



2021

Renewable Energy in Syria



Ministry of Electricity

9/26/2021

Renewable Energy in Syria

until the Year 2030

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Introduction:

Energy is considered the backbone of economic and social development in any country. The severe shortage of oil derivatives and natural gas has led to a weak ability to meet the demand for electricity in order to meet the needs of society, the economic and service sectors, on the one hand, and the high demand for electricity for citizens to use electricity for the purpose of heating, cooking and heating water on the other hand.

The challenges which were imposed on the electricity sector because of the war are great. The fact that the reconstruction stage and beyond requires the availability of sources of energy such as oil, gas and electricity to meet the requirements of that stage, which will witness great efficiency and activity in various sectors. This requires the rehabilitation of generating, transmitting and distributing capabilities of the electrical system and expanding them through the establishment of new projects that keep pace with the future demand for electricity. This in turn will add financial burdens, a large amount of investments and more fuel costs, which makes the electricity sector in the next stage face economic challenges. These challenges impose moving towards renewable energy and raising the efficiency of energy use in order to achieve the following goals:

1. Increasing the contribution of renewable energy to the energy balance (on both the demand and supply sides, projects independent of the network and projects linked with the network).
2. Improving energy efficiency in various sectors.
3. Developing the current electrical system (power stations and electrical network).
4. Localizing and developing renewable energy technology (manufacturing equipment and developing scientific research).
5. Creating new job opportunities for specialists from the younger generation.

One: The Reality of Electrical Power Sector:

After the attacks of terrorist gangs on the infrastructure of oil and gas facilities, power plants, and networks of transmitting and distributing electricity – accompanied with an economic blockade on the country –the amount of primary energy available decreased from 24 million (tone oil equivalent or “toe” for short) in 2011 to its lowest level of about 10 million (toe) in 2016. It rises to 12 million (toe) in 2020, and it is expected to decline again to about 10 million (toe) in 2021. In the following we show a comparison in figures for the most important indicators of electricity before and after the war:

A. Indicators of Electricity before the War (During the Period 2005-2010):

- **Production:** electricity production increased from 34.1 billion (kWh) in 2005 to about 46.2 billion (kWh) in 2010, i.e., with an average growth rate of 6.3% annually.

- **Peak Load:** the demand for peak capacity increased from /6000/ megawatts in 2005 to /8000/ megawatts in 2010, i.e. with an average growth rate of 6% annually, which is one of the highest global growth rates.
- **Consumption of Fuel Oil:** the amount of fuel oil consumed to produce electricity decreased from /4/ million tons in 2005 to /3.8/ million tons in 2010, i.e., with an average of /10400/ tons per day.
- **Consumption of Natural Gas:** the amount of gas consumed to produce electricity increased from /3.4/ billion m³ (cubic meter) in 2005 to /6.6/ billion m³ in 2010, i.e. with an average of /18/ million m³ per day.
- **Consumption of Electricity Produced:** consumption of electricity increased from /27/ billion kWh in 2005 to /36/ billion kWh in 2010, noting that the average rate of domestic consumption in the country forms 51% of the total consumption.
- **Per Capita Share of Electricity:** the per capita share of electricity increased annually from /1866/(kWh) per capita to about /2,232/(kWh) per capita during the same period.

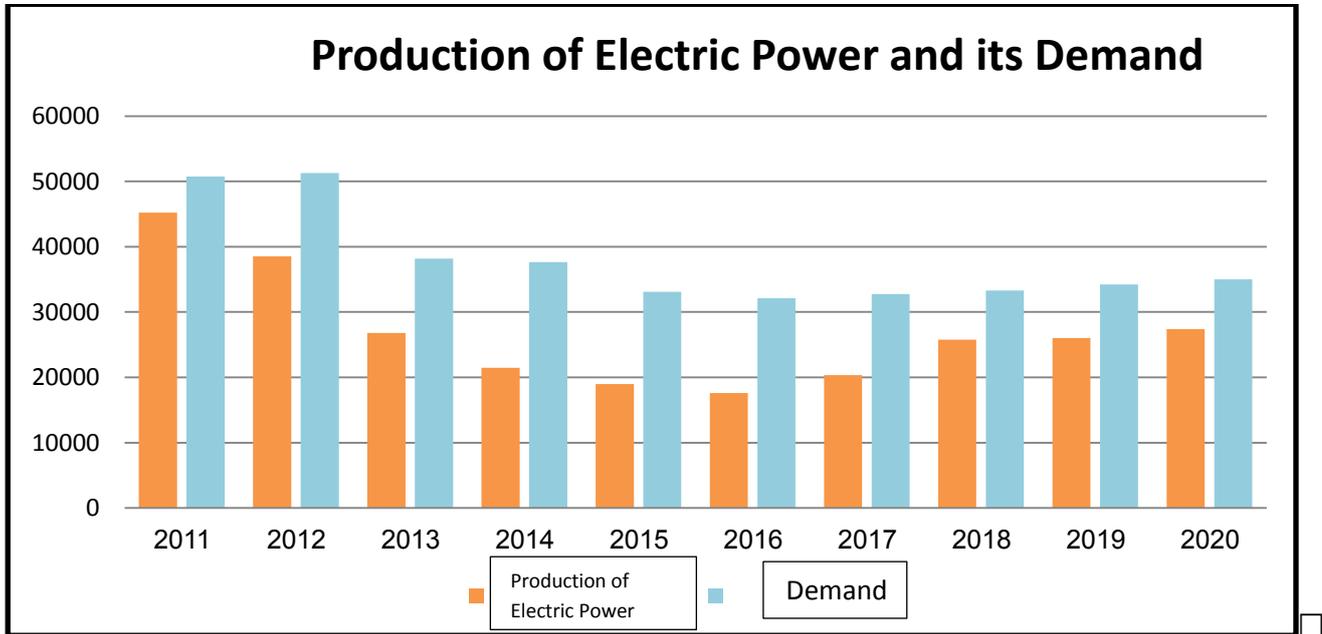
B. Indicators of Electricity During the War (from 2011 till the end of 2020):

- **Production:** electricity production decreased from /49/ billion (kWh) in 2011 to about /19/ billion (kWh) in 2016. It then increased to /27/ billion (kWh) during the year 2020 due to the increase in the amount of gas supplied to power plants.
- **Consumption of Fuel Oil:** the amount of fuel oil consumed to produce electricity decreased from /3.8/ million tons in 2011 to /1.6/ million tons in 2016. It then increased to /2.1/ million tons in 2020.
- **Consumption of Natural Gas:** the amount of gas consumed to produce electricity decreased from /20/ million m³ per day in 2011 to /7/ million m³ per day in 2016. It then increased to /13/ million m³ per day in 2019. Since the last quarter of 2020, daily gas imports decreased to /8.2/ million m³ per day, and it is still decreasing.
- **Consumption of Electricity Produced:** electricity consumption decreased from /39/ billion (kWh) in 2011 to /15/ billion (kWh) in 2016, then the amount of electricity consumed increased to about /22/ billion (kWh) in 2020. This indicates that the average household consumption is about 60% of the total consumption.
- **Per Capita Share of Electricity:** per capita share of electricity decreased from /2378/(kWh) annually in 2011 to /895/(kWh) per capita in 2016, and reached /1190/(kWh) per capita annually.

