sound Energy, which has a license to the Tenderara gas field in eastern Morocco, deferring the signing of final exploration and production contracts with the Moroccan government until the end of June. Eni, an Italian company, is currently reviewing its energy projects in the region, as it announced just a few days ago (Future for Advanced Research & Studies, 2020).

In terms of renewable energy, it's possible that some of the region's planned renewable energy projects will be hampered by global supply chain disruptions, as the "Corona" virus forced the closure of a number of solar panel factories and major wind turbines around the world, particularly in Spain and Italy (Future for Advanced Research & Studies, 2020).

#### **2.4.5 Supply chains have been impacted.**

The current situation will undoubtedly have an impact on the region's oil supply chains, including refineries and fuel distribution stations. Oil refineries are likely to reduce their production capacity in response to lower fuel consumption in the domestic market, and many fuel distribution stations may be forced to do the same (Future for Advanced Research & Studies, 2020).

According to a previous statement by Asadullah Quli Zadeh, Chairman of the Board of Directors of the Iranian Petroleum Products Merchants Association, the sale of oil derivatives in Iran has clearly ceased in light of the outbreak of the "Corona" virus and movement restrictions, which will force the closure of 70% of the stations deployed in them (Future for Advanced Research & Studies, 2020).

#### **2.4.6 Restrictions on foreign labor**

Foreign workers in the Middle East's energy sector are in trouble as a result of the "Corona" virus outbreak, as many governments have taken steps to limit foreigners' access to oil installations, such as Algeria, which recently took steps to limit foreigners' access to oil and natural gas fields, while some foreign companies have taken the opposite approach. The oil and gas industry would be impacted by the restrictions imposed on foreign workers (Future for Advanced Research & Studies, 2020).

To summarize, the energy sector in the Middle East is facing significant risks as a result of the "Corona" outbreak, and its recovery will hinge on how quickly the virus is contained and spread is limited, as well as international and regional efforts to support energy and oil market stability in particular (Future for Advanced Research & Studies, 2020).

#### **2.5 The impact of the COVID-19 pandemic on transport sector.**

In 2018, transportation accounted for half of total energy consumption (49%) followed by household uses (21%), and industry (14%) (Serena Sandri, 2020). Jordan Vision 2025, the country's main strategic growth plan, has set important goals for the country's socioeconomic progress from 2015 to 2025. Jordan expects to hit a 7.5 percent economic growth rate in 2025 with this plan, despite this, poverty and unemployment rates of 8% and 9.17 percent are still targets. To realize this vision, the government has devised a set of objectives and actions centered on strong private sector growth and resilience to external economic shocks. Although climate change and the environment are not at the forefront of Jordan Vision 2025, it does address a number of environmental issues, including climate change adaptation, water and energy conservation, waste management, and natural resource security (OMR, 2020).

The International Energy Agency (IEA), a Paris-based intergovernmental organization, claims that, the transport sector, including road, rail, air and sea, has been particularly affected by the closures, and demand for gasoline, diesel and jet fuel has fallen dramatically. The International Energy Agency (IEA) reported that in April 2020, global oil consumption decreased by 29% compared to the same month in 2019. In May 2020, the decline was 26%. Since oil supplies were widely abundant at the start of 2020, the collapse in demand has led to an unprecedented drop in prices, with dire consequences for companies that extract, refine and distribute petroleum products (OMR, 2020).

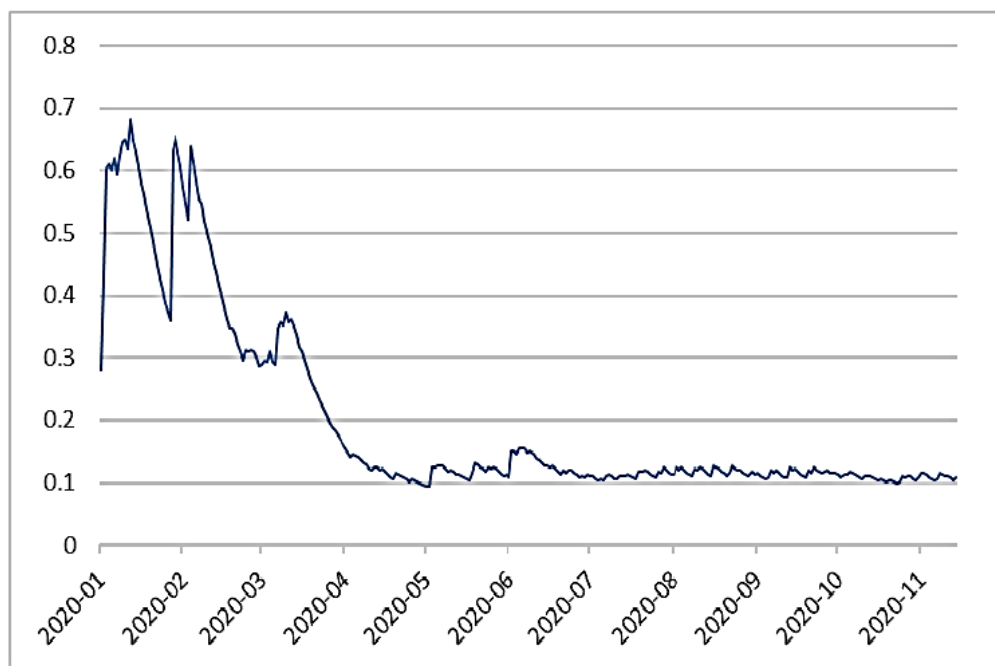
#### **2.6 The impact of the COVID-19 pandemic on Oil & Gas companies.**

Oil and gas companies are in the midst of a multi-pronged crisis as a result of COVID-19's impact. When the global crude oil market has more crude oil than it can use and potentially store, oil prices plummeted. The oil

supply/demand imbalance is occurring at the same time as a drop in demand for chemicals and refined products as a result of industrial slowdowns and travel restrictions following COVID-19. (Abegunde, 2020). On 1 January 2020, a barrel of crude oil was traded on the NASDAQ exchange in New York for US\$67.05. This price had plummeted down to US\$30/bbl by 15 March 2020. BP's market price today is just 51 percent of what it was at the beginning of 2020 (Corner, 2020).

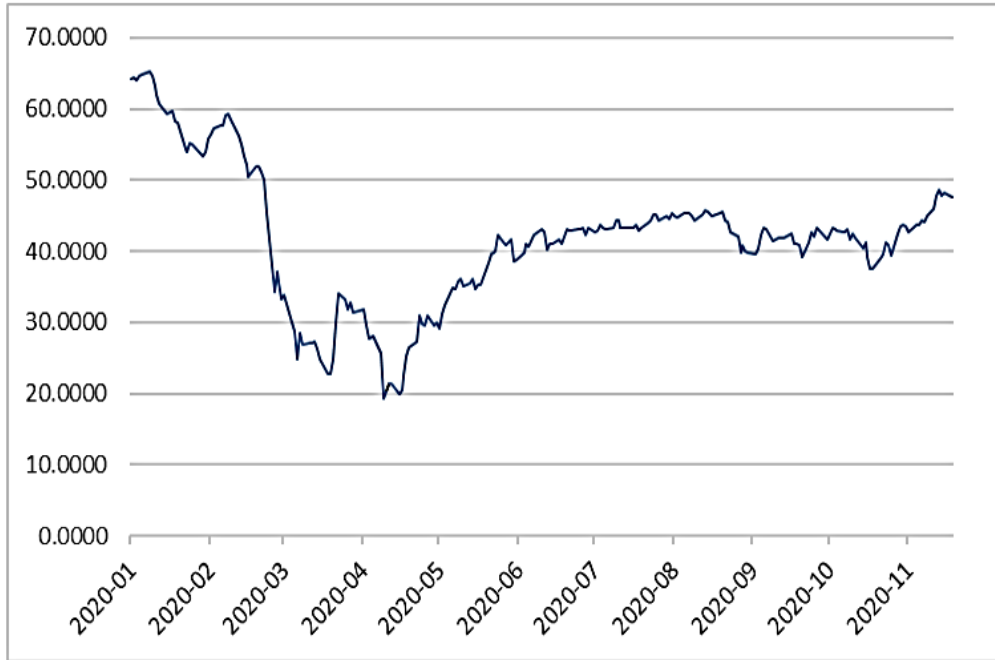
The relationship between COVID-19 and fossil energy prices is explored in this paper. The results show that the asymmetric relation exists in quantiles [0.6, 0.8] and [0.8, 1], meaning that only COVID-19 cases with high volatility have an effect on oil and natural gas prices. However, due to global economies' reduced dependence on coal, there is no significant causal correlation in the coal sector (Wang, 2021).

COVID-19 and Fossil Energy Prices: An Asymmetric Relationship Asian,

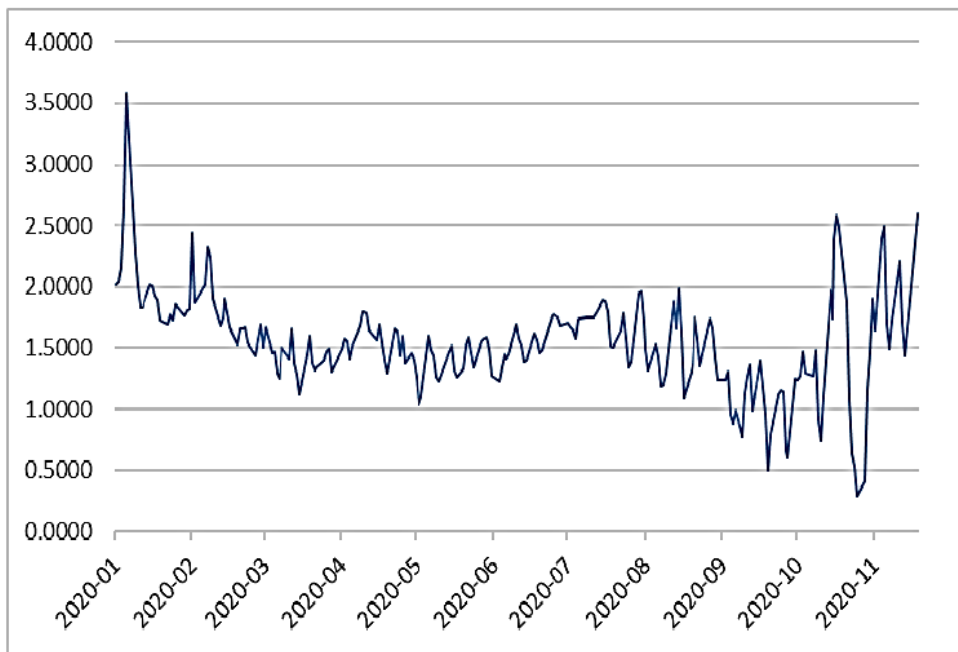


**Figure 2.2: Cases and Prices Data (Daily new case volatility)** (Wang, 2021).

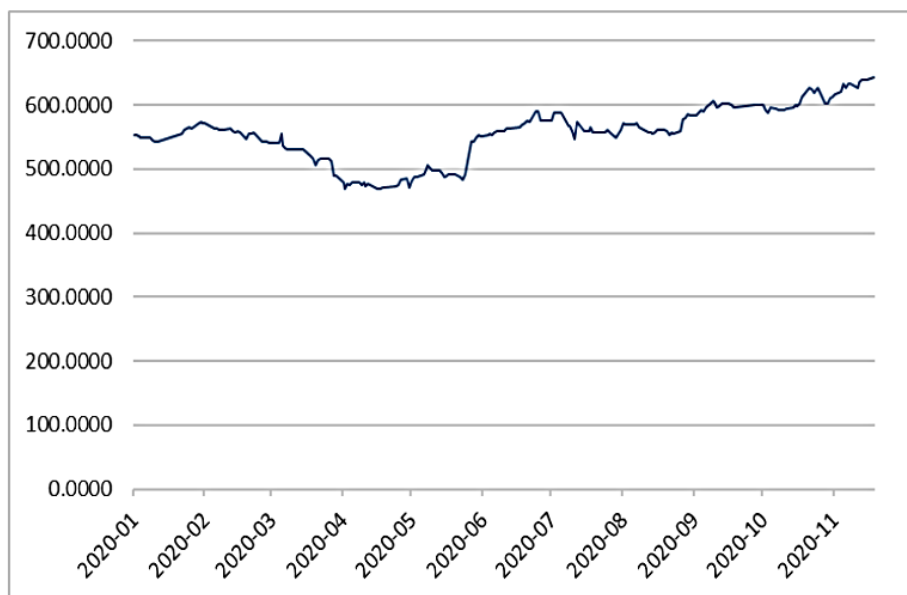




**Figure 2.3: Cases and Prices Data (Oil Price) (Wang, 2021).**



**Figure 2.4: Cases and Prices Data (Natural Gas Price) (Wang, 2021).**



**Figure 2.5: COVID-19 Cases and Prices Data (Coal Price) (Wang, 2021).**

Figure 2.2 contains a plot of the volatility of daily COVID-19 cases; and Figure 2.3, 2.4 and 2.5 have time-series data for oil price, natural gas and coal price, respectively (Wang, 2021).

### **2.6.1 Jordan's Oil Sector Before Covid-19 Pandemic.**

The Jordan Petroleum Refinery Company (JPRC), which is one of the largest companies operating in the Kingdom, which has been making profits for years without interruption and has a great strategic and economic impact on the national economy, its recent disclosure showed that it is on the verge of financial losses in the first half of this year for the first time since long years (AL\_RADAWI, 2020).

The refinery's losses this time are not a result of the company's business and its operational activities, but rather it is a result of the application of accounting standards based on taking the valuation differences between its stock balance at the end of 2019 with its balance at the end of June in the last two June. At a value of about 122 million dinars, and this is normal if we know that the estimates of oil prices at the end of last year amounted to approximately 68 dollars per barrel, then decreased after that and during the first half period to less than 25 dollars per barrel, which required the management of the company to take allocations The necessary for this significant decrease as a result of the differences in the valuation of the stored goods between the end of last year and the first half of this year (AL\_RADAWI, 2020).

