



Energy Industry in Iraq



General State of the Economy

Iraq, officially the Republic of Iraq, is a country in the southwestern Asia bordering Turkey to the north, Syria to the north-west, Jordan to the west, Iran to the east, and Saudi Arabia and Kuwait to the south. In

addition, Iraq has access to the Persian Gulf with a total coastline of 58 kilometers, which is the shortest coastline among all countries in the Persian Gulf region.

According to 2024 statistics, Iraq, which in terms of the size of its territory is 60th in the world, is home to around 47 million people.

Republic of Iraq / جمهورية العراق

Capital: Baghdad	Density: 82.7/km ²	Currency: Iraqi dinar (IQD)
Official languages: Arabic, Kurdish	Life expectancy at birth: 69.12 years	GDP (PPP): \$508.973 billion (2023 est.)
National Day: 3 October	Area (land): 438,317 km ²	GDP - per capita (PPP): \$11,742 (2023 est.)
Population: 46,729,000 (2024 est.)	Coastline: 58 km	Internet country code: .iq

Source: [1,2,3,4,5]



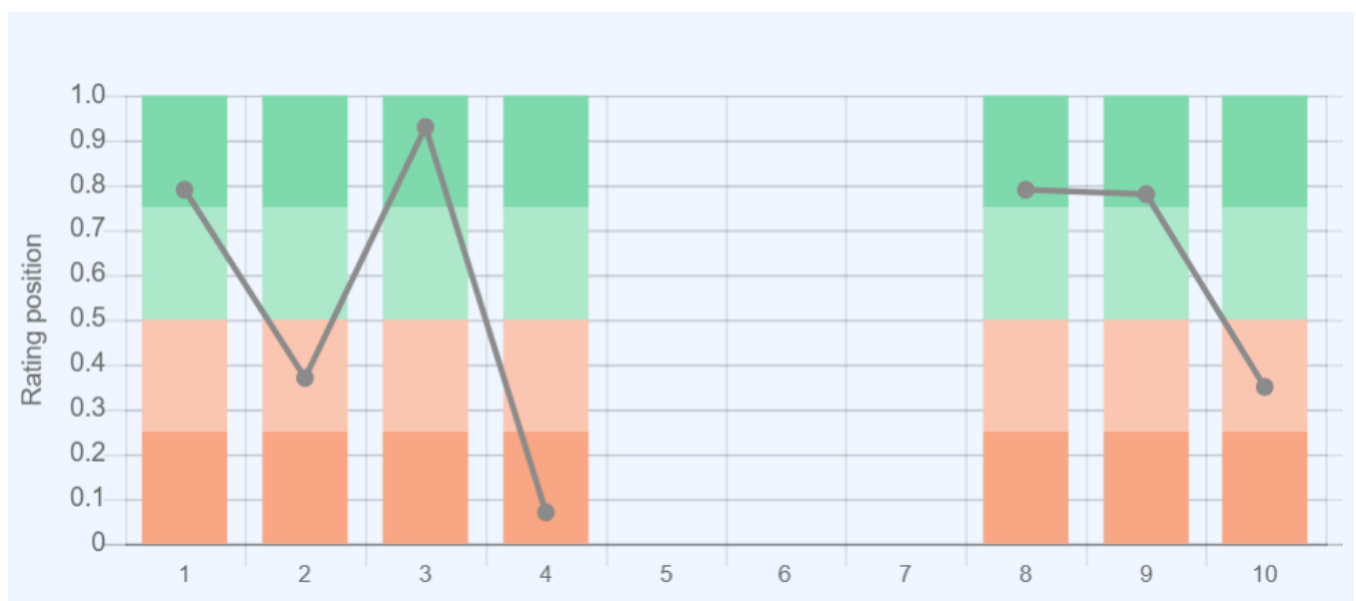
Oil Crude Gas Tanker Ship. Envato. MP35VK9U6X

In terms of population density, the country is 93rd out of 201 countries. Iraq is a federal parliamentary republic divided into 18 governorates with its capital is Baghdad. The official languages are Arabic and Kurdish [1,2,3]. The ranking positions of Iraq relative to other countries have been determined for an extensive list of economic, energy, innovative and educational indices, as well as for metrics reflecting the state of the environment. The economic indices include, for example, GDP per capita, annual average GDP growth, high-technology exports, and others. The list of energy indices includes proven reserves of oil, gas and coal, production-consumption ratio combined, and energy use, etc. Each of the indices has a ranked list of included member countries. Since the number of countries in each rating is different for each index, the positioning of the country of interest is displayed on

a special chart, where the vertical axis is a uniform relative scale from 0 to 1, whereas the horizontal axis denominates the various indices and respective numbers relating to the descriptions given underneath.

Thus, in such a relative “0-1” diagram, the country’s position is marked with a dot in proportion to its location in the original rating list. If the country is among the leaders regarding the selected indicator, it will be marked close to 1 in the upper green zone on the relevant chart “0-1”, if the country is an outsider in the rating list, then it will be marked in the lower red zone of the chart “0-1”, etc. A single list of indices is used for all countries. If a country is not in the ranking list for any index, then the corresponding position on the charts is not displayed.

Ranking position of Iraq for list of economic indices:



Sources:

1. GDP (purchasing power parity), 2020 est. / The World Factbook/Library/Central Intelligence Agency *228
 2. GDP - per capita (PPP), 2020 / The World Factbook/Library/Central Intelligence Agency *229
 3. Inflation rate (consumer prices), 2019 est. / The World Factbook/Library/Central Intelligence Agency *228
 4. Charges for the use of intellectual property, receipts (BoP, current US\$), 2020 / International Monetary Fund, Balance of Payments Statistics Yearbook, and data files. / License: CC BY-4.0 *88
 5. The Global Competitiveness Index 2019 / Rankings / Reports / World Economic Forum *141
 6. High-technology exports (current US\$) 2019-2020 / United Nations, Comtrade database through the WITS platform / License: CC BY-4.0 / Data *134
 7. 2021 Index of Economic Freedom / International Economics / The Heritage Foundation *178
 8. Reserves of foreign exchange and gold, 2017 est. / The World Factbook / Library / Central Intelligence Agency *195
 9. Annual average GDP growth in %, for the last 10 years (2011-2020) / World Bank national accounts data, and OECD National Accounts data files / License: CC BY-4.0 *206
 10. Public debt (% of GDP), 2017 est. / The World Factbook / Library / Central Intelligence Agency (from smallest to largest) *210
- * Total number of countries participating in ranking

Figure 1. Economic indices of Iraq

As a country with significant oil resources, Iraq has enormous economic potential, the development of which is hampered by corruption, political instability and underdeveloped private sector, as well as social tensions and conflicts within the country. Of the indices presented in the figure above, Iraq has the highest values for Inflation rate (0.93), GDP (0.79) and Reserves of foreign exchange and gold (0.70). The weakest part of Iraqi economic indicators is Charges for the use of intellectual property (0.07). Data

on the High-technology exports is not available and the country is not included into The Global Competitiveness Index and the Index of Economic Freedom, so the corresponding positions on the chart above are blank.

