



COUNTRY PROFILE

on recycling management and water management in
JORDAN



German RETech Partnership
Recycling & Waste Management
Made in Germany



German Water
Partnership



IMPRINT

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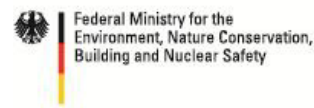
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JORDAN COUNTRY PROFILE

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LIST OF ABBREVIATIONS

AFD	Agence Française de Développement
AHK	German Chamber of Industry and Commerce Abroad
BMZ	Federal Ministry for Economic Cooperation
CIA	Central Intelligence Agency, US foreign intelligence service
DAAD	German Academic Exchange Service
DHIHK	German-Arabic Chamber of Commerce and Industry
EBRD	European Bank for Reconstruction and Development, also EBWE
EDAMA	Arab.: Sustainable – NGO Jordanian entrepreneurial company
EIB	European Investment Bank
EU	European Union
FTA	Free Trade Agreement
GAFTA	Greater Arab Free Agreement
GAM	Greater Amman Municipality
GCEP	General Corporation for Environmental Protection
GDP	Gross domestic product
Ghorfa	Arab – German Chamber of Commerce and Industry e.V.
GIZ	German Society for International Cooperation
GJU	German – Jordanian University
GTAI	Germany Trade and Invest
HDI	Human Development Index
IBRD	International Bank for Reconstruction and Development, World Bank
IRI	International Republican Institute
IWRS	Integrated Water Resource Management
JCS	Joint Service Councils
JIC	Jordan Investment Commission
JOD	Jordanian Dinar
KfW	Reconstruction and Loan Corporation
MBT	Mechanical biological waste treatment plant
MENA	Middle East and North Africa
MENAREC	MENA – Renewable Energy Conference
MENRU	Ministry of Ecology and Natural Resources
MOMA	Ministry of Municipal Affairs

MVA	Waste incineration plant
NUMOV	Nahost – und Mittelost – Verein e.V. (German Near and Middle East Association)
PET	Polyethylene terephthalate
PPK	Paper, cardboard, cartons
PPP	Purchasing power parity
TED	Tenders Electronic Daily, EU tender database
UNESCO	United Nations Educational, Scientific and Cultural Organisation
USAID	United States Agency for International Development
WHO	World Health Organisation
WTO	World Trade Organisation

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1. PREFACE

The environmental technology export initiative by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety aims to spread and reinforce knowledge about and application of environmental and climate protection technologies and innovative (green) infrastructure in target countries. In order to spread knowledge, the tasks include the targeted support of all activities that help small and medium-sized enterprises (SME) with their high need for support in the internationalisation of their "green" range of services to tap the ever increasing global demand for environmental, climate protection and efficiency technologies. This also includes information management in the companies; this can be supported by providing market information.

According to the experiences of the German RETech Partnership and German Water Partnership associations, it is often difficult for individual companies to access well-founded economic, legal, political, market-relevant and competitive information that is also tailored for use in SMEs for a relevant target market as the basis for investment decisions. The existence of a solid and yet practical prepared basis of information is indispensable in order to support the readiness to tap new markets, especially when supporting SMEs with limited personnel and financial capacities. This is also the prerequisite for further export promotion measures being able to achieve the desired effects.

Those behind the idea for this proposal, RETech and GWP and the energy and environmental technology consultation company eclareon have already worked closely together in 2014 and 2015 on this question as part of a study compiled by eclareon for the Federal Ministry for Economic Affairs and Energy about the existing export promotion instruments for an export initiative for environmental technologies.

German municipalities also play an important part in the consultation of the public authorities responsible for the organisation of waste management in the respective target countries and are often asked for support. However, just like the SMEs, they need well-founded knowledge of the conditions in the respective target countries. uve GmbH für Managementberatung has an extensive municipal network and well-founded experience with respect to the required conditions when establishing waste management structures and has incorporated these.

When formulating recommendations for action as part of the above-mentioned study for the federal government on the possible organisation of an export initiative, for the first time priority countries for recycling and water management were defined together with respect to the creation of well-founded information that is tailored to the industry's needs. This is exactly where our plan to design, create and distribute countries profiles in the Ukraine, Jordan, Serbia, United Arab Emirates, Saudi Arabia and Cuba comes in. These pick up on the recommendations for action from 2015 and, for the first time, draw up common market analyses in the form of country profiles for German recycling and water management, distribute these in both sectors and use them as a basis to develop a joint market tapping strategy for these countries. As part of a grant project with BMUB promotion,

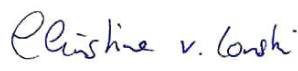
- a common structure was developed for these country profiles,
- with one part that can be used generally across different sectors and the part that is used for the relevant specific sector
- and the research, analyses and preparations were implemented in the consultation companies with experience in these countries.

Foreign markets that are currently of interest for both sectors but are still lacking transparency were selected as target countries for this measure.

The work results are provided to companies from both sectors as well as any interested readers free of charge with these publications. As a result of the positive experiences of both associations, work is currently in progress to continue the project with new countries for publication in 2018.



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2. SUMMARY

With its population of almost 8 million, the Hashemite Kingdom of Jordan (Jordan) is a developing country with enormous economic potential. For this reason, the country is also an interesting market for German recycling and water management companies, whether as a provider of planning and engineering services or as a plant supplier. Head of State King Abdullah II. has used political reform to start economic liberalisation and open the economy for the global market [1]. Despite the difficult political situation in almost all neighbouring states, Jordan is a relatively stable and safe country with lots of foreign investment since it has become the economic and trade centre in the Middle East. All the international banks and hotel chains can be found here.

The economic dynamism of the relatively young state can be seen from its real GDP growth and the economic success despite the global financial crisis in 2008 and the civil unrest in Syria since 2011. Investors benefit from stable exchange rates and relatively moderate inflation rates [2].

Jordan's main export goods are clothing, fertilisers, potash, phosphates, vegetables and medicines, and the main import goods are crude oil, machines, means of transport, iron and grain. The heavy dependence on energy imports results in a negative trade balance. In order to increase the percentage of domestic energy production from 4% (2011) to 40% (2020), financial incentives and investor-friendly legislation were introduced, especially for renewable energy, shale oil and nuclear power.

In order to tackle Jordan's water scarcity, opportunities were created to allow water and wastewater to be managed by Public Private Partnerships. Fresh momentum was injected into the important tourism economic sector, which was stagnating due to unrest in the Middle East. This took the form of cultural tourism, ecotourism and adventure holidays. Reforms and academic cooperation programmes have paved the way for a knowledge-based economy since 2004.

Embedded in a reform-based constitutional monarchy with political stability and economic expansion, Jordan provides interesting business opportunities and an investor-friendly atmosphere. There are good business opportunities in recycling management throughout the entire value chain for urban waste. The container systems provided and the vehicle fleets of most of the municipalities responsible for them are outdated. There is a lot of potential for collection system suppliers in the expansion of innovative public waste disposal. Further business opportunities also exist for suppliers of sorting and treatment technology in the areas of separate collection of recyclable materials and residual waste. There is also a high need for the renovation and development of public landfills as well as in the conversion of the gas obtained into energy.

The most pressing problem in Jordan is water scarcity, which is increasing as a result of insufficient water management, a strong natural population increase and the presence of approximately 3 million refugees and migrants in the country. Since Jordan is one of the world's driest countries, every conceivable innovation to treat water and to use water sparingly is required.

Due to the rapid increase in Jordan's population, which is due to double by 2050, the dwindling renewable water resources and the sinking water quality, the Jordanian government is increasingly searching for professional expertise regarding sustainable cost-coverage for water supply and reducing water loss. This results in business opportunities for German SMEs as technology suppliers for energy-efficient and water-efficient technologies for agricultural irrigation, wastewater treatment, reusing treated wastewater and desalination of sea water as well as in consultation services for sustainable operation and maintenance of plants and distribution networks, service and accounting. There is a continued need for the new construction of treatment plants and dams and the renovation of the existing infrastructure. Leak locating systems, energy-efficient and water-efficient

pumps, measurement equipment and technologies for the use of renewable energies are particularly in demand. Construction companies are currently benefiting from the construction boom in Jordan's biggest cities and the high need for treatment plants and dams. Financing opportunities for German companies have been enabled increasingly over the past years by international and national donors. There is particular interest in the collaboration with state operators by means of public-private partnerships. Jordan's latest wastewater master plan intends to equip towns and villages with 5000 inhabitants and more with a wastewater infrastructure and treatment plants. Accordingly, there is also an urgent need to cooperate with municipalities, villages and local suppliers and to reinforce their service capabilities.

3. COUNTRY-SPECIFIC BASIC INFORMATION

3.1. GEOGRAPHY AND DEMOGRAPHICS

Area and population density

Jordan borders Israel and the Palestinian Autonomous Territories to the west, Syria to the north, Iraq to the north-east and Saudi Arabia to the south-east and the south. In the south, it has 27 km of Red Sea coastline with the port city of Aqaba (sometimes also spelled *Agabe*) as the country's only port. With an area of 89,342 km², there are approximately 90.86 inhabitants per km² (in comparison: Germany has 231.5 inhabitants per km²) [3]. Over 80 % of the country is desert and accordingly not inhabited. Only 5 % of Jordan's area can be used for agriculture. The cultivation of fruit and vegetables is highly dependent on irrigation.

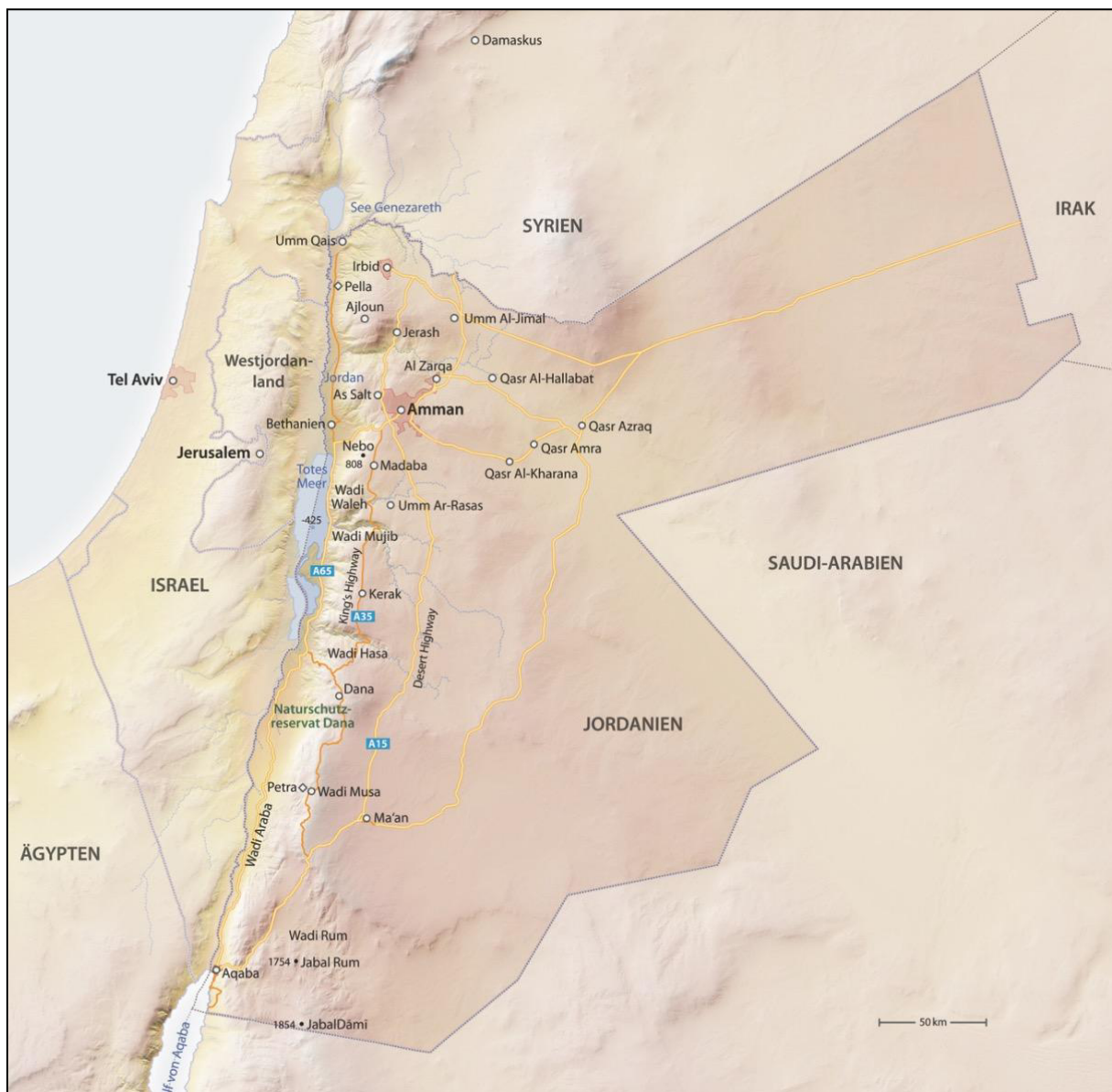


Figure 3.1: Map of Jordan

Source: Mosebach, Nägele & Musharbash, 2015 [4]

Climate

Jordan lies in the transition area between the dry, continental desert climate and the Mediterranean climate with wet winters. The north west of the country has a Mediterranean climate with warm, dry summers and wet, mild winters. In winter, frost can occur and even snow on the highest mountain peaks. The temperatures can fluctuate between 8 and 25 degrees Celsius throughout the year. At the Dead Sea (420 m below sea level) and in Aqaba on the Red Sea, temperatures range between 16 and 38 °C. It is usually sunny and warm, even in the winter months. It barely cools down at night in summer. The east and south are dominated by a continental desert climate with high differences in temperature between day and night. Here, the temperatures in summer can exceed 40 °C and then fall to 13 to 19 °C in winter again. Sometimes, at the beginning and the end of summer, a warm, sand-laden wind blows from the desert for a few days. As a result, temperatures can increase by 10 to 15 °C within a few hours [5].

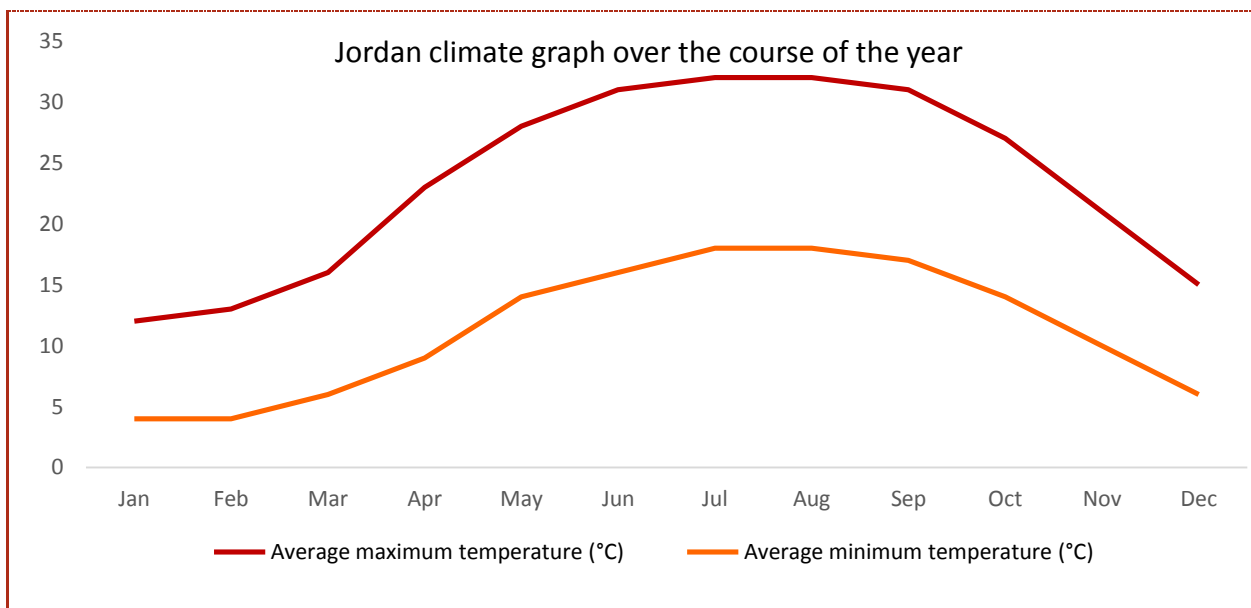
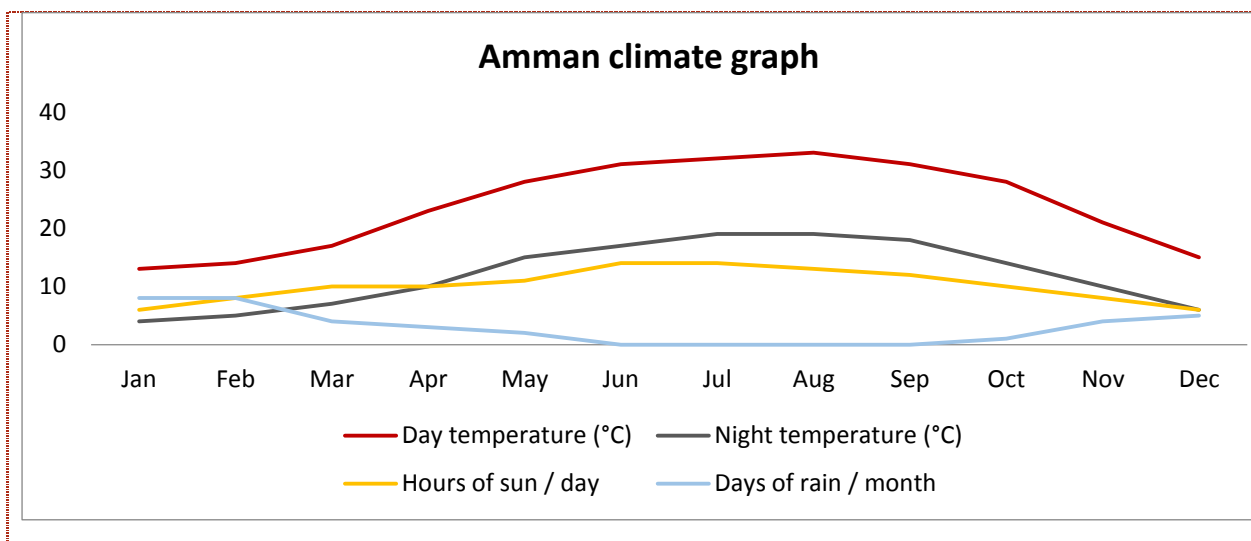


Figure 3.2: Average temperatures in Jordan

Source: Oppermann, 2012 [6]



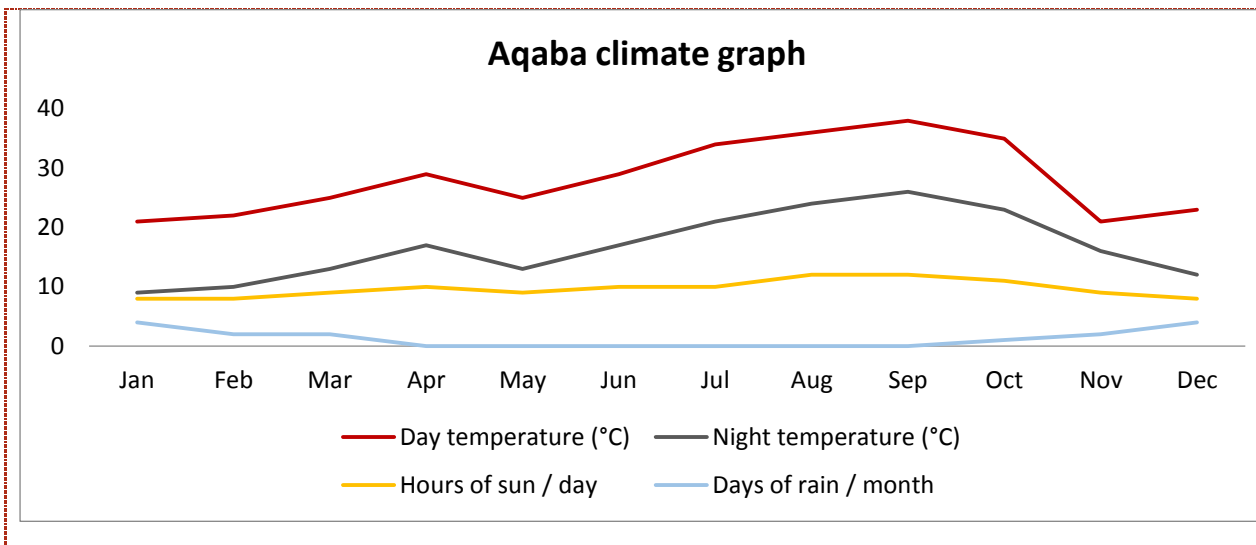


Figure 3.3: Climate graphs for Amman and Aqaba

Source: Nemitz [5][3]

Precipitation decreases from west to east and from north to south. The main rainy season is in winter between November and March, although there is virtually no precipitation at all between June and September. The mountain ranges in the west of the country have 400-600 mm annually while the rest of the country has just 250 mm and the eastern desert areas only get 50 to 200 mm precipitation annually.