## 2.6.2 Jordan's Gas Industry

Since British Petroleum (BP) left Jordan in 2013, hopes for gas discovery in Jordan have dwindled (Hjazin, 2014). According to the late chairman of the Jordanian parliament's energy committee, BP backed out not just on technical, but also political grounds (Betroleum, 2019). It's easy to envision a situation in which policymakers want to sabotage public confidence in the potential of national oil and gas deposits (including fracking) in order to make a fast bargain with Noble Energy for Israeli gas, which is located just across the Mediterranean Sea. The pipeline's construction began in 2001, with the first segment connecting Arish in the Sinai Peninsula to Aqaba, Jordan. Following that, additional parts were constructed to link Aqaba to the Syrian border, and from there to Lebanon and the Turkish border (Scheer, 2020).

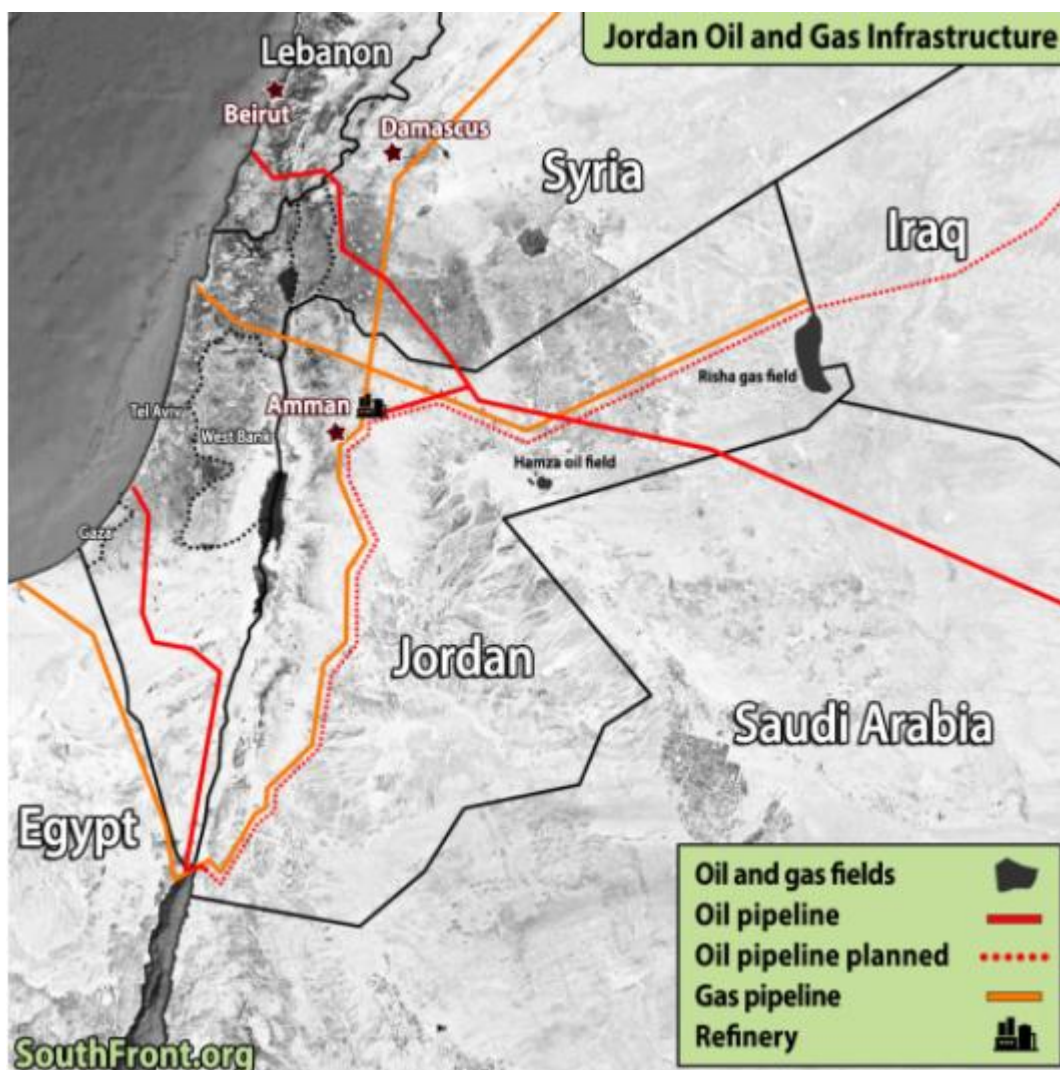


Figure 2.6: The Arab Gas Pipeline Map (southfront, 2019).

The prospect of producing 700 million cubic feet of natural gas from the Risha field per day (mcf/d) (nearly twice Jordan's current daily consumption) has steadily faded. Jordan was projected to receive up to 300 mcf/d from this area as early as 2015(5). However, after the Egyptian revolt in 2011, Since July 2003, Jordan's Liquefied Natural Gas (LNG) imports from Egypt have steadily decreased. As a result, LNG electricity generation fell from 80 percent in 2010 to 20 percent in 2012. The primary factors were once again bad politics, mismanagement, and uncertainty. It's unclear how many or how much of these considerations influenced BP's decision to abandon discovery in Jordan (Abu-Dayyeh, 2015).

## **2.7 The impact of the COVID-19 pandemic on Energy Sector in Jordan:**

### **2.7.1 Environment Indicator**

To contribute to climate change mitigation and live up to the global sense of the need to move from a carbon-based to a sustainable economy, we must monitor carbon emissions and participate in the Global Carbon Stocks Program, where Covid-19 has directly led to reduced greenhouse gas emissions and domestic air pollutant emissions, due to reduced energy demand. Due to nationwide curfews, Jordan's factory activity has been reduced, resulting in significant reductions in greenhouse gas emissions and energy demand. (Feras Alasali 1, 2021).

The Ministry of Environment began preparing the Green Growth National Action Plan 2021-2025 in late 2018 as the next step toward implementing the proposals in the National Green Growth Plan, at the request of the Cabinet of Ministers. The GG-NAP outlines green growth structures and actions for Jordan's agriculture, energy, tourism, transportation, waste, and water sectors, with the goal of assisting Jordan's green growth vision and improving future capacity to rebound and contain shocks from disasters such as COVID 19 (MoEnv, 2020).

### **2.7.2 Economic Indicator**

As a result of the COVID-19 pandemic, Jordan fell 16 places to 82 in the World Economic Forum's Energy Transition Index, from 66 in the same index last year, and achieved 49.5% this year, compared to 53% in the 2019 index. Jordan also achieved 46% in terms of energy system performance, compared to 56% last year, and 53% in terms of readiness, compared to 50% in the index last year (Zaidan, 2020).

To improve the economy by reducing domestic fuel consumption and increasing export revenue, equip infrastructure to fully utilize renewable energy, and provide a network of energy support in parallel with Jordan's population boom and rapid urbanization, promote the development of economic capacity is gaining popularity locally and internationally.

Jordan's economy slowed to 1.3 percent in the first quarter of 2020, representing just a portion of the COVID-19 pandemic's effects. Despite an increase in net exports and the modest contribution of government consumption, overall economic activity was hampered by weak private demand and muted government investments during the quarter. Meanwhile, labor market forecasts for the second quarter of 2020 show major disruptions from the COVID-19 crises. The already high unemployment rate increased to 24.7% in Q4-2020, up from 19.3 percent in Q1-2020, despite a 0.4 percent drop in the labor force participation rate. (Jordan U. M., 2020). Looking ahead, the pandemic would have a similar negative impact on Jordan's economy and opportunities as it has on its trading partners and the MENA region as a whole; however, lower energy prices and a steady drive for change to improve production and boost competitiveness will help Jordan's economy and opportunities recover in the medium term.

The pandemic is exacerbating the fiscal gap, as tax generation has slowed as a result of the slowing economy and domestic lockdown steps. Jordan's ability to keep the deficit is being hampered by pandemic-related budget burdens and persistent spending rigidities, including the government's efforts to save money by cutting the public sector wage bill. As a result, the total fiscal deficit of the central government (including grants and cash use) increased to 4% of GDP in the first five months of 2020, almost twice as much as in the same stretch of 2019 (worldbank, 2020).

The sharp decline in government finances, combined with a declining economy, has driven central government public debt (including debt held by the Social Security Investment Fund) to 105.3 percent of forecasted GDP by the end of May 2020. In the medium term, as economic growth improves, the fiscal stance is likely to change (worldbank, 2020).

The external sector's current account deficit (including grants) decreased by 6.3 percent year over year in Q1-2020. Following contractions in April and May 2020, an initial build-up of external sector pressure was alleviated in Q2-2020, with both exports and imports returning to positive growth in June. Remittance inflows, on the other hand, remained negative in the second quarter, with no travel receipts inflows due to the cancellation of commercial flights. Although lower international oil prices will help to reduce import costs, the current account deficit is expected to balloon in 2020 as a result of weak external demand and its spillover effects on the domestic economy, including lower exports, remittances, tourism, and foreign investments.

Improving the economy by reducing domestic fuel consumption, rising export share, equipping utilities to fully use good oil, providing a network of energy support in tandem with Jordan's population boom and

accelerated urbanization, and promoting the growth of industrial capability is gaining prominence. Recognition on a global and international level (Saima Munawwar\*, 2013). According to the energy strategic plan, investment in electricity generation, transmission, and distribution projects will cost about \$ 4 billion by 2020. Jordan has been constructing new power plants using the Independent Power Provider (IPP) model. The government privatized Central Electricity Generation Corporation (CEGCO) and authorized four IPP projects built by AES and KEPCO, both of which are based in the United States. Jordan's gross generation capacity is currently around 4 GW.

Transmission and distribution was handled by the government-owned National Electric Power Company (NEPCO) and other generation companies with their own exclusive regions. (Jordan-Renewable-Energy, 2018). More than 7,928 people were employed, and more than 1400 businesses were registered by the end of 2016 (EDAMA Association for Energy, 2019). As renewable energy accounted for just 1% of total energy demand in 2007, Jordan's government devised an aggressive Energy Master Plan to expand renewable energy's share to 7% in 2015 and 10% in 2020. Law No. 13 on Clean Energy and Energy Efficiency (EE) was passed in Jordan in April 2012, which created a fund to finance renewable energy projects of up to 500 MW (Jordan G. o., 2012).

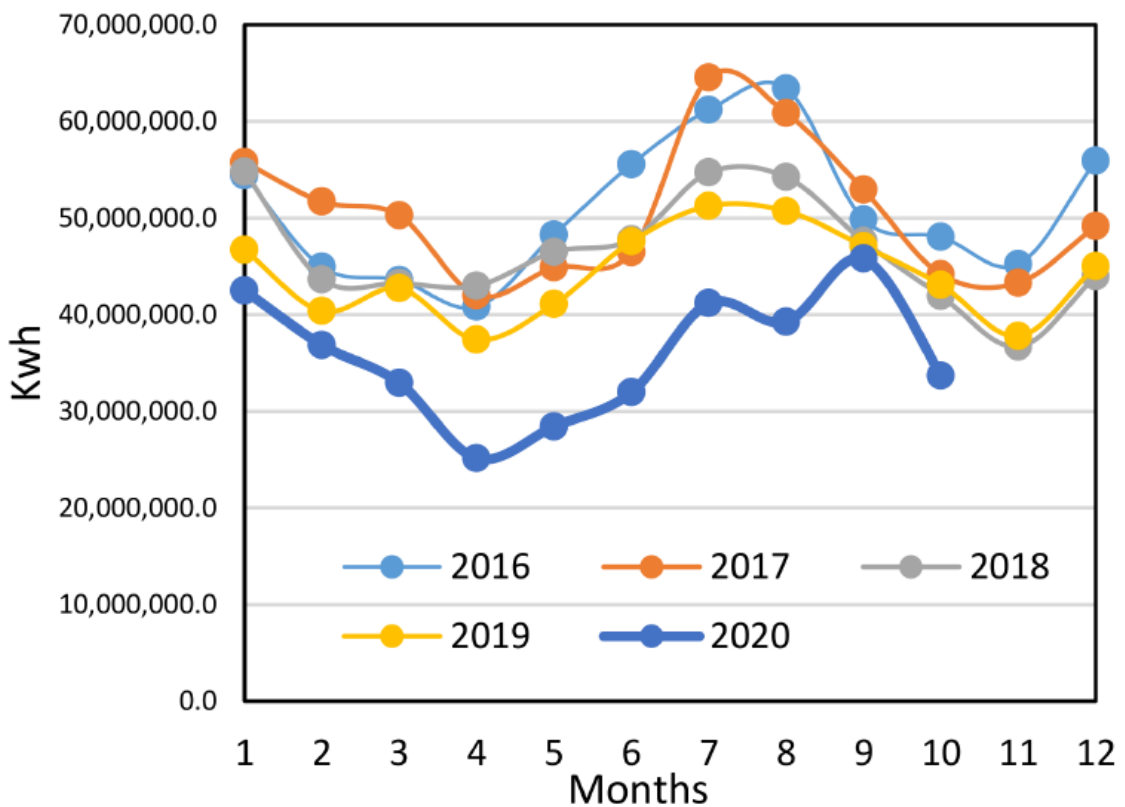
Jordan's operating PV capacity was reported to be around 567 MW at the end of 2017, with around 100 MW of net-metered systems, according to the Middle East Solar Industry Association (Association M. E., 2018). 450 MW of systems greater than 100 KW are under construction as of February 2018, with another 200 MW tendered in 2017. According to BNEF, approximately 270 MW of new PV capacity was installed in 2017, with industry forecasts for 2018 of about 580 MW (EDAMA Association for Energy, 2019)]. Jordan received EUR 128 million in loans from the European Investment Bank and the French government in 2015 for the construction of the Green Corridor initiative, which aims to upgrade Jordan's energy grid to accommodate planned PV projects. By 2018, the improved infrastructure should be up and running. The 103-megawatt In April 2018, the Quweira solar photovoltaic (PV) power plant near Aqaba was linked to the grid.