Energy resources

Iraq is one of the global leaders in terms of proven reserves of fossil fuels. The country has the fifth-largest proved crude oil reserves representing 8.52% of the world's total. Natural gas reserves are 12th largest in the

world with the global share of 1.82%. Comparing Iraq's fossil fuel resources with other world leaders, for instance, oil reserves are about 2 times less than in Venezuela and Saudi Arabia, while gas reserves are more than 12 times less than in Russia. The share of Iraq's population makes up about 0.55% of the world's population [6].

Table 1. Fossil energy resources of Iraq

Resource/explanations	Crude oil*	Natural gas*	Coal	Shale Gas	Tight Oil	Coal mine methane
Value	145.02 (8.52%)	131.69 (1.82%)	-	-	-	-
Unit	billion barrels	Tcf	-	-	-	-
Year	2021	2020	-	-	-	-
Source	[6]	[6]	[-]	[-]	[-]	[-]

*the share of the country's reserves in world total is provided in brackets

In terms of tons of oil equivalent, according to 2024 data, conventional proved reserves by fuel type were: 85.5% – crude oil and 14.5% – natural gas (Fig.5). As the majority of the southern countries, Iraq has favorable conditions for the development of renewable energy in general and

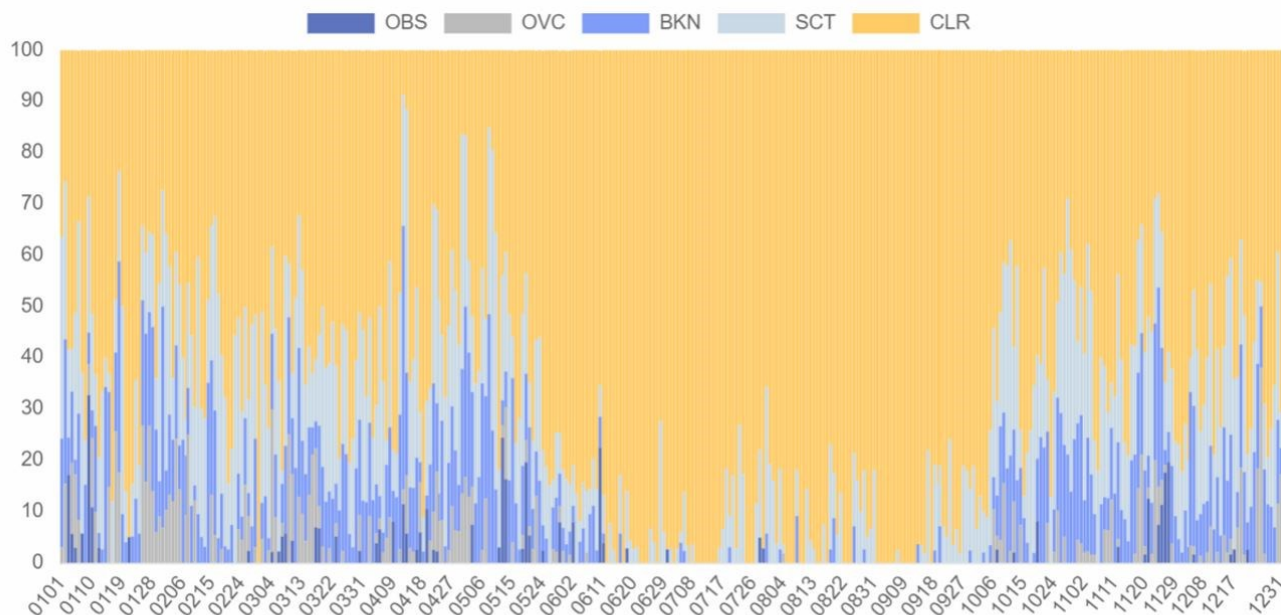
solar power in particular. In a number of regions of the country, especially in its western-southern part, solar GHI reaches 5.8-5.9 kWh/m² per day.

The most favorable climatic conditions for wind energy development are in the southern part of Iraq, as well as

IRAQ, NAJAF

Latitude: 31.95, Longitude: 44.32

Average daily sky coverage over 10 years of observations, %



CLR - clear, SCT - scattered from 1/8 TO 4/8, BKN - broken from 5/8 TO 7/8, OVC - overcast, OBS - obscured, POB - partial obscuration