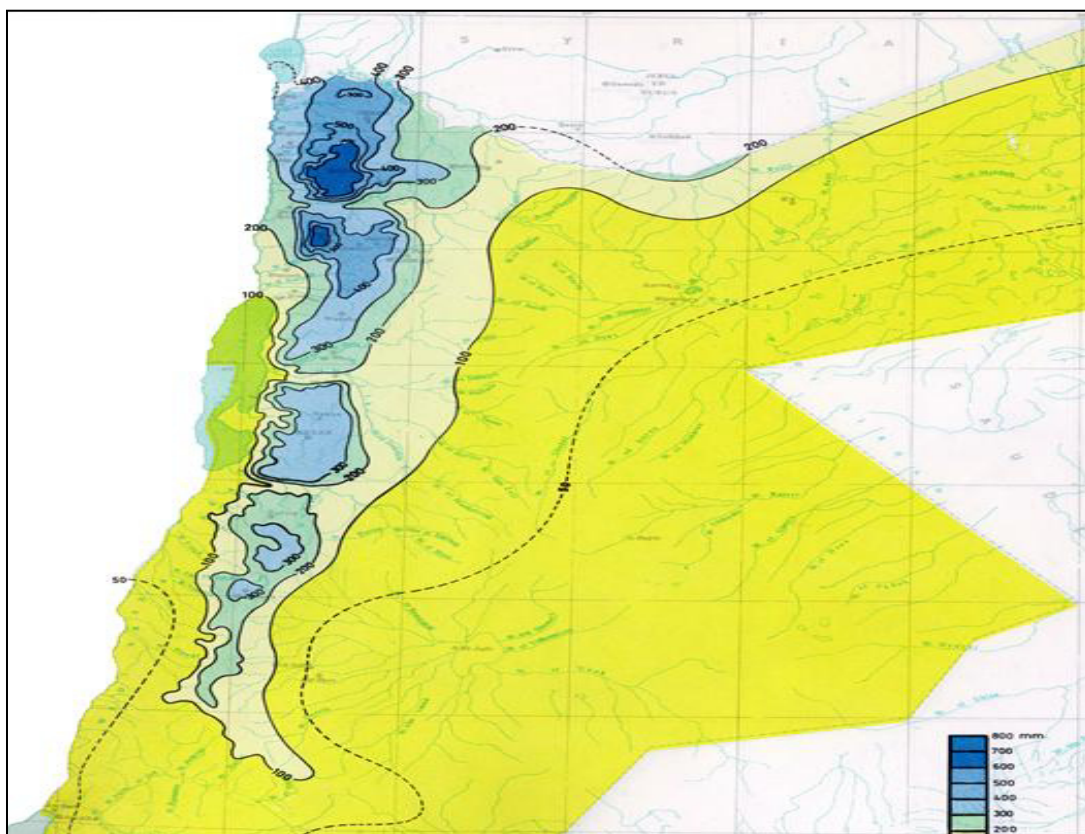


Figure 3.4: Map of Jordan's precipitation

Source: Dr. Dureid Mahasneh, 2010 [7]

According to a study by the Jordanian hydrologist Dr. Dureid Mahasneh [7], only 8 % of the average rainwater quantity of 8,300 million m³ is used as surface and ground water. The rest evaporates and is not available.

Of the 33 countries that are expected to suffer from extreme water scarcity in 2020, Jordan ranks in position 14 [5]. According to the study by Dr. Dureid Al-Mahsneh, Jordan will record increasing water deficits due to the increased requirement of the growing population and the constant water quantity capacity [7].

Table 3.1: Jordan's water quantity capacity

Year / million m ³	2008	2010	2015	2020	2022
Total requirement	1526	1496	1569	1645	1673
Water occurrence	867	933	1085	1143	1662
Available	659	563	484	502	11

Source: Dr. Dureid Mahasneh, 2010 [7]

Age structure and urbanity

The population in Jordan has more than doubled from 3.3 to 7.6 million between 1990 and 2015. According to data from the World Bank, the annual population growth rate of 3.7 % (1980-1990) was one of the highest in the world. Between 2005 and 2010 it was 2.94 %. According to estimates from the United Nations, in 2010 there were around 3 million international migrants from the Palestinian Autonomous Territories, Iraq or Syria living in Jordan. This is the equivalent of approximately 45.9 % of the Jordanian total population. Jordan had already accommodated 750,000 refugees in 2011. In 2015, a further half a million refugees came due to the unrest in neighbouring Syria.

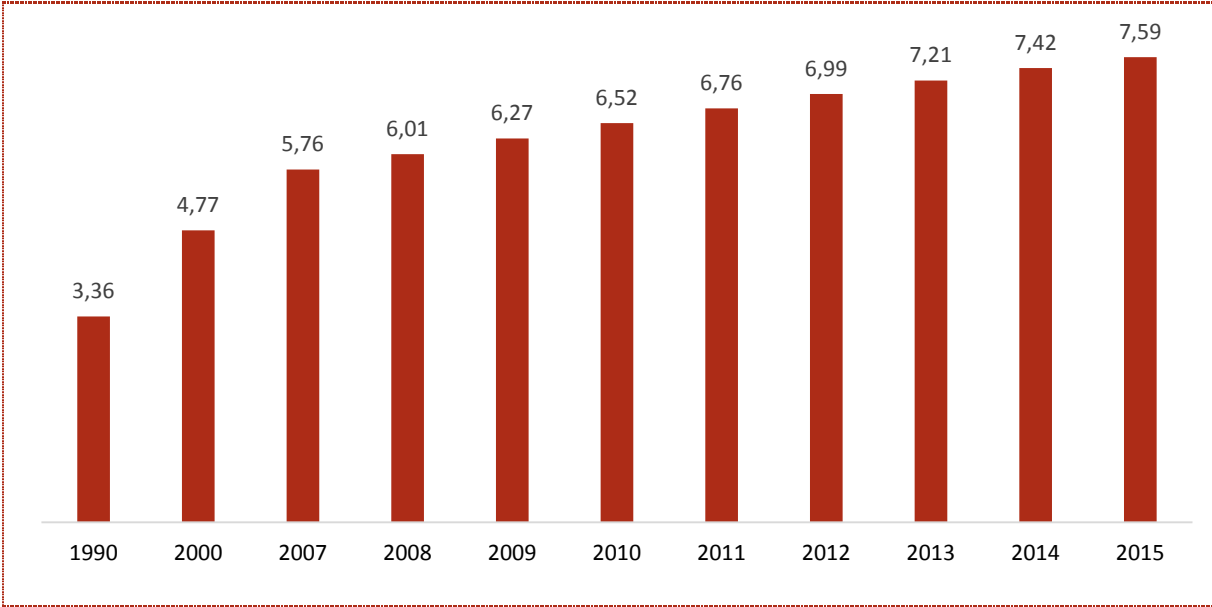


Figure 3.5: Jordan's population growth from 1990-2015, figures in million inhabitants

Source: World Bank, 2017 [8]

Four out of five of Jordan's inhabitants currently live in cities. The Bedouin tribes, estimated to make up less than 1 % of the overall population, are considered to be supportive of the state, however their economical significance is minimal.

Currently, around 4 million people live in Greater Amman/Zarga, over half of the country's inhabitants. In addition, there are an estimated half million Iraqis and a continuously increasing number of refugees from Syria. The metropolitan area of the university city of Irbid in the north of the country has around 650,000 inhabitants. Other rapidly growing areas with a high population density are As-Salt and especially Aqaba. Since the free trade area was established and tourism was specifically promoted, Aqaba has developed into the urban centre of southern Jordan. The population has doubled within a few years.

The urbanisation trend in Jordan can be seen from the increase in city population from 59.9 % to 78.5 % between 1980 and 2010. The Jordanian population is characterised by a high percentage of young people under 25 (a total of over 55 % of the population) and a low percentage of people over 65 (3.91 %).

Due to the population's age structure (2015: 0-14 years: 35.42 %; 15-24 years: 20.25 %; 25-54 years: 36.12 %; 55-64 years: 4.3 %; 65 years and over: 3.91 % [12]), Jordan is considered to be a young country. The median age is 22.6 years old.

Ethnic, language and religious groups

There are no indigenous people living in Jordan. Jordan is much more homogeneous when it comes to ethnicity and religion than most of its neighbouring Arabic states. Approximately 97 % of the population are Arabs. The state religion is Islam and the official language is Arabic. Jordanian Muslims are Sunnis. Around 2 to 3 % belong to various Christian churches. In addition to the Arabic population, there are minorities once settled by the Ottomans in the 19th century: Sunni-Muslim Circassians and Chechens, Christian Armenians, Kurds and Bahai from Iran.

Over 50 % of the Jordanian population is made up of Palestinian refugees who fled after the Palestine War and the Six-Day War. The majority of the population are descendants of the political refugees from Palestine, Lebanon, Iraq and Syria. It is estimated that under 1 % live as nomads or semi-nomads [11].

Education

Education and higher education policy is a high priority for the Jordanian government. As part of the second phase of the "Education Reform for Knowledge Economy" programme, measures were implemented between 2009 and 2016 to further improve the school education and infrastructure, the quality of teaching and vocational training and, last but not least, teacher education and training with the help of international donors including the Federal Republic of Germany [12]. According to estimates by UNESCO, the illiteracy rate in the Jordanian population (as at 2015) is approx. 2 % [13]. English is taught as a second language and is widespread as colloquial language. Around 98 % of all children go to school. In Jordan, school attendance is obligatory and free of charge for children from 6 to 15 years of age. The Jordanian school system results in many pupils having an higher education entrance qualification after 12 years at school.

After completing secondary school, lots of young Jordanians aim to get a university degree. In 2012, there were a total of approx. 680,282 students in Jordan [13]. Technical training opportunities are rare and are not really considered by the population to be an equal-quality alternative to a university education. There are 10 state and 19 private universities in Jordan as well as 51 higher education institutions. The most well known state universities are: The University of Jordan (Amman) with over 40,000 students, the Yarmouk University (Irbid) with over 30,000 and the Jordan University of Science and Technology (Irbid) with over 20,000 students. The Jordanian higher education institutions are very interested in international collaboration and exchanges. As a result, approximately 28,000 foreign students are currently studying at Jordanian higher education institutions [14].

Since 2005, the German Jordanian University (GJU) in Madaba has also been attracting school leavers. The GJU is a Jordanian state university whose curriculum and teaching is based on the model of German higher education institutions. Close cooperation with an ever growing network of Jordanian and German companies characterises the teaching and research. For example, the Magdeburg-Stendal University of Applied Sciences has been the GJU's main project partner since 2005 as part of the DAAD program "German higher education institution study opportunities abroad". Since its establishment, the GJU has developed to become one of the country's leading universities with 3,500 students in 8 faculties and a total of 20 degree courses.

Development level

The United Nations 2015 Human Development Report gives a Human Development Index (HDI) of 0.748 for Jordan. As a result, Jordan is in the category "high human development" and in position 80 out of 188. Jordan's HDI value increased by 25.8 % from 1980 to 2014, i.e. from 0.595 to 0.748. This represents an annual increase of 0.68 % [15].

3.2. POLITICS AND ECONOMIC DEVELOPMENT

Form of government and current political developments

The Hashemite Kingdom of Jordan is an independent, sovereign Arabic state with a constitutional monarchy. The head of state is S.K.M. King Abdullah II., who has both legislative and executive competencies. According to the 1952 constitution, the King is also commander-in-chief of the armed forces. He appoints the prime minister and the Council of Ministers. The parliament consists of the House of Representatives with 130 and the Senate with 40 members. Men and women are entitled to vote from the age of 18.

The political landscape in Jordan is not very developed. Most parties only have a weak personnel and material foundation. Their programs are usually not suitable for mobilising large numbers of people. The Islamic Action Front IAF is an exception. According to experts, it is the only political group in Jordan that can be compared with a party like those in the west, since it is organized at local, regional and national level and unlike the other parties it can exhibit a coherent programme.

As part of the political liberalisation process, system-critical opposition parties have been permitted again since 1992 to a limited extent. However, most of these parties were so small and scattered that it was barely possible for them to have a noticeable impact on the population. To date, voters have usually voted for a candidate that belongs to their tribe or from whom they expected a new road for their village or a drinking water pipeline - but not due to political concepts. Over 1,200 candidates put themselves up for the election in 2016 for the 130 seats in the House of Representatives. Of these, 20 % were women. International observers praised a transparent election that further strengthened the country on its path to reformation. It is also worth mentioning the new proportional representation to promote the formation of parties. Of the newly elected parliamentarians, a total of 50 were already in the previous parliament. Over 80 % of the newly elected politicians do not officially belong to any political party.

Jordan is divided into 12 administrative provinces, each under the control of a governor selected and appointed by the king: Amman, Zarqa, Ma'an, Irbid, Balqa, Tafila, Kerak, Mafraq, Jerash, Madaba, Ajlun and Aqaba.



Figure 3.6: Map of the political structure of Jordan

Source: TUBS, 2012 [16]

The province governors are accountable to the king and are primarily responsible for internal security and preserving peace and order. The 12 provinces are sub-divided into districts/counties and sub-districts.

Currency, GDP, growth, inflation

The currency in Jordan is the Jordanian Dinar (JOD), which was pegged to the US dollar in 1995. The Dinar is divided into 100 piastres and 1000 fils. It is worth 1.409 US dollars or 1.337 euros (as at 11th January, 2017) [17]. The price level for European products in Amman is similar to that in Switzerland in many respects [41].

According to data from the World Bank, Jordan is counted as one of the "upper middle income" countries with a high economic potential [18]. In estimates by the International Monetary Fund, the total Gross Domestic Product (GDP) for Jordan is specified as 38.2 billion US dollars (position 91) and its purchasing power parity (PPP) is 83 billion US dollars (position 101) for 2015. The nominal GDP/inhabitant is 5,092.01 US dollars in 2016 (position 97). The GDP growth forecast is positive by trend.

Table 3.2: Development and forecast for GDP growth of Jordan (* Forecast)

Year	2012	2013	2014	2015	2016	2017
GDP growth in %	2.8	3.0	3.4	3.9*	4.0*	4.0*

Source: statista, 2017 [19]

In 2017, the government budget comprised expenditure of the equivalent of 12.6 billion US dollars and revenue to the equivalent of 11.4 billion US dollars. This results in a budget deficit of 1.2 billion US dollars. After grants, the deficit is reduced to 2.8 % of the GDP, compared with 4 % of the GDP for the previous year 2016 [20]. In 2009, the government debt amounted to 15.95 billion US dollars, or 69.9 % of the GDP. In 2006, state spending (in % of the GDP) was 9.7 % for health, 4.9 % for education and 8.6 % for the military [19].

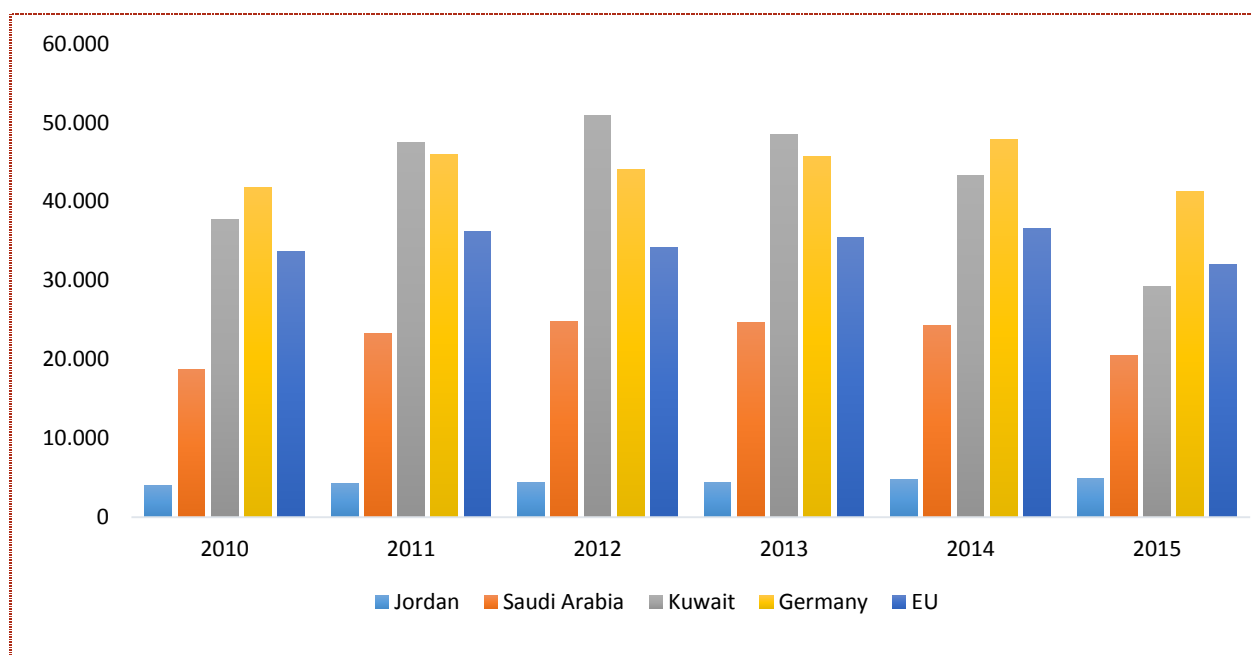


Figure 3.7: A comparison of Jordan's gross domestic product in US dollars per capita for 2010-2015

Source: statista, 2017 [19]

In the years before the war in Syria, Jordan's economy had developed well overall despite scarce resources and difficult political conditions.

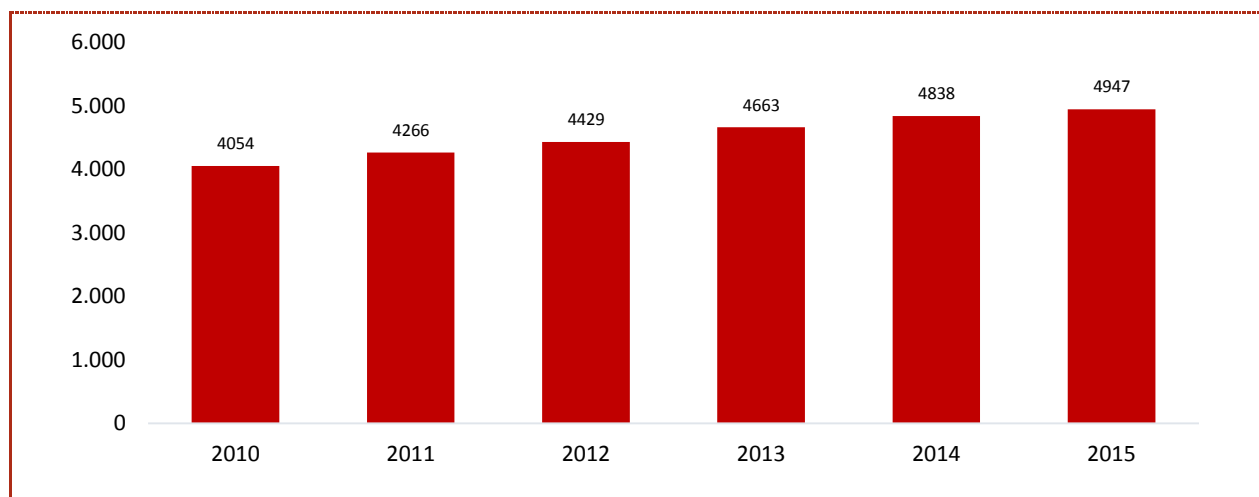


Figure 3.8: Jordan's gross domestic product in US dollars per capita for 2010 - 2015

Source: statista, 2017 [19]

As a relatively small country with a limited domestic market, Jordan chose an export-oriented economic development, however this is affected by global economical and political developments in the region. Additionally, Jordanian economic power depends on foreign development assistance, exports, transit trade and transfers from Jordanians working abroad. Almost 90 % of investments in Jordan currently come from the Arabic Gulf region. Jordan's foreign debt is currently increasing as a result of increased energy costs as the country itself does not have any viable resources.

Jordan's economic policy focuses on consolidating the public budgets, avoiding inflation and integration into the global market. As a result, the former public companies have been almost completely privatised over the past years (including the national airline, mining and telecommunications companies). According to data from the World Bank, the country records positive development in reducing the inflation rate.

Income and employment

Jordanian society is strongly divided both vertically and horizontally: Proportionately, the middle class is larger than in other countries in the region. Overall, wealth is distributed very unevenly and the income gap has grown larger over the past years. Positive economic development is contrasted by constant high unemployment (officially 14 %, unofficially 25 to 30 %) as well as a very low income per capita. The statutory minimum wage is 195 JOD/month (approx. 240 euros). Many Jordanians do not earn more than this, although with an estimated subsistence level of 500 JOD per month, the actual cost of living is on a par with Central Europe. Up to now, even highly qualified professionals earn so little in Jordan that they are leaving the country, heading for the Arabian Gulf. Approximately 30 % of the Jordanian population lives under the poverty line.

Although unemployment has been relatively high in Jordan for years, the country is economically dependent on around 400,000 foreign workers (from Egypt, Syria, Iraq, Sri Lanka, Bangladesh, Indonesia and the Philippines). They are employed temporarily as a low-cost workforce in construction, agriculture, in waste disposal and in housekeeping.

Major industries

Jordan is a country without noteworthy raw materials or an industrial basis. In addition to the resources and main export goods already mentioned, there are also shale oil and uranium deposits which should be used increasingly for energy production as well as natural gas reserves on the Jordan-Iraq border. Jordan is approximately 97 % dependent on energy imports.

Due to Jordan's relatively quiet and stable position, the country has now developed to become an important trade and economic partner for the region. This development contributes to the fact that the service industry (mostly tourism, banking, financial services and information technology) share of the GDP is 67.4 %. It is estimated that until 2013, tourism generated 15 % of the total GDP with medical tourism and conference tourism (Dead Sea and Red Sea) recording especially high growth rates. After a clear margin, this is followed by the production industry (29.3 % share of GDP - especially the textile industry, construction, chemicals) as well as agriculture (3.2 % share of GDP). It is only the textiles produced and the chemical and pharmaceutical products manufactured in the country that are of significance for the regional market. Exporting to Europe often fails due to non-

compliance with EU standards. Agriculture accounts for 2 % of the gross domestic product and is where 3.9 % of employees work.

In Jordan, there is one crude oil refinery and two large fertiliser factories (one Jordanian-Indian and one Jordanian-Japanese) to process the phosphate extracted in the country. In addition, cement and medicines are manufactured in the country and potash is processed. The majority are small and medium-sized enterprises. 26 % of the gross domestic product comes from industry, where 21.5 % of employees work.

International economic relations

Jordan is an important partner for Germany in the Middle East and a country with high appeal for the entire region. The German Federal Ministry of Education and Research supports effective research projects on site and the expansion of the education and further education system. The following German ministries and institutions invest in Jordan and support the expansion of the economy and education:

- The German Embassy, Amman
- The German Society for International Cooperation (GIZ) in Jordan
- GTAI – Germany Trade and Invest
- Goethe Institute, Amman
- The German Academic Exchange Service (DAAD) Amman branch
- DAI- German Archaeological Institute Amman
- KfW (Reconstruction and Loan Corporation)
- German Jordanian University
- Berghof Foundation Friedrich Ebert Foundation, Amman
- Friedrich Neumann Foundation for Freedom, Amman
- Konrad Adenauer Foundation, Amman
- Heinrich Böll Foundation Ramallah Office
- Rosa Luxemburg Foundation, Ramallah

Jordan fulfils all the characteristics of an emerging market and is characterised by a very high trade deficit and overwhelming imports. As a result, the income from exporting Jordanian products to Germany (chemical products, tobacco products and clothing) cannot compensate for the costs of the goods imported from Germany (vehicles and vehicle parts, machines, chemical products, pharmaceutical and similar products). Accordingly, Jordan remains very interesting for the export of German products.