In October 2016, Masdar, an Abu Dhabi-based renewable energy company, signed a power purchase agreement (PPA) for the Baynouna solar farm, which has a capacity of 200 MWAC, with Jordan's National Electric Power Company (NEPCO). In the first quarter of 2019, the plant is scheduled to begin operations. The two module manufacturers in Jordan are Philadelphia Solar in Amman and Wiosun in Aqaba (Jäger-Waldau, 2018).

### 2.7.3 Energy Indicator

This section introduces load demand profiles to explore the five-year periods of monthly demand. The trends in demand in Downtown, for five years for monthly charges, are seen in figure 2.7. The demand for monthly load is indicated by an overall downward trend in March-May 2020 during and after the curfew and restricted worldwide travel. This is mostly because the latest COVID-19 pandemic has drastically altered every part of life (Feras Alasali 1, 2021).

The profiles in Fig.7 display a high correlation with the monthly average over the period of five years.



**Figure 2.7: Monthly electricity demand (KWh) in Jordan's city center over the last five years, including during the current pandemic (Feras Alasali 1, 2021).**

Furthermore, in 2020, the minimum and average demand were lower than in previous years. In 2020, for example, the minimum demand was 765 MWh, compared to 1219 MWh in 2018 and 1029 MWh in 2019. The average demand was 40% and 37% decreased in 2020 compared with 2019 and 2017. During the initial measure span (March to May 2020), Jordan's peak demand and demand activity directly impacted electricity use (Feras Alasali 1, 2021).

**Table 2.1: Summary of electrical demand from 2016 to 2020 during the time of movement restrictions orders (March, April, and May)**

	Electricity Demand (MWh)				
	2016	2017	2018	2019	2020
Maximum demand	2098	1839	1735	1768	1296
Minimum demand	1128	1189	1219	1029	765
Average demand	1443	1492	1444	1319	941

(Feras Alasali 1, 2021).

**Table 2.2: Summary of electrical demand from 2016 to 2020 during movement restrictions orders in March, April, and May)**

	In 2020, compared to the previous year, the percentage reduction in demand			
	2016	2017	2018	2019
Maximum demand	38%	30%	25%	37%
Minimum demand	32%	36%	37%	35%
Average demand	35%	37%	35%	40%

(Feras Alasali 1, 2021).

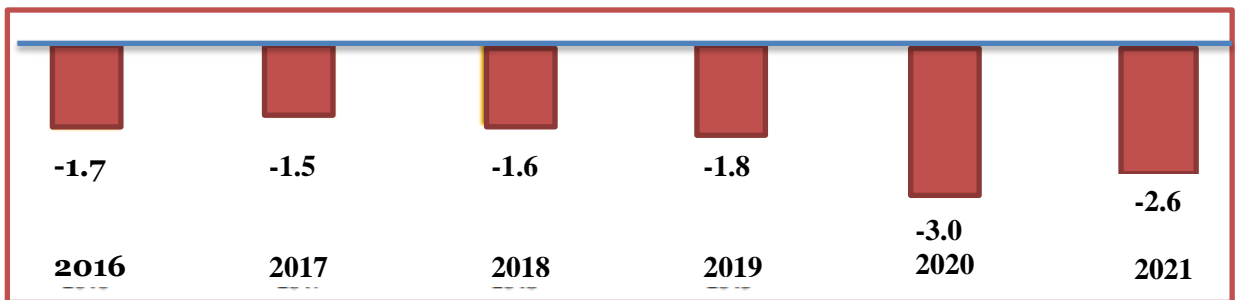
The Renewable Energy and Energy Efficiency Law was passed, and a fund for energy efficiency was set up. A Feed-in-Tariff schedule for renewable energy resources has also been established (memr, Annual Report, 2018). With an increase in electricity generation capacity from 1.13 GW to 1.8 GW, the government has set a goal of generating 10% of its energy needs from renewable sources by 2020 (Khdair, 2020). In addition, the use of renewable energy sources such as solar thermal, geothermal, bio-energy, and wind energy will be improved. This will eventually boost the national energy industry. The Jordanian Energy Sector Updated Strategy (2007-2020) built on the previous National Strategy from 2004, which was hampered by a number of issues that prevented the implementation of a number of projects. The words "resilience" and "sustainability" are not discussed in either the 2007-2020 Strategy or the previous one (Mohammed Issa Shahateet\*, 2021).

The plan identifies the country's major current energy-related challenges, which are divided into two categories: resilience and sustainability. Although these issues are not specifically addressed in terms of resilience or sustainability in the plan, the government has long recognized the issue of energy security, for example, the (MOPIC, 2017) considers it a persistent issue impeding the country's long-term development. Furthermore, the (MoEnv M. o., 2017) According to the report, Jordan's energy sector's resilience is critical because it is vulnerable to external shocks, such as price fluctuations, and has national economic implications. Furthermore, with a 30% increase in population in some



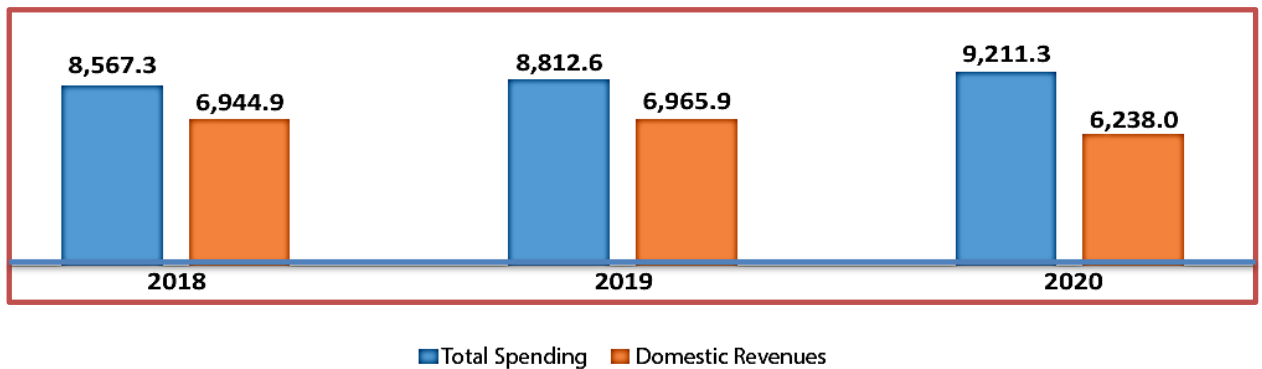
governorates in the last three years, energy demand has risen dramatically, putting a strain on national infrastructures. Even humanitarian organizations working in Jordan's refugee camps have had to deal with unsustainable energy supply costs. (The Royal Institute of International Affairs [Chatham House], 2016).

Even before the Syrian Crisis, the country was already resource-constrained in terms of energy, posing challenges to energy planners, particularly in the power and water sectors. Local and international researchers have also addressed the country's energy demand challenge. (Sameh Shamout a, 2020). The Jordanian economy is also impacted by the Corona pandemic, with a rise in general budgets in 2020, as seen in Figure 2.8 below: The 2020 budget deficit has risen from 1.8 billion dinars in 2019 to 3 billion dinars in 2020 (Forum, 2021).

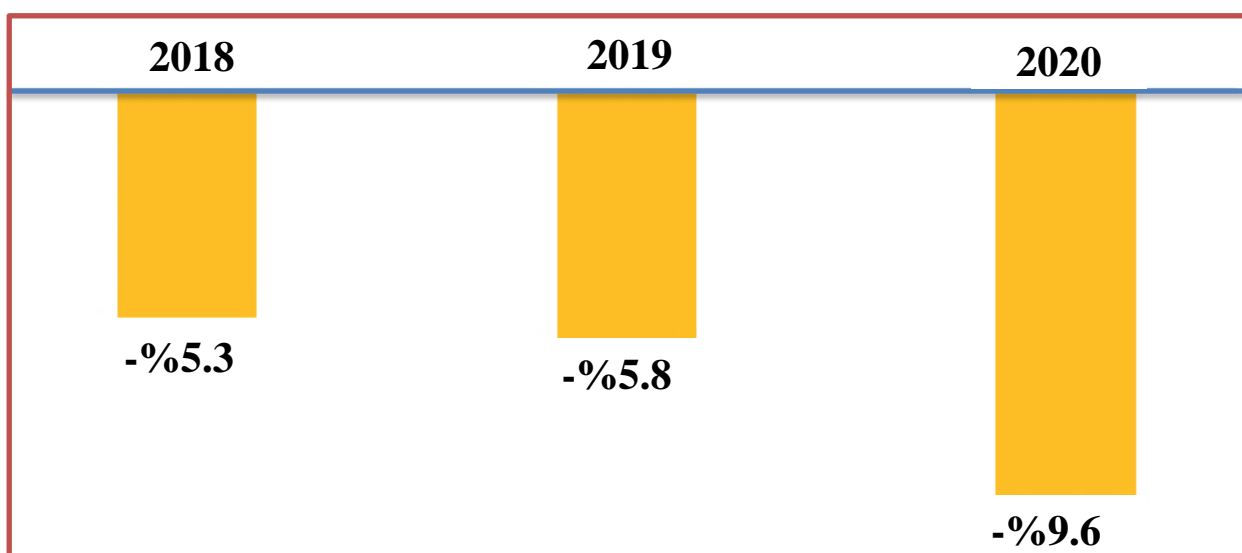


**Figure 2.8: Budget deficit in Jordan from 2016 to 2021** (Forum, 2021).

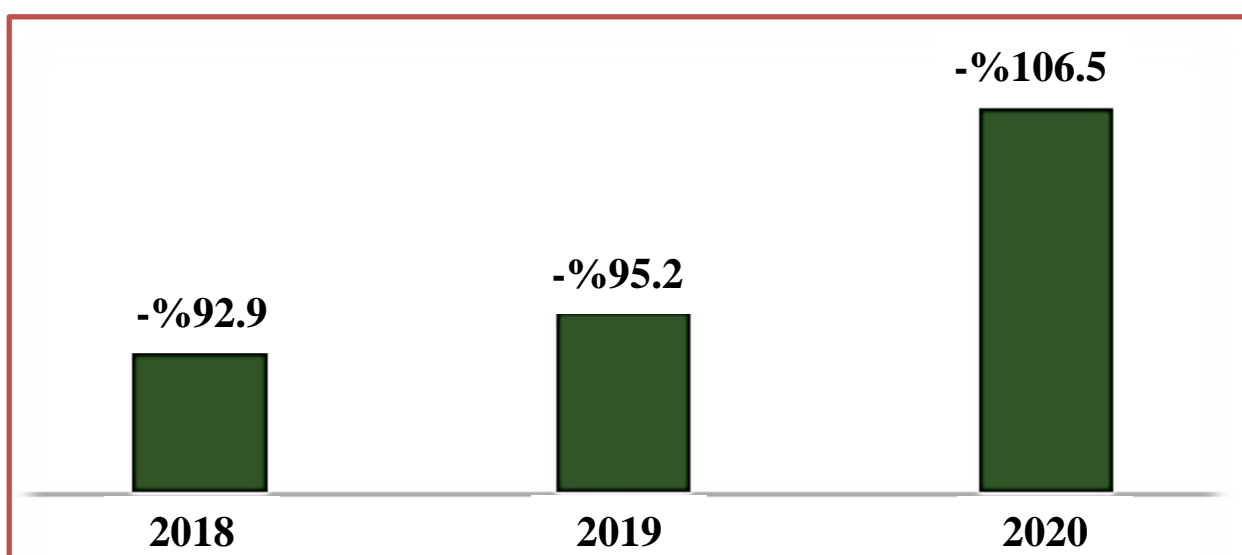
Salaries and wages account for a significant proportion of overall public spending in Jordan, and they are higher than in other countries with comparable wealth and growth. Jordan pays 48.3 percent of the gross public spending on salaries and benefits for government employees and military personnel (Forum, 2021).



**Figure 2.9: The Status of Public Finance (JD Million)** (Forum, 2021).



**Figure 2.10: Budget Deficit to GDB Ratio** (Forum, 2021).

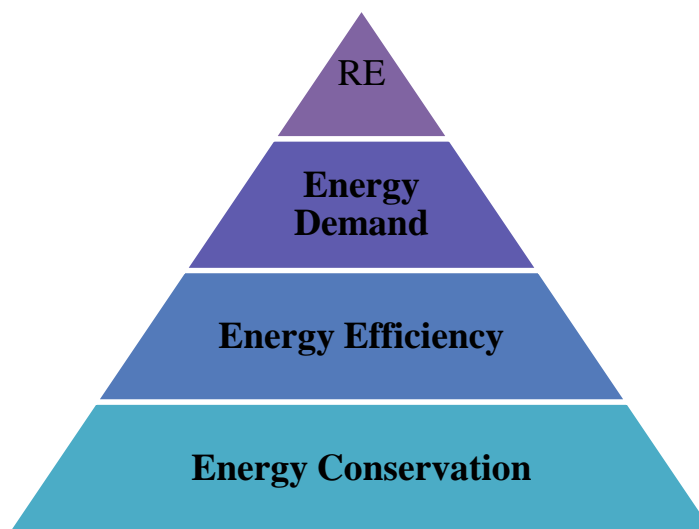


**Figure 2.11: Public Debt to GDB Ratio** (Forum, 2021).

This ratio indicates that there is an underlying issue with public spending products, which is difficult to solve in the near term. Jordan has a higher income share of public investment than Morocco, the United Arab Emirates, and Turkey. The actual high wage bill, along with its poor efficiency, suggests that raising this budget item will only worsen the economy's current problems. Furthermore, with the International Monetary Fund forecasting a sluggish global growth rate of 2.1 percent in 2021, there does not seem to be a solution to this crisis on the horizon.