Source: based on NOAA U.S. Department of Commerce

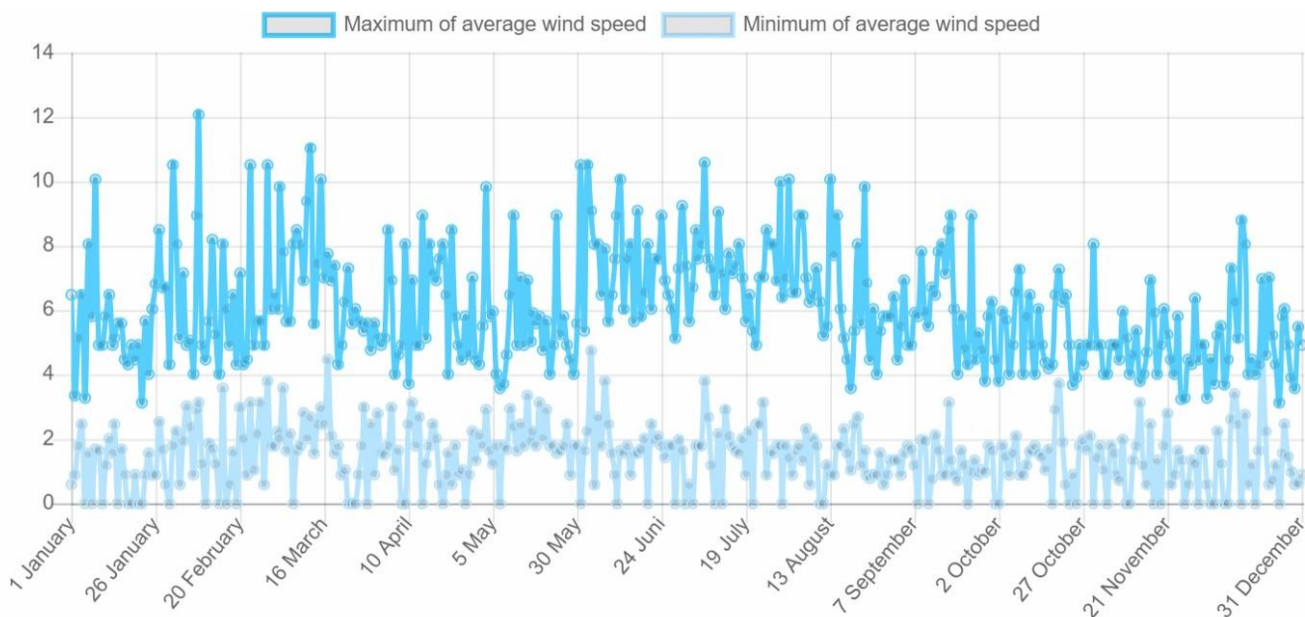
Detailed information: [Interactive map of solar resources](#)

IRAQ. SAMAWA

Latitude: 31.27, Longitude: 45.27

Average speed: 3.68 m/s, Operational share: 65%

Average daily wind speed for 10 years of observations, m/s, 10 m above the ground



Source: based on NOAA U.S. Department of Commerce

Detailed information: [Interactive map of wind resources](#)

the eastern region between the governorates of Diyala and Wasit, where wind speeds reach 6.5-7.0 m/s at a height of 50 meters. Hydropower is currently an energy source with the largest share in renewable power generation in Iraq, accounting for about 90% of renewable electricity. Iraq has two main rivers, the Euphrates and the Tigris, which provide the lion's share of the country's water needs.

Table 2. Renewable energy resources of Iraq

Resource/explanations	Solar Potential (DNI)*	Wind Potential (50 m)*	Bio Potential (agricultural area)	Bio Potential (forest area)	Municipal Solid Waste
Value	5.2-5.8	5.0-6.5	21.3	1.9	1.03
Unit	kWh/m ² /day	m/s	% of land area	% of land area	Kg/per capita/day
Year	2020	2020	2020	2020	2020
Source	[7]	[8]	[9]	[10]	[11]

*for most majority of the territory of the country

However, the hydropower sector has a number of challenges related to infrastructure damage as well as climate change related problems, to which hydropower is very vulnerable. The potential of bioenergy in the country is limited due to insufficient availability of resources and lack of governmental support.

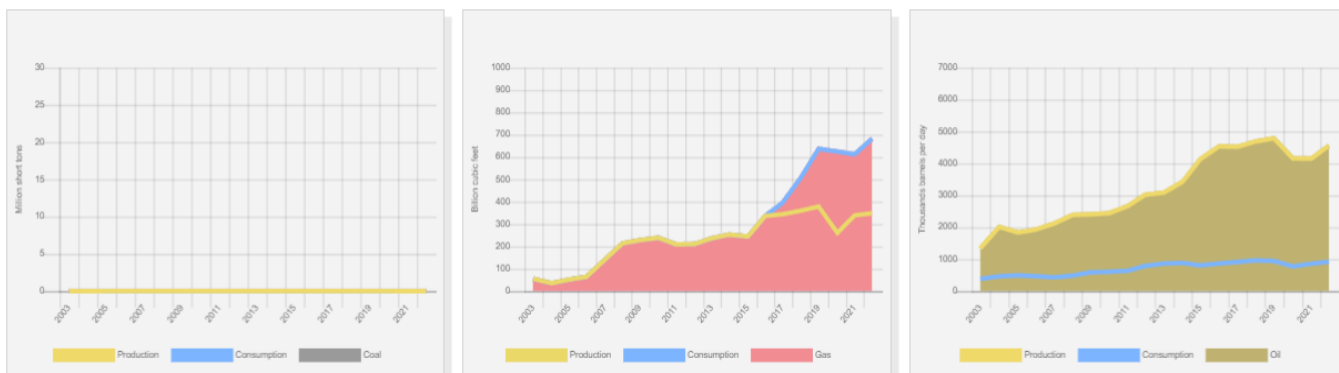
In general, Iraq's share of renewables is negligible if compared to its high potential, and it is currently lagging behind other countries in the region in the field of green energy development and does not have a clear strategy for renewable energy promotion.

Energy balance

Although Iraq is one of major crude oil producers, it is struggling to meet domestic energy demand. According to [6], in 2022 in Iraq, the total production of primary energy was 10.022 quadrillion Btu, while consumption was at the level of 2.567 quadrillion Btu. Thus, Iraq is a

country with a very high share of surplus energy production relative to domestic consumption.

According to the Statistical Review of World Energy 2022 [12], primary energy consumption in Iraq in 2021 amounted to 2.12 exajoules and was dominated by oil – 69.8%, ahead of natural gas – 29.2% and hydro – 1.5% [12].