In 2014, Jordan exported goods to a value of USD 8.4 billion and in return imported goods to a value of USD 22.7 billion (position 86, as at 2014; see Fig. 9) [10].

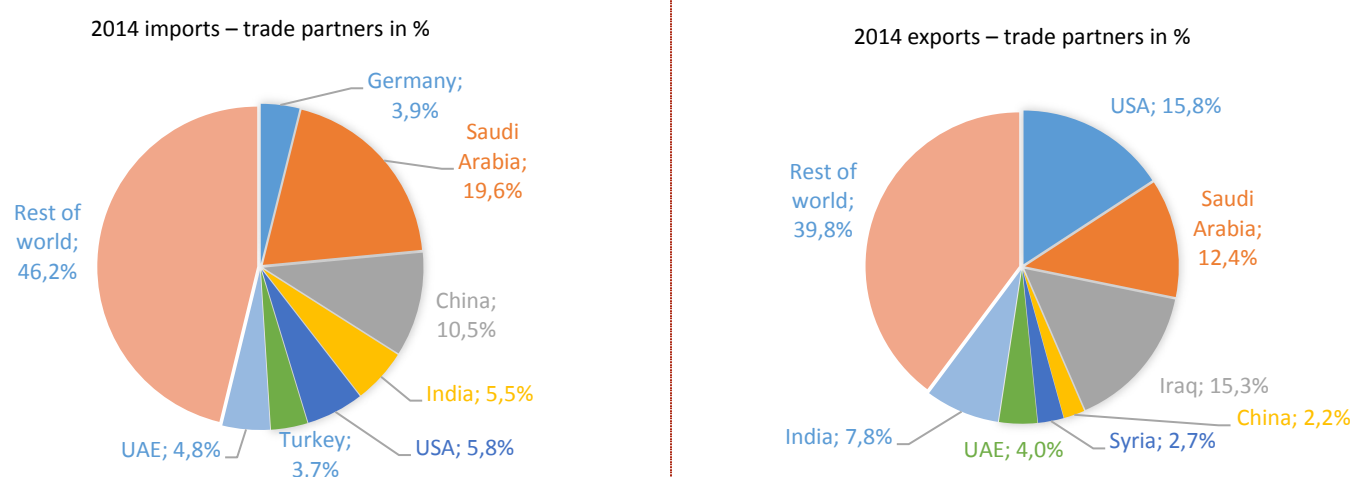


Figure 3.9: Jordan's important trade partners

Source: GTAI, 2016 [10]

Bavarian foreign trade provides information about the import and export statistics for Jordan and presents the foreign commerce figures for Germany as follows [21].

Table 3.3: Export and import between Germany and Jordan

	2014	2015	Difference
Export to Jordan	EUR 683,792,000	EUR 821,405,000	+ EUR 137,613,000 + 20.12 %
Import from Jordan	EUR 17,025,000	EUR 25,372,000	+ 8,347,000 + 49.03 %

Source: Federal Statistical Office, Wiesbaden, 2015 [21]

Infrastructure

The Jordanian Transport Ministry is involved in the development, management and monitoring of the transport and traffic routes in the country.

According to the Transport Ministry, Jordan's infrastructure encompasses approximately 8,000 km of road network, of which 3,440 km are major roads, 2,127 km are secondary roads (paved/tarmacked) and 2,435 km are driveways, forest paths and tracks. The main road connecting Amman and Aqaba is like a motorway and is developed with up to six lanes. The Dead Sea Highway is smaller and more scenic, routed beside the Dead Sea. The network of roads and motorways has a total length of 7,200 km, i.e. approximately 0.88 m per inhabitant. This puts Jordan in position 205 in the global ranking [22].

Jordan also has a sea port in Aqaba, two railway lines, although only one of these is currently in operation and two routes for express buses are in progress in order to reduce the strain on and calm the inner-city traffic and reduce air pollution in Amman.

Table 3.4: Overview of Jordan's infrastructure compared with Europe

Jordan			
	Overall	Per 1 million inhabitants	Per km ²
Roads	7,200 km	887.34 km	80.62 m
Railway network	500 km	62.46 km	5.67 m
Waterways	0 km	0.00 km	0.00 m
Trade ports	1	0.1	0
Airports	approx. 5	0.6	0

Europe			
	Overall	Per 1 million inhabitants	Per km ²
Roads	6,424,700 km	10,650.57 km	1,071.42 m
Railway network	293,500 km	486.59 km	48.95 m
Waterways	53,100 km	88.09 km	8.86 m
Trade ports	7,863	13.03	0.001 m
Airports	3,755	6.22	0.001 m

Source: Own research, Eglitis [22]

Public transport in Jordan is generally not very developed. Most people travel in private cars, shared taxis or buses. There is still no underground in Greater Amman/Zarqa (over four million inhabitants). However, its construction has been announced.

There are a total of three international airports in Jordan (Queen Alia International Airport, Amman; Marka International Airport, Amman; King Hussein International Airport, Aqaba). Only the Queen Alia International Airport can be reached directly from Germany, flying from Frankfurt. King Hussein International Airport is only served from Germany by charter flights and Marka Airport is only served by a few international airlines, all of which come from the Arabic region [23].

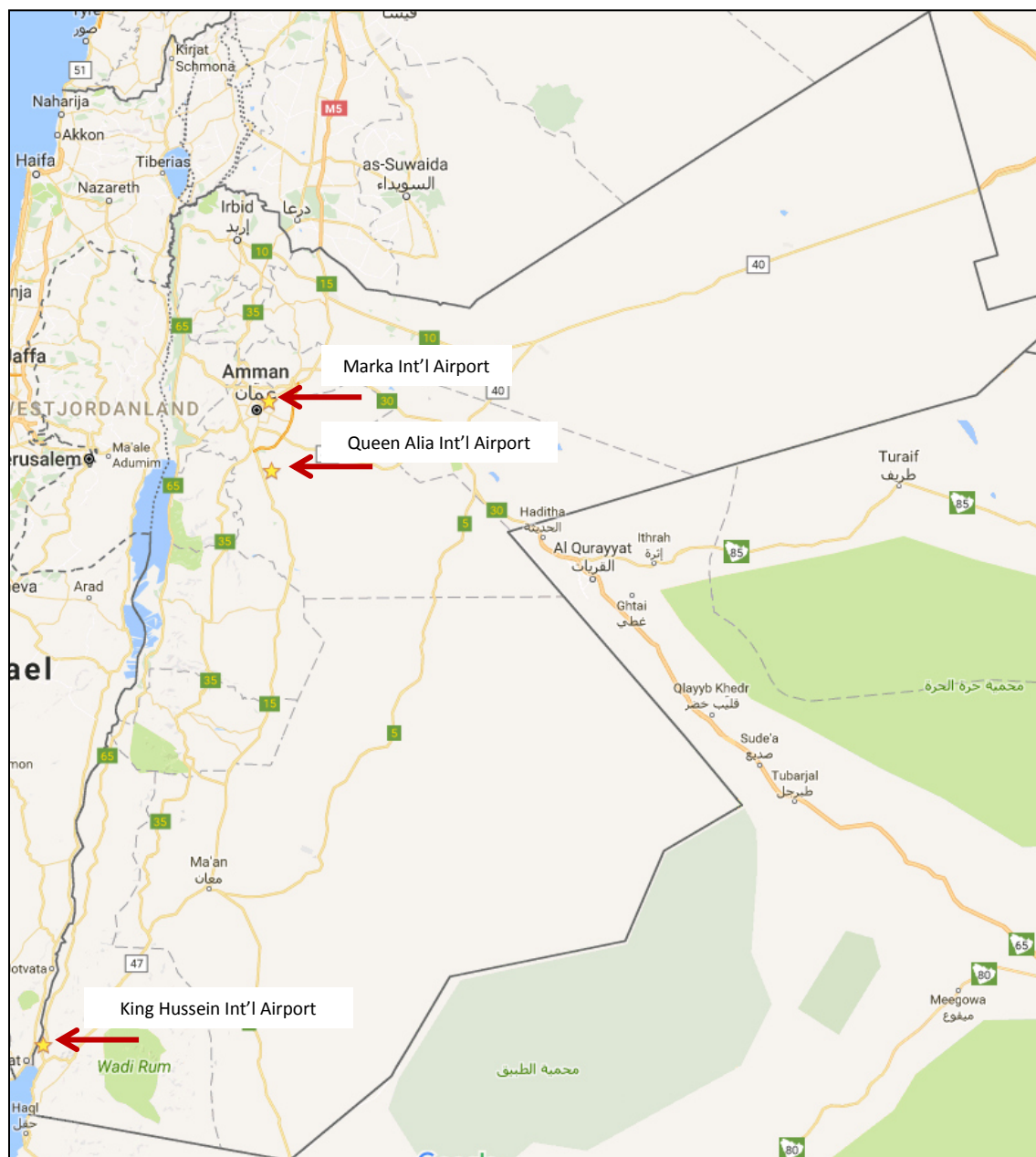


Figure 3.10: International airports in Jordan

Source: Own research, as at February 2017, map from Google Maps

In the information and communication technology sector, there are 4.8 landlines, 179.4 mobile phone contracts and 53.4 internet users per 100 inhabitants (see Table 3.5).

Table 3.5: Jordan's information and communication infrastructure in comparison, as at 2015

	Jordan	Israel	Syria	Iraq	Saudi Arabia	Germany
Landlines	4.8	43.1	18.3	5.6	12.5	54.9
Mobile phone contracts	179.4	133.5	62.4	93.8	176.6	116.7
Internet users	53.4	78.9	30.0	17.2	69.6	87.6
Broadband internet connections	4.2	27.4	3.1	0.0	12.0	37.2

Source: destatis, 2015 [24]

Energy prices

The Kingdom of Jordan does not have any noteworthy crude oil resources and is reliant on energy imports for 97 % of power generation: Natural gas from Egypt and crude oil from the Gulf States. The increasing costs on the global market have to be paid by the consumers too. Some government crises in Jordan were caused by the increases in energy prices for electricity, petrol, diesel and gas that had become necessary. The subsidies for purchasing crude oil and gas are increasing all the time and put a huge strain on the general government budget.

The pricing principle is clearly illustrated in Table 3.6, which contains not only the domestic tariff but also other tariffs:

Table 3.6: Electricity tariffs in Jordan by consumer group

Consumption in kWh/month	2013 JOD/kWh	2014 JOD/kWh	2015 JOD/kWh	2016 JOD/kWh	2017 JOD/kWh
Domestic tariff					
1-160	0.033	0.033	0.033	0.033	0.033
161-300	0.072	0.072	0.072	0.072	0.072
301-500	0.086	0.086	0.086	0.086	0.086
501-600	0.114	0.114	0.114	0.114	0.114
601-750	0.141	0.152	0.163	0.175	0.188
751-1000	0.168	0.181	0.194	0.209	0.224
1001 +	0.235	0.259	0.271	0.285	0.296
Commercial tariff					
1-2000	0.105	0.120	0.138	0.159	0.183
2000 +	0.146	0.168	0.193	0.222	0.255
Industrial tariff (light)					
1-10.000	0.057	0.066	0.075	0.087	0.100
10.000 +	0.066	0.075	0.087	0.100	0.115
Industrial tariff (medium)					
Day	0.072	0.083	0.096	0.110	0.127
Night	0.061	0.070	0.081	0.093	0.107
Industrial tariff (heavy)					
Day	0.108	0.124	0.143	0.164	0.189
Night	0.087	0.101	0.116	0.133	0.153
Peak	2.980	2.980	2.980	2.980	2.980

Source: Mirna Industrial Commercial Company, Amman

The development of the oil price is of great significance for Jordan since the country itself does not have any viable crude oil resources and has to import the majority of its energy resources. Some of the increasing energy needs should be covered by natural gas from neighbouring Israel in future. Solar power will play an increasing part in energy supply in municipalities. Jordan's potential with respect to renewable energy, especially solar and wind energy, has been unused to a large extent to date. To date, Jordan obtains approximately 90 % of its electricity by oil combustion. Converting the hot water supply for private households to solar energy could create jobs and income. Jordan's wind power potential is estimated to be 100 MW. A 1.35 MW wind farm in northern Jordan has been supported by the German government and by German wind turbines [25].

Corruption index

This index categorises states according to the level of corruption risks. Corruption risks are defined by the associated danger and scope as well as the frequency with which citizens could encounter the risk. According to the corruption index by Transparency International, Jordan is ranked at position 57 of 176 countries and receives an evaluation of 48/100 points [26].

3.3. ENVIRONMENTAL POLICY AND ADMINISTRATION

Since 2003, Jordan has had a Ministry of Environment, the successor to the governmental environmental authority "General Corporation for Environmental Protection" (GCEP). The GCEP was supported by the German Society for Technical Cooperation (GTZ) (GIZ since January 2011) from 1997 to 2006. In addition to the Ministry of Environment, other relevant state actors are also active in environmental protection: the Ministry of Planning and International Cooperation, the Ministry of Water and Irrigation, the Ministry of Agriculture and its forestry authority and the Ministry of Health. The Jordanian environmental protection legislation came into force in September 2006. According to information from Jordanian environmentalists, since then the criminal prosecution of environmental crimes has been intensified.

Jordan has joined the following international agreements that are also relevant when it comes to environmental protection:

- Kyoto protocol - the Kyoto protocol to the United Nations Framework Convention on Climate Change
- UNDP - United Nations Development Programme
- Treaty of association with the EU
- Investment promotion and protection treaty with Germany
- FTA – Free Trade Agreement and GAFTA – Greater Arab Free Trade Agreement
- MED-ENEC for energy efficiency in buildings

The measures performed by state and non-state actors aimed at enhancing the environmental awareness of the Jordanian population have not yet been sufficiently successful. In order to change to protect the environment and resources, it is necessary to consistently involve the population. GIZ has been supporting the Jordanian government in protecting the environment and biodiversity since 2013 as commissioned by the Federal Ministry for Economic Cooperation and Development (BMZ). GIZ also supports government organisations and NGOs across the country in taking new approaches to promote awareness for the environment and resources in the Jordanian population and to increase ecologically sustainable behaviour. State and selected non-state organisations are motivating

the population to behave in a more environmentally friendly manner with improved, innovative concepts [27].

3.4. MARKET ACCESS

Distribution channels

Jordan's most important multilateral partners are the United Nations development programme and the World Bank. In third place comes the European Union, which substantiates its relationship with Jordan with the European Union liaison office in Amman, among other things. The EU has redefined the framework for cooperation with the eastern and southern states bordering the Mediterranean (including Jordan). Jordan's main partners are predominantly active in the areas of water, general infrastructure, poverty reduction, education and good governance. Bilateral main donor countries are the USA, Japan and Germany. In addition, Jordan receives state and non-state development aid from the Arabic Gulf States. Jordan's other relevant bilateral partners are Great Britain, Canada, Spain and Denmark (family welfare).

German companies and exporters of global brands (vehicles and machines) have had their own contract partners and Jordanian agencies on site for many years. When searching for new export opportunities and suitable Jordanian companies, the Germany Embassy, the German Society for International Cooperation (GIZ), the German Academic Exchange Service (DAAD) and the German Chamber of Industry and Commerce Abroad (AHK) in Amman may be helpful. The party-affiliated German foundations (Friedrich Ebert Foundation, Friedrich Naumann Foundation, Hans Seidel Foundation, Konrad Adenauer Foundation) are also working on their own projects and are well connected.

Due to its pro-Western attitude, Jordan has been a regional focal country for German development cooperation since the early 1950s. The water sector is the focus of the bilateral German-Jordanian development cooperation. The BMZ considers the promotion of sustainable use of water in Jordan and other countries in the region to be a "task for peace and security". The topic of climate change / climate protection is also attributed great importance. Other focal points include social development, democratisation and economic promotion as well as creating jobs.

Jordan has been EU-associated since 2002. Germany has had a close relationship with Jordan for decades due to the special relationship with Israel and Jordan's negotiating role in the Middle East conflict. Local partners and representatives are registered to handle trade, they draw attention to the products in advertisements and trade fairs. Local and foreign/German trade partners also hold informative events on innovative developments, invite to training courses and present their projects.

Former heir to the throne, Prince Hassan ibn Talal, ex-president of the Club of Rome, is committed to achieving more international cooperation for climate protection.

The following trade fairs of regional importance take place in Amman every year between April and October:

Table 3.7: List of regional trade fairs in Jordan

Trade fair	Topic	Organised by
Jimex	Industry and energy trade fair Exhibition of machines, electricity and renewable energy	Golden Gate Exhibitions Khaled bin Al Walid St.175 11941 Amman, Jordan Tel: +962 (0)6 5658501
Inter Build	Trade fair for the construction industry International exhibition with conference for construction, architecture, decoration and building technology	Fax: +962 (0)6 5650085 www.jordan-fairs.com
Spark	Trade fair for electrics, electronics, communication, computers and biomedicine	
Arabbuild	International exhibition for construction technologies & construction materials	Jordan MICE Project 11196 Amman, Jordan jordanmice.org
Jordan International Industries & Machinery Exhibition	International trade fair for machines and plants This event is considered to be the only international machine show in the region.	
Sonex	Exhibition & forum for solar technology, solar thermal systems, solar water heating systems, smart grid & metering	
Energytech	International trade fair for renewable energy in Jordan	

Source: Trade fair websites (accessed online in December 2016)

Tenders

In Jordan, tenders are always published in local and/or international media and in the corresponding portals. Measures that are planned in cooperation with foreign states in particular are published in the relevant donor country as well as internationally:

- GTAI database - Germany Trade & Invest is the Federal Republic of Germany's company for foreign trade and location marketing [28],
- EU tender database TED - Tenders Electronic Daily, online version of the EU [29],
- Tender database dbMarket [30],
- Tender database for the European Bank for Reconstruction and Development EBRD [31].

Project financing

Unlike Saudi Arabia, Kuwait or the United Arab Emirates, who can balance their budgets themselves, the emerging market of Jordan relies on financial aid from these countries. Although Jordan is a country with a predominantly Muslim population (93 % Sunni Muslims, 5 % Christians, 2 % other), its domestic and foreign bank institutes award commercial loans in line with international conditions.

However, the Jordan Islamic Bank and the Islamic Development Bank (IDB) deviate from this, they are subject to the Islamic economic order with the prohibition of receiving interest and drive economic and social developments in line with sharia. IDB's awarding of microcredits to small companies is particularly of note [32] [33].

Further information can be found at: <http://www.jordanislamicbank.com/en/> and <http://www.isdb-pilot.org>.

German financial institutions are also involved as part of export promotion in Jordan.

KfW provides interested banks with long-term means to refinance export loans as part of the German federal government's ERP export financing programme. The aim is to provide the German export industry with a tool to facilitate the long-term refinancing of export loans covered by the federal government. The purchasers of the German export goods to be financed must be resident outside the European Union. The export loans must be based on export transactions by German exporters which have been classified by the federal government as eligible within the framework of the programme. Hermes cover and a securitisation guarantee from the federal government must be available for each export loan which the bank refinances via the programme. The programme is in operation until 31st December 2020.

The ERP export financing programme is used to promote loans to finance German exports in emerging and developing countries. This benefits not only the developing and emerging markets but also the German exporters as it enables them to open up new markets.

The KfW information sheet provides comprehensive information about which loans are promoted for smaller export transactions of up to EUR 5 million by the KfW IPEX Bank as part of the export financing programme and under which conditions [34] [35].

The following are additional IPEX financing instruments:

- Supplier-bound export financing with and without ECA coverage,
- Domestic and foreign investment loans (including investment by domestic public utilities),
- Structured project financing.

Further information can be found at: <https://www.kfw-ipex-bank.de>.

Hermes cover (export loan guarantee) can be applied for for export transactions to protect against bad debt losses. Further information can be found using the following links:

Jordan: <http://www.agaportal.de/laenderinformationen/laenderseiten/jordanien>.

Apart from KfW, the Ausfuhrkredit-Gesellschaft mbH (AKA) is the only financial institution that is permitted to issue loans as part of the ERP export financing programme by the federal government. As a secondary market institution, the AKA primarily supports the shareholder banks with the implementation and, where necessary, the optimization of international trade financing. The AKA offers financing, risk assumptions and services related to short, medium and long-term export transactions as well as other transactions in international business. Further information can be found at www.akabank.de

Every transaction in international business is based on an importer concluding a delivery contract with an exporter. In many businesses, a foreign bank (the importer's bank) is involved in the financing and/or the processing of letters of credit. AKA provides comprehensive benefit aspects to foreign banks and importers. Exporters are often asked by their customers to provide an attractive financing offer to go with their offer. The exporter can cater to this demand by applying for a buyer credit from their bank. The AKA provides a range of advantages, especially when it comes to buyer credits.

International credit organisations are also active as part of the financing of projects in Jordan. These include the International Finance Corporation (IFC), a subsidiary of the World Bank whose strategy is to concentrate on promoting local companies in emerging and regional markets. IFC supports the improvement of the financial infrastructure of the country and helps to facilitate cross-border investments. In addition, the IFC concentrates on expanding access to financing for small companies and entrepreneurs with the aim of supporting the creation of jobs and promoting ecological sustainability.

Further information is available at:

http://www.ifc.org/wps/wcm/connect/region__ext_content/regions/europe+middle+east+and+north+afrika/ifc+middle+east+north+afrika+and+southern+europe/countries/united+arab+emirates+country+landing+page.

As a result of the pioneer role that Germany has adopted in lots of development areas, German devices and German technologies are highly accepted in Jordan. German companies are known for their good quality and their good reputation worldwide, both in production and in all other stages of the value chain. The close partnership between Germany and Jordan can be described as very good. There are fixed structures for planning, financing and executing projects in the respective ministries, companies and organisations that cooperate with each other. Here, it is the experience and recommendations of the Federal Ministry for Economic Affairs and Energy, which has published several financing studies, such as "Jordan financing study - financing opportunities and risk management", which are built upon in particular.