C. Electricity Indicators During 2021:

- The available capacities of the generation groups affiliated with the Ministry of Electricity amounted to about /1370/ megawatts of steam turbines that require /8000/ tons of fuel oil per day, and about /3445/ megawatts of combined cycle plants and some simple gas turbines that require /18/ million cubic meters of natural gas daily.
- All the above-mentioned groups need spare parts for maintenance and rehabilitation with sums over \$400 million. Providing them is underway through financial payment facilities, soft loans, and so on.
- The decrease in the amount of natural gas from /13/ million m³ per day in 2019 to /8/ million m³ per day has currently led to a decrease in the generated capacity

from /3800/ megawatts to about /2500/ megawatts. The rise in temperature during last summer has contributed to the decrease in capacity available to the generating sets by more than 25%, reaching about /2000/ megawatts only, without the availability of any rotating reserve to maintain the reliability of the power system operating, and to protect the generating sets from emergency accidents, which may cause them to be damaged and out of service.



Two: Current and Future Challenges Facing the Electricity Sector:

A. The Great Need for Investment Credits and Operating Expenses:

The primary plans of the Ministry of Electricity show that the future need to rehabilitate the capacities of generating, transmitting and distributing the Syrian electrical system from the establishing costs during the next ten years is more than /15/ billion dollars, (excluding the operational costs such as the value of fuel, which amounts to about /1.6/ billion dollars annually at the level of electricity production of /25/ billion (kWh) annually). It should be noted that there is a difficulty of obtaining the necessary foreign currency.

B. Achieving a Balance Between Electricity Production Costs and Selling Tariff:

It has become necessary to provide financial liquidity for the continuation of the electrical system's work and reducing the big gap between the cost of generating, transmitting and distributing electricity and the applicable tariff. It is also necessary to reduce price gaps between electricity and other oil derivatives. This requires organizing the subsidy and changing its strategies in order to deliver it to those who need it and thus support the most needy social segments, especially that the current electric tariff contributes to supporting many sectors, particularly the household sector. However, it does not encourage industrialists to increase reliance on renewable energy sources or purchase electric energy produced from private stations. The direct support for the electricity commodity hinders the participation of the private sector in generating electricity, and does not help to increase the contribution of renewable energy and raise the efficiency of energy use in the Syrian energy balance.

C. The Necessity of Developing and Expanding the Capacities of Generation, Transmission and Distribution of the Electrical System:

The introduction of large capacities of renewable energies connected to the network into service requires updating and developing the electrical network, leading to a "smart network".

Three: The Ministry of Electricity's Goals During the Coming Period:

1. Completing plans to expand and develop capacities for generating the Syrian electrical system by maintaining and rehabilitating the existing generating stations, and completing the implementation of generating stations already started.
2. Continuing the work to build generating stations operating on renewable energy sources through government projects and providing concessional financing, or by announcing projects implemented and invested by the private sector and selling electricity to major subscribers or to the Establishment of Transmission and Distribution of Electricity and its companies in the governorates.

3. Completing the work on developing legislations that encourage raising the efficiency of energy use in various sectors, the use of renewable energy, and facilitating procedures for investors in this field both in terms of demand (i.e., meeting electrical loads directly from renewable energy) and supply (i.e., both establishing stations and transmitting electricity to the public network).
4. Completing the work on reducing technical and commercial losses and improving collection of fees by benefiting from automated applications, digital transformation, payment and electronic services.
5. Updating studies related to organizing subsidy and changing its strategies and proposing what is needed to shift from the direct subsidy of the electricity commodity to a humanitarian subsidy, to deliver it to the most needy segments.

Four: The Current Legislative Environment for Renewable Energy:

- 1. Energy Conservation Law No. (3) of 2009:** this law aims to disseminate and apply the concepts of energy conservation, which include rationalizing energy consumption, preserving it and raising the efficiency of its use in all areas that have a permanent impact on the rates of energy production and consumption. It also works to spread the use of renewable energies with its various applications.
- 2. Electricity Law No. (32) of 2010:** it aims to provide electricity to meet the needs of society and the national economy and to allow the public, joint and private national, local, Arab and foreign sectors to invest in the fields of generation and distribution. This law also aims to support and encourage the use of renewable energy in various fields and localizing its industry. Currently, work is underway to update it by separating the renewable energy section within its own law and energy efficiency, in addition to making it more flexible to facilitate the involvement of the private sector in generating electricity and selling it to subscribers, especially on voltages 0.4/20 kV and above.
- 3. The decision on feed-in tariffs for determining the purchase prices of electricity produced from renewable energy:** it aims to encourage investment in renewable energy projects for small and medium-sized enterprises (up to 10 megawatts) that can be connected to the distribution network. In 2011, a decision was issued by the Presidency of the Council of Ministers No. /16202/ that sets electricity purchase prices. It was amended by decision/1763/ of 2016 and recently by decision No. /1113/ of 2020. The prices set in this decision are generally considered rewarding so that investors achieve good financial returns, which are less than the value of the fuel oil needed to produce the same amount of electricity.

4. Investment Law No. /18/ of 2021: this law included investment guarantees and a set of incentives related to exemption from all financial and customs duties, and non-custom tariffs, in addition to exemption from 50% of income tax for a period of /10/ years, including the allocation of land for investors necessary to establish their projects.

5. A Fund to Support Renewable Energy and Energy Efficiency: a law was issued to create a renewable energy fund, which aims to encourage citizens and investors to use renewable energy applications and raise energy efficiency.

Five: Measures under Implementation to Encourage the Use of Renewable Energy:

- Coordination with the concerned authorities is underway to set incentives and facilities to encourage industrialists to use renewable energy as part of their consumption.
- A draft legislative instrument for renewable energy is currently being prepared by an expanded committee with the participation of all stakeholders. It aims to organize renewable energy activities and projects by encouraging and motivating consumers of electric energy and investors to generate energy from renewable sources.
- Work is currently underway to amend some provisions of Law No. /32/ of 2010.
- An announcement was made to provide a special laboratory to test the photovoltaic panels that are imported from abroad in order to control and monitor their quality and matching them with the approved standard specifications.
- Laboratory rulebooks for testing thermal insulation materials in buildings have been prepared. They aim to control and test the quality of insulation materials that are manufactured locally or imported from abroad.
- Continuing and following up a number of specialized training courses in cooperation with the engineers syndicate to qualify engineering cadres in the field of renewable energy and energy efficiency projects.

Six: Current Status of Renewable Energy Projects:

A. Government Projects (Turnkey Projects):

- The implementation of Sheikh Najjar photovoltaic power plant with a capacity of /33/ megawatts is being followed up.
- Negotiations with a group of local and Chinese companies are being held to implement a photovoltaic power plant project with a capacity of/30/megawatts in Jandar area. It is necessary to secure the required financing for the project secured by facilitating the payment of installments (for /12/ years, after putting the project into service).
- A proposal is being studied by HBK, which is a UAE company, for the construction of a photovoltaic generating power plant with a capacity of /300/ megawatts in Widian Al-Rabee area near Tishreen power plant in Rif-Dimashq governorate.
- Studying the technical offers for the establishment of a wind farm power plant with a capacity of /100/ megawatts in the governorate of Homs-Qutaineh, and the establishment of a wind farm power plant with a capacity of /10/ megawatts in the governorate of Homs-Jandar.
- Technical studies are currently being prepared for the implementation of photovoltaic projects for the benefit of some other public authorities.
- The implementation of a photovoltaic project with a capacity of /650/ kilowatts is being completed on the roofs of Faculty of Mechanical Engineering in Damascus University.