## 2.8 Resorting to renewable energy instead of conventional energy:

Faced with such a challenge, it is imperative to pursue alternatives through a strategic plan whose goals revolved around: a stable, clean, efficient, and inexpensive energy to be supplied, wherever possible, through self-reliance and diversifying sources; as a result, the emphasis shifted to improving the green energy sector and energy conservation. "If we build the energy pyramid with energy conservation at the bottom, led by energy production and energy demand, and green energy at the top, we can save energy, save resources, reduce our reliance on imported energy, and improve the climate for this generation and future generations." That's a winning formula.



**Figure 2.12: Energy Pyramid** (Mulhollem, 2010).

Jordan has had a lot of success in this region, attracting many renewable energy projects in the first, second, and third rounds of direct renewable energy project proposals, as well as wheeling and net metering projects on the transmission and distribution grids.

The wind and solar energy installed in Jordan's electric power system are considered significant capacities, which are ratios higher than what has been achieved by developed countries that have made significant progress in this region, where the generating capacity of renewable energy projects is expected to increase by around (2400) MW by the end of 2020. This achievement would not have been possible without the Jordanian electric power system. NEPCO plans to complete the green corridor project soon, which will help in the transmission of renewable energy between (800-1000) MW from the south of the Kingdom to the load centers by integrating the supply of all renewable energy companies that have been contracted and committed to the project according to the agreed timetable (NEPCO, 2019).

Jordan has a chance to be listed among the leading countries in the field of green energy as a result of our collaborative efforts between the government and the private sector to complete those projects. Jordan is currently ranked third in the world in terms of attracting investment to this critical market, in the hopes that such facilities will be more than just electric power plants, but also plants for capacity-building and enhancing local skills, fostering Jordan's growth and national revival. Due to the Kingdom of Jordan's rising energy demand, future strategies for alternative and economic options have been devised. In the area of renewable energy, the comprehensive strategy for the energy sector included legislation aimed at increasing the contribution of new and renewable energy to 7% of the energy mix by 2015 and 10% by 2020 (memr, Annual Report, 2018).

As part of the study, the technical and economic feasibility of using various renewable energy-based supply options to feed the Kingdom is examined. The diagrams, as well as stand-alone RE configurations, are tested on the network. Higher efficiencies on both systems can help shorten payback periods. This will be directly proportional to the amount of solar radiation, the number of long hours of sunlight, and the number of clear days in the year. Integrating SACs as a preheated air source into building HVAC systems is another way to improve system efficiency. Jordan devised a seven-year plan from 2013 to 2020 that focused on reducing oil products, increasing and preserving natural gas inputs, and introducing large alternative energy sources, such as renewable and nuclear energy sources, as well as oil shale, However, most of these projects have been suspended since the COVID-19 pandemic entered Jordan (Hochberg, 2015).

Resorting to renewable energy instead of conventional energy is the best solution to overcome all economic, political, and some environmental obstacles, as renewable energy has proven its ability to withstand the COVID19 pandemic despite some minor obstacles it faced. In the literature, In the renewable energy sector, there is very little research on the impact of the Covid-19 outbreak. The industry is suffering as a result of issues such as supply chain delays, tax stock market issues, and the risk of losing out on government incentives that are set to expire this year (Birol, 2020).

Use of renewable energy resources in Jordan, one of the energy situation in Jordan and Some success stories in the field of renewable energy technologies have been published by (Hrayshat, 2007), The Hashemite University in Jordan examines global radiation, diffused radiation, and other meteorological data to include a systematic report on solar radiation (Etier et al, 2010), (Alzoubi a, 2009) The Greater Amman Municipality's (GAM) building regulations were examined from the perspective of solar accessibility.

They proposed new regulations to ensure sufficient solar accessibility in modern residential apartment construction in Amman (zou'bi, 2010). The degree of agreement between load variation patterns and renewable energy source power generation was reported (Badran, 2001) studied ways to promote the use of industrial solar energy in the Arab world, especially in Jordan (Association M. E., 2018). Based on the above studies, no study has been conducted to research the impact of the Corona pandemic on the energy sector in Jordan. When studying the effects of the Corona pandemic on the energy sector, and trying to explore the post-pandemic future, we are not dealing with a purely economic issue, but rather we are analyzing a central turning point in world history, in which we may witness important geopolitical shifts and shifts in the power centers of the global system. So, Professor of Global Peace and Security Studies at Hampshire College in Amherst, Michael T. Clare, USA, in his analytical paper published in Current History, November 2020, titled: “Energy After Covid19: The Beginning of the End for Oil” (Klare, 2020).

Nonetheless, mainstreaming RE would be difficult, particularly because current Power Purchase Agreements (PPAs) limit the ability to implement an adaptive energy management strategy (Take, for example, the 15-year gas supply deal with Israel or the planned Basra-Aqaba oil pipeline). These projects' opportunistic expenses have failed to account for the underlying socio-economic gains of future RE projects (Amjad Khashman, 2016).



**Figure 2.13: Jordanian trade union sit-in to refuse to import gas from the Israeli occupation Source (arabi21, 2014).**

The two major technical obstacles stymieing RE growth are national energy overproduction and the unpredictable existence of RE.Z It will be dangerous to incorporate facilities that compete with current electric grids that can no longer accommodate a power surplus because the electric grid is now overburdened. Intermittency can also have a negative effect on the total electric grid by making it unreliable.

## **2.9 Integration to drive recovery**

Covid-19 brought the PAEM's future benefits into much sharper focus. The urgency of improving regional integration was demonstrated by global supply chain disturbances and volatile oil prices, to name a few factors. Meanwhile, stable electricity is critical for Covid-19's industrial and economic recovery. Because of the region's rapid population growth, there would be an ever-increasing demand. In addition, the PAEM is in line with many MENA countries' proposals for a "green recovery" (oxfordbusinessgroup, 2021). Morocco, which provided about 35 percent of its electricity needs from renewables before the pandemic thanks to a number of large-scale solar projects, is one of the region's clean energy pioneers. Morocco plans to raise its renewable energy share to 50% by 2030, and to be entirely fueled by renewables by 2050. In terms of renewable energy, the region still has a lot of untapped capacity, and having access to a larger market would help this important sector expand. Saudi Arabia, which has set aggressive renewable energy targets in light of the pandemic, is a prime example of a country seeking to grow in this region.

Although renewables only accounted for 0.05 percent of the country's energy generation in 2018, the government announced in January a revised target of 50 percent by 2030, which would be accomplished by the widespread implementation of new projects. Another benefit of the PAEM is that it would enable member countries to access some of the cross-border electrical interconnection infrastructure that has been funded by the Arab Fund over the years, as well as interconnections established by GCC countries. The PAEM may have a cumulative capacity of nearly 300 GW, placing it second only to the European Network of Transmission System Operators in the world. Of necessity, achieving this aim would necessitate a significant amount of dedication and investment. Although some big steps must also be taken before the PAEM can get off the ground, the lessons learned over the past year, together with a recognition of the hurdles ahead, are likely to increase political will and expedite the process.

## **CHAPTER THREE**

### **Research Methodology and Finding:**

#### **3.1 Introduction**

The initiative is summarized by the multiple benefits that can be gained from the advancement of solar technology, which can be generally divided into three categories: energy, economy, and environment. Mutual interference is also possible since the three E are intertwined. Any or all of these acts may be applicable depending on the country; the priority order may differ. This study's approach will be as follows:

- 1- Review previous studies on the energy sector in Jordan and the effect of COVID-19 on Energy in other countries.
- 2- Review of previous Jordan surveys which discuss the effects of COVID-19
- 3- Analyze the spread of COVID-19 in Jordan and recognize the situation of Energy and understand the relationship between them.
- 4- To examine the demand for electricity on an annual and regular basis before and after the COVID-19 pandemic, and to completely isolate the effect of COVID-19 on Jordan's energy demand.
- 5- Set up some recommendation & documentations.

#### **3.2 Summary of Effect of COVID-19 on businesses survey in Jordan conducted by United Nations Development Program (UNDP) and International Labor Organization (ILO).**

The results of a quick assessment of COVID-19's effect on Jordanian businesses are presented in this thesis. The assessment is based on data from two separate market evaluations by the International Labor Organization (ILO) and the United Nations Development Program (UNDP). The survey database was combined to act as a foundation for research. Fafo Institute for Labor and Social Research (Fofa) had methodological design and supervision for the ILO survey's implementation. The study is one of a sequence of accelerated studies conducted by As part of a larger effort to evaluate the impact of the COVID-19 pandemic on Arab labor markets, the ILO has released a report (Tewodros Aragie Kebede, 2020).

ILO and UNDP performed a sample survey in Jordan of 1,190 people in conjunction with Fafo. In April 2020, to companies (including home-based companies, micro and small businesses, and larger corporations). This survey provides results on the effect of Covid-19 on businesses that use collection data. Companies included manufacturing companies (38%), distribution and distribution companies (11%), mining and quarry (10%), accommodation providers and food services (10%); the remaining 31% is divided amongst different industries.

The COVID-19 pandemic is putting an increasing economical strain on all nations, causing economic disruption and killing hundreds of thousands of people around the world. The lack of foreign support for meeting the 17 Sustainable Development Goals (SDGs), climate change mitigation and adaptation, and biodiversity conservation would also hurt low and middle-income countries. The pandemic is expected to stymie development toward the SDGs by 2030, which was still stumbling prior to the epidemic. The COVID-19 pandemic has now shown Jordan's weaknesses in this sector, as well as the weaknesses in businesses and services such as health systems across the world, and it is a disaster in the making as the pandemic spreads quickly to Jordan due to its weak health system, which is compounded by low access to modern and reliable electricity. Given Jordan's growing demand for energy, strife is inevitable. In the world of green energies, to be precise (UNDP, 2020)..

Since the COVID-19 began to spread, the demand for fossil fuels has decreased, especially in light of the total or partial closure measures that Jordan and most of the world are witnessing, amid stopping many industries at a level the whole world has not seen for seven decades and expectations that this pandemic will bring about radical transformations that will last for a more extended period. Concerning fossil fuels and the apparent growth in the use of renewable and sustainable sources, Predictions with lower initial costs for solar panels and Solar Water Heater collectors increased oil prices. The introduction of a carbon tax will significantly reduce the non-configurable configurations of the independent structures. Moreover, advances in the technology of producing these ingredients will improve their efficiency. As a result, the implementation of separate schemes becomes economically and technically feasible. Therefore, clean and fuel-free supply options will be obtained (UNDP, 2020)..

Short-sighted politics, reliance and science and technology impediments all lead to uncertainty in the energy planning process. However, if Jordan moves towards energy independence, the effect of these considerations on the energy policy will be much less drastic. Instead of importing Egyptian and Israeli gas as well as heavy crude oil from Saudi Arabia and Iraq, this could be accomplished by tapping into existing oil shale, gas, and clean energy sources. Jordan has a lot of promise for renewable energy sources like wind and solar. Savings of up to 20% could be achieved in certain industries with only limited capital expenditures in energy production and rationalization. Furthermore, shipping nuclear fuel carries significant dangers, several nuclear power plants around the world, especially in India and the Philippines, have been halted due to enriched uranium shortages. As a result, Jordan's dependence on imported nuclear fuel will continue to pose a geopolitical problem as well as a persistent



threat to the country's energy stability. necessitating a continuous supply of electricity from conventional sources (UNDP, 2020).

Another significant factor to the energy mess was the fabrication of the electricity load in order to explain the inclusion of nuclear power in the grid. This was achieved at the exorbitant cost of "load mismanagement" and correspondingly high capital investment, with negative effects for programs in other industries. Finally, if substantial future change can be anticipated with realistic optimism. Exaggerated demand load projections in the Plan add to the overall energy policy perspective (UNDP, 2020)..

### **3.3 Surveys Finding**

In the event that the current situation at the time of the survey had persisted, more than half of the surveyed businesses (56%) planned to be in operation for fewer than three months. About a fifth of the businesses were unsure whether they would continue to operate, indicating the high degree of instability in the industry. Just 13% of businesses plan to continue operating for longer than three months. Smaller businesses, like their willingness to continue paying salaries, were more likely to shut down after a month than medium and larger businesses. Those businesses that were in a bad financial condition due to the lockdown were much more likely to shut down than those that were in a comparatively strong financial situation (UNDP, 2020).

Reduced revenues (63%) and poor liquidity and cash flow issues (46%) were identified as the key barriers to the surveyed businesses continuing operations in the months ahead. Many manufacturing firms face transportation and access to work challenges, especially in the garment and textile industries, where production costs have risen significantly due to the provision of shuttle buses, as public transportation is unavailable during the lockout and reduced in capability due to social distancing steps (UNDP, 2020).

In terms of the Covid-19 crises' effect on overall market morale, more than half of the surveyed businesses (52%) are optimistic that they can survive the storm and return to profitability after the crisis is over, while 21% are not confident in their economic resilience and robustness. All of the surveyed businesses had a high level of doubt about their robustness, but micro businesses had an especially high level of concern (29 per cent). As compared to businesses that were prosperous prior to the recession (63%) and businesses that were losing money prior to the crisis (33%) were more optimistic that they would survive the crisis (41 per cent) (UNDP, 2020).

As a result of the COVID-19 crisis, almost 40% of surveyed businesses avoided paying social security contributions, taking advantage of the waiver introduced in Defence Order 1. As compared to bigger

businesses, a higher percentage of small businesses have avoided paying their bills. Just 34% of businesses with more than 100 workers have avoided paying their bills, compared to 45 percent of micro businesses. Overall, 63 percent of surveyed companies have taken no steps to ensure market continuity; however, this number is marginally higher for home-based businesses, at 74%. Businesses are contemplating the launch of innovative goods (18%) or new business structures (14%), as well as incorporating innovation and technological systems (11%), and e-commerce sites (10 per cent) (UNDP, 2020).

Lack of sales/demand (36%) was cited as a major obstacle for businesses in the coming months, followed by liquidity restrictions (23%), and transportation issues (23%). (22 per cent). More than a third (37%) of respondent micro businesses said they will be unable to operate for more than one month under current conditions (lockdown), demonstrating the fragility of businesses (UNDP, 2020).