When realising projects abroad, it is important to pay attention to the financing opportunities of export and investment projects and to check these in advance. This is especially important if additional external financing is required. Here, the required financing or the funds made available must be organised either by the German exporter or by the Jordanian importer. In order to avoid risk, the recommendation is to protect the export transactions with the help of suitable financial instruments. Essentially, several options are available to German companies: Commercial export financing, international credit financing and local state funding programmes. However, it must always be assumed that Jordanian companies will only accept participation if they will later benefit from the completed project. The municipalities also rely on foreign help for recycling, water and wastewater management since they do not have the required funds.

Measures by the European Bank for Reconstruction and Development (EBRD) are very helpful for supporting municipalities in improving the infrastructure and implementing innovative, sustainable projects abroad. KfW is also a reliable companion and advisor for many infrastructure projects commissioned by the federal government with the financing of water and wastewater disposal plants. The IFC also provides additional options.

Jordan is supported by loans from the International Monetary Fund (IMF). The country also receives aid from the World Bank and the Islamic Development Bank.

Customs and other import regulations

An investment protection programme has existed between Germany and Jordan since 2010. A double taxation agreement is being prepared. The German customs homepage dated 2nd September 2016 refers to an important EU decision regarding movement of goods to Jordan: According to a decision by the EU-Jordan Association Committee on 19th July 2016, certain categories of products manufactured in Jordan that are associated with creating jobs for Syrian refugees are processed under favourable conditions [36].

In order to supply its population, Jordan relies on goods manufactured abroad and charges customs and fees for their importation. The customs amount varies and depends on the classification and quantity of goods imported. The type of products imported also affects the customs and fees to be paid, i.e. whether they cover the population's basic needs or are what are known as luxury goods.

Additional regulatory approvals may be required in Jordan depending on the type of goods. The bureaucratic obstacles in Jordan can be very time-intensive. It is advisable to consult the relevant authorities in good time in order to obtain the relevant information when planning and implementing the import of plants and devices of all types. Experienced import and export offices that are also commissioned with handling transportation offer their services in the capital city of Amman and in the port of Aqaba. The Jordanian Chamber of Industry and Commerce in Amman also provides documentation about the current ordinances and stipulations. Essentially it is the manufacturer or the importer who is responsible for complying with the technical framework specifications.

Lots of documentation must be presented for customs clearance:

- Delivery contract,
- Production documents (origin of goods and approval),
- Invoice (usually in English),
- Delivery note,
- Accompanying documents (technical description, approval, weight, etc.).

Further valuable information for entrepreneurs and businessmen can be found on the Germany Trade & Invest homepage [37].

Customs charges and import costs are not specified as the regulations and ordinances change frequently. However, the current data can be called up on the Jordan Customs homepage at any time (<http://www.customs.gov.jo/English/default.shtm>).

Further information about foreign trade, business processing, market development, customs, law and business trips to Jordan can be found here (in German):

- <https://www.auwi-bayern.de/awp/inhalte/Laender/Anhaenge/exportbericht-jordanien.pdf>
- <https://www.iloxx.de/net/iloxx/hilfe/experttipps/laenderinfo.aspx?land=jor>
- <http://www.finanz-links.de/wirtschaft/handel/jordanien.htm>
- https://www.iloxx.de/net/content/dokumente/handelsrechnung_muster.pdf

Legal and tax matters

Before starting a business activity in Jordan, consulting a lawyer is recommended. As Jordanian law differs from German law in many aspects, it is important to avoid potential obstacles or misunderstandings, e.g. in construction law or with assembly or work contracts as well as in matters relating to company law. In general it makes sense for important contracts to include detailed rules concerning collaboration and to be drafted bilingually. Sample contracts must not be used or accepted without

first being checked by a professional. A local lawyer can also be of assistance in checking potential collaboration partners. Here it is also important to find out about the current tax rates charged on corporate profits and on sales tax from the authorities specified above.

Information about German-speaking tax advisors and lawyers can be found in chapter 6.

Business etiquette

It is relatively simple to obtain an entry visa for Jordan. Travellers of almost all nationalities can purchase a visa for single entry on arrival at border crossings, ports and airports for JOD 40 (\$56 / €54). Tourist visas are valid for 30 days and can be extended by up to a month by registering at the local police station [38].

Jordanians are known for their hospitality and willingness to help. Although the official national language in Jordan is Arabic, lots of people speak very good English in addition to Arabic. As a result, there are rarely linguistic barriers for German businessmen who speak English. Road signs and buildings are often labelled in both Arabic and English.

Jordanian business partners place great importance on good personal relationships, enabling the foreign collaboration partner to enter the market successfully. Plenty of time and patience should be allowed to build up and maintain these relationships. Regular contact and mutual trust are required before business contracts can be concluded. Communicating by e-mail alone is not enough. Accepting informal appointments and invitations at home signify interest in the Jordanian business partner's private surroundings.

Business dress is usually worn for official meetings with business partners and authorities in Jordan. Under no circumstances should foreign businessmen wear what is supposed to be local clothing. European women can also dress as they do in their home country. Women are fully accepted as business partners in Jordan and are often to be found in managerial positions in Jordanian companies and institutions. However, despite this, it is still advisable for women to cover their shoulders and avoid low-cut T-shirts. Men do not wear shorts, not even in summer [38].

Since Jordan is an Islamic country, the working week starts on Sunday and finishes on Thursday. Opening hours are from 9 am to 5 pm. Banks open earlier, at 8.30 am but then close at 3 pm. Most government institutions work from 8 am to 2 pm. Many businesses and shops are closed on Fridays and Saturdays [38].

The following should be noted when greeting and taking leave:

- There is only one form of address in Arabic, equivalent to the English "you".
- Business meetings are usually held in English or translated.
- Addressing with Mr. and Mrs. followed by the first name and not the surname is widespread throughout.
- Titles such as Dr. are usually also followed by the first name.
- In Jordan, a businessman with an engineering degree is also addressed in this way, meaning that the Jordanian partner will also expect this address.

As in many countries, greeting by shaking hands is also standard between men in Jordan. With conservative Islamic women, attention should be paid as to whether she offers her hand first. Only then should a hand be offered in reciprocation. Greeting and taking leave takes the form of a handshake or a hug between men and women when both are Jordanians [38].

The Jordanians are very proud of their country, their very long history and what they have achieved since independence in 1946. It is advisable to read up on the history and politics of the country before arrival. Interest in the country is well received from German businessmen and can help to open doors.

When selecting Jordanian employees, the CV and reference should be checked thoroughly, ideally by a lawyer. Jordanian labour law and the Jordanian statutory period of notice should be taken into account. For long-term employment and employee motivation, not only appropriate remuneration but also security and training programmes are important. Here it is also advisable to show interest in the employee's personal and family life.

Regulatory and other features

The political relationship between Jordan and Germany is close and friendly. Jordan is one of the cooperation countries supported by topical and regional programmes by the federal government. The water sector is the focus of collaboration [39]. Officially, Jordan describes itself as a free market economy. However, this principle is contradicted by lots of characteristic particularities of Jordan: High foreign financial aid (USA and Gulf States), prices for many day-to-day goods (bread, energy, water) limited by the government and a "Wasta" that is still generally in practice, i.e. a patronage system with private contact relationships.

In the years before the war in Syria, Jordan's economy developed well overall despite difficult political conditions and scarce resources. The increased oil prices had resulted in a windfall for the region, from which Jordan also benefited. As already mentioned, the long-term inflation rate average of 2 to 3 % was low and relatively stable. The Jordanian King and the Jordanian government are consistently opening up the Jordanian economy for foreign investors. Furthermore, in monetary policy, the Jordanian Dinar has been pegged to the US dollar for years. A growing section of the population in Jordan is pessimistic about the economic future of the country. This is one of many informative findings of a survey by the opinion research institute IRI (International Republican Institute) sponsored by USAID (United States Agency for International Development) in spring 2016 [40].

King Abdullah II's vision is increasingly different from this. He wants to free Jordan from the tight grips of economic dependency, thereby obtaining more political scope for action. For this reason, lots of key companies (such as airlines, water supply companies) were privatised and tax-exempt industrial areas were set up to drive the appreciation of the city of Aqaba and thereby the entire south of Jordan. The forced turning to economic sectors that require fewer resources but are financially profitable, such as banking, transport, logistics, education and education tourism also shows that Jordan is working towards more economic strength and political independence in the regional context [41].

Jordan has neither compulsory exchange nor a restriction on the importation of foreign currencies. However, foreign currency does have to be declared. The completed opening of the Jordanian market for investors and the resulting presence of lots of new stakeholders in the financial market does however mean that the sector has become somewhat unclear. For example, the exchange rate for the JOD is first converted into US dollars and then into euros, resulting in high fluctuations that scare off lots of customers.

General data about Jordanian economic development is provided by: The foreign trade company GTAI, the US intelligence service CIA as part of its Jordan country report and the Jordan country profile by the World Bank. The Jordanian Statistics Office provides additional economic data. The Middle

East Economic Survey provides information about developments in the oil and gas economy. The World Bank also presents long-term trends.

Extensive analyses of the Jordanian economic development are also available from the International Monetary Fund. The continuously updated World Bank analysis "Doing Business in Jordan" provides information about the conditions for investors.

Jordan's foreign debt is currently increasing. One reason for this is the high energy requirements. The country itself does not have any viable resources and has to import the majority of its energy. Some of the increasing energy needs should be covered by natural gas from neighbouring Israel in future. Solar power will play an increasing part in energy supply in municipalities.

The general economic situation and the favourable conditions for German investments and business collaborations in almost all areas are praised by institutions and organisations that are active in Jordan. However, in many cases, economic collaboration in recycling and water management requires procedures to be adapted compared with the situation in Germany. Unlike in Germany, determining who is responsible for the sponsorships of relevant Jordanian facilities (landfills, treatment plants, water and wastewater management, waste management) takes lots of time and effort.

4. RECYCLING

4.1. WASTE PRODUCTION AND DISPOSAL INFRASTRUCTURE

Waste produced

The increasing population number produces higher quantities of waste with all the negative impacts on the environment, drinking water quality and health. The phenomenon of increasing population number is a challenge for the state and all municipalities. Since information about waste quantities (in weight and volume) are not required to charge fees or to calculate any treatments in Jordan, there are only very few studies and data available. Data about waste quantities is generally based on the data collected by various landfills. However, since the waste is generally not weighed in many cases, this data is usually just estimates or projections.

According to a synopsis by GIZ in 2014, 2.1 million tons of solid urban waste was incurred with a population of 6.4 million in Jordan (s. Table 4.8: Background information for waste quantities in Jordan 2014) [42].

Table 4.8: Background information for waste quantities in Jordan 2014

Population	6,388,000
Urban waste	2,077,215 t / year
Medical waste	4,000 t / year
Industrial waste	45,000 t / year
Agricultural waste	> 4 million t / year
Construction and demolition waste	2.6 million t / year
Scrap tyres	2.5 million t / year
Electronic scrap	30,000 items / year
Packaging waste	700,000 t / year

Source: Jordan Country Profile, GIZ, 2014 [42]

The study also states that there is a difference between the urban (0.9 kg / day) and the rural population (0.6 kg / day). In order to specify approximately up-to-date quantities, this data collected has been transferred to the current population (6.98 million in 2016 [43]), with over two thirds living in the areas with high population density around the capital city and in the big cities. Accordingly, the amount of urban waste incurred has most likely increased to approx. 2.3 million tons with a tendency that continues to increase. An additional approx. 4,000 tons of medical and approx. 45,000 tons of industrial waste are predicted on top of this.

According to the studies mentioned above and extrapolated for 2016, each citizen in Jordan produces approx. 301 kg / year of urban waste. Compared with Western Europe this is quite a low quantity of waste, however it is well within the framework of waste quantities of Eastern European or Arabic countries (see Figure 4.11).

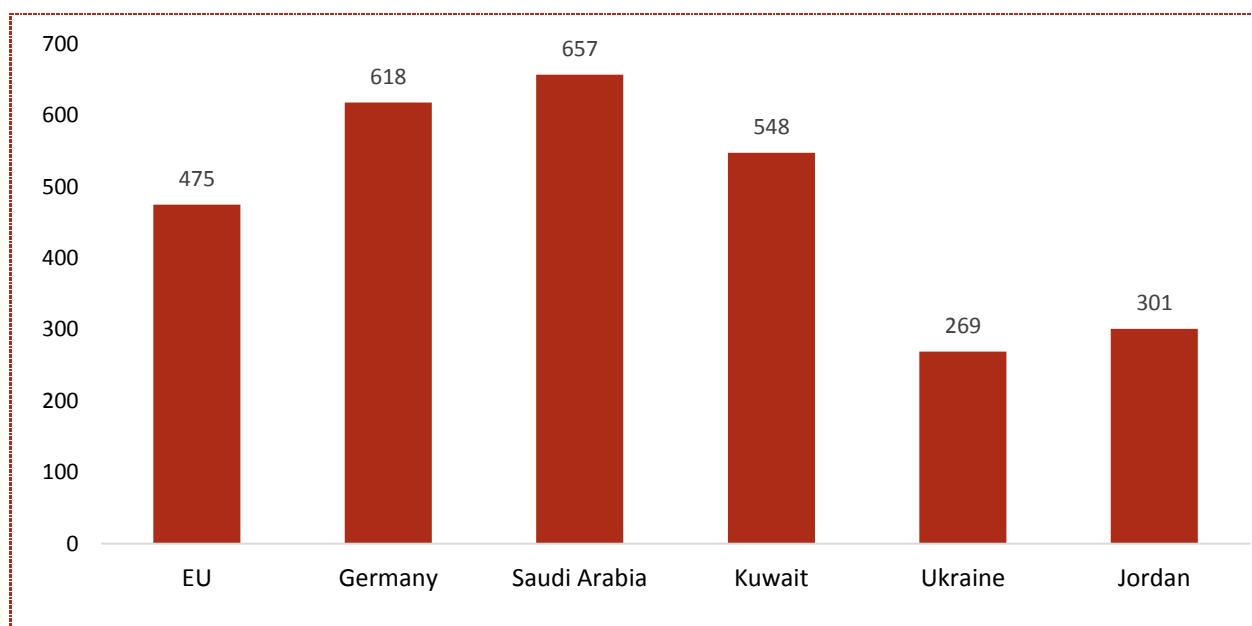


Figure 4.11: Urban waste - quantity per inhabitant in kg (extrapolated for Jordan in 2016, other countries 2015)
Sources: Jordan Country Profile, GIZ, 2014 [42]; EcoMENA, 2015 [45]; EcoMENA, 2016 [46]; Ukraine Country Profile, 2017

A report by the Royal Scientific Society (RSS) is referred to for further information about the type and scope of waste incurred in Greater Amman, where over half of the Jordanian population lives, meaning that waste is produced in the same magnitude at least. This study investigated and analysed 5 of the 26 districts of Amman and took into account not only the varying waste at different times of year but also the standard of living of the inhabitants [47].

Disposal methods

Almost 98 % of all urban waste ends up in landfills. As a comparison, in the EU on average 45 % of urban waste is recycled, 27 % is thermally treated in waste incineration plants and 28 % is disposed of in landfills. Germany is the leader when it comes to recycling, with a comparative figure of 64 %. In Germany, 35 % of urban waste is treated or its energy recovered in waste incineration plants.

Figure 4.12 shows that due to almost complete disposal of waste in landfills, Jordan has a high need for treatment and recovery technologies as well as pre-treatment plants.

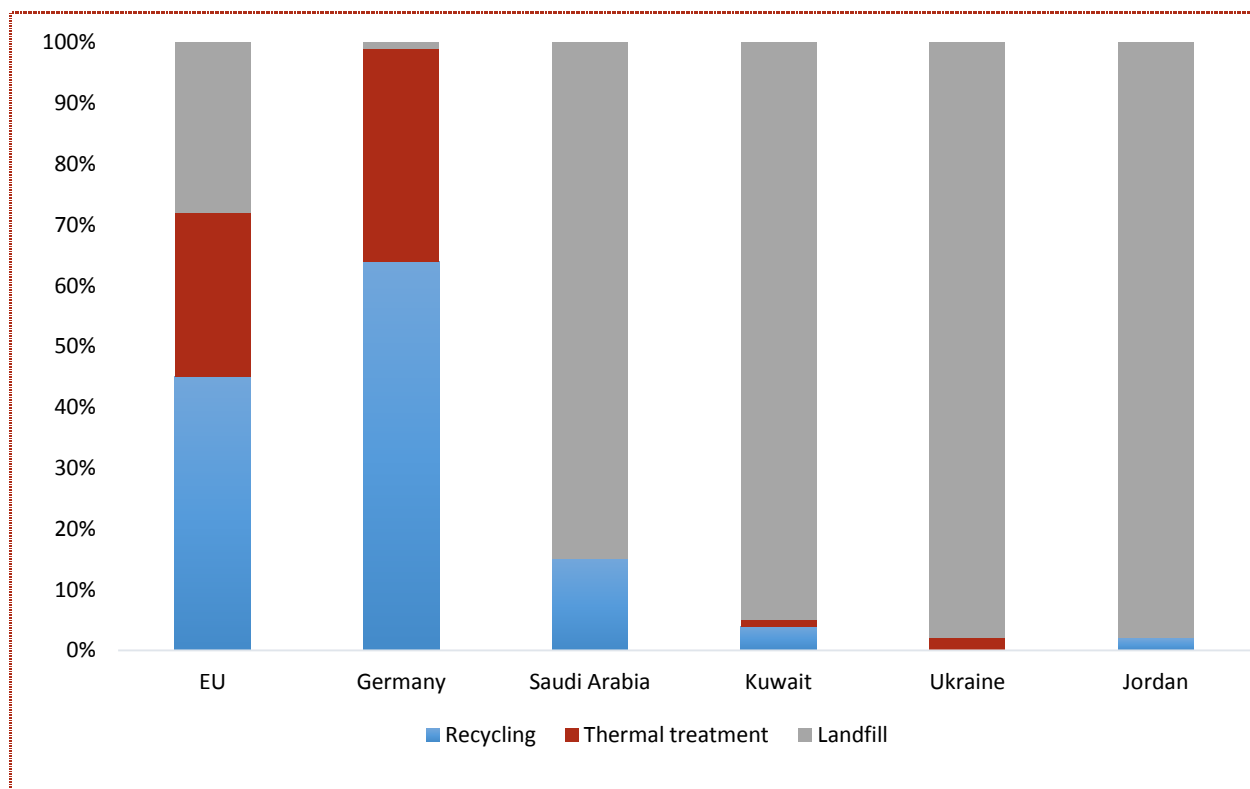


Figure 4.12: Disposal methods for urban waste (2015)

Sources: Jordan Country Profile, GIZ, 2014 [42]; EcoMENA, 2015 [45]; KDIPA, 2015 [48]; Ukraine Country Profile, 2017

Composition of the urban waste

Detailed investigations on site have shown that the urban waste delivered to landfills also contains other types of waste: solid and liquid industrial waste, commercial waste and slaughterhouse waste. There are definitely instances where these types of waste are mixed during collection and transport. As a result, the definition and delimitation of the term "urban waste" is not identical to the definition used in Germany.

The composition of the urban waste in Jordan is distinguished by a relatively high share of organic matter that is not yet recycled.

Paper, glass, plastic and metal together make up 35.5 % of the overall urban waste. It could also be possible to use organic waste for recovery to an extent. Changing habits and the standard of living mean that the organic matter in the city of Amman is replaced by a higher consumption of plastic and packaging materials, for example [49].

