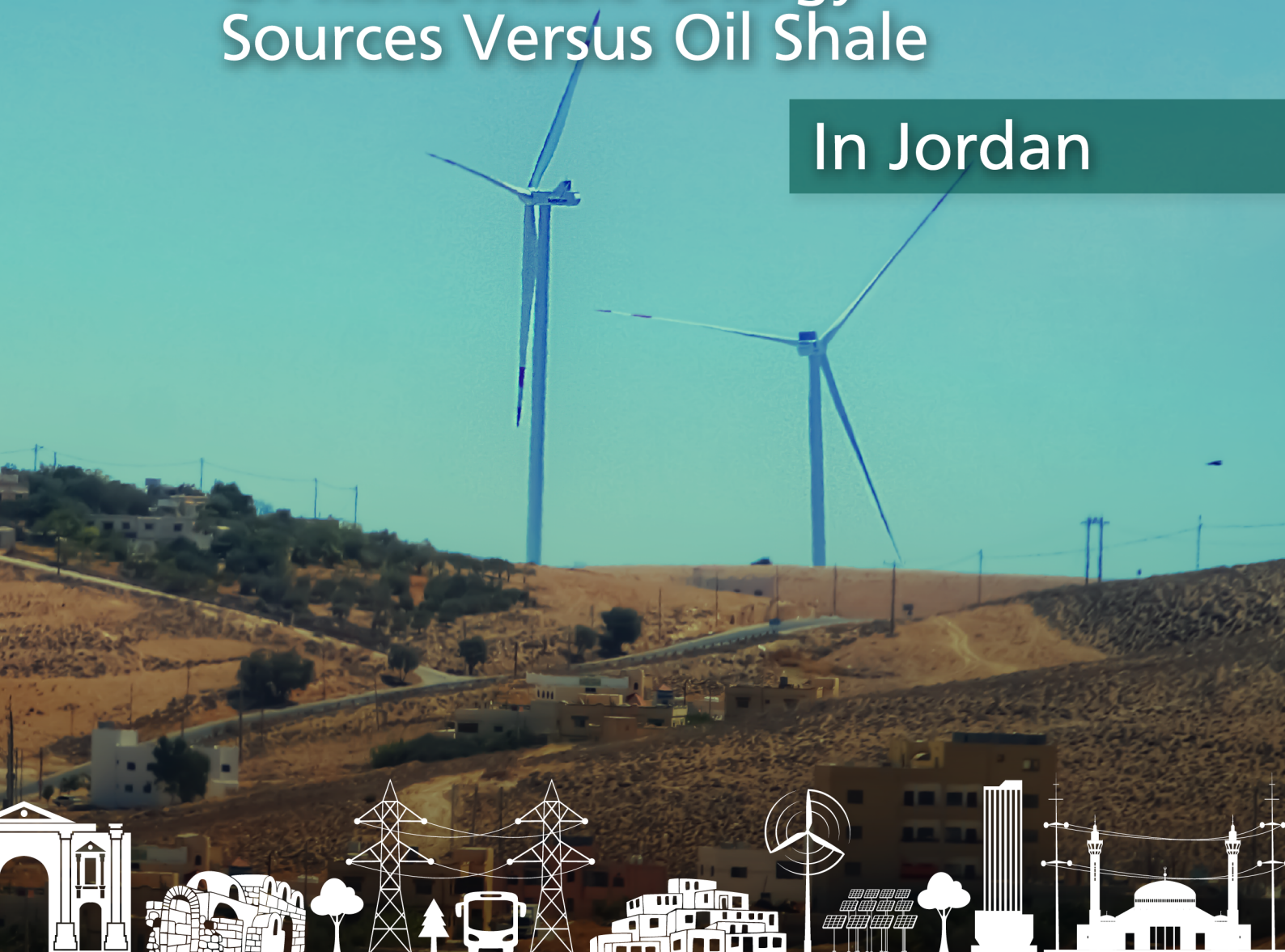


SOCIAL ACCEPTANCE

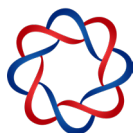
Of Renewable Energy
Sources Versus Oil Shale

In Jordan



Study on behalf of the Friedrich-Ebert-Stiftung — January 2021

**FRIEDRICH
EBERT
STIFTUNG**



Climate and Energy Project
مشروع الطاقة والمناخ

Authors:

Nadejda Komendantova
Leena Marashdeh
Ahmed Al-Salaymeh

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Komendantova, Nadejda

Social Acceptance Of Renewable Energy Sources Versus Oil Shale In
Jordan / Nadejda Komendantova, Leena Marashdeh,
Ahmed Al-Salaymeh; Translated by AbuGhazaleh Translation,
Distribution and Publishing Amman Friedrich-Ebert-Stiftung, 2021

() p.

Deposit No: 2021/3/1956

Descriptors: /Renewable Energy/Energy Sources/Energy Economics/

يتحمل المؤلف كامل المسؤولية القانونية عن محتوى
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جهة حكومية أخرى.



ISBN: 978-9923-759-31-8

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Cover photo by:

Jehad Albdour

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1

INTRODUCTION

Energy policy in Jordan is a contested issue considering availability of several electricity generation alternatives, recent increase in energy tariffs and public protests. Currently several technological options are in discussion by the government of Jordan, including oil shale and renewable energy sources. However, further deployment of renewable energy sources was slowed down because of patterns of electricity supply and demand as well as necessary further development of electricity grids.

Intensions from private households towards renewable energies are an important driver or barrier for the energy transition. Social acceptance in Jordan is crucial for further development of any kind of technology. For example, public protests against nuclear energy resulted in several changes of location of proposed power station (Goussous, 2019). Therefore, this research aims to address perceptions of inhabitants, especially in the regions which will be affected by deployment of renewable energy sources and oil shale, towards benefits of these technologies, but also towards perceived risks and impacts on environment and human health, as well as impacts in terms of costs of electricity and needed investment.

Our main research questions are the following:

- What is the level of awareness and information sources for oil shale and renewable energy sources?
- What are perceptions of risks and benefits of both technologies?

With our research we aim to evaluate intension and acceptance of private households towards oil shale and renewable energy sources, while evaluating essential for social acceptance factors, as well as perceptions of risks and benefits of both technologies.

Our research also aims to address correlations between the level of awareness about both technologies, expectations of socio-economic benefits and perceptions of risks (environmental, technical, social and economic), also including such factors as willingness to pay for electricity coming from various energy sources.

We are particularly interested in the perception of environmental impacts compared to perceived socio-economic impacts and views on deployment of energy infrastructure for local electricity consumption. Among them are the following: level of awareness about renewable energy and oil shale, in general, and about the planned projects, in particular, general attitudes and concerns towards renewable energy and oil shale projects, perceived costs and benefits of renewable energy and oil shale, perceived positive and negative impacts.