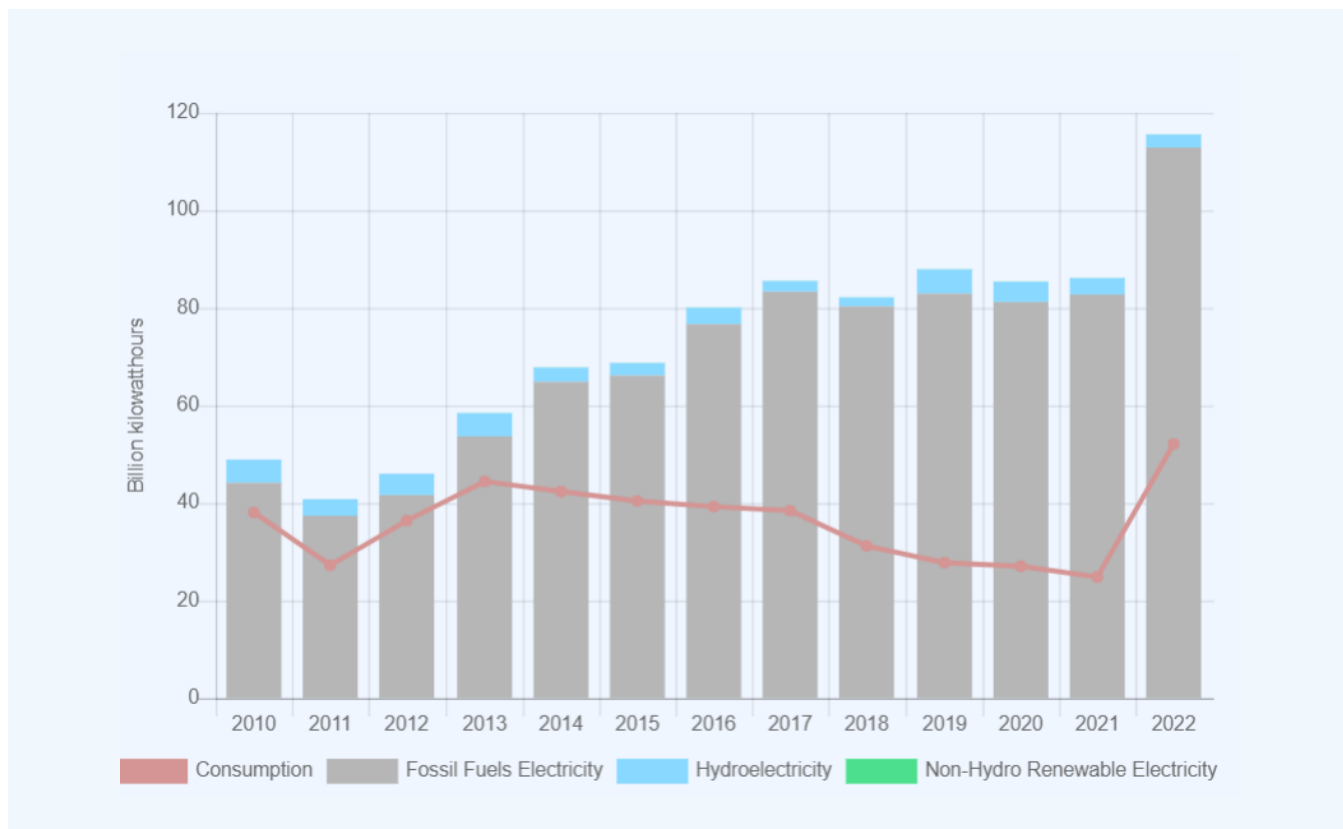


Source: U.S. Energy Information Administration (Mar 2024) / <https://www.eia.gov/>

Figure 2. Production and consumption of fossil fuels in Iraq (left–coal, in the center– gas, right–oil)

As the chart above shows, Iraq's natural gas and crude oil production has gradually increased over the past ten years, with crude oil production almost 5 times higher than domestic consumption. In contrast, natural gas con-

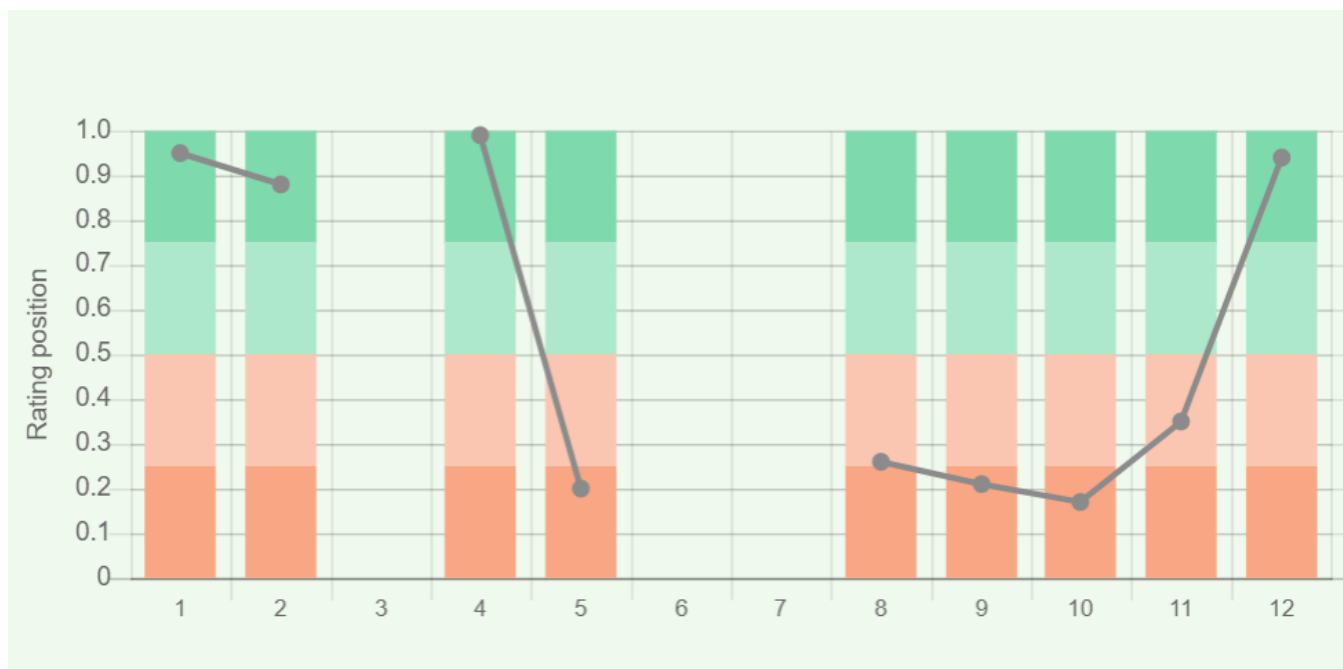
sumption is almost twice as high as domestic production, forcing Iraq to import gas from neighboring countries, mainly Iran.