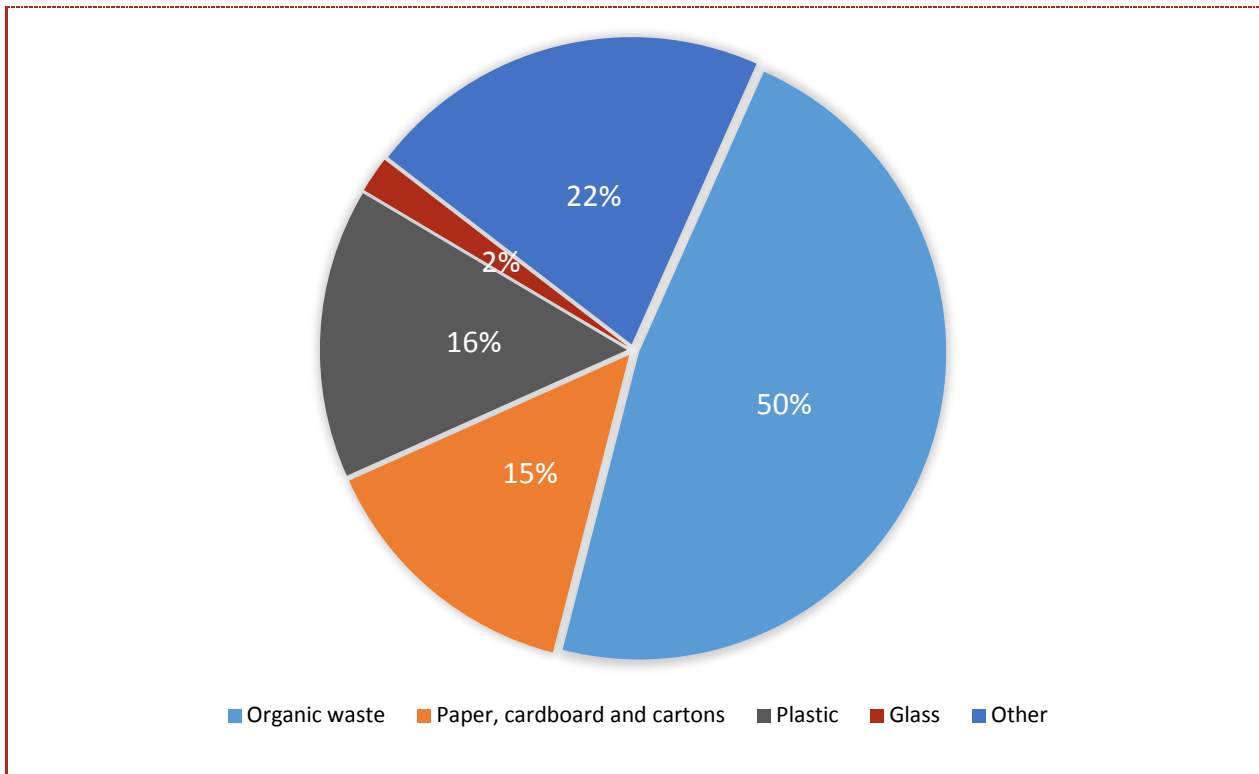


Figure 4.13: Composition of urban waste in Jordan in 2010

Source: Jordan Country Profile, GIZ, 2014 [42]

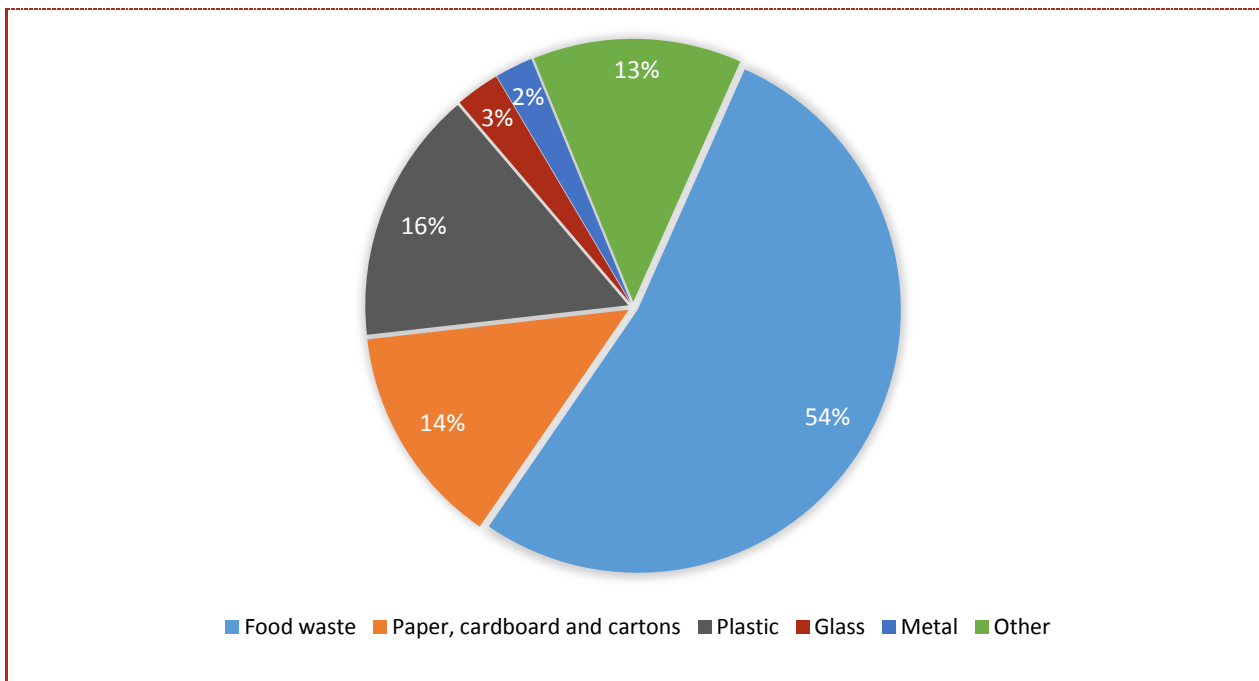


Figure 4.14: Composition of urban waste in Amman

Source: QDAIS 2006 [49]

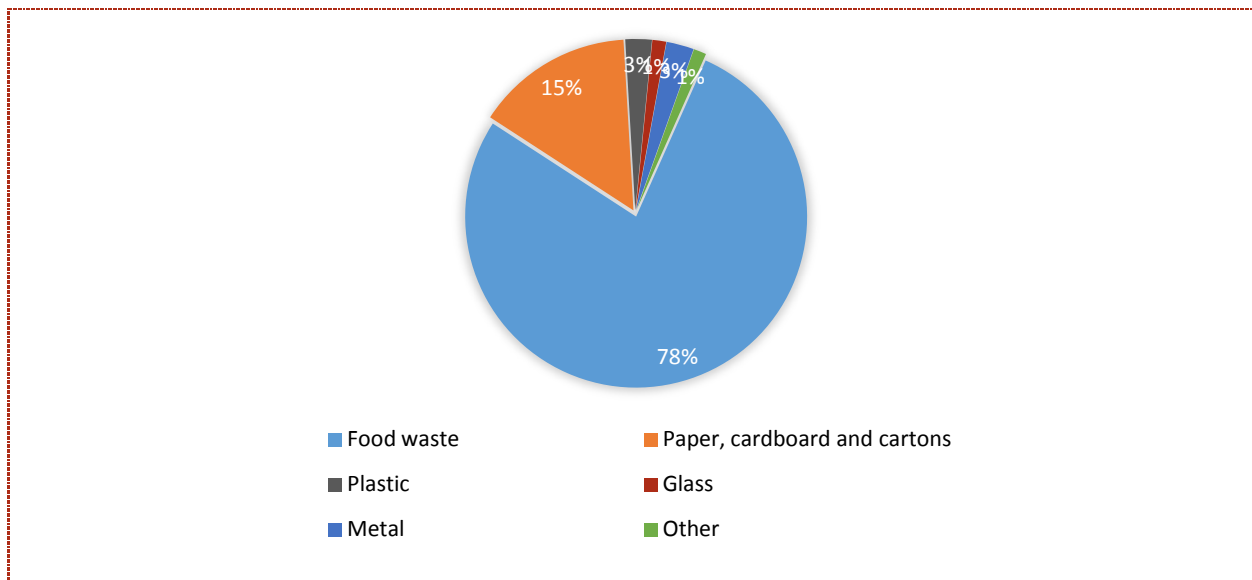


Figure 4.15: Composition of urban waste in Irbid

Source: QDAIS 2006 [49]

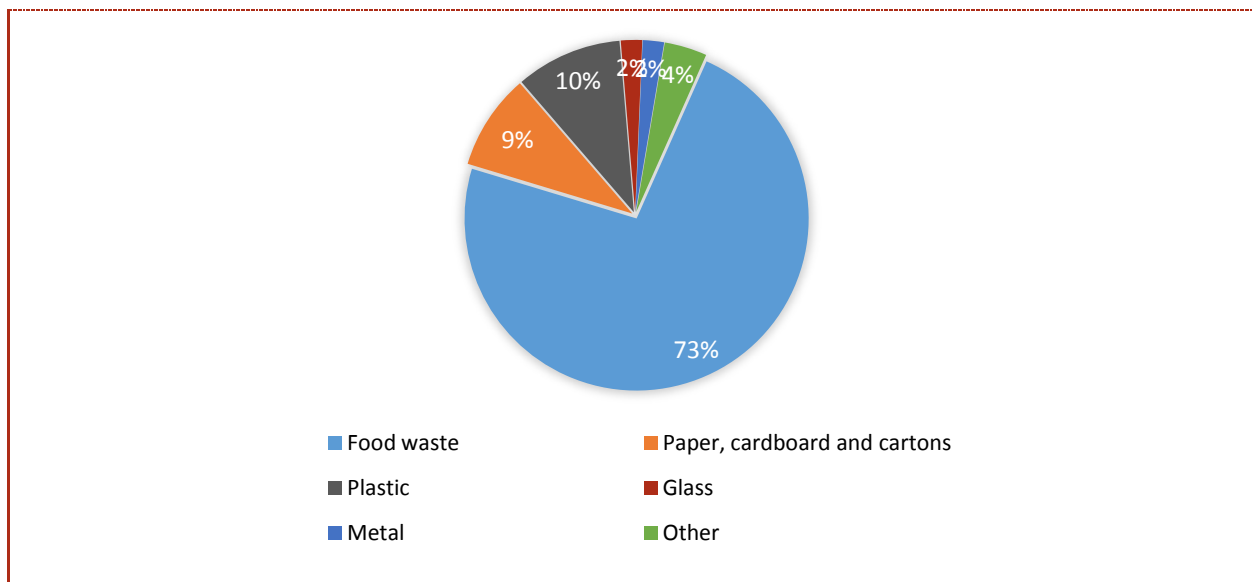


Figure 4.16: Composition of urban waste in Zarqa

Source: QDAIS 2006 [49]

Collection of waste and recyclable materials

The collection of mixed urban waste is generally carried out by providing collection containers. In 2014, the city of Amman started providing collection bins for detached houses. In certain areas, the city administration has trialled providing two containers in order to separate the dry and wet waste. Unfortunately, these are virtually ignored and are not monitored by the relevant authorities. As a result, they are emptied by the same vehicle. All containers throughout the country are publicly accessible and can be filled by any citizen. The required collection of recyclable materials has still not been introduced for paper, cardboard and cartons (PPK), glass, aluminium or PET.



Figure 4.17: Containers for dry and wet waste in Amman

Source: Photo - Nazih Musharbash

The majority of urban waste in Jordan could be recycled if the required conditions were available. To do so, a lot of effort would have to be made in order to mobilise acceptance in the population.

Some household recyclable materials are currently collected by the informal sector. This is carried out by people known as waste collectors. These waste collectors are not contracted by companies or municipalities and search through the waste containers - often putting their own health at risk - before they are collected, looking for usable items: Aluminium cans, bottles (plastic or glass) and metals. These collections are delivered to collection points or company backyards. The profits are often very low. The privately organised collection points then sell the recyclable materials to secondary raw material dealers. Since neither paper nor glass are manufactured in Jordan, it is not possible to recycle paper, cardboard, cartons or glass in the country.



Figure 4.18: Can collector (waste collector) in Amman

Source: Photo - Nazih Musharbash

Area coverage for the collection of waste and recyclable materials

Waste collection and waste transport in Jordan are distinguished by a high rate of collection, almost 100 % in the capital city of Amman. In rural areas, this lies between 75 and 95 % [50]. There is no legal obligation in Jordan to collect urban waste separately or for separate collection systems. There are 99 communities that are responsible for road cleaning, waste collection and transport to landfills in Jordan.

Tenders and disposal fees

The municipalities are responsible for the collection of urban waste. There is a standardised system for awarding municipal contracts. These include the improvement of the existing structure, procuring new vehicles and devices as replacements and the implementation of new plant technologies, for example.

Fees are generally charged for the collection, transportation and disposal in the landfill for household waste. However, these fees are intentionally kept low for socio-political reasons. It is very hard to communicate to the population that it costs almost as much to treat a ton of waste as it costs to import a ton of wheat, for example. Even if the usability of the recyclable materials in the waste collected is recognized, the municipal funds are not enough to finance treatment and recycling plants. The waste fee in Jordan is not related to the number of people in a household or the volume of waste produced.

It is becoming more and more difficult for the municipalities to cover the running costs with the ongoing population growth. The low-interest loans provided by the municipal development bank and the funds allocated by MOMA are far from enough to achieve balanced waste management operation. For this reason, the municipalities are entitled to charge waste fees. The electricity bill for private households includes a disposal fee of 5 to 10 %. The waste fees include a flat fee of approxi-

mately EUR 22 / year for a consumption of 200 kWh. This interconnection is favourable for low earners who use less electricity and burdens higher earners who use more electricity. This method has proven to be successful as many households previously could not be charged. Despite this, the fee revenue is a long way from covering the costs. A higher waste fee is not reasonable for the population with increasing living costs and high unemployment.

Recycling, treatment and disposal

There are no plants for treating or recycling recyclable materials from urban waste in Jordan. Glass, plastics or paper that are collected separately as recyclable materials in some cases (e.g. by the informal sector) are sold for recycling abroad.

At the Al-Ekedier landfill, there is a simple mechanical sorting plant (sieving, sorting belt). Positive sorting is carried out manually and enables separation of approx. 30-50 % of recyclable materials. The system is flexible and operating costs are low.

Setting up modern sorting plants for recycling materials is in discussion but implementation has not even been started.

Initial composting concepts exist for organic waste.

In Jordan, waste is not (yet) subjected to energy recycling or treated thermally. A waste incineration plant is in the tendering phase. In 1983, Joint Service Councils (JSC) were set up for efficiency reasons. They are responsible for the landfill disposal of all household waste, sewage sludge, olive oil wastewater and to some extent for industrial waste. The JCS disposes of approx. 50 % of household waste in landfills. The rest is disposed of by GAM (Greater Amman Municipality) [50]. Accordingly, 98 % of waste produced in Jordan is simply disposed of in landfills without any treatment [44].

Hazardous waste is taken to the Swaqa special waste temporary storage facility and stored there temporarily, and in some cases disposed of there long term. The waste producers (predominantly the pharmaceutical industry in Jordan) have to pay approx. 280 JD / ton in fees. The fees are collected by the Jordanian Ministry of Environment. Some special waste is then taken from Swaqa to a special waste incineration facility. This incineration plant is operated privately by the Nasser Group. Hospital waste is also incinerated there. Nasser Group owns this plant. The vast majority of special waste currently stays in Swaqa. [51].

Biogas use takes place on the former, now closed landfill in Russeifeh. According to rough estimates, approx. 12 million tons of waste are stored here. There are currently 105 landfill gas drill holes. In 2009, the Russeifeh biogas project was registered as a Clean Development Mechanism Project (CDM) by (UNFCCC) [52].

There is a similar project for collecting and recycling landfill gas in Gabawi. The company Helektor from Greece is commissioned with this task.

Landfills

There are currently 20 actively operated landfills in Jordan. There are no comprehensive gas and seepage water management systems. According to a study by RSS, the pH value in the three largest landfills indicates seepage water in the basic soil. On top of this, the Al Ghabawi landfill has the highest salt concentration according to the study. The heavy metal content (nickel, chrome, lead) in the landfills is over the maximum permissible limit defined by Jordan Industrial Estates (JIEC). At open

landfills, air and soil pollution pose a risk to the surroundings. Rodents, common in dumps, spread pathogens, exposing workers to diseases and risks [53].

The most important landfills in Jordan are:

- old-closed landfill (Al-Rusifeh-Zerqa),
- actively operated landfill (Al-Ekedier-Irbid),
- newly actively operated landfill (Al Gabawi-Amman),
- actively operated Swaqa landfill for special waste.

Table 4.9: List of landfills in Jordan

No.	Landfill	Commissioned in	District	Area in 1000 m ³	Quantity in tons/day
1	Akaider	1980	Irbid	806	800
2	Al-Husaineyat	1986	Mafraq	180	170
3	North Badia	2003	Mafraq	360	43
4	Al-Ruasihed	2003	Mafraq	179	4
5	Al-Hamra	1990	Al-Salt	275	450
6	Al-Ghabawi	2003	Amman	1974	2500
7	Madaba	1974	Madaba	87	500
8	Dhulil	1991	Zarqa	270	295
9	Dair Alla	1998	Balqa	363	290
10	Azraq	1983	Zarqa	250	17
11	North Shuneh	1983	Irbid	200	67
12	South Shuneh	1988	Al-Balqa	No information	55
13	Ghor Al-Mazra'a	1997	Karak	205	22
14	Lajoon	1995	Karak	485	190
15	Ghor Al-Safi	1997	Karak	153	25
16	Tafilah	1990	Tafilah	450	65
17	Al-Shoubak	1983	Ma'an	26	45
18	Eyil Neimat	1984	Ma'an	274	42
19	Ma'an	1994	Ma'an	502	90
20	Al-Quaira	2000	Aqaba	270	25
21	Aqaba	2000	Aqaba	60	115
22	Swaqa	No information	Swaqa	No information	7500

Source: Aljaradin & Persson, 2012 [54] & Al-Jayyousi, 2015 [55]

The landfills listed in Table 4.9 are currently in operation. With the exception of the Gabawi landfill, the selection of the location of the remaining landfills in Jordan was not carried out using a feasibility

study. The location of this landfill was selected using an environmental impact assessment for the best location selection. It was also planned and designed in accordance with international standards [56].

4.2. MARKET PARTICIPANTS – DISPOSAL, RECYCLING AND ENVIRONMENTAL TECHNOLOGY

This section briefly presents some of the companies and organisations that operate in the environmental sector in Jordan as examples and without any claim to completeness.

The State of Jordan is the largest employer in Jordan, followed by UNRWA (United Nations relief and works agency for Palestinian refugees in the Near East). According to information on the Foreign Office website on 14th January 2017, 56 % of workers are employed in the formal sector (34 % in public service and 22 % in the private sector). 44 % of Jordanian workers are employed in the informal sector, e.g. retail, handicraft, services, construction and agriculture [57].

Disposal companies

Waste management in Jordan is generally run by local economies. Only where necessary are Jordanian companies involved in performing tendered work. Machines and other devices as well as vehicles are imported. Collaboration between public and private enterprises is rather rare. Domestic and/or foreign companies can be commissioned with the building of technical plants.

The following key figures are specified for waste management in a presentation by the Jordanian Ministry of Environment in 2015:

Table 4.10: Technical data about urban waste in Jordan, 2015

Technical data - urban waste	
Containers	50,000 x
Transport vehicles	1,000 x
Workers	10,000 x
Landfills designed for urban waste	1
Illegal landfills	21
Material treatment plants for urban waste	1 (not in operation)
Cardboard recycling plants	8
Metal recycling plants	5
Plastic recycling plants	5 - 10

Source: Daibes, 2015 [58]

Table 4.11: Technical data about other waste flows in Jordan, 2015

Technical data - other waste flows	
Waste treatment centre for hazardous industrial waste in Swaqa	1 plant operated by the Nasser Group
Hazardous industrial waste that is treated and/or stored in Swaqa	10 - 20 %
Treatment plants for medical waste	~ 30
Medical waste that is treated in existing plants	50 %
Composting plants for fertiliser	1
Recovery plants for scrap tyres	15
Recycling plants for scrap tyres	2

Source: Daibes, 2015 [58]

The plants and centres shown in Table 4.10 and Table 4.11 are - unless expressly stated otherwise - small companies that work privately alongside the municipal companies. The waste collectors mentioned previously also collect cartons, plastic, scrap tyres, etc. here and deliver the waste to the small companies in exchange for remuneration.

Initiatives and projects

The Jordanian Ministry of Environment has passed comprehensive environmental protection legislation that focuses on the development and implementation of statutory rules. In particular, the following are specifically mentioned: Pollutant emission, water quality and waste treatment. Furthermore, Jordan is very interested in renewable energy and has reformed lots of laws and regulations in order to liberalise the market. The foundation has been laid for the private sector to be strongly involved in investments in this sector, meaning that the German renewable energy industry also has plenty of opportunity. That organic matter can be used to create gas, which is then converted into electricity, is also known in Jordan. As already mentioned, there is a lot of potential for waste treatment and generating energy.

The German embassy in Amman provides economic information about Jordan and an overview of the foreign trade promotion by the Federal Republic for German investors:

- Jordan Investment Commission (JIC) provides support with registrations, licensing processes and investment decisions. (www.jic.gov.jo)
- The German-Arabic Chamber of Industry and Commerce in Cairo (DAIHK) and its over 2200 member companies support trade and investment between Germany and the Arabic world. (www.ahkmena.com/)
- Arab-German Chamber of Commerce and Industry e. V. (Ghorfa) is the official representation of all Arabic chambers of commerce and industry in the Federal Republic of Germany. (<http://www.ghorfa.de>)
- Nahost – und Mittelost – Verein e.V. (German Near and Middle East Association) promotes bilateral economic relationships between Germany and the countries in the Near and Middle East. (www.numov.org)
- German Business Service provides support with planning business trips to Jordan.
- Jordanian Embassy in Berlin: (www.jordanembassy.de)

- The German federal government supports lots of projects in Jordan which aim to effectively and sustainably improve Jordan's infrastructure. There are a range of programmes available for this purpose (e.g. via KfW).
- The relevant Federal Ministries and GIZ support the measures as part of the technical cooperation incorporating German and Jordanian companies.
- Project: Supporting an NGO

"EcoPeace Middle East" is the only intraregional environmental organisation in the Middle East. It has been working with Jordanian, Palestinian and Israeli municipalities for over 20 years to sustainably protect resources, thereby offering a real alternative to the failed peace negotiations. The activists focus on cross-border environmental cooperation instead of the Middle East conflict. Their environmental activists work in Israel, the Palestinian Autonomous Territories and in Jordan.

Other projects that show the diversity of the potential participation and investment of German companies are mentioned in note form here:

- Protection of the environment and biodiversity in Jordan,
- Sustainable use of ecosystem services in Jordan,
- Promoting participative resource management to stabilise the situation in recipient communities in Jordan,
- Waste to (positive) energy,
- Decentralised, integrated sewage sludge management.
- Connective Cities

The first dialogue event on integrated waste management as part of the Connective Cities programme in the Middle East took place from 14th to 16th April 2016 in Amman, Jordan (www.connective-cities.net/infothek/dokumentationen/ansaetze-integrierter-abfallwirtschaft/).

Participants from seven Jordanian and four German communities and cities compared their positive experiences obtained in practice in the planning of municipal waste management, waste separation, recycling and depot management. The participants' interest also focused on the collaboration with the population, especially with respect to raising awareness for sustainable waste management. The municipal practitioners developed project ideas for the future proceedings at community level in mutual, cooperative consultation.

- Project: Foundations of waste management and landfill construction

The Agricultural and Environmental Sciences Faculty of the University of Rostock and the Ihlenberger Abfallentsorgungsgesellschaft GmbH (IAG) from Selmsdorf have been working together to research waste management for many years. For example, the services offered by the Waste and Resource Management (ASW) department organised and accompanied an informational trip for a Jordanian delegation. The Jordanian guests were representatives of the Ministry of Municipal Affairs as well as mayors of various Jordanian cities. The focus was on residual waste treatment in Germany and running waste treatment plants.

- Project: GAM Solid Waste Crisis Response Programme – urgent investments into waste management, technical aid

Funded by the Federal Ministry for Economic Affairs and Energy as a result of a decision by the German parliament (Bundestag), the EBRD is currently checking the support of a waste management plan in Jordan. In addition to a loan to refinance debts to a value of EUR 130 million, it includes funds to a value of EUR 65 million to finance urgent, not yet specified investment into waste management in the greater region around the Jordanian capital of Amman. Technical aid is provided to carry out the project, including procurement as well as to implement the action plan for environmental and

social measures (ESAP). More information: <http://www.ebrd.com/work-with-us/procurement/p-pn-161206a.html>.