B. Projects with the Private Sector on the Basis of Power Purchase Agreements:

1. Projects licensed in accordance with Article /28/ of the Electricity Law, which are subject to feed-in tariffs:

- The strategy of the Ministry of Electricity included the installation of /200/ megawatts of photovoltaic power plants. It licensed /157/ projects with a total capacity of /117/ megawatts, of which /72/ projects with a capacity of /19/ megawatts were implemented.
- The strategy also included the installation of /100/ megawatts wind farm power plants. It licensed /9/ projects with a total capacity of /35/ megawatts, of which a project was implemented containing two wind turbines with a total capacity of /5/ megawatts, in addition to implementing a locally manufactured wind turbine with a capacity of /7/ megawatts.

2. Projects licensed according to Article /30/ of the law, which are not subject to feed-in tariffs:

- Negotiations are underway with a number of investors to install /100/ megawatts in Adra, and /100/ megawatts in Hassia, in addition to /300/ megawatts in different regions, all of which are photovoltaic power plants on the basis of power purchase agreements.
- Coordination with the office of the United Nations Development Program is being made to help prepare rulebooks for the announcement of two renewable energy plants with a capacity of /50/ photovoltaic megawatts in Harran Al-Awamid, and /50/ photovoltaic megawatts in Qutainehon the basis of power purchase agreements.

Seven: Updating the Strategy of Renewable Energy until 2030:

The National Renewable Energy Strategy 2030, which was approved by the Presidency of the Council of Ministers, was reviewed in 2019. It was developed based on the changes during the past two years, in light of the significant shortage in the supply of oil derivatives, especially diesel, household gas and electricity due to the shortage of natural gas quantities supplied to power plants. This was also in light of the directives of the president of the Syrian Arab Republic in his oath speech, and then the government statement that stressed the need to develop an optimistic national strategy for the role of renewable energy and raising energy efficiency to improve the electricity situation and bridge the gap between supply and demand. The following table includes the most important basic parameters used in the study.

Item	Unit	Value
Fuel oil price per ton	Dollar/ Ton	400
Price per cubic meter of gas based on (\$6/MBTU)	Dollar/m ³	0.21
The cost of purchasing kWh from projects of the private sector produced from wind turbines.	Dollar/kWh	0.05
The cost of the installed kilowatt of (turnkey) wind turbines, with the provision of financing.	Dollar/kw	1300
The cost of purchasing the kWh from private sector projects produced from photovoltaic panels.	Dollar/kWh	0.04
The cost of the installed kw of photovoltaic panels (turnkey), with the provision of financing.	Dollar/kw	850
The ratio of fuel value to the total value of uses.	%	0.97
Each ton of fuel is equivalent to electricity produced from renewable energies and energy efficiency.	kWh	4000
The price of CO2 ton globally on the date of preparing the study is more than	Dollar /ton	50
Each ton of fuel is equivalent to electricity produced	ton/CO2	3

A. Anticipating the demand for electricity in Syria during the period 2021-2030, ways to meet it, and the remaining deficit.

Equivalent No./1/:

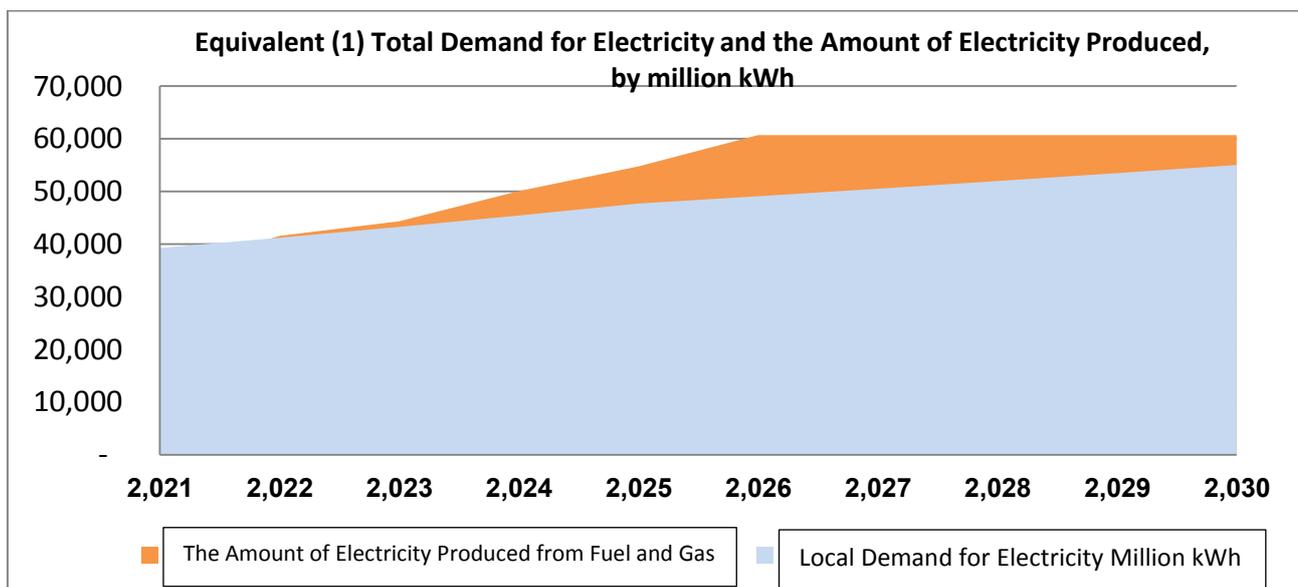
It includes the rehabilitation of the entire generation sets (steam turbines and combined cycle plants) and the endeavor to establish high-efficiency steam generating stations, assuming the availability of all quantities of fuel oil and natural gas as shown in the following table:

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Population (a thousand)	23,387	23,829	24,279	24,738	25,205	25,682	26,167	26,661	27,165	27,678
Hypothetical Peak Load Demand (5% growth)	7,000	7,350	7,718	8,103	8,509	8,934	9,381	9,850	10,342	10,859
Electrical system load factor	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.07	0.07
Local demand for electricity, (one million kwh)	39,245	41,207	43,267	45,431	47,702	49,086	50,509	51,974	53,481	55,032
The amount of electricity produced from the Euphrates (taking into account drought) (million kWh)	1,500	1,500	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Total amount of fuel needed for steam units (tons/day)	6,300	10,600	11,600	16,000	19,600	20,800	20,800	20,800	20,800	20,800
Amount of fuel oil consumed annually (million tons)	2,30	3,87	4,23	5,84	7,15	7,59	7,59	7,59	7,59	7,59
The value of fuel oil consumed annually (million dollars)	920	1548	1694	2336	2862	3037	3037	3037	3037	3037
The amount of electricity produced from steam sets of fuel annually (million kWh)	8213	13818	15121	20857	25550	27114	27114	27114	27114	27114
Amount of natural gas needed per day (million cubic meters) (equivalent as needed)	18.00	19.00	20.00	20.00	20.00	23.00	23.00	23.00	23.00	23.00
The amount of natural gas consumed annually (million cubic meters)	6570	6935	7300	7300	7300	8395	8395	8395	8395	8395
The value of natural gas consumed annually (million dollars)	1393	1470	1548	1548	1548	1780	1780	1780	1780	1780

The amount of electricity produced from gas annually (million kwh)	26280	27740	29200	29200	29200	33580	33580	33580	33580	33580
Amount of electricity produced from fuel and gas (million kWh)	34493	41558	44321	50057	54750	60694	60694	60694	60694	60694
Value of fuel oil and natural gas consumed annually (million dollars)	2313	3018	3241	3884	4409	4817	4817	4817	4817	4817
Total usage costs of thermoelectric plants including fuel value (million)	2384	3111	3342	4004	4546	4966	4966	4966	4966	4966
Deficit or surplus (million kwh)	3252	1851-	3054-	6626-	9048-	13609-	12185-	10720-	9213-	7662-