Source: U.S. Energy Information Administration (Mar 2024) / <https://www.eia.gov/>

Figure 3. Electricity production in Iraq

The electricity sector in Iraq is almost entirely dependent on fossil fuels, which accounted for about 98% of electricity generation in 2022. As can be seen from the graph above, energy production has more than doubled in the last 10 years. According to [6], Iraq's power system is dependent on imports, and about 35% of electricity in 2021 was generated by a combination of natural gas produced in Iran and electricity imported from Iran. In general, the country often suffers from power shortages and inability to meet demand, especially during the summer peak period. This is primarily due to the underdeveloped transmission infrastructure, which results in high distribution losses, averaging more than 50% of the total electricity supply.



Sources:

1. Crude oil proved reserves, 2021 / International Energy Statistic/Geography / U.S. Energy Information Administration (Nov 2021)*98
 2. Natural gas proved reserves 2021 / International Energy Statistic / Geography / U.S. Energy Information Administration (Nov 2021) *99
 3. Total recoverable coal reserves 2019 / International Energy Statistic / Geography / U.S. Energy Information Administration (Nov 2021) *81
 4. Combination production-consumption for Crude oil 2018 / International Energy Statistic / Geography / U.S. Energy Information Administration (Nov 2021) *219
 5. Combination production-consumption for Natural gas 2019 / International Energy Statistic / Geography / U.S. Energy Information Administration (Nov 2021) *123
 6. Combination production-consumption for Coal 2019 / International Energy Statistic / Geography / U.S. Energy Information Administration (Nov 2021) *128
 7. Electricity – from other renewable sources (% of total installed capacity), 2017 est. / The World Factbook / Library / Central Intelligence Agency *170
 8. GDP per unit of energy use (PPP per unit of oil equivalent), 2020 *66
 9. Primary energy consumption - BP Statistical Review of World Energy 2021/BP;GDP (purchasing power parity) - The World Factbook/Library/Central Intelligence Agency
 10. Energy use (primary energy use of oil equivalent per capita) 2020 *127
 11. Primary energy consumption – BP Statistical Review of World Energy 2021; Population - United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, custom data acquired via website. Retrieved 15 November 2021*66
 12. The Global Energy Architecture Performance Index Report (EAPI) 2017 / Rankings / Reports / World Economic Forum
11. Electric power consumption (kWh per capita), 2016 *217
 Electricity Consumption - The World Factbook / Library / Central Intelligence Agency; Population - United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019, custom data acquired via website. Retrieved 15 November 2021
 12. Combination of electricity production-consumption (kWh)/The World Factbook/Library/Central Intelligence Agency *216
 * Total number of countries participating in ranking

Figure 4. Energy indices of Iraq

In addition, the poor performance of the power system is associated with inefficient or damaged power plants, and their low utilization rates. The fact that Iraq is one of the world leaders in fossil fuel reserves is certainly reflected in the energy index chart, with the country showing a strong performance in crude oil (0.95) and natural gas (0.88) reserves. Iraq scores highest in crude oil production to consumption ratio (0.99). As the country has virtually no reserves of coal and only very small amount of

electricity produced from renewables, except hydro, these positions remain blank in the chart above.

Energy Infrastructure

A territorial map showing distribution of the largest infrastructure projects of the fossil fuel sector in Iraq is displayed in Figure 5. As previously mentioned, crude oil reserves account for 85.5% and natural gas for 14.5% of all proven reserves of fossil fuels. According to [6], with 145 billion barrels Iraq has the world's fifth-largest pro-

ved crude oil reserves, representing 8% of global reserves. The Iraq's major fields are located onshore and the majority of Iraqi oil production comes from the super-giant Rumaila oil field in southern Iraq. Crude oil extracted here is sent by pipeline to local refineries or export facilities, including the offshore Basrah Oil Terminal in the Mideast Gulf.



Oil & gas operations, Iraq. Envato. 2AZVMCEY65

The country's oilfield infrastructure includes a number of refineries and storage facilities located along oil pipelines. The Baiji refinery in Saladin province is Iraq's largest refinery, producing one-third of the country's total oil production, and is one of the main sources of fuel for domestic consumption.

Similar to crude oil, the lion part of Iraq's proven gas reserves lie in Basrah governorate in the south of the country. It should be noted that most of natural gas reserves in Iraq is associated with oil extraction. The insufficient infrastructure for treatment, collection and processing of natural gas makes Iraq to the second-largest flaring country after Russia. According to a World Bank estimate, in 2022 Iraq flared around 18 billion cubic meters of gas per day, which has the potential to power over three million homes. The zero-emissions agreement Iraq signed with the World Bank commits Iraq to a

strategy that will drastically reduce gas flaring and use this energy source to revitalize an economy that relies heavily on crude oil [13]. As already mentioned, the electricity sector in Iraq is heavily dependent on fossil fuels, which accounted for 97.7% of electricity generation in 2022. In addition, the country's limited natural gas processing capabilities necessitate a heavy reliance on imports of Iranian gas and electricity. The largest power generation facility in the country, the Besmaya combined cycle power plant, is located 25 km east of Iraq's capital Baghdad and has an installed capacity of 3GW. Hydroelectric power plants generated 2.3% of electric power in 2022. Located on the Tigris River in the western governorate of Ninawa, Mosul Dam is a major hydroelectric power plant in the country. The dam serves to generate hydroelectricity and provide water for downstream irrigation.