### **3.3.1 As a result of Jordan's COVID-19 response initiatives, all of the surveyed businesses reported cash flow issues, decreased demand and supply, and value chain disruption (UNDP, 2020).**

- A. Just 7% of surveyed businesses said they were running normally at the time of the study, while 39% said they were operating but with less employees (7%), fewer working hours (16%), or both (16 per cent). About half of the businesses surveyed (51%) said they had temporarily closed.
- B. 42% of businesses said they'll be able to afford all employees' wages for less than a month under current terms, while another 42% said they'll be able to do so for less than three months. Micro companies (55%) and small businesses (44%), on the other hand, suggested that they lacked the financial resources to continue paying wages for another month, while medium businesses (33%) and larger businesses (23%) were more likely to be able to do so.
- C. Around a quarter of businesses (26%) said they could stay open for less than a month under current conditions, 30% said they could stay open for 1 to 3 months, 5% said they could stay open for 4 to 6 months, and only 13% said they could stay open for more than 6 months. A significant number of them (27%) had no idea how long their companies would last if the situation at the time of the survey remained unchanged.
- D. About half of the respondents (52%) are optimistic that they can weather the recession and return to profitability, although 20% are skeptical of their economic stability and robustness. However, when asked about their pre-crisis financial condition, 25% of businesses said they were losing money and 46% said they were

breaking even, implying that many businesses were in financial trouble prior to the lockdown measures. Home-based and micro-business owners are more concerned.

- E. The vast majority of workers who were unable to go to work due to the lockdown continued to be paid in full or in part by their employers. Employees who were unable to come to work were also paid in full 71% of the time, with 20% collecting partial wages. As opposed to workers in small businesses, employees in big businesses were more likely to receive full pay when they were unable to come to work.
- F. Companies' ability to navigate the economic downturn would be determined by a variety of factors, including how flexible they are in maintaining business continuity and adjusting their business processes; moreover, only 25% of respondents said they had a business continuity strategy in place.
- G. More than 72 percent of surveyed businesses said they had distributed protective clothing to workers, such as hand sanitizer, goggles, and gloves, or had increased cleaning and sanitizing activities through workplaces, in order to minimize the spread of COVID-19 in the workplace (55 per cent). However, 23% of microbusinesses said they had taken no action at the time the survey was conducted.
- H. The majority of businesses (67%) said they were unaware of any assistance packages or interventions available to help them alleviate the crises' effects at the time the survey was conducted (late April). 12 percent of businesses said the government is subsidizing salaries, with 16 percent of small businesses and 21 percent of businesses with 100 or more employees saying the government is subsidizing pay. Soft loans were used by 8% of respondents, and credit was used by 5% of respondents.
- I. Direct financial support is seen by 53% of companies as the most important support required to deal with the crisis at this time, with 60% of micro businesses and 43% of firms with more than 100 employees showing a need for direct financial support.
- J. 42% of all businesses polled said wage subsidies were essential to deal with the crisis at this stage, with 68 percent of businesses with more than 100 employees agreeing. Access to credit was stated by 20% of respondents.

### **3.4 The policy measures in Jordan related to COVID-19 pandemic.**

The number of companies that applied for funding under defense Order 6 was issued by the Ministry of Labor on May 5th, as seen in the tables below.

**Table 3.1: Request got for salaries to be reduced by 50%**

	<b>Amount</b>	<b>Approved Applications</b>	<b>Rejected applications</b>
Number of applications	3704	3443	261
Number of workers	185,256	143,869	41,387
Number of workers whose wages will be reduced	124,817	108,030	16,787
Reduction percentage	67 %	75 %	40 %

(Forum, 2021).

**Table 3.2: Applications for closure of business**

	<b>Amount</b>	<b>Approved Applications</b>	<b>Rejected applications</b>	<b>Under Process</b>
<b>Number of applications</b>	<b>406</b>	<b>197</b>	<b>164</b>	<b>45</b>
<b>Number of workers</b>	<b>9,775</b>	<b>3,192</b>	<b>5,623</b>	<b>960</b>
<b>Number of workers whose wages will be reduced</b>	<b>8,439</b>	<b>2,914</b>	<b>4,926</b>	<b>599</b>

(Forum, 2021).

**Table 3.3: Received application for a monthly wage reduction for workers**

	<b>April 2020</b>	<b>May 2020</b>
<b>Number of applications</b>	<b>1,647</b>	<b>1,647</b>
<b>Number of workers</b>	<b>78,230</b>	<b>78,230</b>
<b>Number of workers whose wages will be reduced</b>	<b>55,911</b>	<b>55,911</b>

(Forum, 2021).

### **3.5 Selections from the survey**

The ILO business survey sample was taken from the database of ILO, which included "all companies that have engaged in ILO's program and project activities." The ILO's database is largely the product of its career centers, which are designed to link job seekers and employers. The sample consisted of all available companies in the ILO database, totaling 1,355 businesses. The UNDP's corporate study used three databases to sample 2,584 out of 38,471 businesses: I The Municipal Property Tax database was primarily used in the Kingdom to sample a variety of registered companies and home-based businesses (except for businesses registered within the Greater Amman Municipality and Aqaba Special Economic Zone) (UNDP, 2020).

The Ministry of Digital Economy and Entrepreneurship (MODEE) Tech-start-up database was used to sample registered businesses in the services, manufacturing, and agriculture sectors from within the Greater Amman Municipality (329 enterprises); and (ii) the IRADA Program<sup>17</sup> database was used to sample registered businesses in the services, manufacturing, and agriculture sectors from within the Greater Amman Municipality (329 enterprises) (2,113 enterprises) (142 enterprises). UNDP collected responses from businesses who received direct assistance from various UNDP projects and initiatives in a separate data collection campaign. A total of 270 UNDP beneficiary enterprises from seven governorates were included in the survey (Mafraq, Zarqa, Amman, Irbid, Ajloun, Jerash, Karak, Madaba, and Balqa; Businesses that were both formal and informal in terms of their registration status included micro, small, and home-based businesses. The results of this survey were not combined with those of the other datasets. instead, it was examined independently (UNDP, 2020).

#### **3.5.1 Questionnaire**

The ILO and the UNDP collaborated on a systematic questionnaire. The form and specificity of questions have an effect on the accuracy of survey results as well as the likelihood of respondents returning for more rounds. As a result, the survey questionnaire was kept short, with no long or multiple-choice questions. The questionnaire was divided into smaller parts, each of which addressed different topics and addressed different types of respondents, resulting in a versatile questionnaire design (e.g. from enterprises of various sizes). While the ILO used the full version of the questionnaire, the UNDP only used a simplified version to collect data. Both questionnaires were translated into Arabic and made available to respondents in that language, as the main field of the Questionnaire was in the manufacturing and agriculture sectors (UNDP, 2020).

### 3.5.2 Data gathering (The ILO's business survey)

Computer-assisted telephone interviewing was used to perform the ILO survey (CATI). KoBoToolbox was used to create the data collection software, and smart cell phones were used to execute it. To carry out the data collection activities, The International Labour Organization (ILO) recruited 20 interviewers and three supervisors. Fafu gave the three managers a one-day immersive training before teaching the 20 interviewers and two controllers. The information was gathered between April 14 and April 29, 2020. The data was stored on a dedicated, reliable server, as is customary in humanitarian response. There were 714 completed interviews with business leaders as a result of the data collection, representing a response rate of 53% (UNDP, 2020).

The sample of businesses comprised producers (38%), wholesale and retail (11%), mining and quarrying companies (10%) as well as hosting and food services (10%), while the remaining 31% were divided into numerous segments of companies (UNDP, 2020).

**Table 3.4: State of interviews, according to the (ILO) survey**

	<b>Frequency</b>	<b>Percent</b>
<b>Completed</b>	<b>714</b>	<b>53</b>
<b>Refusals</b>	<b>127</b>	<b>9</b>
<b>Telephone unreachable</b>	<b>114</b>	<b>8</b>
<b>Call not answered</b>	<b>168</b>	<b>12</b>
<b>Other</b>	<b>232</b>	<b>17</b>
<b>Total</b>	<b>1355</b>	<b>100</b>

(UNDP, 2020)

### 3.5.3 The (UNDP) business study

The UNDP performed two data collection activities, the first of which sought to utilize Jordanian government databases, and the second of which focused on UNDP-supported businesses. The data collection for the first study of companies was outsourced to Crystel Call, a survey firm. The data was collected by a team of 15 interviewers from April 19 to April 26. Data was collected using the “Genesys” program and then exported to Excel/SPSS for review. The data gathering exercises yielded an 18% response rate, with 476 completed interviews with enterprise members. Since the records are out of date in terms of basic details needed for the analysis, such as active phone numbers, the high rate of non-response can

be due to this. Seventy-two percent of the 476 interviews completed came from the Municipal Property Tax database, while twenty-five percent came from the IRADA service database, and three percent came from the MODEE database (UNDP, 2020).

Five UNDP employees collected data for the second batch of UNDP beneficiaries from April 23 to April 28, 2020. A response rate of 55% translates to a sample size of 155 businesses. The resulting dataset is examined independently, with the results presented in Section 10 (UNDP, 2020).

### **3.5.4 Restrictions**

Not all companies in Jordan have the data utilized in this research. In addition, during the survey operations a series of problems were confronted, imposing some restrictions that have to be taken into account while interpreting the findings. Their responses are minimal and informal companies are limited to the sample (UNDP Tewodros Aragie Kebede, 2020).

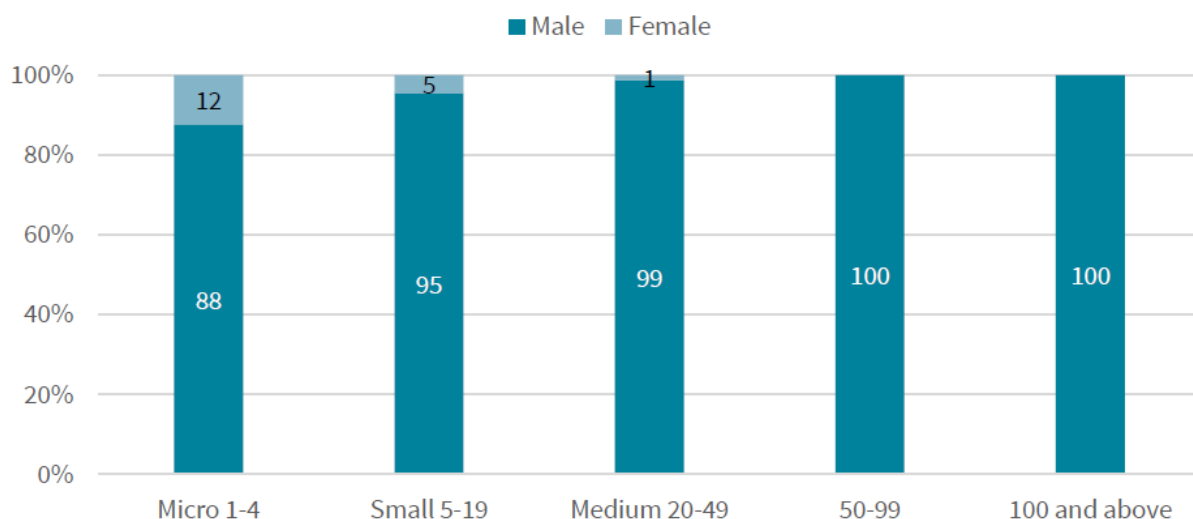
Despite these restrictions, the reports provide insights into the effects of the COVID-19 epidemic on companies. To dynamically capture the implications of COVID-19, the surveys are built as a panel structure to repeatedly interview samples of companies. In later rounds of data gathering, certain constraints will be resolved (UNDP Tewodros Aragie Kebede, 2020).

### **3.5.5 Five Characteristics of the Businesses Included in the Study.**

The profile of the businesses in the dataset is presented in this section, which will be included in the following sections (6-9). For statistics that use a smaller survey, explicit remarks are provided—as previously discussed, the UNDP's questionnaire was marginally shorter. A total of 1,082 people responded with details on where their businesses are located. Amman has the highest concentration (74%) followed by Irbid (13%), and Jerash (3%). (3 percent). (6 per cent). Jordanians own the vast majority of the businesses (87%) and Syrians own 3%. Of the others, some businesses are owned by people of various nationalities, but mostly Jordanians (2%); others are split evenly between Jordanians and Syrians own 1% of the companies, while the rest are owned by citizens of different nationalities (UNDP, 2020).

Almost every company surveyed (97%) has a license from the relevant authorities. As a consequence, this evaluation is most useful for organized companies. The majority of the companies (41%), with less than four workers, were micro businesses, while 28% were small businesses with five to 19 employees, 13% had 20 to 49 employees, 8% had 50 to 99 employees, and ten percent had more than 100 employees. Female

entrepreneurs owned just 8% of the companies. Female ownership was more prevalent in microbusinesses (12%) and declined as the size of the company increased (Figure 3.1).



**Figure 3.1: Ownership by business size (employee number) and sex (per cent) (UNDP, 2020).**

The companies are classified into 19 associated sectors using the International Standard of Industrial Classification (ISIC) scheme. Manufacturing, however, accounts for the majority of them (38%) followed by industrial and retail trade (11%), mining and quarrying (10%), and housing and food services (10%). (10 percent). (ten percent) The remaining 31% comes from a number of sectors with small sample sizes that are categorized as "other industries." The bulk of businesses have been in service for more than five years: 27% have been in operation for five to ten years, and 45% have been in operation for more than ten years. Eighty percent of companies with more than 100 employees have been in operation for more than ten years. About 4% of companies were less than a year old, and only 1% were between 1 and 2 years old (12 %). Table 3.5 shows the age of the businesses as well as their size (UNDP, 2020).