The previous table shows that if the necessary financial resources are available to rehabilitate the existing stations and put the planned stations into operation with the availability of fuel needed to operate them, (fuel oil quantities range from /6500/ tons per day in 2021 to /20800/ tons per day in 2030), the quantities of natural gas range from /18/ million cubic meters per day in 2021 to /23/ million cubic meters per day in 2030. This is commensurate with the capacities of the gas groups and the combined cycle available at the Public Establishment for Electricity Generation (PEEG)), as follows:

- The total demand for electricity will increase by 5% and will rise from about /39/ billion kWh in 2021 to /55/ billion kWh in 2030.
- The amount of electricity produced from traditional sources will increase from about /20/ billion kWh in 2021 to /60/ billion kWh in 2030.
- The deficit in the amount of electricity will decrease from 15.4 billion kWh in 2021 until there is an electricity surplus of /7/ billion kWh in 2030, by 15%, which is very necessary for the stability of the work of the electrical system.



Following is a table of the required financial resources:

	First Period	Second Period	Total
	2025 -2021	2030-2026	Million Dollars
The value of fuel oil and natural gas consumed□	16,865	24.083	40,948
Total uses of thermoelectric plants, including fuel value	17,387	24,828	42,215

The resources required for this equivalent are very large and constitute a serious challenge to the national economy that is difficult to achieve. Therefore, the second equivalent has been studied, which reflects the most expected situation of fuel availability with the contribution of renewable energy and energy efficiency.

Equivalent No. /2/:

It includes the rehabilitation of some of the existing steam groups and the endeavor to deploy new, high-efficiency steam generating stations, assuming the stability of fuel quantities (where the quantities of fuel oil range from /6,500/ tons per day in 2021 to /12000/ tons per day in 2030), and (natural gas quantities range between /8/ million cubic meters per day in 2021 to reach /14/ million cubic meters per day in 2030) during the study period. This occurs with introducing renewable energy into demand or supply, in addition to projects to raise energy efficiency that will contribute to reducing energy demand. In order to clearly show the results, this period has been divided into two periods. The first period is from the year 2021 to 2025, and the second period is from the year 2026 until 2030.

2- (1) Anticipating the Demand for Electricity in Syria During the First Period (2021-2025) and Ways to Meet the Deficit:

Year	2021	2022	2023	2024	2025
Population (a thousand)	23,387	23,829	24,279	24,738	25,205
Hypothetical Peak Load Demand (5% growth)	7,000	7,350	7,718	8,103	8,509
Electrical system load factor	0.08	0.08	0.08	0.08	0.08
Local demand for electricity, (one million kWh)	39,245	41,207	43,267	45,431	47,702
The amount of electricity produced from the Euphrates (taking into account drought) (million kWh)	1,500	1,500	2,000	2,000	2,000
Total amount of fuel needed for steam sets (tons/day)	6,300	9,700	9,700	9,700	12,100
Amount of fuel oil consumed annually (million tons)	2.30	3.54	3.54	3.54	4.42
The value of fuel oil consumed annually (million dollars)	920	1416	1416	1416	1,767
The amount of electricity produced from steam sets of fuel annually (million kWh)	8,213	12,645	12,645	12,645	15,773
The amount of natural gas consumed currently (million cubic meters) (pessimistic equivalent)	8.00	8.00	1.00	11.00	11.00
The amount of natural gas consumed annually (million m ³)	2,920	2,920	4,015	4,015	4,015
The value of natural gas consumed annually (million dollars)	619	619	851	851	851
The amount of electricity produced from gas annually (million kWh)	11,680	11,680	16,060	16,060	16,060
Quantity of electricity produced from fuel and gas (million kWh)	19,893	24,325	28,705	28,705	31,833
Value of fuel oil and natural gas consumed annually (million dollars)	1,539	2,035	2,267	2,267	2,618
Total usage costs of thermoelectric plants including fuel value (million dollars)	1,586	2,098	2,338	2,338	2,699
Deficit or surplus that arises from not considering electricity one of	17,852	15,382	12,563	14,726	13,869

the renewable energy(million kWh)					
The amount of electricity that is supposed to be produced from renewable energy and raising efficiency (million kWh)	2,411	2,846	3,418	4,877	5,636
Capacity of Photovoltaic panels connected to the network (megawatts)	30	83	183	783	873
Public sector projects (turnkey) with providing financing using cumulative payment facilities (megawatts)		33	83	233	383
Public sector projects with providing financing according to annual capacity (megawatts)		33	50	150	150
Foundational costs of photovoltaic panels connected with the public sector network (million dollars)		36	43	128	128
Private sector photovoltaic projects, purchasing electricity produced cumulatively (megawatts)	2.5	50	100	550	490
The cost of buying electricity out of the private photovoltaic panels connected to the network (million dollars)	0.16	3.20	6.40	35.20	31.33
Capacity of photovoltaic collectors according to public and private demand (megawatts)	100	129	167	215	278
Public sector photovoltaic projects according to cumulative demand (megawatts)		20	40	70	110
Public sector photovoltaic projects according to annual capacity (megawatts)		20	20	30	40
Foundational costs of photovoltaic panels according to public sector demand (million dollars)		17	17	26	34
Photovoltaic energy produced (million kWh) (1600 hour annually)	208	339	560	1,598	1,841
Capacity of wind turbines connected to the network (megawatts)	5	10	18	32	56
Public sector projects (turnkey) with providing financing using cumulative payment facilities (megawatts)			5	10	20
Public sector projects with providing financing according to annual capacity (megawatts)			5	5	10
Foundational costs of wind turbines connected to the public sector network (million dollars)			7	7	13
Private sector wind power projects according to the annual capacity (megawatts)	5	5	3	9	15
Private sector wind power projects, purchasing electricity produced cumulatively (megawatts)	5	10	13	22	36
Cost of purchasing electricity out of private wind turbines connected to the network (million dollars)	0.50	1.25	1.60	2.70	4.53
Capacity of small wind turbines according to demand, private sector (megawatts)	0.20	0.48	1.14	2.71	6.47
Wind turbine power produced (million kWh) (2500 hour annually)	10	26	47	86	157
Number of solar water heaters (by thousand) (each heater provides 1800 kWh annually).	1000	1107	1226	1357	1503
Electricity provided by solar heaters in various sectors (million kWh)	1800	1993	2206	2443	2705
Saving electricity by implementing procedures of raising the efficiency of using energy (million kWh)	392	487	605	751	933
Deficit from considering electricity from renewable energy and raising efficiency (million kWh)	15,441	12,537	9,144	9,849	8,234
The amount of electricity produced from fuel and gas with renewable energy and raising efficiency (million kWh)	22,303	27,170	32,123	33,582	37,469
Foundational costs for public sector projects from wind and photovoltaic power (million dollars).	-	52.97	66.00	159.50	174.50
Costs of purchasing electricity from wind and photovoltaic power, private sector (million dollars).	0.66	4.45	8.00	37.90	35.86
Total costs of renewable energy plants (purchasing electricity and foundation)	0.66	57.42	74.00	197.40	210.36