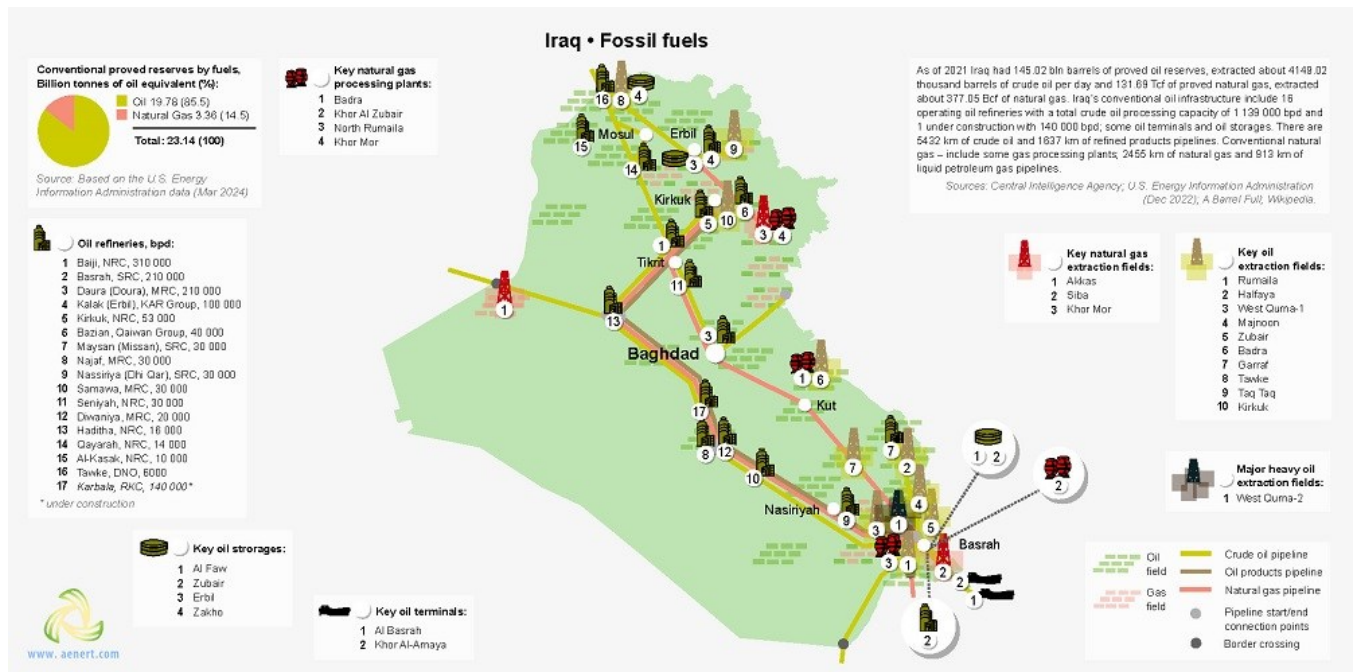


Figure 5. Basic infrastructure facilities of the fossil fuel sector in Iraq

As noted, Iraq has a strong renewable energy resource base, the utilization of which could increase Iraq's energy security and reduce its greenhouse gas emissions. Renewables accounted only for about 0.5% of generated electricity and weak overall infrastructure makes the integration of renewables problematic, and poses additional challenges to the stability of the energy system. The country requires a comprehensive approach to modernizing the electricity supply, in particular the expansion and modernization of grid capacity as well as energy storage systems.

Iraq has committed to achieving sustainable development by 2030, which requires energy from renewable sources, predominantly solar, to make up 20% of the energy mix. However, as a result of the lack of a renewable energy regulation law, political instability and delays in making the necessary changes, achieving these targets is doubtful. In addition, the tense security situation and the deplorable state of Iraq's economy are not conducive to attracting international investors [14].

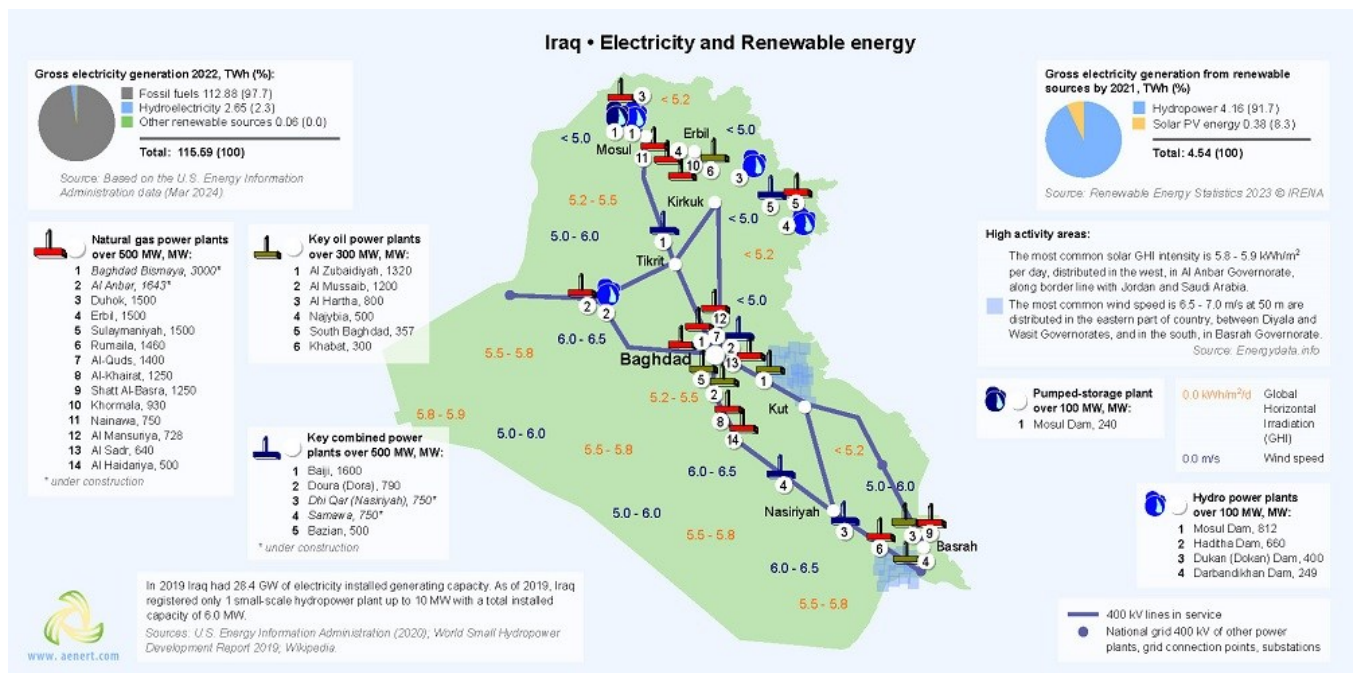
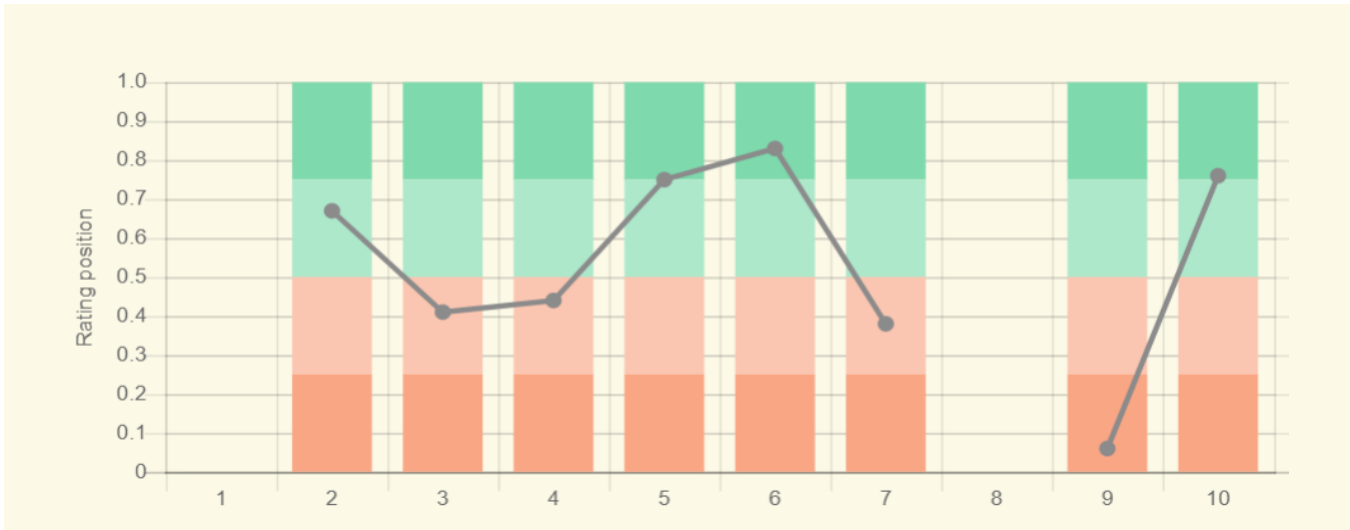