2 POLICY

2.1 ENERGY POLICY

The new energy strategy 2020 - 2030 was launched in 2020. According to the strategy, the major aims of Jordan are to achieve energy security, maximize the deployment of local energy resources, and reduce the cost of energy. For example, only in 2019, Jordan imported about (91%) of its energy needs at high costs (Ministry of Energy and Mineral Resources, 2019). The National Energy Strategy includes targets to increase the contribution of renewable energy and oil shale sources to the national energy supply. The new strategy states that in 2020 Jordan has 11% of its energy mix is from renewable energy, accounting to 21% in the electricity generation mix, and will reach to 31% in 2030. Currently 39% of the primary energy is being used to generate electricity and the 61% of the remaining energy is for transport, heating and industry. The locally produced energy share does not exceed 4.7% of the current total primary energy.

The Jordanian government settled targets for energy transition (EDAMA and FES, 2019). These targets were inspired by several works. The four-phase model, developed by Fishedick et al., (2020), Holtz et al., (2018) and Henning et al., (2015) for energy transition in Germany was one of the examples. According to this model there are four phases of energy transition:

Phase 1	Phase 2	Phase 3	Phase 4
Take-off RE: Introduction of renewable electricity into the electricity system and initial Signs of an accelerated diffusion.	System integration: Flexibility options and sector coupling become important to accommodate further increasing shares of renewable electricity. Renewable electricity starts to substitute fossil fuels and natural gas in other sectors than electricity.	PtF/G: Power-to-fuel/gas (PtF/G) applications enter the market and absorb increasing shares of 'surplus' renewables during times of high RE supply, but will also start to be linked with dedicated RE supply facilities for international cooperation and the creation of export market structures.	Towards 100% Renewables: the residual fossil fuels become fully replaced, also in sectors that are difficult to decarbonize. Export market structures will be expanded.

Jordan is currently at the end of Phase 1 and is entering into Phase 2, The share of renewable energy sources is still small and the grid expansion and retrofitting will take place through the next 10 years.

The National Energy Strategy 2020-2030 also includes oil shale as an alternative energy source to contribute to the electric power mixture with 15% of the electric energy consumed in Jordan in 2020 but it has been delayed because of COVID19 and some disputes with the Jordanian government. But the plans are that the electricity from oil shale to remain at 15% from the electricity mix for many years to come. This represents 8% of the Jordanian energy mix. Currently there is one oil shale project in the Attarat area to generate electricity by direct burning technology with a capacity of 470 MW. The project is being implemented by an Estonian company. Such projects require government guarantees through signing agreements to purchase the electric energy produced from these projects, while projects of oil production don't require such guarantees to purchase the produced oil. Other projects are still not confirmed to be implemented.

The Jordanian community participates in formulation of national energy strategy Energy directly and indirectly, through parliament council, academic institutions, media and other ways. There are also protests and issues with social acceptance towards certain projects and certain technologies. The activists protested in Amman in March 2019 against the gas deal with Israel is one example. The poll conducted by the University of Jordan's Centre for Strategic Studies across all Jordanian governorates found that 66.5% of respondents want this agreement to be scrapped. Following a direct vote and the preference of the majority, the Lower House of the Jordanian parliament passes in January 2019 a draft of law proposed by the Chamber's Legal Committee, which bans the import of Israeli gas to Jordan (Jordan Times, 2020). The Constitutional Court has ruled that the gas deal between the National Electric Power Company (NEPCO) and Noble Energy to import natural gas from Israel does not need Parliament's approval. In a ruling published recently in the Official Gazette, the court explained that the government is not required to refer the gas deal to the Lower House for approval as it was signed between two companies and not two states. The court's decision came in response to a request by the government in March to rule on the interpretation of Article 33 of the Constitution, (Jordan Times, Sep.2019).

2.2 AWARENESS RAISING

According to Jordan Oil Shale Energy –JOSE, there was a communication with the local communities from the beginning of the geological research phase and had local Jordanian contractors and employees on site. Some interviews were conducted by local media agencies with the local communities in Lajjun and are published to reflect their point of view in regard to oil shale projects.

A TV report was issued in 2014 by Amman.net (<http://tinyurl.com/yyl3p4mt>). The report includes interviews with local community in Lajjun, governmental representative, and a geologist. The interviewed resident was complaining on having intermittent electricity supply in his village while there is a plenty of Oil Shale in his area that could be exploited to cover his village needs from electricity. Another TV report was issued on October 2019 by the National Jordanian TV (<https://youtu.be/92ANf4qEE8o>). The report includes interviews with a representative from the local community in Attarat, the community liaison officer and the project consultant. The representative of the local community expressed his hope to create a large number of jobs for the local community, also he requested to establish a vocational training center to train the community on the needed skills to work in the project. According to community liaison officer, the area is very poor, and it suffers from high unemployment rate. He pointed that the local community was involved in the construction phase of the project, through working on the construction machines. He added that the company provides vocational and technical training programs for the local community. According to the project consultant, currently there is more than 2000 workers in the project and many of them are from the local community.

2.3 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENTS

In the last decade, the academic debate around energy transition and technologies, such as renewable energy sources or oil shale, has shifted from their economic and technical viability to political and social problems associated with projects' implementation. The diversity of socio-political challenges surrounding energy transition policies evinces the relevance of its social dimension (Komendantova et al., 2015; Komendantova et al., 2018).

Environmental Impact Assessments (EIA) can be considered as a risk governance mechanism and as a participatory governance tool because at its core is public participation of local stakeholders and lay people can comment on the outcomes (Koivurova & Lesser, 2016). The purpose of EIA is to reduce or prevent negative environmental impacts of projects that could have major impacts on land use. What is considered as "major" depends on the nature of the project under consideration and is case-specific. The EIA is not a decision-making procedure, but an evaluating and planning procedure for projects, which are assessed at the preparation stage.

Participation in environmental management such as in EIA and SIA enables local communities to provide feedback on possible environmental challenges of the projects but also about their social and economic concerns. One of the main aims of EIA is to encourage participation of different parties in the planning phase before project implementation, and before giving any (environmental) permission to implement the project. So basically, the EIA is a planning tool, and its outcomes can influence the project alternatives, i.e. the different possibilities to implement the project. It should provide possibilities for stakeholders and rights holders to participate in the planning process.

A Social Impact Assessment, in most jurisdictions and sectors, is implemented as a component of an Environmental Impact Assessment (EIA) (Momtaz, 2013; Hildebrandt & Sandhan, 2014). SIA was introduced with the goal of including information on the effects that projects have on the communities, providing inputs to improve the management of social relations in the private sector, and improving social benefits at the local level. The SIA is internationally defined as a study that seeks to understand the changes a project or policy can produce in the social sphere and its potential negative and positive impacts, including social (life forms, work, recreation, relations between people, and organization) and cultural aspects (values, beliefs, and norms that drive the way people perceive themselves and their community) (Vanclay, 2002; ICGPCIA, 1994). The SIA is conducted to provide information to governmental actors, companies, social actors, and communities about the sociocultural effects of a project in a specific context, with the objective of preventing and mitigating adverse impacts and maximizing positive impacts, as well as improving the management of relationship between the project and the community (Esteves et al., 2012; 2002; Burdge, 2003).