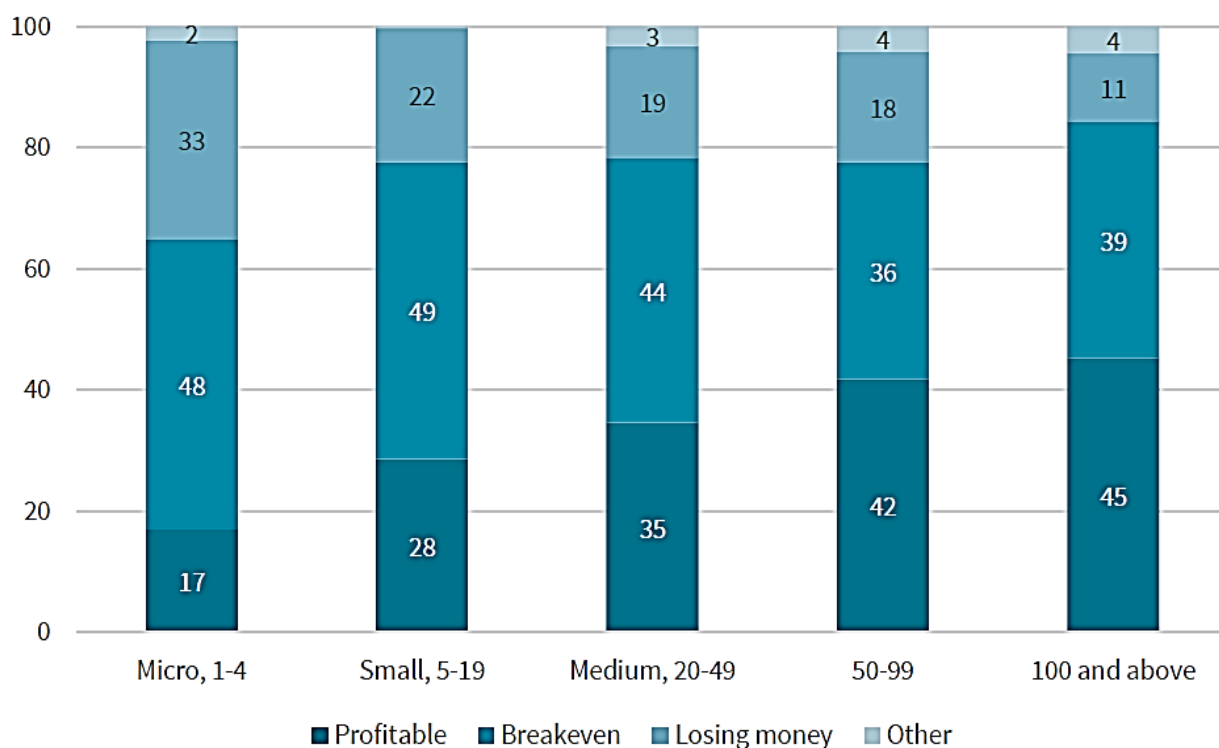


**Table 3.5 Number of years the company has been in service by scale (percent)**

Total	Less than	1-2	3-4	5-10	More than	Total	
	1 year	years	years	years	10 years	Total	Sample size
	<b>4</b>	<b>12</b>	<b>12</b>	<b>27</b>	<b>45</b>	<b>100</b>	<b>1,185</b>
Size of enterprise by number of employees							
Micro, 1-4	8	19	16	27	30	100	489
Small, 5-19	2	11	15	27	45	100	330
Medium, 20-49	1	5	8	28	58	100	155
50-99	1	1	6	29	63	100	97
100 and above	-	-	3	17	80	100	114

**n=All enterprises**  
(UNDP, 2020).

Before the Coronavirus pandemic, about 27% of businesses were successful, with 46% breaking even and 25% losing revenue. Prior to the recession, microbusinesses (33% of all businesses) were losing revenue (Figure 3.2).



**Figure 3.2: Financial position of businesses prior to the COVID-19 crisis, by size (percent) (UNDP, 2020).**

The degree to which businesses have ongoing contractual obligations has a bearing on their willingness to take on new ones. Bank loans are used by around a third of the 1,185 businesses (37%), and larger businesses

(those with 50 or more employees) seem to depend on them more than smaller businesses. Micro companies are more likely than other businesses to provide microfinancing loans (Table 3.5). Three out of ten businesses have postponed payments (UNDP, 2020).

Few of the businesses polled have childcare, flexible work schedules, or parental leave, both of which are essential for working from home and for parents, especially mothers. Seventy-four percent of the 1,187 businesses said they had no other arrangements or non-pay incentives in place. The most common providers with such plans are businesses with more than 100 employees: 26% have maternity leave, 17% provide childcare facilities, and 10% provide flexible working arrangements (Table 3.6).

**Table 3.6: Shows existing financial obligations by company size (percent). (UNDP, 2020)**

	Micro-financ e loan	Bank loan(s)	Bills of exchange	Deferred Cheques	Open letters of credit	None	Sample size
<b>Total</b>	<b>11</b>	<b>37</b>	<b>10</b>	<b>30</b>	<b>5</b>	<b>35</b>	<b>1,185</b>
Size of enterprise by number of employees							
Micro, 1- 4	15	35	9	18	2	40	487
Small, 5- 19	12	33	10	35	2	33	330
Medium, 20-49	7	38	15	41	10	30	156
50-99	4	45	11	44	8	31	98
100 and above	6	49	11	37	17	29	114

**n= The total number of businesses. Since there were many responses, the row percentages totaled more than 100.**

**Table 3.7: Arrangements offered by companies based on their size (percent) (UNDP, 2020).**

		Childcare services	Flexible Working Arrangements	Family Leave	None	Sample size
<b>Total</b>		<b>3</b>	<b>7</b>	<b>21</b>	<b>74</b>	<b>1,185</b>
Size of enterprise by number of employees	Micro, 1-4	1	4	20	77	488
	Small, 5-19	1	11	25	70	330
	Medium, 20-49	3	4	17	79	156
	50-99	2	7	16	82	98
	100 and above	17	10	26	58	115

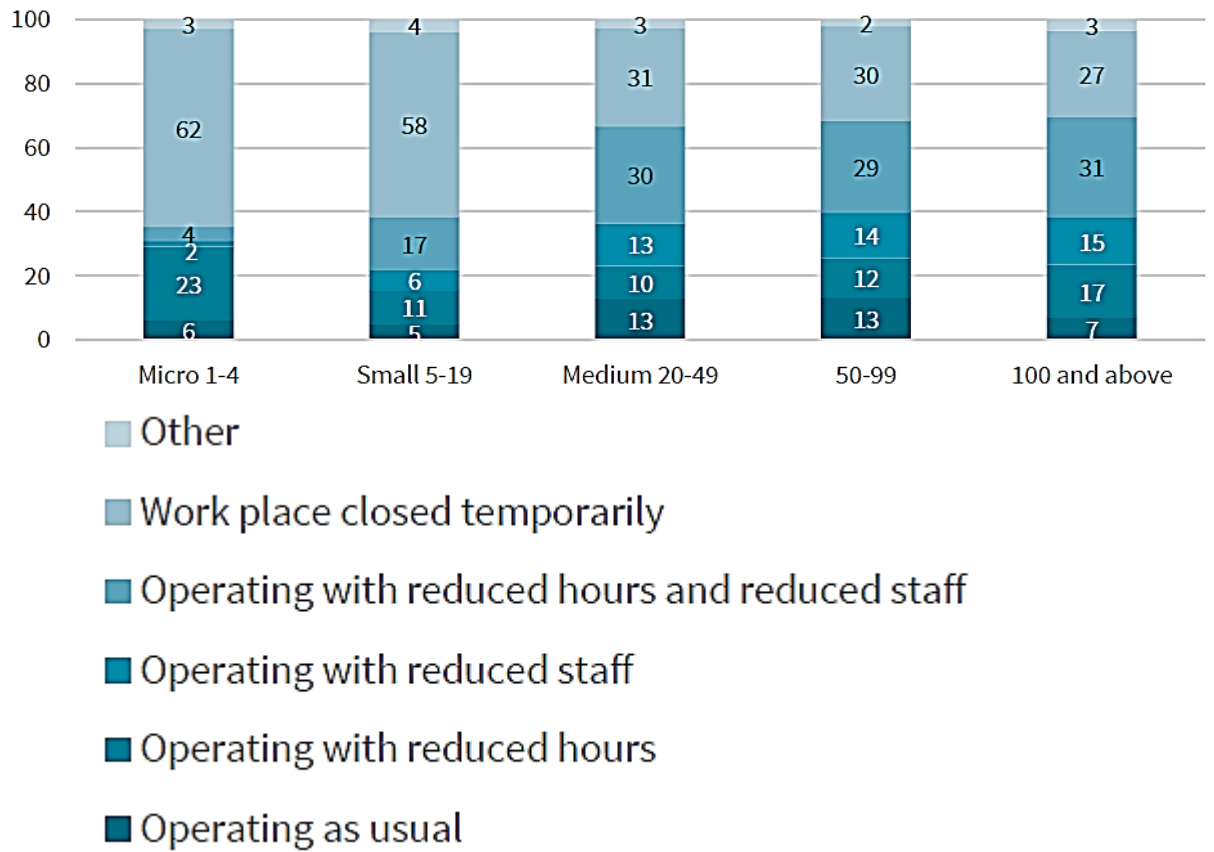
n=Enterprises in general. It's possible that many responses and percent add up to more than 100.

### 3.5.6 COVID-19's impact and business response measures

The COVID-19 pandemic and its reaction policies have had a major effect on Jordanian businesses. Cash flow issues, decreased demand and availability, and value chain instability are reported by nearly all of the businesses surveyed for this study. Furthermore, the vast majority of them anticipate a significant drop in sales (UNDP, 2020).

### 3.5.7 Status of operations

Just 7% of the 1,190 businesses surveyed were working as they were before the pandemic at the time of the study. 39 percent of businesses were running with fewer employees and/or fewer hours, and 51 percent of businesses had temporarily shut down. When in comparison to medium and larger companies (less than 31%), a higher percentage of micro (62%) and small businesses (58%) had temporarily shut down their operations (Figure 3.3).



**Figure 5.3: Operational state of businesses based on their size (percent)**  
(UNDP, 2020)

### 3.5.8 Economic impacts

Reduced demand and revenues were a concern for nearly three-quarters (73%) of surveyed businesses, while income loss was recorded by 59 percent and liquidity issues by 52 percent. Since lower demand and sales result in lower revenue, Lower demand and revenues have been confirmed by all companies that have experienced a revenue loss (Table 3.8). Economic effects are fairly equally spread across businesses of various sizes. However, a considerably higher proportion of small and micro businesses seem to be increasing their loans in order to deal with the crisis. If the recession persists, or in the wake of the crisis, this could result in a large number of bankruptcies among these businesses (UNDP, 2020).

**Table 3.8: COVID-19's economic effects by scale (UNDP, 2020)**

										Total	
	Loss of revenue	Reduce demand / sales	Increased costs of production	Access to cash/liquidity problems	Problems importing materials needed	Increased revenue	Increased debt	Bankruptcy	No economic impact	Total	Sample size
<b>Total</b>	59	73	24	52	21	1	14	3	5	100	696
<b>Size of enterprise by number of employees</b>											
<b>Micro 1-4</b>	68	73	15	55	18	1	22	4	4	100	158
<b>Small 5-19</b>	55	71	19	46	14	1	17	2	4	100	223
<b>Medium 20-49</b>	58	75	32	56	25	2	7	2	6	100	130
<b>50-99</b>	56	76	29	54	26	1	9	1	7	100	87
<b>100 and above</b>	59	74	34	53	30	-	6	2	4	100	98

n= The total number of Enterprises. It's possible that many responses and percent add up to more than 100.

### **3.6 The impact of the COVID-19 pandemic on travel and import restrictions for tourism and manufacturing**

Tourism, which includes transport and hospitality services, is projected to be one of the hardest hit markets. The imposition of travel bans, as well as the closing of airports and border crossings, has resulted in a large number of cancellations and a complete halt to the industry. According to the Chairman of the Jordan Inbound Tour Operators Association (JITOA),<sup>18</sup> up to 40,000 jobs in the hospitality industry, associated coach transportation, and among tour operators will be lost. International travel constraints and a global economic slowdown are projected to reduce demand for travel to Jordan from Europe, the United States, and Asia until the first quarter of 2021. “One of the worst hit industries is tourism, with a GDP contribution of JOD 4 billion (USD5.6 billion) or 13% of GDP (UNDP, 2020).

The government's tourism response policies are modest, encouraging only domestic tourism packages, which are insufficient to compensate for the industry's economic effects. Given the closing of tourism offices, restaurants, transportation, and travel agencies, and the longer-term outlook for growth – not until the first quarter of 2021 (JITOA, 2020).

### **3.7 Energy and Electricity situation**

The Company renewed its energy sharing deal with the Egyptian Power Transmission Company for 2020 in order to satisfy the Kingdom's electricity requirements when they become available (NEPCO, National Electricity Power Energy Annual Reports, 2019).

In 2019, the electric power system's peak load is (3380) MW, up from (3205) MW in 2018. Based on the outcome of the Electricity Demand Forecast Study for the period, this is projected to rise by 3.0% in 2019 and (2.9%) annually (2020-2040). To meet Jordan's, the demand for energy, the Company, through its National Control Center, takes all required steps to ensure that all customers receive uninterrupted electricity at negligible rates, in accordance with international standards (NEPCO, National Electricity Power Energy Annual Reports, 2019).

The Energy and Minerals Regulatory Commission, generation and distribution firms, these activities include the Ministry of Energy and Mineral Resources, as well as the Energy and Minerals Regulatory Commission. In comparison, the Jordanian electric power system's generation capacity at the end of 2019 was around (5728) MW, including the generation capacity of renewable energy projects on the distribution grid, which was around (460) MW, up from (360) MW the previous year, with a growth ratio of 1 (27.8 percent) (NEPCO, National Electricity Power Energy Annual Reports, 2019).