4.3. LEGAL AND INSTITUTIONAL CONDITIONS

Paramount objectives

The environment, especially natural resources, recycling and water management is classified as urgent in chapter 2 "Integrated environmental management" of the "2021 National Agenda for Sustainable Development". Reducing solid waste and the proper treatment of urban and industrial waste as well as the renovation of landfills should be advanced. Important legal conditions have been introduced for this purpose.

The paramount objectives of waste policy in Jordan aim to noticeably curb waste quantities that are deposited in landfills, securing and renovating existing landfills and accelerating the expansion of recycling of recyclable materials.

Important rules

- According to Environmental Protection Act No. 52, the Ministry of Environment is authorised to pass suitable ordinances to implement targets of the 2021 National Agenda.
- Waste management regulation no. 27 from 2005 regulates the necessary requirements for workforce, equipment, monitoring, container management, separation of hazardous waste, documentation and subsequent treatment and its checking.
- A 2003 ordinance regulates the disposal and treatment of residual oil; it stipulates the operating instructions, licence requirements and documentation for the use of generators and transporters as well as the technical requirements.
- In line with 2009 community ordinance no. 83, the administration of the city of Amman is authorised to create a fee system to prevent waste and for waste disposal for the transportation, treatment and disposal of urban waste in the Greater Amman area.
- The City of Amman statute no. 67 dated 1979 and the associated modifications (most recently no. 21 in 2005) regulates the approvals for the collection and transportation of waste and prohibits illegal depositions.
- Further ordinances and decrees regulate the disposal of hazardous industrial and special waste or the requirements for compost of animal and plant origin; they also define the technical requirements for the location, storage and processing of waste.
- The jurisdiction of the municipalities is also regulated in community law no. 13 dated 2011 and its modifications (no. 7 dated 2012) with respect to their responsibilities in their sphere of influence regarding municipal cleaning, waste disposal and disposal, etc.
- Renewable energy is regulated in Energy Efficiency Act No. 13 dated 2012.

Implementation in practice

Despite a range of laws, ordinances, decrees and paragraphs to regulate waste management targets, lots of plans that are important for the country remain unheeded and are not implemented. On the one hand, there is still a serious lack of environmental awareness in the Jordanian population, who still does not want to take responsibility for public spaces. On the other hand, effective monitoring mechanisms do not take effect as they either do not exist or the resources required for them are not released.

It can be assumed that the foreign donor countries stipulate a corresponding check for the sustainable compliance with the assisted measures and thereby can influence the implementation of these checks.

For example, the option of charging fees for separated collection would currently result in an overwhelming rejection by the population. This would result in even more disregard for the rules and increased pollution of public spaces.

Authorities and their responsibilities

Institutionally and legally, several ministries and their subordinate authorities are generally each responsible for the implementation, compliance and monitoring of the relevant state requirements in Jordan.

The Jordanian Ministry of Environment is responsible for the development of conditions and the monitoring of waste legislation. Performance of the legal provisions and implementation of the directives adopted are accompanied by the municipalities and the Ministry of Municipal Affairs (MOMA) responsible for this. Hospital waste and agricultural waste are monitored by the relevant Ministry of Health or Agriculture respectively. According to a statutory rule, industrial waste must be disposed of by the producers. Financial and personnel resources as well as the required monitoring are often lacking in implementation.

Overall, several ministries, authorities, municipal regional authorities and offices are responsible for waste and recycling management:

Table 4.12: Responsibilities of institutions in waste and recycling management in Jordan

Authorities	Main tasks
Ministry of Environment (MoE)	<ul style="list-style-type: none"> • Determines waste management policy for urban waste, hazardous waste and special waste, • Regulates compost from plant and animal products, • Monitors compliance with the relevant laws, • Develops waste legislation, • Supervises authorities when awarding licences for technical plants or vehicles to comply with health and environmentally-relevant aspects, • Oversight over the waste and plant register which is kept by the municipalities, • Regulation of the waste management sector.
Ministry of Municipal Affairs (MoMA)	<ul style="list-style-type: none"> • Oversight of communities and cities, • Provision of municipal services, • Monitoring municipal services, • Regulating and monitoring municipal waste management.

Cities and communities	<ul style="list-style-type: none"> • Providing the required financial, technical and personnel resources for the collection, transport and disposal of urban waste, • Deciding about joining inter-municipal supply centres (landfills), • Operational running of the urban waste sector.
Joint Services Councils	<ul style="list-style-type: none"> • Running and monitoring the landfills.
Greater Amman Municipality (GAM)	<ul style="list-style-type: none"> • Introducing and monitoring waste management in Greater Amman.
Ministry of Health (MoH)	<ul style="list-style-type: none"> • Checking and monitoring hospital waste.
Ministry of Agriculture (MoA)	<ul style="list-style-type: none"> • Checking and monitoring agricultural waste.
Ministry of Energy and Mineral Resources	<ul style="list-style-type: none"> • Regulation of renewable energies.

Source: Jordan Country Profile, GIZ, 2014 [42]

Although the communities and cities are responsible for the collection, (as yet non-existent) recycling and safe disposal (still landfill) of urban waste; apart from the City of Amman, they are not able to autonomously decide about further developments and innovations.

4.4. BUSINESS OPPORTUNITIES FOR GERMAN COMPANIES

The annual 3 % increase in urban waste quantities is in itself a reason for German companies to get involved in solving the waste problems in Jordan [59].

The demand for services, construction of plants and delivery of devices in the Jordanian waste management sector, especially urban waste, is very high. Assistance and investments are required throughout the entire value chain from collection, sorting, treatment and recycling to disposal of waste and the monitoring thereof as well as renovating landfills. The fleets and the metal container systems are outdated or insufficient in almost all communities. The fact that Jordan has a relatively high collection system density overall should be taken into account in all undertakings.

It is not mandatory to collect recyclable materials and residual waste separately in Jordan. Recyclable materials are only collected sporadically by the informal sector. This feature means good business opportunities for suppliers of relevant technology, especially since this urgently required recycling is part of Jordan's 2021 agenda. There is also still considerable catching up to do when it comes to sorting.

When it comes to disposing of waste, there are business opportunities for German companies in securing, renovating or retrofitting existing landfills. Waste treatment is always associated with emis-

sions and significant disruptive impacts on the environment and the climate. On top of this, recyclable materials that could be recycled are wasted. This background highlights the necessity of an integrated waste treatment concept for environmental protection that is legally prescribed in Jordan. This also provides opportunities for German companies with the relevant experience to advise Jordanian communities and cities and draw up suitable waste management concepts with them. The combined objective of needing to recycle waste and aiming to generate energy may well lie in the treatment of organic waste. The relatively high share of organic matter in the urban waste delivered includes animal waste and large quantities of chicken manure from chicken feeding hutches and egg production plants.

Waste in Jordan is not recycled or disposed of thermally unless you count the fires at some landfills. Studies and preliminary planning are currently under way for the construction of a waste incineration plant. This plant could alleviate several problems from the existing waste management situation, promote conversion into energy and make a large percentage of landfills superfluous.

Even if a waste incineration plant was started up in the area around the capital of Amman, lots of deficits in rural and other urban areas would remain unsolved. Further needs for action exist in the modernisation of the collection infrastructure, the expansion of an as yet unknown recycling infrastructure and the transition of the rudimentary and conventionally practised methods into a future recycling management system. Among other things, this affects the previously mentioned separate collection and recycling of recyclable goods such as paper, cartons, glass, cans and PET bottles.

As already described in detail, Jordan provides high potential for investments in the waste management sector. This includes both the planning and the technical and logistical aspects.

Despite lots of trouble spots in the region, Jordan is considered to be relatively stable. The good quality of German companies with the slogan "Made in Germany" recognised in Jordan is highly esteemed. This results in good conditions for successful German firms and companies. This applies to planning and engineering offices, service providers in disposal management and suppliers of containers, vehicles and treatment or sorting plants as well as to companies in the landfill renovation and landfill gas recycling sectors.

5. WATER MANAGEMENT

5.1. WATER SUPPLY AND WASTEWATER DISPOSAL

Water resources

Water availability is very low and continuously falling in Jordan due to the rapid population growth, the overuse of the groundwater reserves and intensive droughts over the past decades in a country that is affected by high water stress at the best of times. According to UNESCO, Jordan is currently one of the regions with the highest water scarcity worldwide [60]. This is one of the largest challenges and limiting factors for the economic development of the country.

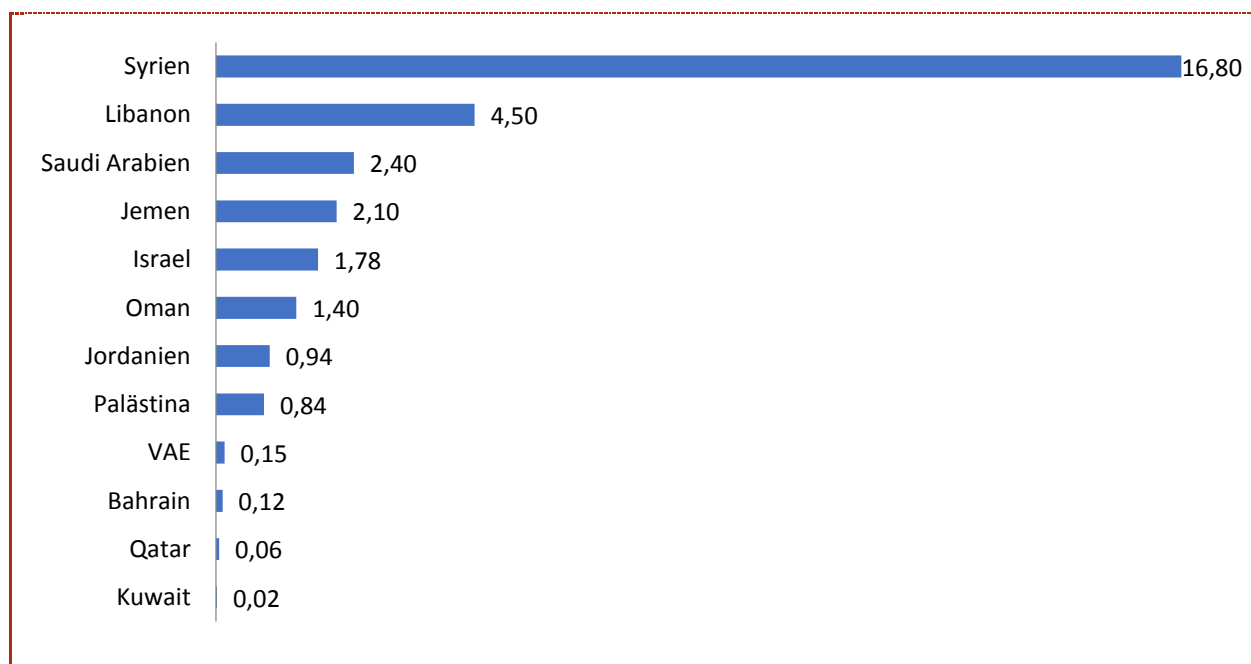


Figure 5.19: Renewable water resources in selected Arabic countries (billion m³)

Source: FAO, 2016 [61]

Due to its geographical position and the country's topology, Jordan's climate is diverse. It is sub-tropical in the Jordan Valley, Mediterranean in the highlands and continental in the eastern desert area and in the lowlands. Winters in the Jordan Valley are rainy and warm, in the highlands they are mild to cool and in the desert areas they are cold and dry. Summers, on the other hand are hot in the Jordan Valley, in the desert areas and in the lowlands and mild in the highlands. According to IPCC, average precipitation is 111 mm/year. Precipitation varies considerably by region. Over 91 % of the country gets less than 200 mm of precipitation in a year. The average precipitation quantity is 50 mm/year in the eastern and southern desert regions and up to 650 mm/year in the highlands. The majority of precipitation falls between October and May [61].

Jordan has been affected by intense droughts over the past decades. These have been more intense and more frequent over the past years. Between 2005 and 2015, 8 years were recorded in which there was a considerable deviation from the long-term precipitation average. There were especially intense droughts in 2005, 2007, 2008, 2010 and 2011. Between 1700 and 3000 million m³ less precipitation was measured in this period compared with the long-term average [62].

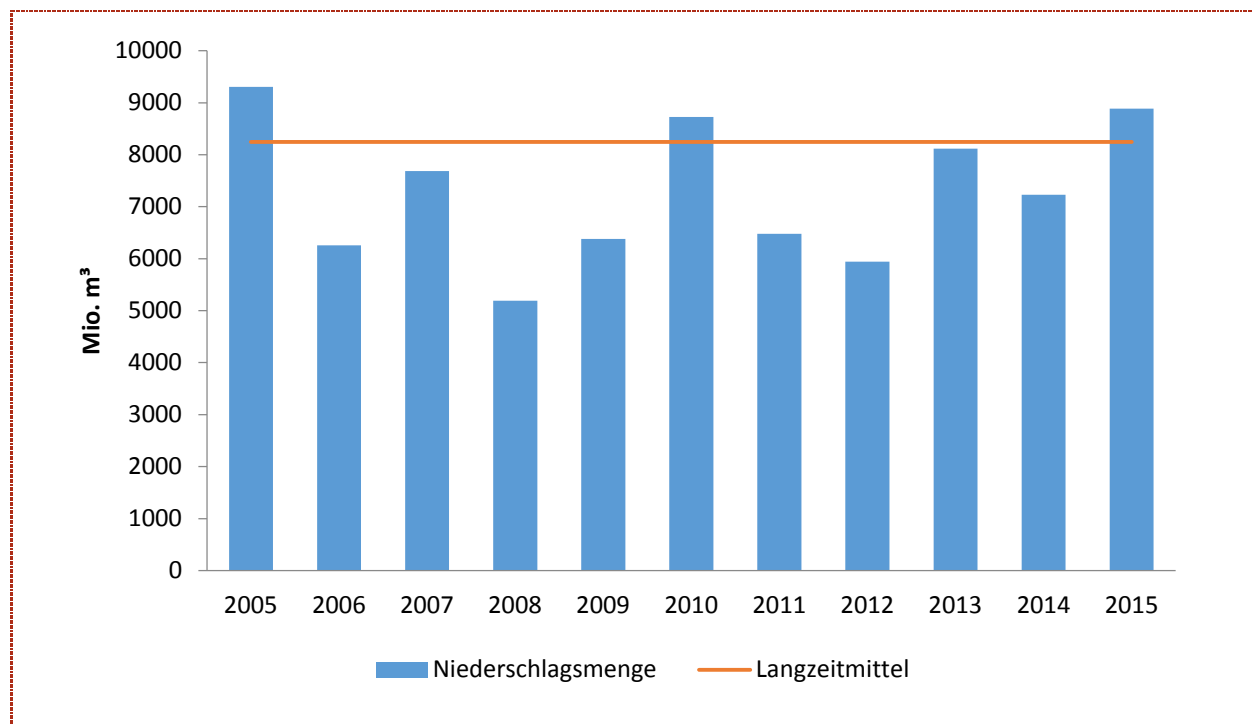


Figure 5.20: Annual precipitation deviation from the long-term average (million m³)

Source: MWI, 2016 [62]

In 2014, the occurrence of renewable water resources in Jordan was estimated at 937 million m³/year, renewable groundwater reserves were estimated at a total of 540 million m³ [63]. At 100 m³ per capita, this is well below the global average of 500 m³/capita [64].

Jordan's groundwater is distributed over twelve large aquifers, of which ten are renewable and two are what is referred to as "fossil" or non-renewable groundwater resources. The Disi aquifer is the largest of the aquifers. Since 2013, it has been used as part of a large-scale water supply project beyond the safe yield in order to ensure the population's supply security. The Jafer aquifer has renewable and non-renewable water resources. The large renewable groundwater occurrences are generally in the Yarmouk, Amman-Zarqa and Dead Sea drainage areas. The safe yield of this groundwater occurrence is estimated to be 275.5 million m³/year [61]. However, the statistical groundwater level is sinking between 1-20 m annually [62].

Table 5.13: Use of groundwater resources in Jordan (in million m³)

Groundwater drainage area	Safe yield (million m ³)	Removal (million m ³)	Deficit (million m ³)
Disi	125	143	
Amman-Zarqa	87.5	166	-78.5
Yarmouk	40	54	-14
Jordan Side Valley	15	46.7	-31.7
Azraq	24	52.5	-28.5
Jafer renewable	9	35	-29
Jafer non-renewable	18	42917	
Jordan Valley	21	17	4
Dead Sea	57	90	-33

Araba South	5.5	8.5	-3
Hammad	8	1.9	6.1
Sirhan	5	1.7	3.3
Araba North	3.5	6.3	-2.8

Source: NWI, 2016 [62]

Due to the sinking water availability, what are known as non-conventional water resources are gaining in importance all the time. In particular, this includes treated wastewater, and, to a small extent, desalinated sea water. The former is primarily used in agricultural irrigation, but also in the industrial sector. Currently, 91 % of the water used in agriculture is treated wastewater [62].

However, groundwater is still by far the most important water resources in Jordan. In 2015, the groundwater occurrence in the country represented a share of 52 % of the use of water resources in the country. On the contrary, surface water is only used for 30 % and treated wastewater for 17 % of water supply [64]. Although sea water desalination does exist in Jordan, it still plays such a small part in water use that it only makes up a very small share of 1 % of the overall water use to date [65].

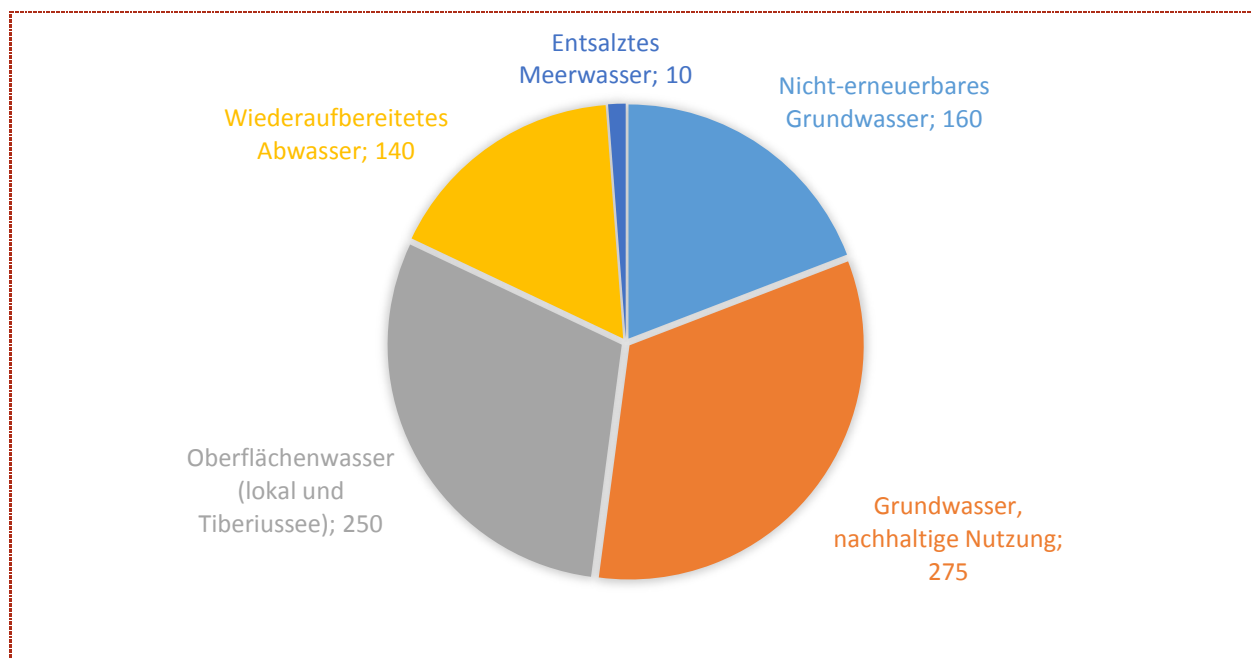


Figure 5.21: Water consumption by resource (in million m³/year)

Source: GTAI, 2016 [65]

Jordan is currently striving to achieve a huge conversion in the energy sector from fossil fuels to renewable energy sources. The National Energy Strategy contains ambitious objectives to increase the contribution of the country's renewable resources to the overall energy production. According to the strategy, this should account for a share of 10 % in 2020. 2,000 MW should be provided by new solar and wind energy projects by 2020.

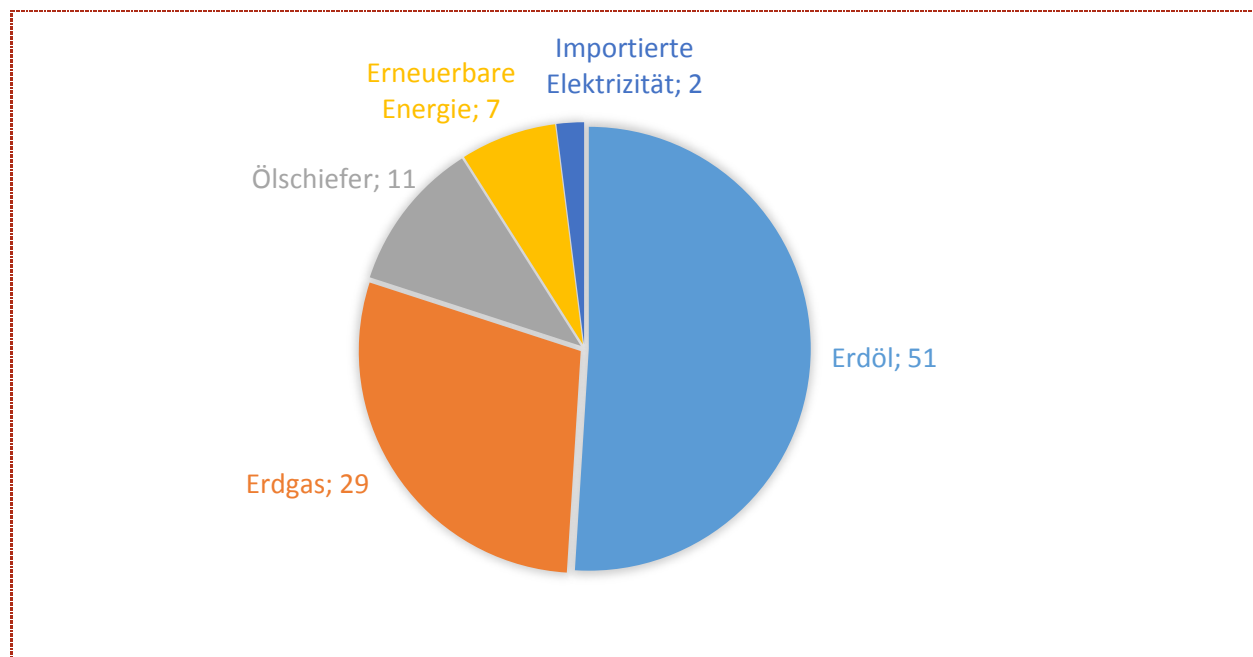


Figure 5.22: Energy mix in Jordan (in %)

Source: PMR, 2016 [66]

Jordan only uses 7 % of its renewable resource potential to produce energy and imports 93 % of its energy and fuel needs from neighbouring countries, accounting for approximately 20 % of the country's GDP. 18,841 GWh of energy were produced in total in 2015. The majority of renewable energy was produced by wind turbines, followed by hydropower, biogas and photovoltaics [66], [67].