2.2. Anticipating the Demand for Electricity in Syria During the Second Period (2026-2030) and Ways to Meet the Deficit

Year	2026	2027	2028	2029	2030
Population (a thousand)	25,682	26,167	26,661	27,165	27,678
Hypothetical Peak Load Demand (5% growth)	8934	9381	9850	10342	10859
Electrical system load factor	0.08	0.08	0.08	0.07	0.07
Local demand for electricity, (million kWh)	49,086	50,509	51,974	53,481	55,032
The amount of electricity produced from the Euphrates (taking into account drought) (million kWh)	2,000	2,000	2,000	2,000	2,000
Total amount of fuel needed for steam sets (tons/day)	12,100	12,100	12,100	12,100	12,100
Amount of fuel oil consumed annually (million tons)	4.42	4.42	4.42	4.42	4.42
The value of fuel oil consumed annually (million dollars)	1,767	1,767	1,767	1,767	1,767
The amount of electricity produced from steam sets of fuel annually (million kWh)	15,773	15,773	15,773	15,773	15,773
The amount of natural gas consumed currently (million cubic meters) (pessimistic equivalent)	11.00	11.00	11.00	11.00	11.00
The amount of natural gas consumed annually (million m ³)	4,015	4,015	4,015	4,015	4,015
The value of natural gas consumed annually (million dollars)	851	851	851	851	851
The amount of electricity produced from gas annually (million kWh)	16,060	16,060	16,060	16,060	16,060
Quantity of electricity produced from fuel and gas (million kWh)	31,833	31,833	31,833	31,833	31,833
Value of fuel oil and natural gas consumed annually (million dollars)	2,618	2,618	2,618	2,618	2,618
Total usage costs of thermoelectric plants including fuel value (million dollars)	2,699	2,699	2,699	2,699	2,699
Deficit or surplus that arises from not considering electricity one of the renewable energy(million kWh)	15,252	16,676	18,141	19,648	21,199
The amount of electricity that is supposed to be produced from renewable energy and raising efficiency (million kWh)	6,572	7,767	9,358	11,603	15,002
Capacity of photovoltaic panels connected to the network (megawatts)	972	1,084	1,208	1,346	1,500
Public sector projects (turnkey) with providing financing using cumulative payment facilities (megawatts)	483	583	633	683	733
Public sector projects with providing financing according to annual capacity (megawatts)	100	100	50	50	50
Foundational costs of photovoltaic panels connected with the public sector network (million dollars)	85	85	43	43	43
Private sector photovoltaic projects, purchasing electricity produced cumulatively (megawatts)	489	501	575	663	767
The cost of purchasing electricity out of the private photovoltaic panels connected to the network (million dollars)	31.33	32.05	36.78	42.43	49.09
Capacity of photovoltaic panels according to public and private demand (megawatts)	359	464	599	774	1,000
Public sector photovoltaic projects according to cumulative demand (megawatts)	150.00	200.00	250.00	300.00	350.00
Public sector photovoltaic projects according to annual capacity (megawatts)	40	50	50	50	50
Foundational costs of photovoltaic panels according to public sector demand (million dollars)	34	43	43	43	43
Photovoltaic energy produced (million kWh) (1600 hour annually)	2,131	2,477	2,892	3,392	4,000
Capacity of wind turbines connected to the network (megawatts)	100	178	316	562	1,000
Public sector projects (turnkey) with providing financing using cumulative payment facilities (megawatts)	40	90	190	340	540
Public sector projects with providing financing according to annual capacity (megawatts)	20	50	100	150	200
Foundational costs of wind turbines connected to the public sector	26	65	130	195	260

network (million dollars)					
Private sector wind power projects according to the annual capacity (megawatts)	24	28	38	96	238
Private sector wind power projects, purchasing electricity produced cumulatively (megawatts)	60	88	126	222	460
Cost of purchasing electricity out of private wind turbines connected to the network (million dollars)	7.50	10.98	15.78	27.79	57.50
Capacity of small wind turbines according to demand, private sector (megawatts)	15.44	36.84	87.88	209.61	500
Wind turbine power produced (million kWh) (2500 hour annually)	289	537	1,010	1,930	3,750
Number of solar water heaters (by thousand) (each heater provides 1800 kWh annually).	1,664	1842	2,039	2,258	2,500
Electricity provided by solar heaters in various sectors (million kWh)	2,995	3,316	3,671	4,064	4,500
Saving electricity from implementing procedures of raising the efficiency of using energy (million kWh)	1,158	1,438	1,785	2,216	2,752
Deficit from considering electricity from renewable energy and raising efficiency (million kWh)	8,680	8,909	8,783	8,045	6,197
The amount of electricity produced from fuel and gas with renewable energy and raising efficiency (million kWh)	38,405	39,600	41,191	43,436	46,835
Foundational costs for public sector projects from wind and photovoltaic power (million dollars).	145.00	192.50	215.00	280.50	345.00
Costs of purchasing electricity from wind and photovoltaic power, private sector (million dollars).	38.83	43.03	52.56	70.22	106.59
Total costs of renewable energy plants (purchasing electricity and foundation)	183.83	235.53	267.56	350.22	451.59

B. Study Results of the Second Equivalent:

From the data in the previous two tables, we can see that:

- The number of population will increase by 5 million, which is equivalent to 22% of the population at present. If the conditions remain unchanged, they will constitute a great pressure on the available sources and resources.
- If the necessary financial resources are available to rehabilitate some of the existing stations, with the availability of fuel to operate them, in addition to introducing renewable energy stations and raising energy efficiency, a large part of the demand for electric energy will be met. The deficit will gradually decrease to 11% in 2030, which is somewhat acceptable.
- The following table shows the capacities to be installed during the years of the first period from traditional and renewable sources, as well as the quantities of fuel oil and natural gas required to operate these stations annually, and the quantities of electricity produced from each type of these stations annually. There is a comparison with the total annual demand for electricity and the expected deficit.

Year	2021	2022	2023	2024	2025
Local demand for electricity (million kWh)	39,245	41,207	43,267	45,431	47,702
The amount of electricity produced from the Euphrates (taking into account drought) (million kWh)	1,500	1,500	2,000	2,000	2,000
The amount of electricity produced from steam sets of fuel annually (million kWh)	8,213	12,645	12,645	12,645	15,773
The amount of electricity produced from gas annually (million kWh)	11,680	11,680	16,060	16,060	16,060
The amount of electricity produced from fuel and gas (million kWh)	19,893	24,325	28,705	28,705	31,833
Deficit or surplus that arises from not considering electricity one of the renewable energy(million kWh)	17,852	15,382	12,563	14,726	13,869
The amount of electricity that is supposed to be produced from	2,411	2,846	3,418	4,877	5,636