### **3.8 The impact of the COVID-19 pandemic on National Electric Power Company**

The COVID-19 pandemic had a major effect on Jordan's power market, causing:

- I. A sharp drop in electricity consumption due to the economic slowdown, estimated at around 10%, which was not reflected by NEPCO's long-term payment obligations under long-term contracts with electricity and gas suppliers (NEPCO, National Electricity Power Energy Annual Reports, 2019).
- II. A drop in the distribution companies' recovery of energy purchases, resulting in a two-month halt in payments from the distribution companies to NEPCO (from mid-March to mid-May 2020) and serious delays afterwards, with severe consequences for NEPCO's operational cash flows (NEPCO, National Electricity Power Energy Annual Reports, 2019).

As a result, NEPCO was forced to start deferring payments due to severe working capital restrictions. NEPCO has only been able to pay 75% of the sums owed to Jordan's green and traditional private independent power producers (IPPs), which have almost half of the country's generating energy, since April. Jordan's power supply was put in jeopardy as a result of this.

That may also jeopardize the hard-won integrity of the contractual structure that supports that industry. As a result, investor interest in Jordan as a foreign direct investment destination and, given its position as a regional model, the renewable energy sector in SEMED, could be jeopardized (MoEnv., 2020)..

To resolve this concern, the Bank collaborated closely with NEPCO, Jordanian authorities, investors, and other IFIs. NEPCO has signed an agreement with all renewable energy IPPs to return to absolute payment discipline and refund its arrears within the first half of 2021 as a result of these efforts. NEPCO is working on a related deal with traditional power suppliers, which will be finalized before the proposed loan is signed. This is an important step toward regaining investor interest, which is vital considering the magnitude of investment needed for Jordan's and the region's ongoing green transformation (VISP, 2019).

### **3.9 National Action Plan for Green Growth 2021-2025**

Jordan's Ministry of Environment has been working hard to help the country's green growth transition. In 2017, the Cabinet approved the National Green Growth Plan, which listed green growth as a top national priority. Jordan's green growth vision – rapid economic and socially beneficial growth – stresses the importance of resilience building. This is important for our economy to recover and continue to grow in the years 2021-2025, despite external shocks such as the negative effects of COVID-19. Green Growth Action Plan for the United States The aim of this strategy is to support Jordan's environmental and climate action while also achieving our long-term economic growth objectives (MoEnv., 2020).

#### **3.9.1 Implementation Principles for Green Growth**

Green growth is a distinct development strategy that will necessitate extensive cooperation among national stakeholders, which the NGGP has described as a key challenge and opportunity. MEMR lead agency in charge of coordinating the execution of all energy-related policies and strategies, but many of the activities in this action plan would involve collaboration among agencies, stakeholders, and sectors. The private sector, civil society actors, and government agencies – such as the GAM, MPWH, local governments, and others – are all active in leading and assisting action delivery. Donors, development partners, and local non-governmental

organizations (NGOs) are all expected to contribute financial resources, professional expertise, and an understanding of local needs and circumstances.

### **3.10 The nuclear debacle**

Jordan's nuclear policy started in 2007, with the controversial establishment of the Jordan Atomic Energy Commission. Jordan's parliament voted to cancel the program in 2012, shortly after the Jordanian parliament's Energy Committee claimed that JAEC had misled Jordan's people and government about the project's costs. (Eye, 2015).

Nuclear energy plans are going forward despite the parliament's decision. Jordan announced in May that it would build a uranium extraction plant, citing the existence of 36,389 metric tons of uranium oxide in central Jordan, and in June that Russian-owned Rosatom would build two reactors, the first by 2021 and the second by 2025, with Jordan covering 51 percent of the \$10 billion cost.

According to the JAEC, Nuclear power is Jordan's only option for achieving energy freedom. Jordan can conveniently mine uranium, according to one of its arguments (even though it would have been exported for enrichment). AREVA, a French firm, left Jordan in 2012 after four years after discovering uranium mines that were of a lower quality than would usually be economically viable.

Other concerns, according to Jayoussi, include a lack of water and Jordan's location in the midst of conflict. Furthermore, as the reactors' construction has progressed, the government has failed to include local stakeholders in decision-making or to deliver the promised environmental impact evaluation. "The government is not transparent," she said. Other issues, Water scarcity and Jordan's location in the center of warring countries, according to Jayoussi. In addition, as the reactors' construction has progressed, the government has failed to include local stakeholders in decision-making or to deliver the promised environmental impact evaluation. She said, "The government is not transparent."

### **3.11 Oil shale in Jordan**

Jordanian oil shale is thought to be of exceptional consistency. Since the bulk of the mines are shallow, they are ideal for open-cast mining. Oil shale is a domestic option that can provide Jordan with a long-term supply of inexpensive, secure, and ample electricity, meeting a large portion of the country's domestic energy needs and providing a long-term alternative the map below shows the position of oil shale in Jordan in relation to the country's oil needs.





**Figure 11.4 location of oil shale in Jordan** (Enefit, 2019).

Benefit is committed to protecting the atmosphere for present and future generations, and oil shale has significantly reduced environmental risks due to recent advances in drilling and processing technology. Advances in technology allow all of the energy from the rock to be removed, leaving only inert, non-hazardous ash behind, which can then be used as a valuable component material in road building and the cement industry. Furthermore, as an organic aspect of the mining operation, all abandoned open pit mining areas can be recultivated continuously. Recultivation is carried out in collaboration with the local government in order to make the most use of degraded fields in the future.

Higher (EE) in both oil shale power generation and shale oil extraction has also benefited from technological advancements. Oil shale retorting does not require a supply of external energy, resulting in lower CO<sub>2</sub> emissions. Furthermore, the excess heat created during the retorting process may be used to generate energy, reducing CO<sub>2</sub> pollution typically produced by power plants. The oil pyrolysis process is virtually water-free, thanks to new innovations that use highly water-efficient processes. The majority of Jordan's water input comes from brackish water, which is unfit for human use without expensive water treatment. Dust suppression in mining, ash processing, and converting shale oil into refined synthetic fuels are all done with brackish water. Wastewater disposal and reuse get a lot of attention. To reduce water consumption for cooling, air-cooled condensers can be used for power generation.

Oil shale producers in Jordan are expected to follow strict environmental

requirements based on internationally agreed principles such as World Bank Standards and International Finance Corporation Standards as part of their concession agreements with the government. Furthermore, all developers must perform a comprehensive environmental and social impact assessment in conjunction with the local community and agencies, covering a broad variety of considerations and addressing potential negative consequences (Enefit, 2019).

The impact of the Corona epidemic on the oil shale sector was very slight, because it has not been operated so far, but it was limited to delaying the supply chains of equipment that was imported to complete the facility (Moala, 2021). (Muala, 2021).

### **3.12 Other challenges facing the energy sector's growth**

- A. Proposals for energy efficiency are taking too long to execute.
- B. There is a general lack of understanding of the advantages of energy efficiency.
- C. Database is inaccessible, and details is unclear.
- D. Inadequate regulation of Jordanian building codes implementation.
- E. The Energy Efficiency Applications Law requires additional posts.
- F. insufficient support for low-income households' Energy Efficiency projects.
- G. Poor access to Energy Efficiency education, empowerment, and training
- H. Many Jordanian laws, including Article (10) of Bylaw No. (73) of 2012 on Regulating Procedures and Means of Conserving Energy and Improving Its Efficiency, which went into effect on April 1, 2013, should be revisited. 15 Solar Water Heaters (SWHs) are not allowed to be used in standalone buildings or apartments smaller than 250 m<sup>2</sup>, exempting more than two-thirds of dwellings from the law.

## **CHAPTER FOUR**

### **RESULTS, ANALYSIS and DISCUSSION**

#### **4.1 Discussion and Analysis**

The COVID-19 pandemic is placing increasing economic pressure on all nations, causing economic disruption and killing hundreds of thousands of people worldwide. As the COVID-19 pandemic has now shown Jordan's vulnerabilities in this sector, as well as weaknesses in businesses and services such as health systems around the world, the expectations showed that this pandemic will bring about drastic shifts that will last for a longer period. Regarding fossil fuels and the apparent growth in the use of renewable and sustainable sources,

Short-sighted policies, dependence, and scientific and technological constraints lead to uncertainty in the energy planning process. However, if Jordan moves towards energy independence, the impact of these considerations on energy policy will be much less severe. Instead of importing gas as well as heavy crude oil, this can be achieved by making use of shale, gas and existing clean energy sources. Jordan has a lot of hope in terms of renewable energy sources such as wind and solar energy. Savings of up to 20% can be achieved in certain industries with only limited capital expenditures in energy production and rationalization.

#### **4.2 Recommendations**

In order to achieve the target priorities and targets, the following recommendations must be considered based on this report:

- A. These results show that Jordan should start cutting out conventional energy and replacing it with renewable energy. This promotes the improvement of the economy, self-reliance, and environmental conservation, and benefiting from new lessons from COVID-19 and the status of the energy market globally, where the overall strategy for Jordan's energy sector should be reconsidered, which did not mention the COVID-19 pandemic, unlike other countries, which began to change their policies according to the new data and encourage the use of alternative energy to effectively support and manage a higher share of renewable energy sources.
- B. Removing the price hurdle in tandem with the growth of the clean technologies sector in Jordan.
- C. Compiling and reviewing data on renewable energy sources such as wind and solar
- D. Conducting technical commercial research on the use of solar panels in multi-family residences and small commercial establishments.. (Hrayshat, 2007)

- E. Intensifying the government's serious work in the field of solar energy by supporting and financing projects related to solar energy.
- F. The government should also review the regulations for licensing the installation of solar energy systems to facilitate access to licenses.
- G. Investment in energy-saving policies, including the advancement of renewable, viable energy technologies, must be channeled and prioritized.
- H. With breakthrough technical developments, we must align the electricity grid with a projected future without traditional energy in order to become prospective electric power exporters.
- I. We recommend intensifying the government's serious work in the field of renewable energy by supporting and financing projects related to renewable energy & energy efficiency (REEE). We should also review the regulations for licensing the installation of solar energy systems to facilitate access to licenses.
- J. Companies and investors should play a greater role in promoting investment in alternative and clean energy by encouraging low-carbon supply chains and seizing opportunities in clean energy markets to provide job opportunities and reduce the unemployment rate that has burdened the government and citizens alike. Renewable energy stocks not only offer investors a higher total return on fossil fuels but also lower rates in annual fluctuations, which is a very important indicator for investors.
- K. In light of the above findings and claims, all interested Jordanian stakeholders should be informed that COVID-19 has dealt a significant blow to fuel prices in the first quarter of 2020, oil prices dropped by 50% (Forum, Jordan Strategy, 2020) Oil price risks are substantial, arising from both supply and demand shocks. Oil prices will be kept down for a long time due to a combination of increased fuel production and poor global demand" (Fund, 2020).
- L. Every three to five years, Jordan's energy policy should be modified and revised. In underdeveloped countries like Jordan, strategy changes are particularly helpful because they have much more leverage both internally and externally than those in emerging countries.
- M. Take energy efficiency (EE) governance seriously, and encompasses both the public and private sectors, as well as the local government.
- N. Amend, refresh, and rewrite EE guidelines to make them more adaptable to the ever-changing demands of the Jordanian market.

- O. Raising sectoral awareness of laws, regulations, and EE equipment exemptions, as well as broadening their application to the general public.
- P. Look at the possibility of introducing new strategies and technology to help the nation properly meet its electricity demand (e.g. CSP, EVs).
- Q. Launch public awareness campaigns in Jordan's mass media targeted at all sectors of society, emphasizing the value, benefits, and effect of EE on individuals and the region. This procedure will assist with the replacement of outdated and inefficient electrical equipment and lamps.
- R. Coordinate student programs in colleges and schools related to energy efficiency, Restructuring the education system in schools to provide an informative clean energy system policy for changing customer behavior, promoting sustainable and integrating EE into curriculum solutions.
- S. Allow for more electricity contributions by decentralizing the national grid.
- T. Implement zero-feed-in infrastructure, expand storage capacity, and export electricity to neighboring countries.

The following points are intended to help Jordan achieve a future energy-efficient transportation system:

- A. Build a more efficient mass transit system that operates across the Kingdom.
- B. Complete new public transportation programs, such as the Bus Rapid Transit, to provide an interconnected and efficient public transportation system that connects all of the Kingdom's governorates (BRT). New projects such as the Light Rail Transit (LRT) and underground metro networks (subways) should be implemented to reduce the number of private cars and increase demand for public transportation.
- C. The rehabilitation and activation of the railway as an official mode of transportation serving all governorates should be a top priority for the country.
- D. Policymakers should make public transit a top priority. Negotiating with regulators would be better if the government had more leverage of public transit, since working with a handful of airlines rather than thousands, as it is today, would be easier. As a result, large-scale operators will be able to benefit from economies of scale in their activities. This would allow them to reduce operating expenses per passenger or per mile traveled while maintaining or upgrading services that small operators cannot manage.

- E. Increase the number of electric vehicle charging stations to address issues about EVs breaking down due to insufficient battery capacity. It is also essential to develop energy storage technology. EV and electric vehicle government benefits, such as tax and customs exemptions, are not readily available throughout the world.
- F. Introduce the idea of carpooling, which saves people money on petrol, tolls, and time. Carpooling reduces air pollution, greenhouse gas emissions, highway traffic congestion, and the need for parking spaces, rendering it a more climate friendly and cost-effective means of transportation.
- G. Invest in more scientific analysis and creative concepts in this field, focusing on a systematic approach to gathering, reporting, and tracking data as non-biased and emotion-free theoretical observations.

We hope to move away from private cars and toward public transportation, from taxis to carpooling, buses to BRTs and metros, and fossil fuels and oil waste to REEE and recycled technologies. There are more bus options than ever before, but in order to reduce the electricity cost, we must achieve a balanced and integrated mass transportation system.