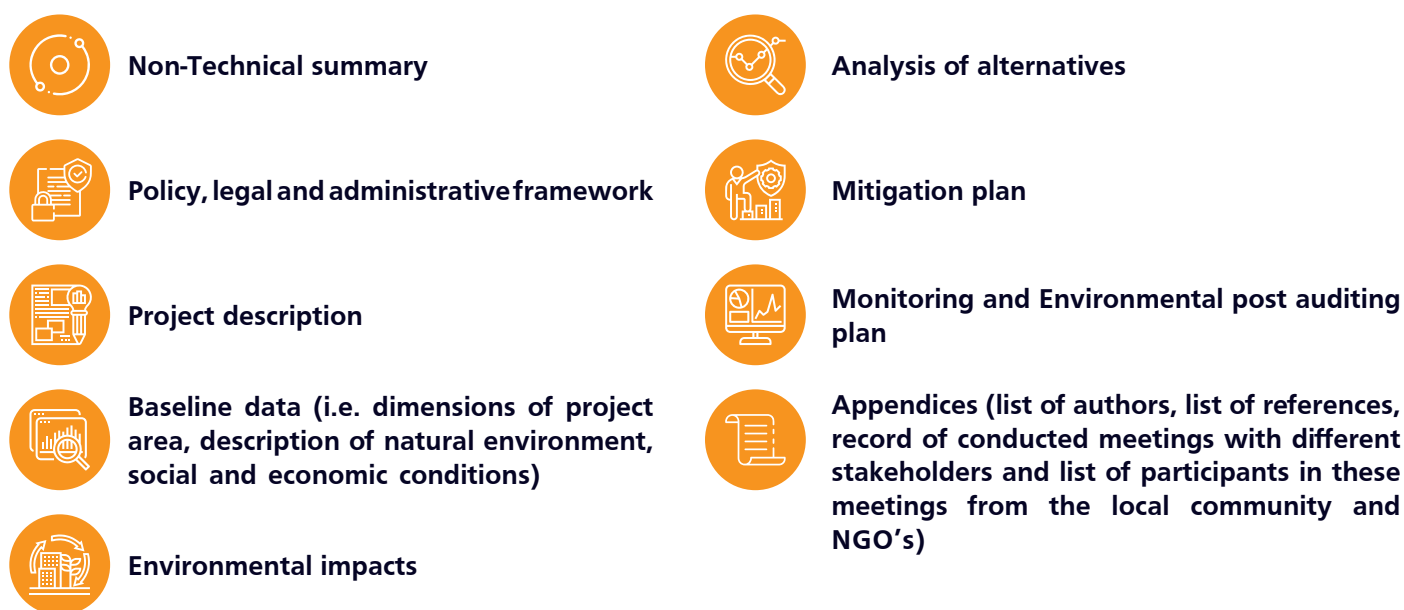
The Ministry of Environment (MOE) in Jordan, is responsible for supervising projects, monitoring their work progress and verifying the environmental safety of their implementation. Also, the ministry is responsible for the approval of environmental studies for the projects of public institutions, private institutions, and non-governmental associations. These bodies are obliged to submit periodic reports to the Ministry on the work of these Projects in financial and technical terms.

MOE issues the environmental regulations that regulates the environmental issues for projects in Jordan. No industrial or agricultural or commercial, or touristic, or housing project is permitted to commence its activities without getting environmental approval from MOENV. There are many regulations related to energy projects implementation (Ministry of Energy):

- | | | | | |
|--|---|--|--|---|
| ● Environmental Impact Assessment ("EIA") Regulation 37/2005 | ● Environmental Requirements for Electric Energy Generation from Oil Shale Regulation 75/2013 | ● Regulation for the Management of Hazardous and Dangerous Substances, Transport and Handling No. 24 of 2005 | ● Air Protection Regulation No. 28 of 2005 | ● Soil Protection Regulation No. 25 of 2005 |
|--|---|--|--|---|

According to MOE, the Environmental Impact Assessment term means any procedure that aims to define, describe and evaluate the impact of all project phases in terms of Environmental, Social and Economic aspects and to identify the possible ways to limit the negative impacts on the environment. Such assessment is prepared for the planning, design, implementation, operation and removal phases of the project parallel to the preparation of economic feasibility study (Environmental Impact Assessment ("EIA") Regulation 37/2005).

The Environmental Impact Assessment study should be concise and include the important environmental issues and its content should be proportional to the expected negative impacts of the project on Environment. It aims to address the project designers, its implementation companies, its owner, the affected local community, and the related non-governmental environmental institutions. The study should include:



In conclusion, the environmental impact study is a requirement for the new projects in Jordan and it considers the socioeconomic impacts. Different methods of participation procedure are used to involve stakeholders and residents in the process of energy projects development, such as Public Consultation meetings, scoping sessions and reports, and questionnaires.

According to the Article No. 8 in the Regulation no. 50 of 2015, it is required from the investors of RE direct proposals to include the required environmental studies in their offer for the project area (Ministry of Energy and Mineral Resources). Currently also the requirement for social impact assessment was included.

The use of renewable energy is associated with environmental issues such as land use, visual impacts, biodiversity, water use, air quality, noise, and the hazardous materials in their solid waste.

The major environmental concerns regarding oil shale exploitation is the generation a high percentage of ash as solid waste (50-60 %) with organic matter content up to 25% in average and a considerable percent of toxic trace metals. One of the major concerns is the leaching propensity of trace elements of the spent oil shale into both surface water and groundwater aquifers (Gharaibeh, 2017).

Attarat Umm Ghudran oil shale deposit as the shallow aquifer that underlies the El Lajjun deposit provides fresh water to Amman and other municipalities in central Jordan. According to Enefit company, a socio-economic evaluation was conducted by an independent body to determine the effects of the project, including direct and indirect economic benefits and the expected effects on the social structure.

According to the requirements of the Ministry of Environment (MoE), power purchase agreement with NRA, and approved EIA terms of reference approved by Ministry of Environment (MoE) in April 2011, The Company must prepare a comprehensive Environmental Impact Assessment for the power project and its associated mining activities. The EIA study was completed by PÖYRY MANAGEMENT CONSULTING in line with the requirements of the Jordanian Environmental Impact Assessment ("EIA") Regulation 37/2005, in addition to the requirements for

the social and environmental assessment of the Equator Principles and IFC Performance Standards, to identify environmental, social and health receptors susceptible to potential impacts as a result of the project activities (i.e. construction, operation and decommissioning). Pöyry has subcontracted Arabtech Jardaneh (AJ) to be the local Jordanian partner to help undertake a part in the activities of preparing the EIA Study (Pöyry Management consulting, 2013).

PÖYRY MANAGEMENT CONSULTING

based its socio-economic study on:

- Participatory consultative processes with local populations (sex and age disaggregated focus groups, public consultations and roundtable sessions).
- Socio-economic baseline survey of a sample of households in Al-Damkhi, Al-Qatranah, and a sample of nomadic herders utilizing the concession area; and Literature review of local and national socio-economic context.
- Stakeholder interviews were held with the local community, community and tribal leaders, government officials and civil society organisations. Relevant stakeholders in Amman were also interviewed including government bodies, NGOs and donors that work in sectors or on projects relevant to the socioeconomic study of this project.

Also, JOSCO company has a dedicated community liaison officer who constantly engages with local governmental agencies, local communities, civil society, research bodies, universities and other stakeholders in order to build constructive, collaborative and enduring relationships.