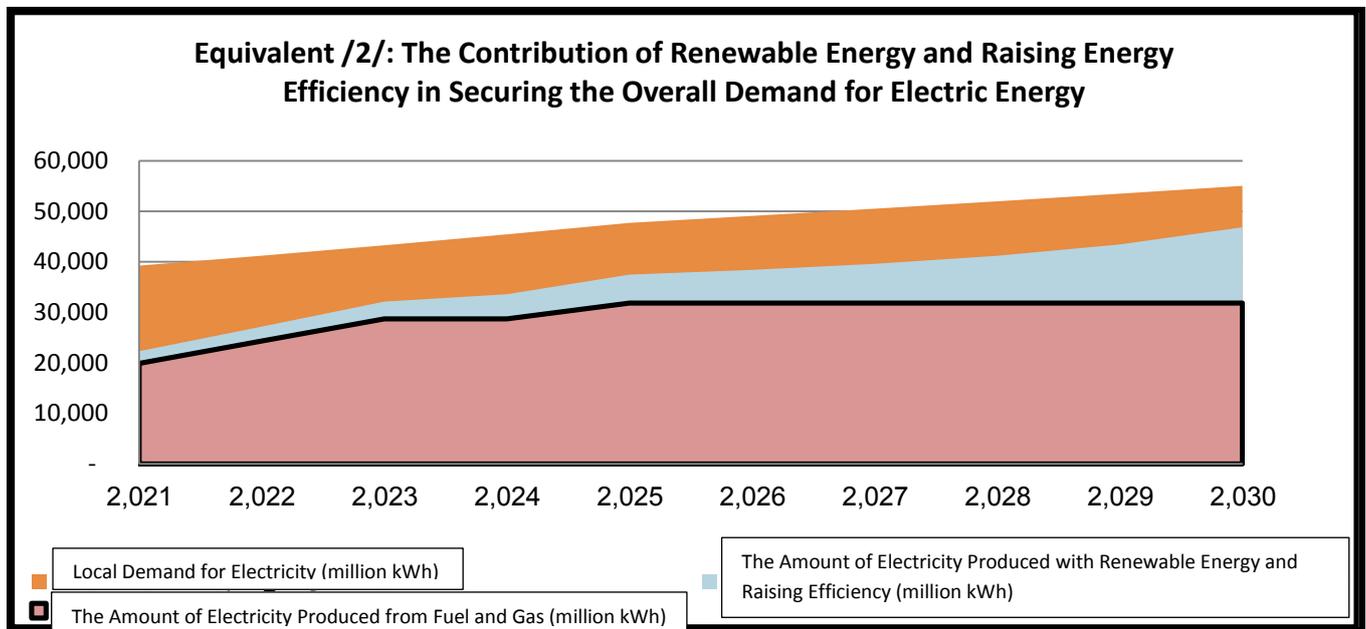
renewable energy and raising efficiency (million kWh)					
Photovoltaic energy produced (million kWh) (1600 hour annually)	208	339	560	1,598	1,841
Wind turbine power produced (million kWh) (2500 hour annually)	10	26	47	86	157
Electricity provided by solar heaters in various sectors (million kWh)	1800	1993	2206	2443	2705
Saving electricity from implementing procedures of raising the efficiency of using energy (million kWh)	392	487	605	751	933
Deficit from considering electricity from renewable energy and raising efficiency (million kWh)	15,441	12,537	9,144	9,849	8,234
The amount of electricity produced from fuel and gas with renewable energy and raising efficiency (million kWh)	22,303	27,170	32,123	33,582	37,469

- The following table shows the capacities to be installed during the years of the second period from traditional and renewable sources, as well as the quantities of fuel oil and natural gas required to operate these stations annually, and the quantities of electricity produced from each type of these stations annually. There is a comparison with the total annual demand for electricity and the expected deficit.

Year	2026	2027	2028	2029	2030
Local demand for electricity (million kWh)	49,086	50,509	51,974	53,481	55,032
The amount of electricity produced from the Euphrates (taking into account drought) (million kWh)	2,000	2,000	2,000	2,000	2,000
The amount of electricity produced from steam sets of fuel annually (million kWh)	15,773	15,773	15,773	15,773	15,773
The amount of electricity produced from gas annually (million kWh)	16,060	16,060	16,060	16,060	16,060
Quantity of electricity produced from fuel and gas (million kWh)	31,833	31,833	31,833	31,833	31,833
Deficit or surplus that arises from not considering electricity one of the renewable energy(million kWh)	15,252	16,676	18,141	19,648	21,199
The amount of electricity that is supposed to be produced from renewable energy and raising efficiency (million kWh)	6,572	7,767	9,358	11,603	15,002
Photovoltaic energy produced (million kWh) (1600 hour annually)	2,131	2,477	2,892	3,392	4,000
Wind turbine power produced (million kWh) (2500 hour annually)	289	537	1,010	1,930	3,750
Electricity provided by solar heaters in various sectors (million kWh)	2,995	3,316	3,671	4,064	4,500
Saving electricity from implementing procedures of raising the efficiency of using energy (million kWh)	1,158	1,438	1,785	2,216	2,752
Deficit from considering electricity from renewable energy and raising efficiency (million kWh)	8,680	8,909	8,783	8,045	6,197
The amount of electricity produced from fuel and gas with renewable energy and raising efficiency (million kWh)	38,405	39,600	41,191	43,436	46,835

We note from the previous two tables that:

- The total demand for electric energy will increase from about /39/ billion kWh in 2021 to /55/ billion kWh in 2030.
- The amount of electricity produced from traditional sources will increase from about /20/ billion kWh in 2021 to /32/ billion kWh in 2030.
- The amount of electricity produced from renewable sources and raising energy efficiency will increase from about /2.4/ billion kWh in 2021 to /15/ billion kWh in 2021 in 2030.
- The deficit in the amount of electricity will decrease from /15.4/ billion kWh in 2021 to /6.1/ billion kWh in 2030.



C.Environmental Impact of Renewable Energy Equivalent and Raising Efficiency:

In order to clarify the important role played by renewable energy and to raise the efficiency of reducing quantities of unburned fuels, and thus reducing the quantities of harmful gas emissions, the most important of which is carbon dioxide, the quantities of unburned fuels from each type of renewable energy were calculated according to the plan set, as well as the quantities of CO2 emissions, and the important financial impact of this reduction, which will have a positive impact on the rapid spread of renewable energy. This effect is shown in the following tables:

1. Photovoltaic Panels:

Year	2021-2025	2026-2030	2021-2030
Photovoltaic Energy Produced (million kWh) (1600 hour annually)	4,546	14,892	19,438
The amount of unburned fuel from producing electricity from photovoltaic panels (million tons)	1.137	3.723	4.859
The value of unburned fuel from producing electricity from photovoltaic panels (million dollars)	454.603	1,489.156	1,943.759
The amount of avoided CO2 emissions by using photovoltaic panels (million tons)	3.410	11.169	14.578
The value of avoided CO2 emissions by using photovoltaic panels (million dollars)	170.476	558.434	728.910

2. Wind Power Turbines:

Year	2021-2025	2026-2030	2021-2030
Wind Turbine Energy Produced (million kWh) (2500 hour annually)	327	7,515	7,842
The amount of unburned fuel from producing electricity from wind turbines (million tons)	0.082	1.879	1.960
The value of unburned fuel from producing electricity from wind turbines (million dollars)	32.651	751.543	784.194
The amount of avoided CO2 emissions by using wind turbines (million tons)	0.245	5.637	5.881
The value of avoided CO2 emissions by using wind turbines (million dollars)	12.244	281.829	294.073

3. Solar Water Heaters in Various Sectors:

Year	2021-2025	2026-2030	2021-2030
The amount of electricity from solar heaters in various sectors (million kWh)	11,147	18,546	29,693
The amount of unburned fuel from using solar heaters (million tons)	2.787	4.636	7.423
The value of unburned fuel from using solar heaters (million dollars)	1,114.718	1,854.569	2,969.287
The amount of avoided CO2 emissions by using solar heaters (million tons)	8.360	13.909	22.270
The value of avoided CO2 emissions by using solar heaters (million dollars)	418.019	695.463	1,113.483

4. Measures to Raise Energy Efficiency:

Year	2021-2025	2026-2030	2021-2030
Saving electricity from implementing measures to raise efficiency of energy use (million kWh)	3,168	9,348	12,517
The amount of unburned fuel from implementing measures to raise efficiency of energy use (million tons)	0.792	2.337	3.129
The value of unburned fuel from implementing measures to raise efficiency of energy use (million dollars)	316.842	934.832	1,251.673
The amount of avoided CO2 emissions by implementing measures to raise efficiency of energy use (million tons)	2.376	7.011	9.388
The value of avoided CO2 emissions by implementing measures to raise efficiency of energy use (million dollars)	118.816	350.562	469.377