### **4.3 Limitations & Future Research Development**

- A. Lack of data available: for example, up to this point, no survey or report has ever been published from the Energy and Mineral Resources Ministry (MEMR) showing how much the Covid19 pandemic has impacted the energy sector.
- B. The lack of prior research studies on this topic, as this pandemic is relatively new, and adequate studies have not been conducted on the extent of its impact on the energy sector.
- C. We have noticed misleading estimates and a shortage of EE data during our study. For example, After comparing the annual reports of the Ministry of Energy and Mineral Resources and NEPCO, we discovered that per capita electricity use in 2017 was 1,784 kWh according to the MEMR report and 2,100 kWh according to the NEPCO report (REEE, 2018), (NEPCO, 2017).
- D. This statistical disparity shows that the competent authorities are poorly coordinated and hinders analysis.
- E. We suggest sending a copy of the study to the MEMR, as well as other relevant authorities, so that the recommendations can be considered.

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## **APPENDIX 1**

**Questionnaire for Enterprises- 1st Wave (April 2020)**

**Impact of the Covid-19 Pandemic on the Jordanian Labour Market  
Questionnaire for Enterprises (UNDP Tewodros Aragie Kebede, 2020).**

## Introduction and request for verbal consent

My name is ..... and I am working for....

The Coronavirus (Covid-19) pandemic, and the measures that Governments are taking to curb the spread of the virus, are having severe impacts on enterprises across the world as well as in Jordan. To help mitigate the impact, the government and its development partners need to know how enterprises and their employees are impacted. This will allow for prioritization, better design and targeting of response measures.

Hence, we kindly ask you to support these efforts by helping us fill out this survey. All your responses will be kept confidential and will only be used for research purposes.

Thank you!

## Section 1: Enterprise profile

To start with, we would like to ask you a few questions on the situation of your enterprise prior to the coronavirus (Covid-19) pandemic and the lock-down measures introduced by the Government of Jordan.			
101	<p><b>What kind of business, service or activity is carried out by your enterprise?</b></p> <p><i>If respondent does not understand, give examples</i></p> <p><i>What are the main goods/products or services produced at the place where you work? Describe the main activities carried out by the enterprise. Record if business is wholesale trade, retail trade, manufacturing, or services</i></p>	<p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	
102	<p><b>Which industry does this enterprise represent?</b></p> <p><b>Interviewer: Please conduct the classification. Do not ask the respondent!</b></p>	<p>Agriculture; forestry and fishing 1</p> <p>Mining and quarrying 2</p> <p>Manufacturing 3</p> <p>Electricity; gas, steam and air conditioning supply 4</p> <p>Water supply; sewerage, waste management and remediation activities 5</p> <p>Construction 6</p> <p>Wholesale and retail trade; repair of motor vehicles and motorcycles 7</p> <p>Transportation and storage 8</p> <p>Accommodation and food service activities 9</p> <p>Information and communication 10</p> <p>Financial and insurance activities 11</p> <p>Real estate activities 12</p> <p>Professional, scientific and technical activities 13</p> <p>Administrative and support service activities 14</p> <p>Education 15</p> <p>Human health and social work activities 16</p> <p>Arts, entertainment and recreation 17</p> <p>Tourism 18</p> <p>Other service activities 19</p> <p>Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use 20</p> <p>Activities of extraterritorial organizations and bodies 21</p> <p>Not elsewhere classified 22</p>	

103	<b>How many employees were working for the enterprise in February 2020?</b> <i>Size of enterprise</i>	Home-based Business Micro 1-4 Small 5-19 Medium 20-49 50-99 100 and above	1 2 3 4 5 6	
104	<b>Was the owner of your enterprise male or female?</b>	Male Female	1 2	Ask if 103<5
105	<b>What was the ownership structure of your establishment?</b> <i>For MSEs</i>	Fully Jordanian Fully Syrians Equal share: Jordanian and Syrian Mostly Jordanian Mostly Syrian Owned by other nationalities	1 2 3 4 5 6	Ask if 103<5
106	<b>What was the ownership structure of your establishment?</b> <b>For Medium and Large enterprises</b>	Mostly Jordanian owned Fully Jordanian owned Equal share: Jordanian and Foreign Mostly foreign owned Fully foreign owned	1 2 3 4 5	Ask if 103>4
107	<b>What was the main market for your enterprise?</b> <b>Mark all that apply</b>	Local area market Broader domestic Regional (middle-east) Global	1 2 3 4	
108	<b>Does your enterprise use e-commerce or website platforms for marketing and sales?</b>	Yes ,specify reference _____ Not suitable to our business No	1 2 3	
109	<b>Does your enterprise offer childcare facilities, flexible working arrangements or family leave?</b> <b>Mark all that apply</b>	Childcare services Flexible working arrangements Family leave No	1 2 3 4	Ask if 103>1
110	<b>What was the registration status of your enterprise?</b> <b>Interviewer: Please fill in this information if available.</b>	Home based (registered) Home based (unregistered) Unregistered/ informal Registered Other	1 2 3 4 5	
111	<b>For how long has your enterprise existed?</b>	Less than 1 year 1-2 years 3-4 years 5-10 years More than 10 years Don't know Refusal	1 2 3 4 5 8 9	
112	<b>Where was your business operating in Jordan? enterprise located in Jordan?</b> <b>Mark all that Apply</b> <b>(Relevant if enterprises have different areas of operations in Jordan, Eg. amman, Irbid)</b>	Irbid Albalqaa Jarash Al-Zaraqaa Al-Tafieleh Ajloun Aqaba Amman Al-Karak Madaba Ma'an Al-Mafraq	1 2 3 4 5 6 7 8 9 10 11 12	
113	<b>Approximately, how many employees were employed by your enterprise in February 2020?</b>	_____		

114	What percent of your employees were female?		<input type="text"/>	
115	What percent of your employees were Jordanian/ non-Jordanian?		Jordanian <input type="text"/> Syrians <input type="text"/> Others <input type="text"/>	
116	Approximately what percentage of your employees would you describe as low-skilled workers? <i>Low-skilled employees refer to those whose tasks involve no specialized knowledge/competence for the enterprise</i>		<input type="text"/> Don't know Refusal	98 99
117	Approximately, what percentage of your employees had a contract with duration of 1-year or more?		<input type="text"/> Don't know Refusal	98 99
118	Approximately, what percentage of your employees had a written contract?	<input type="text"/> Don't know Refusal		98 99 Ask if 110<2 or >3
119	What was the percentage of expenditure for wages and salaries in February 2020?		<input type="text"/> Don't know Refusal	
120	Approximately, what was the amount of operating revenue for the enterprise during 2019? In JD		<input type="text"/>	
121	How would you describe the financial status of your enterprise prior to the lockdown period, i.e. before March 2020		Profitable Breakeven Was losing money Other specify	1 2 3 4
122	Do you have any existing financial commitments? Mark all that apply		Micro-finance loan Bank loan(s) Bills of exchange Deferred Cheques Open letters of credit None	1 2 3 4 5 6

## Section 2: Impact and implications

<b>In the following, we would like to ask you about how the coronavirus (Covid-19) pandemic and the government's response to it is affecting your enterprise at present.</b>				
201	Currently, what is the operational status of the enterprise?		Operating as usual Operating with reduced hours Operating with reduced staff Operating with reduced hours and reduced staff Work place closed temporarily Other	1 2 3 4 5
202	So far and since the onset of the coronavirus crisis in the country, what has been the economic impact on your enterprise? Mark all that apply		Loss of revenue Reduce demand / sales Increased costs of production Access to cash/liquidity problems Problems importing materials needed Increased revenue No economic impact Other. Please specify	1 2 3 4 5 6 7 8
203	How many employees have been permanently laid off due to the coronavirus measures? <i>This refers to employees which the enterprise does not intend to take back later</i>		Male <input type="text"/> Female <input type="text"/>	
204	How many employees have been temporarily laid off due to the coronavirus measures? <i>This refers to employees which the enterprise intend to take back later</i>		Male <input type="text"/> Female <input type="text"/>	

205	<b>Does your enterprise pay employees who are not able to come to work due to the lockdown?</b> <i>This doesn't include those that are diagnosed with the coronavirus</i>	Full payment More than 50 percent 50 percent pay Less than 50 percent pay No payment	1 2 3 4 5	
206	<b>Is your enterprise providing any compensation to temporary/seasonal workers with regular tasks for the enterprise who are left without work as a result the coronavirus crisis?</b> <b>Eg. Daily laborers, casual workers</b>	Yes, full compensation Yes, partial compensation No compensation Not applicable, we do not have any contract/gig workers Other (specify)	1 2 3 4 5	
207	<b>Has your enterprise stopped payments to Social Security (Old Age, In-validity and Survivors Pension) as a result of measures related to coronavirus? (Defence Command 1)</b>	Yes for all Yes for Some No Refusal	1 2 3 9	
208	<b>Has your enterprise stopped payment for health insurance for your employees as a result of measures related to coronavirus?</b>	Yes No Refusal	1 2 9	
209	<b>For how many more months is your enterprise in condition to continue paying salaries to all current workers under existing conditions?</b>	Less than one month 1-3 3-6 More than 6 months	1 2 3 4	
210	<b>How long would your enterprise still be able to stay operational if the present situation continues?</b>	Less than a month 1-3 months 4-6 months More than 6 months Don't know	1 2 3 4 5	
211	<b>With regards to the coronavirus crisis, what are the biggest obstacles facing your enterprise in the coming months? Mark all that apply</b>	Reduced sales/demand Restrictions on foreign currency Bank shutdowns Political/social instability Low liquidity/ cash flow problems No restocking of goods/raw materials because of import restrictions Transportation problems Loss of investment Other	1 2 3 4 5 6 7 8 9	
212	<b>How confident are you that the enterprise is economically robust enough to come through the crisis and resume profitable business after the crisis is over?</b>	Highly confident Confident Neither Unconfident Highly unconfident	1 2 3 4 5	

### Section 3: Coping measures and support

<b>In the following, we would like to know more about how your enterprise is coping with the Corona-virus pandemic and the government's responses to it, as well as the needs that you might have to be able to better cope with the situation caused by the pandemic.</b>				
301	<b>What measures has your enterprise taken to reduce the spread of the coronavirus at the work place? Mark all that apply</b>	Disseminated protective gear (i.e., hand sanitizer, masks, gloves) for employees to use at their discretion Enhanced cleaning and sanitizing efforts across facilities Implemented a shift schedule to rotate staff and minimize the number of people at the worksite Established a dedicated commuter shuttle for our employees No measures have been taken yet Other specify	1 2 3 4 5 6	
302	<b>What general measures has your enterprise taken due to the coronavirus with regards to existing staffing? Mark all that apply</b>	Had to reduce staff number Had to lower staff salary levels Had to reduce working hours Had to shift to another type of product/service No measures Other specify	1 2 3 4 5 6 7	



303	<b>Has your enterprise changed its existing recruitment plans as a result of the coronavirus measures?</b>	<p>Yes, we stopped hiring completely 1</p> <p>Yes, but we do replacement hires 2</p> <p>No, there are no changes to recruitment plans 3</p> <p>Increased recruitment 4</p> <p>Unsure about plans 5</p> <p>Other. Please specify 6</p>	
304	<b>Has your enterprise developed a business continuity plan following the coronavirus crisis?</b>	<p>Yes 1</p> <p>No 2</p>	Ask if 103>3
305	<b>What measures has your enterprise taken to ensure business continuity? Mark all that apply</b>	<p>Consider new business model 1</p> <p>Introduced e-commerce 2</p> <p>Selling some assets 3</p> <p>Considering introduction of new products 4</p> <p>Reduce prices of products and services 5</p> <p>Increase prices of products and services 6</p> <p>Negotiate delay of payments 7</p> <p>Decided to accelerate technological, product and service innovation 8</p> <p>Explored new office and business models 9</p> <p>Strengthened global reach of supply chain 10</p> <p>Planning to withdraw from market 11</p> <p>Negotiate with lenders for lowering the financing cost and extending the repayment cycle 12</p> <p>Negotiate with the lessor for the reduction or ex-emption of rent, equipment rental fees 14</p> <p>Shut down certain production lines, outlets 15</p> <p>Apply for subsidies 16</p> <p>Other. Please specify.</p>	Ask if 103>3
306	<b>Are there any support packages /measures the enterprise is benefit-ting from? Mark all that apply</b>	<p>Not aware of any support packages 1</p> <p>Access to finance/credit 2</p> <p>Tax relief/ deferral 3</p> <p>Relief or deferral of credit/ loans payments 4</p> <p>Reduction or exemption of rent, equipment rental fees 5</p> <p>Business stimulus package/ investments 6</p> <p>Government subsidizing pay 7</p>	
307	<b>What type of enterprise support would be most needed to cope with the situation at this stage? Tick 3 that are most relevant to you. Maximum three options allowed</b>	<p>Technical assistance on development of business plans 1</p> <p>Technical assistance to support introduction of e-com-merce 2</p> <p>Access to credit 3</p> <p>Wage subsidies 4</p> <p>More flexible rules on lay-offs and dismissals 5</p> <p>Emergency unemployment insurance scheme 6</p> <p>Preferential tax policies 7</p> <p>Direct financial support 8</p> <p>Social security policies for supporting employment, work resumption and production resumption 9</p> <p>Policies for coordinating the supply chain 10</p> <p>Policies for reducing production and operating costs 11</p> <p>Other specify 12</p>	
308	<b>Is your business contributing to or interested in contributing to the Covid-19 response?</b>	<p>Through in-kind support 1</p> <p>Through financial support 2</p> <p>Providing direct services to affected communities 3</p> <p>Cannot/ not relevant 4</p> <p>Other. Please specify.</p>	

### Section 4: Follow-up information and comments

<p><b>Lastly, we would ask you a few questions that might help us to follow-up the valuable information that you have provided in the coming months as the Coronavirus pandemic progresses.</b></p>			
401	<p><b>Would you be willing to provide updated information in May so we can help monitor the impact?</b></p>	<p>Yes No</p>	
402	<p><b>Please provide contact information</b></p>	<p><b>Telephone number</b> <b>E-mail address</b></p>	<p>10 digits xxx@xxx.xx</p>
403	<p><b>Please add any additional comment</b></p>	<p>_____</p> <p>_____</p> <p>_____</p>	

## المعلومات الشخصية

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