3 TECHNOLOGIES

3.1 RENEWABLE ENERGY SOURCES

Jordan has abundant renewable energy resources, including solar and wind energies. Jordan has favorable conditions for deploying solar power in terms of sunshine duration and solar radiation. Long hours of sunshine can also guarantee longer hours of electricity generation. The solar irradiance ranges between 5 and 7 KWh/m². The majority of the regions in Jordan offer direct normal insolation (DNI) above 2,000 KWh/m²/yr. The best sites, which are in the south, exceed 2,300 kWh/m²/yr (Al Zou'bi, 2010). The areas of Ma'an and Aqaba have the highest levels of solar irradiance in the country and globally, ranging between 6-7 KWh/m² and 1.2-1.35 KWh/m² for diffuse irradiance (Al-Sayed, 2013).

The generation capacity of renewable energy projects carried out on the transmission and distribution grids reached about (1470) MW by late 2019, representing about (25.7%) of the total generation capacity. The total share of renewable energy represented by 1100.5 MW from Solar Energy, 369.6 MW from Wind Energy, 12 MW from Hydro energy and 3.5 MW from Biogas (National Electric Power Company, 2019).

Different types of solar systems are in use in Jordan. Small stand-alone PVs and large grid-connected PV systems are used for heating water in households, for electricity in educational, public buildings and commercial institutions, water pumping systems, and agricultural applications such as greenhouses. Several solar projects in Jordan are in planning and under construction.

3.2 OIL SHALE

Jordan has the 8th largest oil shale resource in the world. Estimates show that the volumes of oil shale resource consist of 40 to 70 billion tons (World Energy Council, 2007; NEPCO, 2018). Almost 70% of its territory contains oil shale deposits with good quality marinite oil shale. Jordanian oil shale is generally of a good quality, with relatively low ash and moisture contents, a gross calorific value of 7.5 MJ/kg, and an oil yield of 8 to 12%. The quality of the Jordanian oil shale can be compared to the quality of the oil shale in the western of the United States.

The most important resources are in the west-central Jordan. In this part of the country the resources are also close to the surface and infrastructure. The majority of these resources are suitable for open cast mining. In this part Jordan has eight important oil shale reserves (Juref ed Darawish et al.,). All of them are located 20 to 75 km from the east of the Dead Sea. Other resources are in Yarmouk nearby the Jordanian northern border and in the Ma'an area in the south of Jordan.

More than 50 billion tons are located in the central part (Fig. 1), and with unlimited oil shale quantities are reported in the north of the country (Alnawafleh et al., 2015). The identified oil shale resources are enormous and will cover the Jordan's energy need for hundreds of years (Besieso, 2007; Alnawafleh et al., 2015).

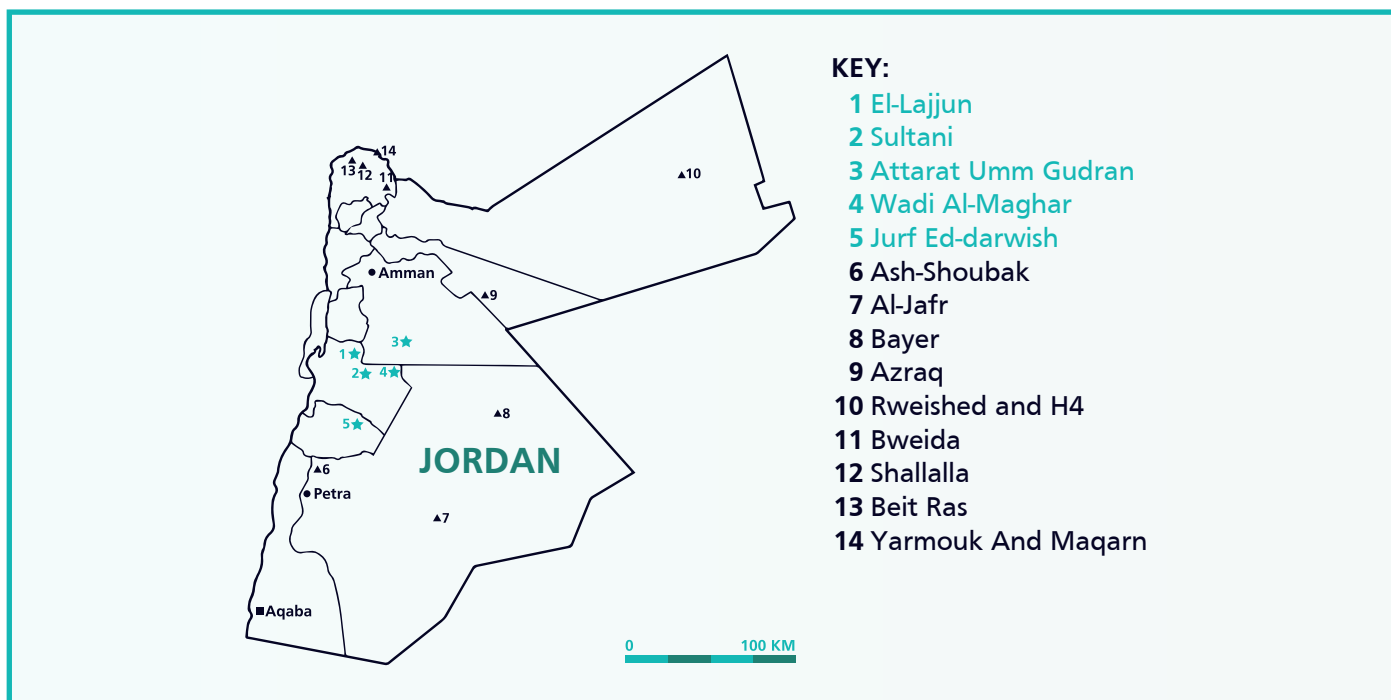


Figure 1: Oil Shale distribution in Jordan. Central Jordan oil shale deposits are highlighted in stars.

Source: Alnawafleh et al., 2015

Jordan has a long history of exploration of oil shale however despite several geological missions this technology still hasn't reach the market scale. Oil shale was known in Jordan since ancient time. The modern exploration started during the Ottoman empire. The first geological survey of oil shale reserves was conducted by the German Geological Mission in 1968 with the focus on El Lajjun area. This was followed by several other studies realized by Germans, Russian, Chinese and Americans during the period 1968-1999.

The first discussions about extraction of oil shale started in 2000ies when the Jordanian government signed memorandum of understanding with a number of international energy companies. In 2006 it was the Estonian energy company Eesti Energia which was awarded an exclusive right to study one third of the resources at the El Lajjun deposit. Later this right was also transferred to cover the Attarat Umm Ghudran oil shale deposit. During the same year a memorandum of understanding was signed with Royal Dutch Shell the Azraq and Al-Jafr blocks of central Jordan. Also in 2006 the Jordanian government signed a memorandum of understanding with Saudi Arabian International Corporation for Oil Shale Investment also to evaluate El Lajjun deposit and Attarat Umm Ghudran resources. In 2007 a memorandum of understanding was signed with the Brazil Petrobras for exclusive right to study a block at the Attarat Umm Ghudran deposit. Couple of years later also Russian and Abu Dhabi companies showed their interest. A memorandum of understanding was signed with the Russian Inter RAO UES company in 2009 and with the Abu Dhabi National Energy Company.