5. Total Renewable Energy Sources and Raising Energy Efficiency:

Year	2021-2030
Saving electricity, considering electricity as a renewable energy and raising efficiency (million kWh)	70,000
The amount of avoided fuel emissions, considering electricity as a renewable energy and raising efficiency (million tons)	17
The value of the avoided fuel emissions, considering electricity a renewable energy and raising efficiency (million dollars)	7000
The amount of CO2 emissions avoided by renewable energy and raising efficiency (million tons)	52
The value of CO2 emissions avoided by renewable energy and raising efficiency (million dollars)	2600

6. A comparison between the value of unburned fuel and the foundation costs and purchase of electricity from renewable energy:

Year	2021-2025	2026-2030	2021-2030
Total costs of renewable energy plants (purchase of electricity + installation) (million dollars)	540	1,489	2,029
The value of unburned fuel by producing electricity from photovoltaic panels and wind turbines (million dollars)	487	2,241	2,728

D. The Strategic Plan to Benefit from Renewable Energy Sources and Raising Energy Efficiency until 2030:

The plan aims to achieve a balance between supply and demand for energy at the lowest costs by raising energy efficiency to reduce energy demand. It also expands the applications of renewable energy, to ensure meeting the total demand for electricity in 2030, which is expected to reach about /55/billion kWh.

The following table shows the capacities of renewable energy projects that will be installed, whether connected to the network or independent from it, the amount of electricity produced from them, the number of solar heaters that will be installed, and the contribution of projects to improve energy efficiency, taking into account that the mentioned projects will be financed by the public and private sectors:

Year	2021-2025	2026-2030	2021-2030
Capacity of photovoltaic panels connected to the network (megawatts)	873	627	1,500
Public sector projects (turnkey) with providing financing by cumulative payment facilities (megawatts)	383	350	733
Private sector photovoltaic projects, purchasing electricity that is produced cumulatively (megawatts)	490	277	767
Capacity of photovoltaic panels with public and private demand (megawatts)	278	722	1,000
Public sector photovoltaic projects with demand cumulatively (megawatts)	110	240	350
Capacity of wind turbines connected with the network (megawatts)	56	944	1,000
Public sector projects (turnkey) with providing financing by facilitating payment cumulatively (megawatts)	20	520	540
Wind turbine private sector projects to purchase electricity produced cumulatively (megawatts)	36	424	460
Capacity of Small Wind turbine on the demand side of the private sector (megawatts)	6	494	500
Number of solar water heaters (thousand) (A heater provides 1800 kWh annually)	1,503	997	2,500
Saved electricity from solar heaters in various sectors (million kWh)	2,705	1,795	4,500
Saving electricity from implementing measures to raise efficiency of energy use (million kWh)	933	1,819	2,752

From the previous table, we note that the total capacity of photovoltaic projects will reach /2500/ megawatts. The capacity of wind power projects will reach /1,500/ megawatts, while the number of solar heaters will reach /1.2/ million dollars.

The following table shows the stages of implementing this plan:

Stage	First Stage till 2025	Second Stage till 2030	Total
Photovoltaic projects (megawatts)	1150	1350	2500

Wind Turbine Power Projects (megawatts)	60	1440	1500
Number of solar heaters (one thousand heaters)	300	900	1,200

E. The Distribution of the Plan of Renewable Energy Projects until 2030 According to the Implementing Agency:

The following table shows the distribution of the renewable energy projects plan until 2030 according to the implementing agency, as follows:

The Implementing Body	Solar Capacity (megawatts)	Wind Turbines Capacity (megawatts)	Household Solar Heater (Heater)
Ministry of Electricity - turnkey projects	730	540	200.000
Private sector projects connected with the transmission network	570	360	-
Private sector projects connected with the distribution network	200	100	-
Projects not connected to the network with the demand	1000	500	1.000.000
Total	2500	1500	1.200.000

F. Governmental Financial Costs Required to Implement the Second Equivalent:

The following table shows that the total costs of securing fuel oil and natural gas until 2030 amounted to about \$24.3 billion. It also shows that the total costs of renewable energy plants (electricity purchase + installation) amounted to about \$2.03 billion dollars.

Year	2021-2025	2026-2030	2021-2030
Number of population (a thousand)			
The value of fuel oil consumed annually (million dollars)	6,935	8,833	15,768
The value of natural gas consumed annually (million dollars)	3,792	4,256	8,048
The value of fuel oil and natural gas consumed annually (million dollars)	10,727	13,089	23,816
The total costs of the uses of thermoelectric plants including the value of fuel (million dollars)	11,059	13,494	24,289
Installation costs of photovoltaic panels connected to the network, public sector (million dollars)	333	289	631
The cost of purchasing electricity from private photovoltaic panels connected to the network (million dollars)	76	192	268
Installation costs of photovoltaic panels on the demand side, public sector (million dollars)	94	204	298
Installation costs of wind turbines connected to the network, public sector (million dollars)	26	676	702
The cost of purchasing electricity from wind turbines connected to the network (million dollars)	11	120	130
Installation costs of wind turbines and photovoltaic public sector projects	453	1,178	1,630
Costs of purchasing electricity out of wind turbines and photovoltaic private sector projects (million dollars)	87	311	398
Total costs of renewable energy plants (purchasing electricity + installation) (million dollars)	540	1,489	2,029

The following table shows the values of the financial resources for equivalent No. /2/ required during the first period of the year 2021-2025, and the second period of the year 2026-2030 and the total of the two periods:

Unit: one billion dollars	First Period	Second Period	Total
	2021-2025	2026-2030	2021-2030
The value of fuel oil and natural gas consumed	11.1	13.2	24.3
Costs of purchasing electricity from projects of renewable energy	0.54	1.49	2.03

A comparison between the value of the unburned fuel and the installation costs and the purchase of electricity from renewable energy:

Year	2021-2025	2026-2030	2021-2030
Total costs of renewable energy plants (purchase of electricity + installation) (million dollars)	540	1,489	2,029
The value of unburned fuel by producing electricity from photovoltaic panels and wind turbines (million dollars)	487	2,241	2,728

In general, the volume of investments needed to implement this plan is about \$3.5 billion. The private sector can contribute in these investments as investment projects by 30%, and energy consumers in all sectors by at least 30%. This is achieved by granting the necessary facilities and tax exemptions to encourage the establishing of projects to produce electricity based on renewable sources, in accordance with the provisions of Electricity Law No. 32 of 2010 and its amendments and Energy Conservation Law No. /3/ of 2009.