Water demand

The high population growth, also as a result of the huge influx of refugees from regional crisis areas, the rapid increase in the rate of urbanisation and the resulting increasing water demand in households and agriculture have represented an increasing challenge for the water sector in Jordan for years.

The municipal water demand per capita of 126 l/capita*day corresponds approximately to the average global water consumption. Overall water consumption was estimated at 1.4 billion m³/day in 2015. Municipal water demand initially recorded a rapid increase between 2005 and 2013. From 129 l/capita*day in 2005, the water demand reached its highest value to date of 154 l/capita*day in 2013 [62]. However, by 2015, the municipal water demand sank due to the distribution of drinking water resources to the hugely increased population, especially in large cities.

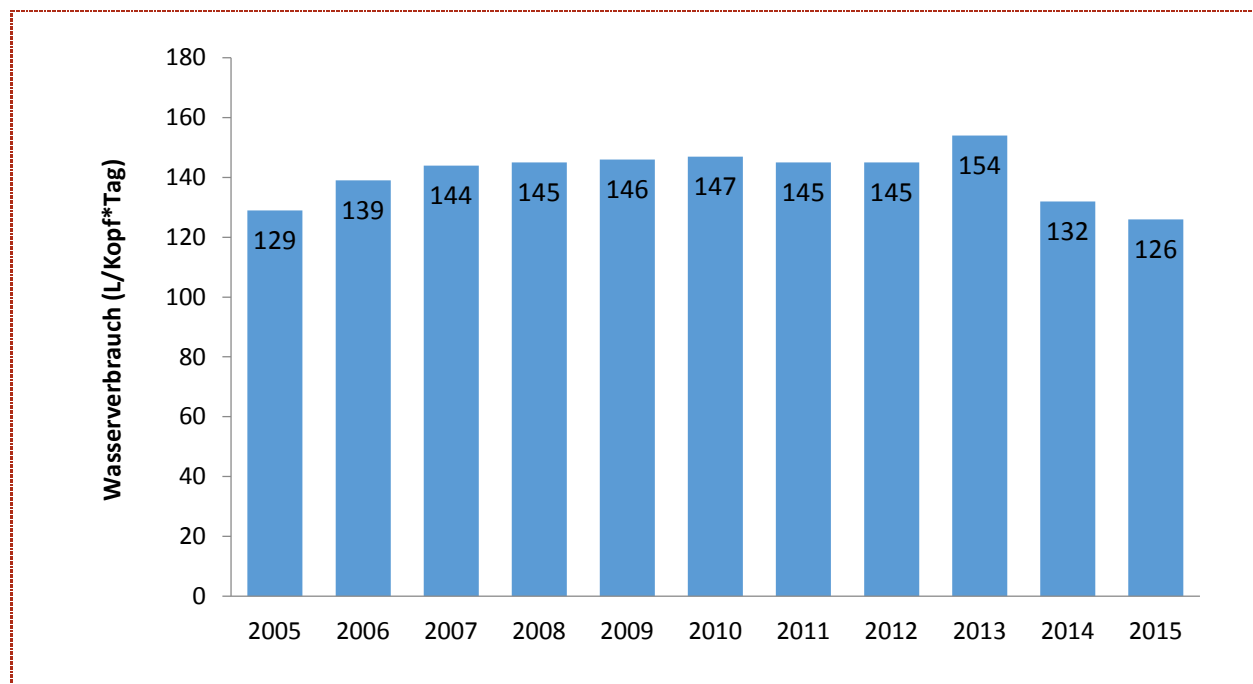


Figure 5.23: Municipal water consumption in Jordan (in million m³)

Source: MWI, 2016 [62]

The sinking municipal water demand does not correspond to the water provided by the municipalities. In order to ensure supply security as part of the increased population, over the past five years, MWI has increased the connection rate of municipal water supply by 20 %. It was possible to increase water provision as a result of the Disi large-scale project which was started in 2013, among other things. The objective of increased abstraction of non-renewable groundwater from Jordan's largest aquifer was also to financially strengthen the water suppliers with increased additional revenue from water provision.

Jordan's agriculture, producer of fruit and vegetables and source of export income enabling Jordan to purchase staple foods on international markets plays an important socio-economic and political part [68]. Although it only accounts for a relatively small share of the GDP (3 to 4 %), farmers require over half over the water occurrence. Food production is barely possible in semi-arid countries like Jordan without irrigation. The agricultural sector uses 51 % of the country's water reserves, followed by private households (45 %) and industry (4 %) [62]. There are conflicts of interest here between food security and the increasing water demands in other sectors such as municipal water supply and industry [65]. For this reason, MWI is planning on balancing the pronounced imbalance in water consumption in Jordan's economic sectors and adjusting it in relation to their contribution to the GDP [62].

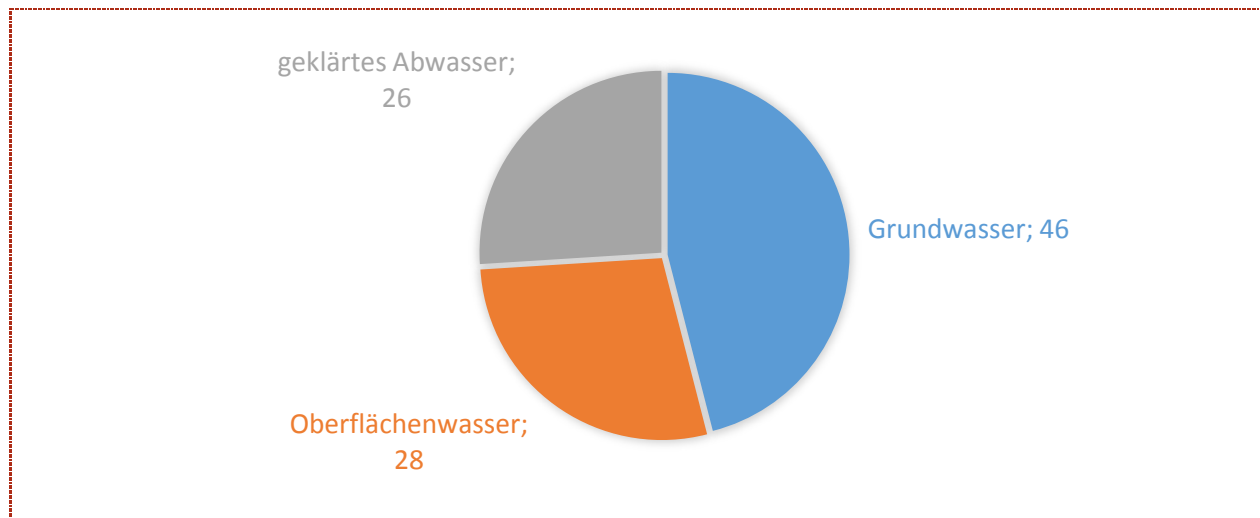


Figure 5.24: Agricultural water consumption by water resource (in %)

Source: MWI, 2016 [62]

Irrigation is largely provided from the groundwater occurrence, with roughly one quarter from surface water and treated wastewater respectively [62]. While treated municipal wastewater is used for irrigation in the Jordan Valley, the use of groundwater has increased in the highlands over the past years. There is a risk of a progressive decrease in water quality of the groundwater occurrence as a result of salinisation. There are also problems due to a high penetration of pesticides and fertilisers in the groundwater which is insufficiently monitored and regulated by the authorities as well as the illegal overuse of groundwater reserves. This is particularly the case in the highlands, which along with the Jordan Valley is one of the two main agricultural production cultivation areas in Jordan [65]. For this reason, another important MWI objective is to expand use of treated wastewater in agricultural irrigation and other non-conventional resources [68].

Drinking water management

According to the WHO and UNICEF, 97 % of the Jordanian population has sustainable access to a drinking water supply. In 2015, 98 % of the urban population and 92 % of the rural population were connected to the water supply network.

Drinking water is primarily obtained from groundwater and surface water resources [62]. In 2015, approximately 332.5 million m³ of groundwater were provided, including non-renewable water from the Disi aquifer that recently started pumping to Amman from the south. In the long term, the canal project between the Red Sea and the Dead Sea should safeguard the growing demand for drinking water [62], [65].

In 2015, 124 million m³ surface water were provided for the drinking water supply. To date, only a small amount (approximately 10 million m³) of drinking water is produced by desalinating sea water. In the future, this method should gain in significance and salt water from the Red Sea in particular should be treated. The increased sea water desalination should simultaneously help with the decreasing water level in the Dead Sea as water is conveyed to the Dead Sea using the new pipelines [65].

Although the drinking water network is relatively well developed, it is not very efficient. Of a drinking water transport in the distribution network of initially 126 l/day*capita, only 61 l/day*capita reaches the households. The term "Non-Revenue-Water" (NRW) is used to describe water loss in the network and the illegal water diversion including unauthorised removal of groundwater. The average NRW value in Jordan is estimated at 52 %.

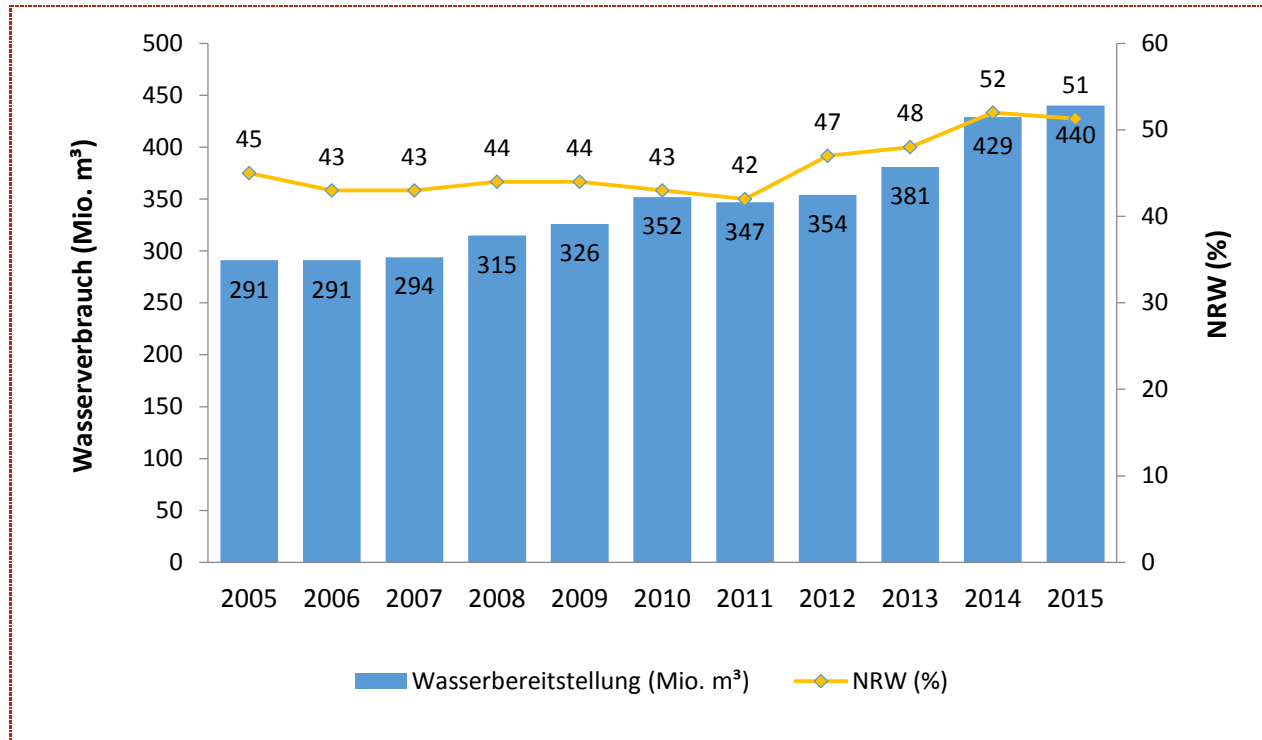


Figure 5.25: Regional water provision and water loss

Source: MWI, 2016 [62]

In order to curb the water loss, MWI has been intensifying closure of illegally used wells since 2013. While the annual number of closures still fluctuated between 19 and 57 between 2007 and 2012, this value was already 141 in 2013 and 562 in 2014 [62]. Objectives and measures to reduce water loss are also part of the new National Water Strategy 2016-2025. MWI is planning to reduce NRW to 30 % and the technical loss rate to under 15 %. The strategy also aims to decrease water theft and the number of illegally used wells [68].

Table 5.14: Water provision (in million m³) and water loss (%)

Governorate	Water provision (million m ³)	NRW (%)
Amman	179	39
Zarqa	67	64
Balqa	36	68
Irbid	45	36
Mafraq	25	53
Karak	21	69
Ma'an	14	73
Aqaba	16	28
Madaba	9	35
Tafilah	6	57
Jarash	7	45
Ajloun	5	42

Source: MWI, 2016 [62]

Additional supply problems are the non-continuous provision and the water contamination in the line network. On average, the supply fails for a few hours once or twice a week. Most households use water tanks on the roof of their house for supply shortages. There are also repeated instances of health risks as a result of leaks and contamination or water being stored in the supply network for a long time. Despite this, the water quality complies with the international WHO standards [68].

Management of the drinking water demand is only covered briefly in the National Water Strategy 2016-2025. This states the following with respect to water resources: "...resource management shall continually aim at achieving the highest possible efficiency in the conveyance, distribution, application and use". The strategy specifies its objectives in demand management:

- Achieving the highest possible efficiency in the conveyance, distribution, application and use,
- Implementing measures to maximise the net gain from using one unit of consumed water,
- Defining and assigning roles played by the different sectors within water protection and
- Promoting systems and devices to save water and reuse water [71].

Waste water management

Over the past 40 years, wastewater networks have been established in large and small cities in Jordan in order to guarantee 63 % of the population access to the wastewater network in 2015. The remaining population uses wastewater tanks or septic tanks in rural areas [64].

Wastewater in Jordan exhibits some special characteristics. The average overall salt content is 580 ppm. At the same time, municipal water consumption is low, resulting in a high organic load and a comparatively high salt content and can trigger subsequent problems in the operation of treatment plants [72].

Table 5.15: Connection rates to the wastewater network and treatment plants by governorate

Governorate	Connection rate (%)
Amman	84
Zarqa	72
Balqa	43
Irbid	52
Mafraq	8
Karak	20
Ma'an	39
Aqaba	72
Madaba	32
Tafilah	31
Jarash	69
Ajloun	42

Source: MWI, 2016 [62]

32 wastewater treatment plants in Jordan ensure wastewater treatment in line with international standards. High investments were made in order to expand the largest wastewater treatment plant Samra recently. The renovation of various WAJ sanitary projects has also contributed to an increase in the connection rate to the wastewater network. 98 % of the wastewater collected is treated [64]. In 2015, 4 of 32 wastewater treatment plants were overworked, this is the result of the rapid increase in population in some urban areas due to rural exodus and some large inflows of refugees from areas of conflict. The Jordanian government is planning to build 14 new wastewater treatment plants by 2020. It is estimated that the total number of wastewater treatment plants will be able to treat 262 million m³ wastewater/year in future [72].

Table 5.16: Treatment plants in Jordan and their expansion capacities and wastewater intake in 2015

No.	Name	Expansion capacity (m ³ /day)	Wastewater intake (m ³ /day)	Started operation in (year)
1	Aqaba-natural	9000	6699	1987
2	Aqaba-mechanical	12000	12475	2005
3	Baqa	14900	11862	1987
4	Fuheis	2400	2719	1997
5	Irbid Centre	11023	8143	1987
6	Jerash East	9000		1983
7	Karak	5500	1408	1988
8	Kufranja	9000	2506	1989
9	Madaba	7600	6557	1989
10	Mafraq	6050	3557	1988

11	Ma'an	5772	2288	1989
12	Abu Nuseir	4000	3201	1986
13	Ramtha	7400	4743	1987
14	Salt	7700	7407	1981
15	Tafila	7500	1450	1988
16	Wadi Arab	21023	12880	1999
17	Wadi Hassan	1600	1594	2001
18	Wadi Mousa	3400	2628	2000
19	Wadi Esseir	4000	5040	1997
20	Ekeidar	4000	1918	2005
21	Lajoon	1000	595	2005
22	Tal Mantah	400	358	2005
23	Jiza	4000	773	2008
24	Samra	360000	294862	2008, 1984
25	Meyrad	10000	6268	2011
26	Shobak	350	92	2010
27	Mansorah	50	15	2010
28	South Amman	52000	5436	2015
29	Mutah and Adnaniyyah	7060	1228	2014
30	Shallaleh	13750	6070	2014
31	North Shouna		1200	2015
32	Zaatari	3500	964	2015

Source: MWI, 2016 [62]

Between 2005 and 2015, the country was able to increase the quantity of wastewater treated from 99 to 147 million m³. Approximately 98 % of treated wastewater is reused in agricultural irrigation and around 2 % in industry [62]. In view of the predicted population growth and the social and economic development of the country, it is expected that the volume of treated wastewater will increase to 240 million m³/year by 2025 [64].

Increasing water scarcity and the need to protect the groundwater resources ascribes an ever increasing importance to the use of treated wastewater in Jordan. For this reason, the Jordanian government plans to support the use of treated wastewater in the coming decades, especially in fast-growing major cities. However, the use of treated wastewater must be conscientiously monitored by a comprehensive risk management system [64].

The National Water Strategy 2016-2025 and the National Substitution Policy consider treated wastewater to be a water resource that is additionally available to the water budget with the priority in unlimited reuse in agricultural irrigation. The main pillars of the National Substitution Policy are public acceptance, sufficiently high water quality, sustainability and the entry into force of the laws. This legally reinforces the use of treated wastewater in line with the guidelines and quality standards

of the WHO and the FAO in agricultural irrigation and is also recommended by the National Water Strategy 2016-2025 [64].

Treated wastewater is routed into open wadis, from which it is either routed to the fields or dams where it then mixes with rainwater or the base flow. Irrigation methods are applied depending on the water quality, the crop plants to be watered and the availability of the mixed water quantity. Ditch and dam irrigation are the main methods used here. Sprinkling methods are not used due to the health risk according to the Jordan standard for the reuse of treated wastewater. Another reason is the chlorine concentration which is higher than the permissible limit value and has a negative impact on the cultivated plants [61].

5.2. WATER MANAGEMENT MARKET PARTICIPANTS

Jordan exhibits good conditions for investment, such as stable regional markets and cooperative relationships with neighbouring countries and the international economy. The main import goods are mineral oil and crude oil, industrial machines, transport goods, food and other agricultural products, textiles and processed goods such as rubber, paper, cartons, yarn, chemicals, clothes and shoes. The main exporters to Jordan are: The European Union (20 % of total imports), Saudi Arabia (20 %), China (11 %), the United States of America (6 %), followed by Egypt, South Korea, Japan and Turkey [73].

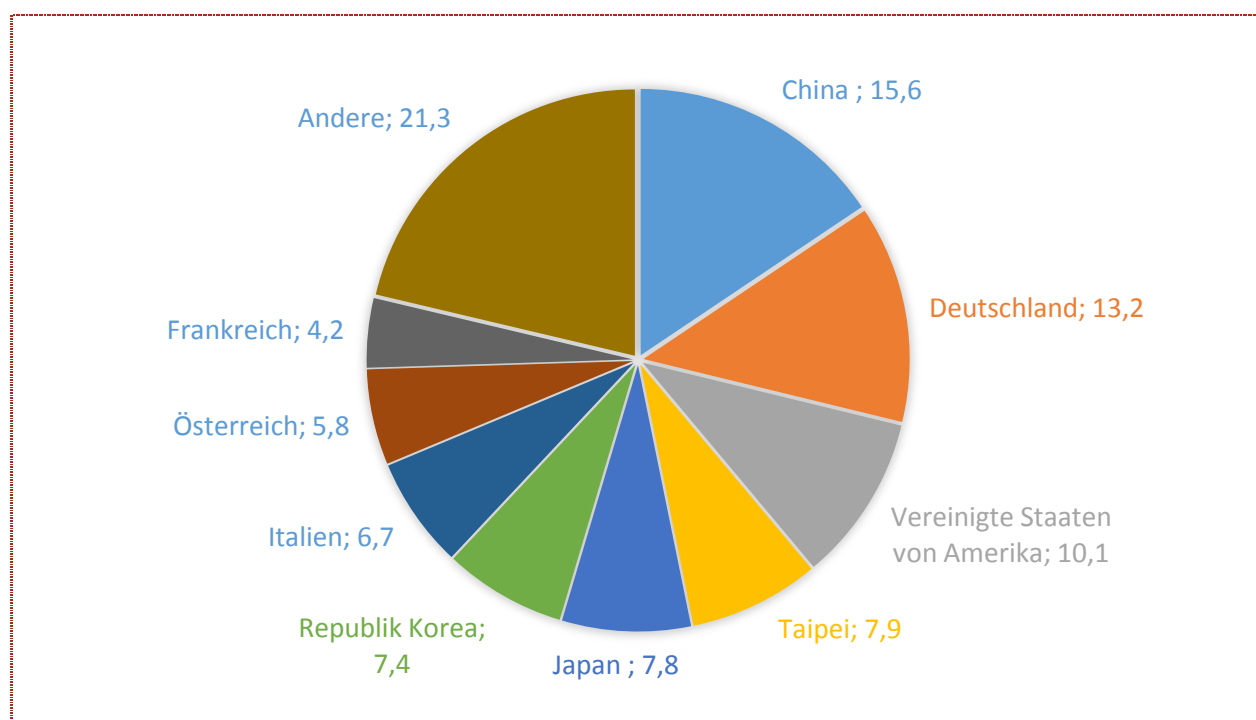


Figure 5.26: Distribution of imports of filter and water treatment technologies in 2015 (in %)

Source: UN Comtrade, 2016

In 2015, the largest import volumes in the area of filter technologies and water treatment were achieved by China (16 %), Germany (13 %), the United States of America (10 %), Taipei (8 %), Japan (8 %), the Republic of Korea (7 %), Italy (7 %), Austria (6 %) and France (4 %) (see Figure 5.26). Italy dominates the import of electrical pumps as the leading import nation (17 %), followed by the United States of America (13 %), China (12 %), Turkey (10 %) and Germany (9 %) [74].