The Jordanian companies are also active on the market. The Jordanian Oil Shale Company, which is a subsidiary of the Shell company, signed agreement in 2009 to start operations in 12-20 years. The Karak International Oil, which is a subsidiary of the Jordan Energy and Mining company signed concession agreement with the Jordanian government in 2011 to build an oil power plant in El Lajjun in 2015. In 2005 the Jordan Cement Factories Company signed the memorandum of understanding to utilize El Lajjun oil shale for cement production.

According to Ministry of Energy and Mineral resources, oil shale is exploited in Jordan through three methods, which are:

- Oil shale heating to produce oil in which the heating of oil shale is conducted underground. The heating products are pumped to the surface. Depending on the underground heating process and the type of kerogen, the obtained oil has to be stabilized and upgraded before further refinement or can be directly used as a refinery feedstock.
- Oil shale distillation by surface mining to produce oil in which the heating of oil shale is conducted aboveground. Surface processing includes three steps:
 - (1) mining of the oil shale and ore preparation,
 - (2) thermal processing or retorting, and
 - (3) processing of the oil shale to obtain a refinery feedstock and value-added by-products.
- Direct burning of oil shale to generate electricity. This technology is a direct combustion of oil shale to produce hot water, steam, and electricity.

4 PROJECTS

The comprehensive national strategy of energy and electricity sector in Jordan addressed the importance of enhancing the contribution of the local energy sources in the total energy mix, the aim is to increase the contribution of renewable energy to the electricity mix to around (20%) by 2020 to around (31%) by 2030 and introducing oil shale by an amount of 15%.

Currently, the energy sector suffers from different problems such as excess in generation capacity. The generation capacity of Jordan electrical system reached about (5728) MW at the end of 2019, including the generation capacity of renewable energy projects on the distribution grid, which reached about (460) MW, compared to (5236) in 2018 with a growth ratio of (7.1%). However, the peak load of the electrical system in 2019 is (3380) MW, while was (3205) MW in 2018. This is expected to increase by (3.0%) in 2020 and (2.8%) annually, based on the results of the Electricity Demand Forecast Study for the period 2019-2040 (NEPCO, 2019). EDAMA and FES report (2019) recommends to electrify energy, by a set of strategies, such as incentivizing increased dependency on electricity, working on the level of legislations that contribute in 'electrifying' all sectors, and lowering conventional generation capacities.

Another problem is the unstudied quantities of contracted fuel. Jordan is committed to long-term agreements to purchase fuel - particularly gas and, produces electricity form electricity generation power plants out of fossil fuel. To mitigate this problem EDAMA report suggest giving the opportunity to industries to benefit from excess imported gas, at cost, and reduce taxation. In addition, the electricity grid is going through some complications that are connected to increased capability alongside electricity generation and limited grid capacity.

Moreover, energy sector structure is currently following the single buyer model. NEPCO currently acts as a single buyer of electricity in Jordan, which means it purchases electricity from different sources and sells it to distribution companies. This model decreases the competitiveness of the generation and distribution sectors, while increase public sector born risks. Experts recommend the opening the market for competitiveness, increase flexibility within upcoming contracts in a way that increases competitiveness, and work on short-term pricing methodologies, towards operating electricity power plants.

4.1 RENEWABLE ENERGY SOURCES

The new strategy was benefiting from many documents. One of them was a report prepared by the EDAMA association in cooperation with the Friedrich Ebert Stiftung (2019). This report presents recommendations for energy sector strategy that reflects the opinions of the private sector, non-governmental agencies and academic institutions. The report is focusing mainly on "maximize local resources share in the total energy mix". The local resources in the report namely represent renewable energy resources from solar, wind and bioenergy, in addition to energy efficiency and energy saving . According to this report, the share of renewable energy

sources (RES) is still small. The grid expansion and retrofitting has not yet been accomplished and are the major barrier for further deployment of RES. Currently the RES sector is not growing much due to investment insecurity and the lack of clear policy directions.

Recently, there has been a remarkable dependence on renewable energy in Jordan as several projects in this area were achieved and several energy purchase agreements were concluded paving the way for future projects in such field, which include the use of storage systems to ensure stability of the electrical power system.

The major achievements in renewable energy projects in Ma'an and Tafila are shown in the following table 1:

	LOCATION	PROJECT NAME/COMPANY	CAPACITY (MW)	OPERATION DATA
WIND ENERGY PROJECTS	Tafila	Tafilah Wind Farm	117	SEP/2015
		Mass Energy	100	Dec/2019
		Abour Energy Company OSC (Xenel)	50	2021
		Daehan (KOSPO)	50	2021
	Ma'an	Al-Hussein wind project Elecnor/ Ma'an	80	Sep/2016
		Green Watt	86	Oct/2018
		KEPCO	89	Jul/2019
		Alcazar	45	Oct/2020
SOLAR ENERGY PROJECTS	Ma'an	Saqr Maan Solar Energy Company	20	2016
		Ennera Company	10	2016
		Shams Maan Company	50	2016
		Anwar Company	20	2016
		Alzanbaka Company	10	2016
		Zahret Al-Salam Company	10	2016
		Al-Ward Joury Company	10	2016
		Ard AlAmal Company	10	2016
		Adwaa Maan Company	20	2016
		Scatec Solar Company	10	2016
		Philadelphia Solar	50	2021

Table 1: Renewable energy projects in Ma'an and Tafila

Tafilah Wind Farm was the first commercial utility-scale wind power project in the Middle East, and largest privately financed wind farm in the Hashemite Kingdom of Jordan. The Tafilah wind farm was developed by Jordan Wind Project Company, a co-development partnership between InfraMed (50%), Masdar (31%) and EP Global Energy (19%). A comprehensive Environmental and Social Impact Assessment (ESIA) was conducted for the project, in accordance with applicable Jordanian Environmental permitting guidelines, and international best practice. The project area is hilly and heavily eroded, and it is located 5.5 km away from Dana Biosphere, which is Jordan's largest nature reserve. Generally, the study expected low impacts of the project on different environmental aspects.

Mass Energy project is located in Al-Tafila Governorate within Al-Halsa province about 130 km south of the capital Amman, approximately 10 km west of the main road No. 15 (Desert Road) and near the main road No. 60, which connects the Darwish with the city of Tafila and the total area of the project land is 10.467 million square meters. An Environmental impact study was conducted for the project.

4.2 OIL SHALE

There are two types of investment agreements in oil shale for surface mining distillation projects:

- **Memorandum of Understanding:**
for the stage of exploration and preparation of the primary economic feasibility.
- **Concession agreement:**
that covers construction, development and production stage.

The process of signing the investment agreement in oil shale, passes through two stages, the Memorandum of Understanding, which is the stage of exploration and preparation of the primary economic feasibility, and the second stage is the "concession agreement", which is the stage of construction, development and production.

The Ministry has signed 4 concession agreements for shale investment with four companies, namely Jordan Oil Shale Company (JOSCO), Karak International Oil Company, Saudi Arabian Oil Shale Company, and Jordan Oil Shale Company.