Figure 6. Electricity production and renewable energy in Iraq

Education and Innovation

The following chart shows Iraq's positions in terms of education and innovation:



Sources:

1. The Global Innovation Index 2021, Rankings / Knowledge / World Intellectual Property Organization / Cornell University, INSEAD, and WIPO (2021): Energizing the World with Innovation. Ithaca, Fontainebleau, and Geneva *132
 2. Patent Grants 2011-2020, resident & abroad / Statistical country profiles / World Intellectual Property Organization *185
 3. Patents in Force 2020 / Statistical country profiles / World Intellectual Property Organization *109
 4. QS World University Rankings 2022 *97
 5. SCImago Country Rankings (1996-2020) / Country rankings / SCImago, (n.d.). SIR-SCImago Journal & Country Rank [Portal]. Retrieved 17 Nov 2021 *240
 6. Internet users in 2018 / The World Factbook / Central Intelligence Agency *229
 7. Internet users in 2018 (% Population) / The World Factbook / Central Intelligence Agency *229
 8. Government expenditure on education, total (% of GDP), 2019 / United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics. License: CCBY-4.0 / Data as of September 2021 *177
 9. Research and development expenditure (% of GDP), 2018 / UNESCO Institute for Statistics. License: CCBY-4.0 / Data *119
 10. Scientific and technical journal articles, 2018 / National Science Foundation, Science and Engineering Indicators. License: CCBY-4.0 / Data *197
- * Total number of countries participating in ranking

Figure 7. The indices of education and innovation in Iraq

Like many countries with large populations, Iraq performs well in terms of the absolute number of Internet users (0.83), but when the number of users is considered as a proportion of the entire population, the country is

below the world average (0.38). There are also positives such as Number of Scientific and technical journal articles (0.76) and a relatively high position in the SCImago Country Rankings (0.75).



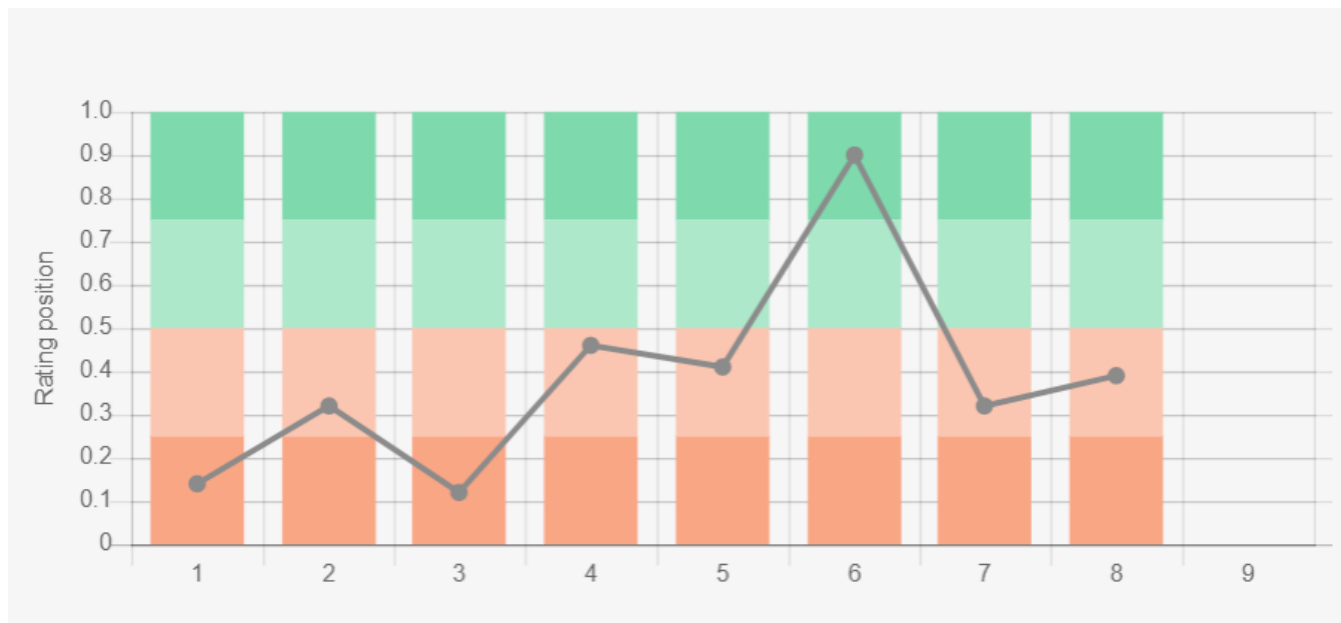
Cuneiform writing of the ancient Sumerian or Assyrian civilization. Envato. DKX8FAG36L