Eight: Policies and Measures Necessary to Implement the Renewable Energy Plan

A. General Policies:

- 1) Continuing the rehabilitation and development projects of the existing conventional thermoelectric power stations and negotiating to provide financing for the construction of new thermoelectric power stations (steam turbines) to meet the future loads of 2030 and beyond.
- 2) Organizing support and changing its strategies with the aim of delivering it to its beneficiaries, so that the electricity tariff is encouraging for citizens to use renewable energy and raise energy efficiency, or to purchase electricity produced from private stations.
- 3) Correcting price policies, and preparing a clear plan, scheduled annually to adjust the tariff, in order to reach the real cost of producing the electricity commodity. This helps the sector to operate in a real economic way, relieve the burdens on the public treasury, and allow benefiting from financial savings to improve the citizen's standard of living.
- 4) Working in parallel with renewable energy projects, with a preference for demand projects, electricity purchase projects, and then turnkey projects.
- 5) Intensifying work on the drinking water pumping program by making use of renewable energy sources. This can be achieved with the aim of providing water safety, providing funding from grants and aids from friendly countries, international organizations, civil society sources and initiatives of popular bodies in addition to government sources (financing projects or through food tariffs). There is a need to set up a binding plan for cooperation between the ministries of electricity, water resources, local administration and the environment.
- 6) Developing legislations, especially Electricity Law No. /32/ of 2010 to allow the sale of electricity from private renewable energy projects to citizens and facilities from different sectors and consuming categories in various voltages, particularly from existing renewable energy plants.
- 7) Developing the necessary programs to train and rehabilitate technical, financial and legal cadres working in the fields of renewable energy.
- 8) Giving priority to the establishment of renewable energy projects to feed the productive sectors (industry, agriculture, services, etc.), both public and private.
- 9) Expanding independent government projects that improve services to citizens by securing a renewable source of energy for government service centers, etc.

- 10) Focusing, in an organized way, on the application of green architecture standards, and finding the necessary mechanism to construct new environment-friendly buildings, so that they are thermally insulated using different thermal insulation materials (natural stones or thermally insulated blocks, etc.). They will be equipped with various renewable energy systems and contain energy-efficient equipment.
- 11) Developing programs for the use of electric transport within large cities, such as trams, electric buses, etc., through the involvement of the national and foreign private sector using renewable energy.
- 12) Preparing to proceed in parallel with the global spread of electric cars that run on batteries charged with renewable energy systems.
- 13) Exempting equipment, raw materials, and all that contributes to raising energy efficiency and applications of renewable energy from customs duties and other non-custom tariffs.
- 14) Simplifying the procedures for obtaining licenses and permits for importing the necessary equipment for investors in renewable energy projects. In addition, dealing with investors out of true partnership over the life of the project, providing the required technical support, providing facilities and finding solutions to the difficulties they may face.
- 15) Localizing the renewable energy equipment industry in Syria.
- 16) Developing scientific research, laboratory structures and technical specifications, as well as framing research work between the National Center for Energy Research with universities and various research centers. Activating cooperation between researchers in the country and others outside it to attract national cadres.
- 17) Providing tax exemptions on imported and manufactured equipment for the purpose of constructing waste treatment plants.
- 18) Developing a plan by the Ministry of Local Administration and Environment to establish waste treatment plants with the aim of generating thermal or electrical energy.
- 19) Establishing a national coordination center for renewable energy projects (Data Collector) at the National Center for Energy Research.
- 20) Developing a quality control system for the equipment of renewable energy systems of all kinds and protecting the consumer market.
- 21) Spreading energy awareness through the development of a national program in which the ministries and concerned authorities contribute.

B. Ministry of Electricity Projects:

Ensuring that the necessary funding for these projects is secured through the following options:

- Allocating amounts from the revenues of selling electricity annually, in addition to the investment plan funds.
- Payment facilities by the executing companies for a period of no less than seven years after putting the projects into service. This requires a governmental guarantee for paying and securing foreign exchange.
- Obtaining loans by the concerned authorities in the Ministry of Electricity for a period of no less than seven years from banks or governmental banks (The Central Bank of Syria - Popular Credit Bank) or government funds (Public Debt - the Syndicate of Engineers - Social Insurance). This requires governmental support to obtain interest-free or low-interest loans.

C. Policies of Private Projects that Link with the Transmission and Distribution Network:

- Drawing an investment map for suitable lands for renewable energy projects **in all governorates** and determining the capacities that can be linked with each transfer station to avoid rationing problems.
- Continuing to work according to the decision of the electric power supply tariff to reach the installation of 300 megawatts or more of renewable energy projects, and to emphasize the following:
 - ✓ Directing new investors to feed vital projects directly, such as drinking water pumps, fuel stations, or communication stations, etc., in cooperation between the Ministry of Electricity and the relevant ministries.
 - ✓ Finding a solution to the existing projects affected by the rationing programs.
 - ✓ Allocating lands for renewable energy projects from state property near the transfer stations in all governorates under the supervision of the Ministry of Electricity, as well as inviting investors to establish projects according to the feed-in tariff.
- Allocating proper lands from state property with encouraging rent allowances.
- Honesty by providing information to investors, equal opportunities and preventing monopoly.
- Introducing new methods of contracting with renewable energy projects with all capacities.
- Providing financing and insurance facilities for these investments.

D. Policies of Renewable Energy Projects in Different Sectors:

1. Domestic and Private Service Sectors:

- Encouraging citizens from the domestic sector, etc., to adopt renewable energy systems of all kinds and by the various methods and means used in neighboring countries. Coming up with appropriate solutions for the conditions of the country, especially the adoption of renewable energy systems to fuel joint works in buildings such as lighting, water pumps, elevators, etc.
- Focusing, in an organized manner, on the application of green architecture standards, and finding the necessary mechanism to construct new environment-friendly buildings. These buildings are thermally insulated (using different thermal insulation materials such as natural stones or thermally insulated blocks, etc.). They are equipped with various renewable energy systems and contain efficient equipment energetically.
- Implementation of specific programs by benefiting from a fund to support renewable energy and raising energy efficiency by granting soft loans for the installation of various renewable energy and energy efficiency systems. This includes thermal insulation of existing buildings, in a way that allows for the gradual transformation of green architecture.
- Obliging public residential buildings (labor housing, or otherwise) and housing associations to benefit from renewable energy and apply opportunities to raise energy efficiency.

2. Public Service Entities Sector:

- Obliging all public bodies (especially those that provide direct services to citizens) to develop an executive program to take advantage of their vacant surfaces for the installation of renewable energy systems in coordination with the Ministry of Electricity and the National Center for Energy Research.
- Allocating public bodies the necessary financial appropriations on renewable energy projects to implement their annual plan, in a way that it is not less than 2% of the appropriations in the investment budget of each entity minimum.

3. Water and Agriculture Sector:

- The Ministries of Agriculture and Water Resources, in coordination with the National Center for Energy Research and the Ministry of Local Administration and Environment, develop an implementation plan to install renewable energy systems to pump water from organized and controlled wells to all pumps within the sewage network until 2030, and allocating the necessary funds.
- Utilizing watersheds and pressure differences in water networks to generate electricity using small water turbines.
- Providing soft loans to agricultural water user associations and owners of licensed and regulated agricultural establishments to install renewable energy systems for pumping water, etc.
- Not granting a license to new wells unless using renewable energy sources.

- Granting soft loans to livestock breeders for the purpose of establishing biogas production plants.

4. Industry and Trade Sector:

- Granting soft loans to those wishing to benefit from solar energy in their facilities.
- Motivating the owners of old and new facilities to benefit from the applications of renewable energy.
- Providing facilities and tax exemptions to industrialists who depend on renewable energy sources for more than 50% of their needs.
- Encouraging the localization of the renewable energy equipment industry and energy efficient devices by providing facilities and incentives.
- Imposing fees on large industrial energy consumers who depend on traditional sources only.

5. Sector of Places of Worship:

- Directing places of worship to develop an executive program to install photovoltaic panels, small wind turbines, and solar heaters on the roofs of places of worship or on the lands belonging to them. The contribution of renewable energy in places of worship reaches no less than 50% of the amount of electricity needed for each place of worship.
- Adopting a special system for electricity tariffs for places of worship, in order to encourage the use of renewable energy.

-end-

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