In addition, the Ministry of Energy signed 11 memoranda of understanding with other companies to extract oil shale, 4 of them withdrew due to high oil prices globally before reaching the concession stage. The ministry also terminated memoranda of understanding with 5 companies, because of the lack of commitment to the terms of the memorandum, in addition to the failure to fulfill its requirements.

COMPANY	PROJECT LOCATION	OIL SHALE EXPLOITATION METHOD	CAPACITY	PHASE
Jordan Oil Shale Energy -JOSE Company (owned by the Estonian Company Enefit / Malay / Jordan)	Attarat um Ghudran	Oil shale fired power plant	470MW	Under construction Operational by 2020
	Attarat um Ghudran	Oil shale production plant	40,000 barrels daily= 40% of Jordan's current daily energy	Engineering and testing phase
JOSCO Company owned by Shell Company	NA	In Situ Conversion Process (ICP)" technology	NA	Engineering and testing phase
Karak International Oil Company "KIO"	Lajoun	Surface distillation for oil production technology of the Alberta Taciuk process (ATP)	25,000 barrels a day	Engineering and testing phase. The agreement was amended in 2018 extending the pre-development phase upon the global oil price drop.
SACOS Company (Saudi Arabian Company for oil shale) owned by a Saudi investor	Attarat	Surface distillation for oil production	9,000 barrels/day, ramping up to a production capacity of 30,000 oil barrels/day by 2028	Under construction Operational by 2022. Specific articles in the agreement were amended in 2018 according to the project special requirements.

Table 2: Summary of oil shale projects with concession agreements

The government also has signed 8 Memoranda of Understanding “MoU” with many international and local companies for investigating the possibility of retorting oil shale to produce oil as shown in the following table.

COMPANY	PROJECT LOCATION	OIL SHALE EXPLOITATION METHOD	CAPACITY	PHASE
Shale Energy (JOSECO)	Sultani area	Russian technology	50,000 barrels per day	NA
Global Oil Shale Holdings Inc. (GOSH)	Attarat Umm Ghudran and Isfir Al Mahatta	amended Brazilian technology	50,000 barrels per day	NA
Al Qamer for Energy & Infrastructure Ltd. Co.	Attarat	produce synthetic crude oil using Canadian technology and generate power from oil shale	NA	NA
Questerre Energy Company	Al jafer and Isfir Al Mahatta	In capsule technology	NA	NA
AL-Lajjun Company	Attarat area and Al Lajjun	Russian technology	30 000 barrels per day	NA
APCO company for oil shale (Aljonoub Company for oil shale)	Na’dyya area	Russian technology	NA	NA
Whitehorn Canadian company	Wadi Abu Hamam area	In capsule technology	50,000 barrels per day	NA
Fushun Mining Group	Na’dyya area	Chinese technology	NA	NA

Table 3: Summary of oil shale projects with MoU agreements

The first electric power plant with direct burning of oil shale is being implemented by Attarat Energy Company (coalition of Chinese, Malaysian and Estonian companies) with a generation capacity of (470) MW and an investment cost of (2.2) billion dollars. The plant will contribute up to (15%) of the Kingdom’s needs of electricity and it is expected to be operational within 2020 (NEPCO, 2018).

In 2014 the government signed an agreement with the Estonian company ENEFIT for the construction of the Attarat power station with a capacity of 470 MW, burning oil shale, at an estimated investment costs of US\$2.1 billion (Enefit, 2017). Another project is the Al Lajjun power station, located in the state of Karak. In 2015 Jordan signed a deal with China that would provide funding for the project.

Attarat project for oil shale provided more than 1000 jobs for Jordanians during the construction phase and worked with more than 30 local companies from the largest companies operating in the Kingdom in various sectors, during 30 months of work.

The estimated saving of the project after the start of the project is about \$ 300 million due to the decline of gas imports after the entry of energy produced from oil shale on the grid, and relying on a local energy source at a time when Jordan has reserves of oil shale up to about 70 billion tons. Al-Attarat Company pays a government fee called (Royalty Fees) of JD (1.5) per ton. The variable cost of the oil shale project is about (1.0) US cents per kilowatt. On the other hand, renewable energy projects pay a cost of (10.0) US cents per kilowatt as storage cost (NEPCO, 2019).

5 Methodology

The theoretical basis of this research is in the Theory of Planned Behavior, which also uses comprehensive socio-psychological models to understand factors which influence public acceptance and willingness to use renewable energy sources. This theory is an extended version of the Theory of Reasoned Action which postulates that a person's actual behavior in performing certain action is directly guided by his or her behavioral intentions. The behavioral intention is jointly determined by attitudes, subjective norms and perceived behavioral control. The socio-psychological models developed in frames of these theories also include moral norms as internal moral rules or values motivated by anticipated self-administered rewards or punishments.

The focus of the proposal is to identify drivers of local public acceptance and opposition towards the renewable energy sources and oil shale in Jordan. Therefore, the methodology of this proposal is based on the large-scale survey with inhabitants of communities nearby existing or planned renewable energy and oil shale infrastructure.

In the academic literature a variety of terms are used to describe acceptance issues. These terms are often used inconsistently or interchangeably although they refer to different notions. The vocabulary includes public perception, acceptability, awareness, willingness-to-pay, readiness to use renewable energy appliances, and public support. We consider the term acceptance to include a range of potential attitudes towards renewable energy technologies that are other than active opposition, including apathy, passive acceptance, approval, and finally active support. Such acceptance can take place in political spheres, in markets, and in communities.

The empirical data collection took place in four communities where infrastructure is under planning, construction or operation. Two of these communities had renewable energy projects such as wind and solar (Ma'an and Tafileh) and other two communities had projects on oil shale extraction and power generation (Lajoun in Karak governate, Attarat and Um Alrasas on the borders of south of Amman).

The main data gathering instrument is a survey administered to citizen. The survey is based on the interview protocol. The interview protocol included separate questions for oil shale and renewable energy sources. However, each protocol had a common part which would allow comparison of results but also specific questions. The interview protocol included multiple choice questions as well as open and semi-open questions. The interview protocol also included ranking questions. The questions were developed based on available literature on acceptance and attitudes towards technologies and identified by this literature drivers.

The main questions behind this research are what the drivers of acceptance for renewable energies versus oil shale are. We are particularly interested in the perception of environmental impacts compared to perceived socio-economic impacts. Among them are the following: level of awareness about technology, in general, and about the planned project, in particular, general attitudes and concerns towards projects, perceived costs and benefits of renewable energy and oil shale, perceived positive and negative impacts etc.

We conduct our survey with inhabitants of communities around planned renewable energy and oil shale infrastructure projects. The respondents were chosen randomly. The sampling included equal groups in terms of age and sex distribution. The sampling size of 200 people allows us making robust conclusions. The interviews were conducted between during summer 2020 and each interview lasted for approximately 30 minutes. The interviews were conducted in Arabic language by the team of interviewers consistent of five people. The interviews were conducted in person when the team of interviewers went personally to all case communities. Further on, the responses from interviews were entered into a unified database. Data were evaluated with the help of existing statistical programs and methods of analysis.