The weakest point of the country on the chart is Government Research and development expenditure (0.06). In addition, the lack of information on Iraqi public spending

on education and its absence in the Global Innovation Index leave these two positions unfilled.

Ecology and Environment Protection

Indicators related to environmental issues are presented in the following diagram:



Sources:

1. CO2 total emission by countries 2020 / European Commission / Joint Research Centre (JRC) / Emission Database for Global Atmospheric Research (EDGAR)*208
2. CO2 per capita emission 2020/European Commission/Joint Research Centre (JRC) / Emission Database for Global Atmospheric Research (EDGAR) *208
3. Forest area 2020 (% of land area) / The Global Forest Resources Assessment 2020 / Food and Agriculture Organization of the United Nations *234
4. Forest area change 2010-2020 (1000 ha/year) / The Global Forest Resources Assessment 2020 / Food and Agriculture Organization of the United Nations *234
5. The Environmental Performance Index (EPI) 2020 / Rankings / Yale Center for Environmental Law & Policy / Yale University *180
6. Annual freshwater withdrawals (m3 per capita), 2017 *179
- Annual freshwater withdrawals, total (billion m3), 2017 – Food and Agriculture Organization, AQUASTAT data. /License: CC BY-4.0;
- Population – United Nations, Department of Economic and Social Affairs, Population Division (2019).
- World Population Prospects 2019, custom data acquired via website. Retrieved 15 November 2021
7. The National Footprint Accounts 2017 (Biocapacity Credit / Deficit) / Global Footprint Network *188
8. Methane emissions (kt of CO2 equivalent), 2018 / Data for up to 1990 are sourced from Carbon Dioxide Information Analysis Center, Environmental Sciences Division, Oak Ridge National Laboratory, Tennessee, United States. Data from 1990 are CAIT data: Climate Watch. 2020. GHG Emissions. Washington, DC: World Resources Institute. Available at: License : Attribution-NonCommercial 4.0 International (CC BY-NC 4.0) *191
9. The Climate Change Performance Index (CCPI) 2022 / Overall Results / Jan Burck, Thea Uhlich, Christoph Bals, Niklas Höhne, Leonardo Nascimento / Germanwatch, NewClimate Institute & Climate Action Network *60

* Total number of countries participating in ranking

Figure 8. Environmental Indices of Iraq

The majority of Iraqi indices describing the country's positioning in the various international rankings related to ecology and environment protection are below average. The country's environmental problems include low forest area (0.12), high total (0.14) carbon dioxide emissions and per capita (0.32). The country is not included in the Climate Change Performance Index (CCPI) 2022, so this position in the chart remains unfilled. Among the country's positive environmental characteristics is its

annual freshwater withdrawal (0.90), which is high, compared to other countries. In general, the environmental situation in Iraq requires significant improvement.

References

- [1] List of sovereign states and dependencies by area / Wikipedia / https://en.wikipedia.org/wiki/List_of_sovereign_states_and_dependencies_by_area
- [2] List of countries and dependencies by population density / Wikipedia / https://en.wikipedia.org/wiki/List_of_countries_and_dependencies_by_population_density
- [3] Iraq / The-world-factbook / Library / Central Intelligence Agency / <https://www.cia.gov/>
- [4] GDP, PPP (constant 2011 international \$) / World Bank, International Comparison Program database. License: CC BY-4.0 / Data / The World Bank / <http://www.worldbank.org/>
- [5] GDP per capita, PPP (current international \$) / World Bank, International Comparison Program database. License: CC BY-4.0 / Data / The World Bank / <http://www.worldbank.org/>
- [6] International Energy Statistic / Geography / U.S. Energy Information Administration (Sep 2023) / www.eia.gov/
- [7] Solar resource data obtained from the Global Solar Atlas, owned by the World Bank Group and provided by Solargis / Global Solar Atlas / globalsolaratlas.info
- [8] Wind Map / Global Wind Atlas 2.0, a free, web-based application developed, owned and operated by the Technical University of Denmark (DTU) in partnership with the World Bank Group, utilizing data provided by Vortex, with funding provided by the Energy Sector Management Assistance Program (ESMAP). For additional information: <https://globalwindatlas.info>
- [9] Agricultural land (% of land area) / Food and Agriculture Organization, electronic files and web site. License: CC BY-4.0 / Data / The World Bank / <http://www.worldbank.org/>
- [10] Forest area (% of land area) / Food and Agriculture Organization, electronic files and web site. License: CC BY-4.0 / Data / The World Bank / <http://www.worldbank.org/>
- [11] World Bank What a Waste / Data / The World Bank / <http://www.worldbank.org/>
- [12] BP Statistical Review of World Energy 2019 (PDF) / BP / <https://www.bp.com>
- [13] Global Gas Flaring Tracker Report / PDF / <https://thedocs.worldbank.org/en/doc/5d5c5c8b0f451b472e858ceb97624a18-0400072023/original/2023-Global-Gas-Flaring-Tracker-Report.pdf>
- [14] The Future of Renewable Energy in the Iraqi Economy under Fossil Energy: Forward-Looking Study / PDF / <http://webology.org/data-cms/articles/20220123081317amWEB19198.pdf>
-

The sources of charts and curves are specified under the images.

[For more information about the energy industry in Iraq see here](#)