Table 5.17: Local companies in the water sector

Company
Al- Maida industrial company
Al-Esra' Factory for Irrigation Pipes Company
Al-Mada for drip irrigation
Al-Samrah Plant Operation & Maintenance Company
Arab Company for the provision of water Technology
Awj Water Engineering Company
Best Environmental Services Technology
Chemical Supplies Company CESSCO
Gibraltar Contracting Company
International for Lining Irrigation Canals
Jordan River Environmental Technology
Karama Drip Irrigation Institution
Nabil Ayyoub Wakileh & Partners Company
National Concord Institution
National Institution for Water Treatment
New World for Water Technology
The factory Comprehensive Water Treatment Equipment
Universal for Industry of Drip Irrigation Pipes
Zaid Mahmoud Institution for Irrigation Systems
The Inter Islamic Network on Water Resources Development & Management
Tabaqet Fahel Water Station
Fusion for Water Treatment Co
Latefa Water Factory
Logistics for Waste Management Co
Channel Factory for Water Equipment
Qualified for Water Technology QWT
Orient Water Treatment Est
Al Tatweer Al Hadari Water
Nahhas World Business Center
EnviroBlend for Water Treatment
Index Water Systems
Mustafa Al Jaar Establishment for Consultation

Source: EDAMA, 2016 [75]

The most important water-relevant institutions in the public sector in Jordan are: Ministry of Environment (MoEnv), Ministry of Energy and Mineral Resources (MEMR), Ministry of Water and Irrigation (MWI), National Climate Change Committee (NCCC), Ministry of Municipal Affairs (MoMA), Ministry of Planning and International Cooperation (MoPIC), Ministry of Finance (MOF) and Public Financing Institutions (PFI) such as the Jordan Renewable Energy Efficiency Fund (JREEEF) and the Jordan Environmental Fund (JEF).

As far as financing is concerned, the internationally active actors Federal Ministry for Economic Cooperation and Development (BMZ), German Society for International Cooperation (GIZ), KfW (Reconstruction and Loan Corporation), United States Agency for International Development (USAID), Europe Aid, Japan International Cooperation Agency (JICA), Agence Française de Développement (AFD), Canadian Government, Abu Dhabi Fund, Gulf Co-operation Council, World Bank (IFC, IBRD), European Investment Bank, European Bank for Reconstruction and Development and Central Bank of Jordan are the most important stakeholders in the Jordanian water sector. However, private institutions such as the Association of Banks in Jordan (ABJ), Jordan Loan Guarantee Fund (JLGF) and Tanmeyah National Association for Microfinance also provide financing opportunities.

The most important institutions with respect to project development for the private sector are: Energy Service Companies (ESCOs), Jordan Chamber of Industry (JCI) and Jordan River Foundation (JRF) [66].

5.3. LEGAL AND INSTITUTIONAL CONDITIONS

Strategies and programmes

Since the resource water represents an increasingly important limiting factor for Jordan's economic development, the political reform efforts by the country are being continuously intensified. Despite this, water scarcity has worsened over the past years as a result of the rapidly growing population. The government wants to counter this development using various strategies and action plans. For this reason, the water sector has been included in the priority sectors in the National Strategy for Jordan (Jordan 2025) and the National Agenda of Government of Jordan (GOJ) [68].

Table 5.18: The most important strategies in the water and wastewater sector

Strategies and action plans
National Water Strategy 2016-2025
Water Sector Capital Investment Program (2016-2025)
Action Plan to Reduce Water Sector Losses (guideline)
Water Utility Policy
Water Demand Management Policy
Wastewater Management Policy
Groundwater Management Policy
Irrigation Water Policy
Irrigation Equipment and System Design Policy
Irrigation Water Allocation and Use Policy

Decentralized Wastewater Management Policy
Water Substitution and Re-Use Policy
Water Reallocation Policy
Surface Water Utilization Policy
Groundwater Sustainability Policy
Energy Efficiency and Renewable Energy in the water sector Policy
Climate Change Policy for a Resilient Water Sector

Source: DWP, 2016 [71]

The "National Water Strategy 2016-2030" published at the end of 2015 contains a comprehensive concept for a future-oriented water supply in Jordan. After numerous crisis plans that were not implemented sufficiently, the new strategy presents an open and critical analysis of the Jordanian water sector, which hopefully means that the government is seriously committed to the reform. The main objectives of the strategy are to expand the water supply and modernise the water infrastructure. Wastewater treatment and sea water desalination should gain significance.

One component of the new strategy is the Water Sector Capital Investment Plan 2016 – 2025. This aims to update investment planning for the Jordanian water sector. The objectives of the investment plan are as follows:

- To improve the inadequate distribution network
- To reduce water loss by replacing and maintaining pipes
- To improve distribution management and increase technical capacity for improved supply coverage
- To provide comprehensive legal conditions for sustainable development and management of state water resources
- To identify areas for investment and develop effective legal and institutional conditions for the implementation of these investments

With these aims, the Water Sector Capital Investment Plan 2016 –2025 wants to contribute to safeguarding water supply, using new water resources and expanding access to the water supply. Indicators for achieving the objective by 2025 include reducing municipal water consumption to 105 l/day*capita, reducing water loss to 30 %, increasing the use of renewable energy to 3.66 kWh/m³pumped water and expanding sanitary provision to 80 %, for example [68].

Investments in the supply sector are planned in order to cater to the future increase in demand as well as in renovation and expanding the water infrastructure [65].

The document "WATER SECTOR CAPITAL INVESTMENT PLAN 2016-2025" provides an overview of the planned projects in the water sector and is available at <http://www.mwi.gov.jo/sites/en-us/Hot%20Issues/Strategic%20Documents%20of%20The%20Water%20Sector/Capital%20Investment%20Plan%20CIP%20Report%20-%20FINAL25%20Feb%202016%20-.pdf>.

Important rules

The Jordanian constitution states that all people are equal and equality for all is established before the law. Regulation of water and wastewater by the MWI is defined in "By-Law No. 14 of 2014". The responsibilities of the Water Authority of Jordan (WAJ) and the Jordan Valley Authority (JVA) are recorded in "Law No. 18 of 1988 and its amendments" and in "By-Law No. 30 of 2001". Other relevant laws for the water sector include "Public Health Law No. 47 of 2008", "Environmental Protection Law No. 85 of 2006" and the law to protect the groundwater "By-law No. 85 of 2002 and its amendments" [62].

Authorities and their responsibilities

The Ministry of Water and Irrigation (MWI), founded in 1998 plays an important part in Jordan's water sector. It is responsible for the strategic orientation and development of the management of water resources, water collection and water supply as well as wastewater disposal and treatment. The MWI coordinates with the WAJ and the JVA. The MWI minister is simultaneously the chairman of the WAJ and JVA.

At operational level, the WAJ is responsible for the public water supply and wastewater treatment and for planning, monitoring, constructing, operating and maintaining water infrastructure projects. It also supervises the municipal operators and the three Jordanian water companies. The latter are supervised by the Program Management Unit (PMU), which manages all contracts with the companies.

The three water companies in Jordan which are monitored by the PMU are all 100 % state-owned:

1. Miyahuna: Company responsible for operating the supply and disposal network and the water supply and wastewater treatment in Greater Amman as well as in the cities of Balqa, Zarqa and Madaba with an estimated 550,000 customers.
2. Aqaba Water Company: Company responsible for operating the supply and disposal network and the water supply and wastewater treatment in Aqaba, Karak, Tafileh and in the Ma'an governorate with an estimated 130,000 customers.
3. Yarmouk Water Company: Company responsible for operating the supply and disposal network and the water supply and wastewater treatment in Jerash, Ajloun, Mafraq and in the Irbid governorate. The company is managed by WAJ and supplies between 380,000 and 400,000 customers.

The JVA is responsible for the economic development of the Jordan Valley. The development and the management of water resources at national level is also part of its responsibility.

WAJ and JVA also make recommendations to the MWI for changes to the water tariff system. However, the water tariffs are defined by the cabinet in Jordan's government, which represents the regulatory institution for water tariffs [64], [76].

Table 5.19: Water sector authorities and their responsibilities

Authorities	Responsibility
MWI	<ul style="list-style-type: none"> • Formulating and implementing laws and strategies for the water sector • Developing and managing the water resources and monitoring the water allocation and use • Creating water budget balances • Developing personnel resources and training measures for the water sector • Raising public awareness of programmes • Monitoring the water quality • Defining the water prices
WAI	<ul style="list-style-type: none"> • Monitoring and conserving water resources, developing priorities for its use, excluding irrigation use • Developing plans and programmes for the implementation of the water laws and strategies as well as developing and using water resources with respect to municipal water supply and wastewater treatment • Coordination and regulation of the construction of public and private wells, performing studies to identify the groundwater occurrence, licensing drilling rigs and drilling • Yield measurements and monitoring wells in order to prevent overuse by farmers
JVA	<ul style="list-style-type: none"> • Development and management of water resources in the Jordan Valley • Responsible for the integrated development plan for the Jordan Valley • Construction, operation and maintenance of dams in the auxiliary wadis and in the Jordan Valley • Construction, operation and maintenance of public irrigation systems in the Jordan Valley • Provision and distribution of the irrigation water to the farmers and collecting water fees for irrigation • Raising awareness of and training farmers in the use of water-saving, efficient irrigation technologies • Cooperation with international funding bodies and farmers with respect to irrigation techniques and planning • Developing emergency plans in the event of water scarcity during droughts

Source: www.jordan.gov.jo, 2016; FAO, 2016 [61], [72]

National and municipal authorities in the water sector are characterised by unclear and overlapping responsibilities and insufficient cooperation between one another. There are also few initiatives and poor incentives offered by national and municipal institutions to promote efficient and sustainable use of the water resource. This political behaviour has encouraged political lack of transparency and inefficiency in the Jordanian water sector for years [77].

Water and wastewater tariffs

Water and wastewater tariffs are very highly subsidised in Jordan. The income only covers a small percentage of the operating and maintenance costs. Income in the water and wastewater sector increased by 36 % between 2008 and 2013. This was due to the sale of water from the Disi aquifer (income of 11 million JOD) and tariff increases in 2011 and 2012. Despite this, cost coverage collapsed from 70 % in 2008 to 57 % in 2013 due to the increased energy prices and the costs for water

collection from the Disi aquifer. Public spending for the water sector is between 2 and 4 % of the GDP and is thereby within the average spending range for the MENA region of 1-5 % of the GDP. However, the difference between income and spending is significant and continuously increasing [64].

The water and wastewater tariff system in Jordan has a very complex structure, is unclear and lacks transparency. In general, the water and wastewater tariff level depends on the region, the use type (households and commercial/industry) and the volume of consumption in m³. In areas that are supplied by public companies (Amman, Zarqa, Maadaba governorate and the northern governorates), the tariffs are generally higher than in the other regions of Jordan that are supplied by the WAJ (Balqa, Al-Karak, Maan, Al-Tafila governorates). The tariffs are collected each quarter.

Water and wastewater tariffs for households are organised using a block system in which users pay more per m³ as their water consumption increases. The first block corresponds to a water consumption of up to 18 m³ per quarter and represents the minimum tariff that is calculated regardless of consumption. The prices per m³ then increase by consumption in further blocks. From a quarterly consumption of over 127 m³, households pay a fixed prices of 1.92 JD/m³, regardless of how much more they consume. Different amounts of taxes are added to the water prices in each block. Accordingly, the invoice amount for water per m³ and quarter is always composed of the tariffs and the taxes. It is not clear how the invoice amount for wastewater is composed. However, it is considerably less than the invoice amount for water and is added to this amount.

Table 5.20: Water and wastewater tariffs for the Amman, Zarqa, Maadaba governorates and the northern governorates

Block	Consumption (m ³ /quarter)	Invoice amount for water (JD/quarter)	Invoice amount for wastewater (JD/quarter)
1	≤ 18	0.36	0.038
2	19-36	0.54-0.37	0.039-0.042
3	37-54	0.40-0.43	0.048-0.12
4	55-72	0.44-0.56	0.13-0.24
5	73-90	0.59-0.70	0.24-0.35
6	91-126	0.71-0.96	0.35-0.51

Source: Own table, data source: www.waj.gov, 2016 [78]

The exact invoice amounts for water and wastewater for the governorates which are supplied by public companies can be seen using the following link: <http://www.waj.gov.jo/sites/en-us/Documents/Water%20and%20Wastewater%20Tariff%20for%20Quarterly%20Bills%20for%20Governorates%20which%20are%20Managed%20by%20Companies%202016.pdf>.

Table 5.21: Water and wastewater tariffs for the Balqa, Al-Karak, Maan, Al-Tafila governorates

Block	Consumption (m ³ /quarter)	Invoice amount for water (JD/quarter)	Invoice amount for water (JD/quarter)
1	≤ 18	0.33	0.038
2	19-36	0.48-0.29	0.039-0.042
3	37-54	0.34-0.36	0.020-0.10
4	55-72	0.36-0.45	0.11-0.17
5	73-90	0.48-0.53	0.18-0.22
6	91-126	0.54-0.71	0.22-0.35

Source: Own table, data source: www.waj.gov, 2016 [78]

The exact invoice amounts for water and wastewater for the governorates which are not supplied by public companies can be seen using the following link: <http://www.waj.gov.jo/sites/en-us/Documents/Water%20and%20Wastewater%20Tariff%20for%20Quarterly%20Bills%20for%20Governorates%20which%20are%20not%20Managed%20by%20Companies%202016.pdf>.

Commercial and industrial water tariffs are higher than the water and wastewater tariffs for households. In 2016, the water tariff was 1.30 JD/m³ and the wastewater tariff 0.805 JD/m³ for quarterly consumption of 6 m³ or less in all governorates in Jordan. An additional amount of 6.0 JD is added. If consumption is over 6 m³, the water price remains constant and the wastewater price increases to 0.865 JD/m³ and 7.8 JD are added.

Based on decision no. 3 by the WAJ management board on 20th June 1999 - approved by the Prime Minister - tariffs are charged for the use of treated wastewater. The amount depends on the sector in which the water is used.

- Agricultural and landscape irrigation: 0.01 JD/m³ + 0.01 JD/m³
- Industrial reuse (energy production and cooling): 0.05 JD/m³
- Research and development: Free of charge (for a maximum consumption of 200 m³/day) if the research results are made available to the WAJ for inspection.

A fee of 0.01 JD/m³ must also be paid for the energy costs when treated wastewater is used [78].

5.4. BUSINESS OPPORTUNITIES FOR GERMAN COMPANIES

Due to the rapid population growth, also caused by the high influx of refugees from crisis areas in the region, the limited renewable water resources and the sinking water quality, Jordan currently cannot afford an effective management and efficient use of the water resources. According to MWI, there is especially high demand for expertise in the following water sector areas [64]:

- Efficient distribution systems
- Mobilising private capital to expand the water infrastructures
- Renovating the existing infrastructure
- Sustainable recovery of the operating and maintenance costs
- Protecting the water resource quality and the water-dependent ecosystems
- Structural clarity and classification in the organisational structure of the responsible water sector authorities. Each institution must have a clear responsibility in order to be able to work effectively and efficiently as well as sustainable financing and effective framework legislation

The Jordanian government is especially interested in collaboration between public and private partnerships and in partnerships with municipalities and local suppliers. Looking at Jordan's latest wastewater master plan, which intends that all cities and towns with a population of at least 5000 should have a wastewater infrastructure and wastewater treatment plants, there is an urgent need for cooperation with municipalities, towns and local suppliers in order to reinforce their service capacities and promote local development [68].

With the background of UN sustainability development goals (SDGs) and the increasing number of public contracts in the MENA region as a result of international donors, the financing opportunities for German companies are also increasingly opening up. According to an OECD analysis, in 2014 Jordan received US\$ 190 million, which is, after Morocco, the second highest financial commitment by the donor countries as part of the bilateral development cooperation for the Middle East and North Africa. Foreign donors have been involved in the Jordanian water sector for years. This especially applies to the German development cooperation. Commissioned by the BMZ, the KfW supports plans for water and sanitary supply in particular in the MENA region with approximately EUR 174 million. By far the largest multi-lateral donor for water projects in the region in the World Bank. The total of their pledges for water and wastewater supply and flood protection in this region amounted to US\$ 611 million in 2014. In future, cross-border water management, the introduction of more energy efficient technologies for municipal water supply and the expansion of water access in rural areas should be promoted in particular [69].

The German water sector is very highly regarded in Jordan and is known for its high degree of specialisation and its quality in plant engineering, service and monitoring. The high supply security in all areas of the industry is also an advantage compared with the competition. This is countered by usually relatively high prices for German technology and services.

Jordan's water sector is growing continuously and provides German companies with very good business opportunities. Liberalisation of the water market is progressing slowly but surely. More and more production and services are awarded to external suppliers [73]. For small and medium-sized enterprises (SME), business opportunities are opening up in management consultation, especially with respect to operating and maintaining plants and distribution networks, service and accounting as well as reducing water loss. There are also benefits for producers and suppliers of:

- Water-efficient technologies in agricultural irrigation,

- Technologies for wastewater treatment, reusing treated wastewater and sea water desalination,
- Leakage locating systems,
- Energy and water-efficient pumps and
- Technologies for using renewable energy in the water sector (wind, bioenergy and solar energy, energy from organic waste and hydropower).

There are specific financing contracts from international and national donors for services, either in resource management or for feasibility studies. Construction services such as for treatment plants and dams are also tendered. However, individual products and accessories such as pumps and measurement equipment are also more in demand [69].

6. USEFUL CONTACTS

Foreign trade promotion and consultation

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Organisation:	Central Bank of Jordan
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Organisation:	Bank of Jordan
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Organisation:	Arab Bank of Jordan
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Organisation:	Jordan Ahli Bank
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Organisation:	Export and Finance Bank
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Organisation:	Capital Bank of Jordan
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7. LITERATURE

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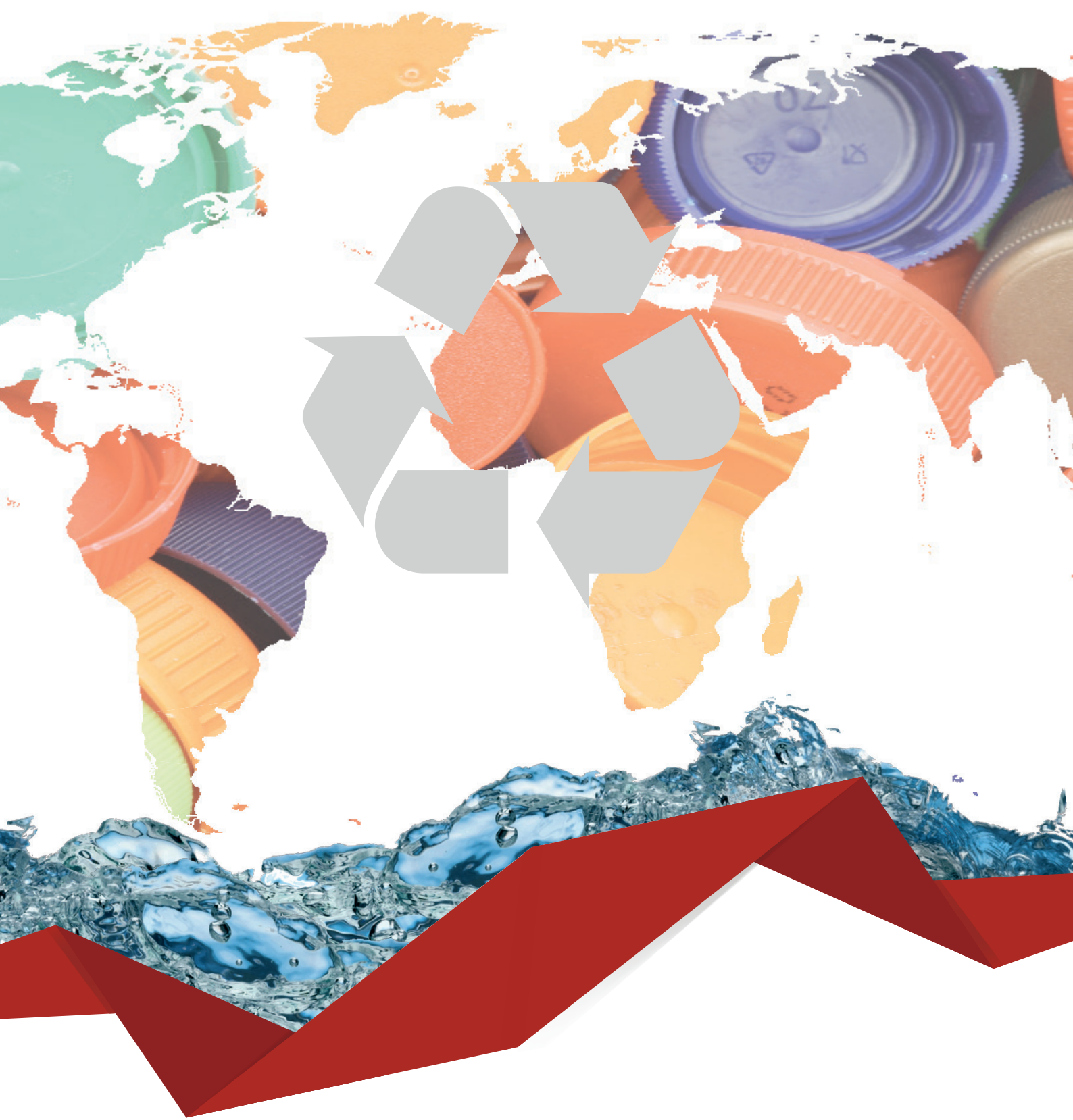
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