6 RESULTS

6.1 LAJOUN

6.1.1 Social acceptance

People surveyed are completely in favor (45%) and in favor (38%) of oil shale projects in Jordan. But the rate of people who did not express their opinion (18%) or skipped this question (22%) was also high. Nobody mentioned that he or she would be against the oil shale in Jordan (table 4).

ANSWER CHOICES	RESPONSES	
Completely in favour	45.00%	18
In favour	37.50%	15
Neither in favour nor against	17.50%	7
Against	0.00%	0
Completely against	0.00%	0
Total		40

Table 4: Social acceptance of oil shale projects in Jordan (Question: How do you feel about oil shale projects?)

A significant share is completely in favor (30.77%) or in favor (46%) of oil shale projects, in general in Jordan, but 21% did not express their opinion (Table 5).

ANSWER CHOICES	RESPONSES	
Completely in favour	30.77%	12
In favour	46.15%	18
Neither in favour nor against	20.51%	8
Against	0.00%	0
Completely against	2.56%	1
Total		39

Table 5: Social acceptance of oil shale projects in own community (Question: How do you feel about oil shale projects in your own community?)

A lower share of surveyed people is supporting large-scale projects. Only 16% are very much in favor of large-scale energy projects and 30% are somewhat in favor. 20% are against large scale projects and 18% are not supporting large scale infrastructure (table 6).

ANSWER CHOICES	RESPONSES	
Yes, very much	16.00%	8
Yes, somewhat	30.00%	15
No, very little	18.00%	9
No, not at all	20.00%	10
Don't know or not sure	16.00%	8
Total		50

Table 6: Social acceptance of large-scale infrastructure projects (Questions: How do you like large-scale projects in general in your country?)

Based on the survey energy security and low electricity prices are the main factor of acceptance for oil shale in Jordan as people think that the low electricity prices are the most important factor of electricity generation (53%), followed by being independent from imports from other countries (49%), reliability of providing electricity without interruptions (39%), safety of technology (31%). The avoiding negative environmental impacts is the least priority (25%) (table 7).

	Most important	Very important	Important	Little important	Not Important	Total	Weighted Average
Low electricity prices	52.94% 27	31.37% 16	11.76% 6	3.92% 2	0.00% 0	51	4.33
Safety of the technology	31.37% 16	43.14% 22	25.49% 13	0.00% 0	0.00% 0	51	4.06
Reliability of providing electricity without interruption	39.22% 20	37.25% 19	15.69% 8	7.84% 4	0.00% 0	51	4.08
Avoiding negative environmental impacts	25.49% 13	39.22% 20	29.41% 15	3.92% 2	1.96% 1	51	3.82
Being independent from imports from other countries	49.02% 25	35.29% 18	9.80% 5	3.92% 2	1.96% 1	51	4.25

Table 7: Ranking of criteria for their importance regarding electricity generation in Jordan (Question: In your opinion, what is the most important about electricity generation?)

Majority of people in Lajoun (72%) think that oil shale is important for Jordan to become independent from energy imports. They also think that oil shale power station will provide a reliable source of electricity to their community (64%). However, they also think that renewable energy sources will provide a reliable source of electricity for their community (62%). They also think that new energy infrastructure in their community will be constructed according to the public regulations (44% fully agree and 36% somewhat agree). People also think that it is important to involve inhabitants into decisions regarding large scale infrastructure (32% fully agree and 42% somewhat agree) (table 8).

	I FULLY AGREE	I SOMEWHAT AGREE	I NEITHER AGREE NOR DISAGREE	I SOMEWHAT DISAGREE	I FULLY DISAGREE	TOTAL	WEIGHTED AVERAGE
I am worried that new infrastructure projects will not be completed.	28.00% 14	36.00% 18	24.00% 12	10.00% 5	2.00% 1	50	3.78
The oil shale plant will provide a reliable source of electricity for our community.	64.00% 32	28.00% 14	6.00% 3	0.00 0	2.00% 1	50	4.52
Renewable energy will provide a reliable source of electricity for our community.	62.00% 31	20.00% 10	16.00% 8	0.00 0	2.00% 1	50	4.4
It is important that the local population is consulted on decisions about large scale infrastructure.	32.00% 16	42.00% 21	20.00% 10	2.00% 1	4.00% 2	50	3.96
It is not necessary that the population is informed about the details of large-scale infrastructure project.	14.00% 7	26.00% 13	32.00% 16	16.00% 8	12.00% 6	50	3.14
New energy infrastructure in my community is constructed according to public regulations.	44.00% 22	36.00% 18	10.00% 5	4.00% 2	6.00% 3	50	4.08
Shale oil is important for Jordan to become independent from energy imports.	72.00% 36	14.00% 7	12.00% 6	0.00 0	2.00% 1	50	4.54

Table 8: Perceptions of benefits of new energy infrastructure (Question: I will now read to you a set of statements, please tell me how you feel about them on a scale from 1-5 (where 1=I fully disagree and 5=I fully agree))

6.1.2

Awareness and information

The majority of people in Lajoun (63%) are aware of the oil shale power station which is planned in Jordan but they (78%) are not aware of any public information campaign for the oil shale power station. Also, many people (59%) are aware that oil shale power station is planned in the vicinity to their community. Interestingly a larger number of people (59%) is not aware that oil shale extraction projects are planned in Jordan. The bigger share of people (54%) is also not aware of any public information campaign for oil shale extraction projects.

At the same time people feel that they are not well informed about oil shale power station. Many (32%) say that they are not informed at all or badly informed (10%). 34% are somewhat informed. Only 8% feel that they are well informed and 16% have no opinion about this issue (table 9).

ANSWER CHOICES	RESPONSES	
Well informed	8.00%	4
Somewhat informed	34.00%	17
Neither well nor badly informed	16.00%	8
Badly informed	10.00%	5
Not at all informed	32.00%	16
Total		50

Table 9: Level of being informed about oil shale power station (Question: How well informed do you feel about the oil shale power station?)

Even though many people said that they were not aware that oil shale extraction projects are planned in Jordan, they think that they are well informed (52%) and somewhat informed (34%) about oil shale extraction projects in general (table 10).

ANSWER CHOICES	RESPONSES	
Well informed	52.00%	26
Somewhat informed	34.00%	17
Neither well nor badly informed	12.00%	6
Badly informed	2.00%	1
Not at all informed	0.00%	0
Total		50

Table 10: Level of awareness about oil shale extraction projects in general (Question: How well informed do you feel about the oil shale extraction projects?)

People in Lajoun are more critical regarding information from various sources than people in other studied by this research communities. It seems that scientists are the most trustful source of information, 65% of people have some trust to scientists and the rate of people who don't have trust to this source of information is the lowest. Also, project developers enjoy some trust (37%). At the same time politicians have the lowest level of trust (49%) as well as foreign investors (29%), NGOs (27%), mass media (25%) and international institutions (24%) (table 11).

	Complete Trust	Some Trust	Little Trust	Very Little Trust	No Trust	Total	Weighted Average
Mass media	9.80% 5	21.57% 11	31.37% 16	11.76% 6	25.49% 13	51	2.78
Scientists	15.69% 8	64.71% 33	11.76% 6	5.88% 3	1.96% 1	51	3.86
Project developers	6.12% 3	36.73% 18	32.65% 16	12.24% 6	12.24% 6	51	3.12
International institutions (UN etc.)	9.80% 5	17.65% 9	27.45% 14	21.57% 11	23.53% 12	51	2.69
Foreign investors	9.80% 5	19.61% 10	29.41% 15	11.76% 6	29.41% 15	51	2.69
NGOs	7.84% 4	27.45% 14	27.45% 14	9.80% 5	27.45% 14	51	2.78
Politicians	0.00% 0	17.65% 9	15.69% 8	17.65% 9	49.02% 25	51	2.02

Table 11: Trusted sources of information (Question: How much do you trust information from the following sources?)

Even though people don't trust mass media, almost a half of them get information about oil shale power station from government-controlled media like TV, newspapers, radio or internet sites, followed by private media (17%) and social media (13%). Friends and family is the less important source of information (11%). Information campaigns from NGOs (9%), local or national authorities (6%) or international developers (6%) rank at the bottom in terms of importance (table 12).

	1	2	3	4	5	6	7	Total	Score
Media (internet, newspapers, tv, radio) – government controlled	45.00% 18	22.50% 9	7.50% 3	2.50% 1	2.50% 1	2.50% 1	17.50% 7	40	5.28
Media (internet, newspapers, tv, radio) – private	17.14% 6	34.29% 12	17.14% 6	8.57% 3	5.71% 2	11.43% 4	5.71% 2	35	4.91
Friends and family	11.11% 4	11.11% 4	16.67% 6	22.22% 8	8.33% 3	11.11% 4	19.44% 7	36	3.83
Information campaigns by local or national authorities	6.25% 2	9.38% 3	25.00% 8	9.38% 3	21.88% 7	15.63% 5	12.50% 4	32	3.72
Information campaigns by developers	6.25% 2	3.13% 1	12.50% 4	25.00% 8	28.13% 9	15.63% 5	9.38% 3	32	3.5
Information campaigns by NGOs	8.82% 3	5.88% 2	8.82% 3	8.82% 3	23.53% 8	26.47% 9	17.65% 6	34	3.18
Social media (e.g. Facebook, twitter, blogs, etc.)	13.16% 5	10.53% 4	7.89% 3	15.79% 6	7.89% 3	13.16% 5	31.58% 12	38	3.39

Table 12: Source of information about oil shale power station (Question: Where do you get information about the oil shale power station?)

The same situation is also for information sources regarding oil shale extraction projects. The bigger share of people receives information from government-controlled media (49%). Private media (15%) and social media (13%) are two other important information sources (Table 13).

	1	2	3	4	5	6	7	Total	Score
Media (internet, newspapers, tv, radio) – government controlled	48.98% 24	10.20% 5	8.16% 4	8.16% 4	4.08% 2	4.08% 2	16.33% 8	49	5.14
Media (internet, newspapers, tv, radio) – private	14.89% 7	27.66% 13	14.89% 7	12.77% 6	10.64% 5	8.51% 4	10.64% 5	47	4.55
Friends and family	10.64% 5	25.53% 12	21.28% 10	17.02% 8	12.77% 6	6.38% 3	6.38% 3	47	4.6
Information campaigns by local or national authorities	4.26% 2	10.64% 5	31.91% 15	17.02% 8	4.26% 2	17.02% 8	14.89% 7	47	3.83
Information campaigns by developers	4.26% 2	10.64% 5	12.77% 6	25.53% 12	29.79% 14	10.64% 5	6.38% 3	47	3.77
Information campaigns by NGOs	2.08% 1	6.25% 3	8.33% 4	10.42% 5	31.25% 15	31.25% 15	10.42% 5	48	3.02
Social media (e.g. Facebook, twitter, blogs, etc.)	12.50% 6	8.33% 4	2.08% 1	8.33% 4	6.25% 3	22.92% 11	39.58% 19	48	2.85

Table 13: Sources of information about oil shale extraction projects (Question: Where do you get information about the oil shale extraction projects?)

6.1.3 Expected impacts

Many people think that the oil shale power station will have positive (37%) and very positive (27%) socio-economic impacts for their lives. Many people (24%) expect no impacts. The number of people who think that impacts will be negative (8%) and very negative (4%) is minor (table 14).

ANSWER CHOICES	RESPONSES	
Very positive socio-economic impacts	27.45%	14
Somewhat positive socio-economic impacts	37.25%	19
No socio-economic impacts	23.53%	12
Somewhat negative socio-economic impacts	7.84%	4
Very negative socio-economic impacts	3.92%	2
Total		51

Table 14: Expected socio-economic impacts (Question: How do you think your life will be impacted by the oil shale power station?)

These expectations are even more positive regarding impacts on entire Jordan. People think that these impacts will be positive (33%) and very positive (33%). 24% could not answer this question. The number of people who think that impacts will be negative (6%) and very negative (4%) is minor (table 15).

ANSWER CHOICES	RESPONSES	
Very positive socio-economic impacts	33.33%	17
Somewhat positive socio-economic impacts	33.33%	17
No socio-economic impacts	23.53%	12
Somewhat negative socio-economic impacts	5.88%	3
Very negative socio-economic impacts	3.92%	2
Total		51

Table 15: Expected impacts from oil shale power station for entire Jordan (Question: How do you think will Jordan be impacted by the oil shale power station?)

The situation is similar for oil shale extraction projects. Many people expect very positive (64%) and somewhat positive socio-economic (20%) impacts for their lives from implementation of oil shale extraction projects. Nobody expects that oil shale extraction projects will have negative impacts (table 16).

ANSWER CHOICES	RESPONSES	
Very positive socio-economic impacts	64.00%	32
Somewhat positive socio-economic impacts	20.00%	10
No socio-economic impacts	16.00%	8
Somewhat negative socio-economic impacts	0.00%	0
Very negative socio-economic impacts	0.00%	0
Total		50

Table 16: Expectations of socio-economic impacts for own life (Question: How do you think your life will be impacted by the oil shale extraction projects?)

People are also positive in expectations of socio-economic impacts from oil shale extraction projects for their community. 66% expect very positive and 24% expect somewhat positive socio-economic impacts from oil shale extraction projects for their community. However, 4% expect very negative and 2% somewhat negative impacts (table 17).

ANSWER CHOICES	RESPONSES	
Very positive socio-economic impacts	66.00%	33
Somewhat positive socio-economic impacts	24.00%	12
No socio-economic impacts	4.00%	2
Somewhat negative socio-economic impacts	2.00%	1
Very negative socio-economic impacts	4.00%	2
Total		50

Table 17: Expectations of environmental impacts for own life (Question: How do you think your life will be impacted by the oil shale extraction projects?)

As in other regions people (45%) are mainly expecting direct, indirect and induced jobs being created as a socio-economic impact of the oil shale power station, followed by positive expectations regarding impacts on electricity prices (43%). The expectations of socio-economic impacts are also connected with an improvement of the quality of infrastructure (35%) and costs of land (32%) as well as tourism to Jordan (22%) and traditional values (21%). As about expectations of negative impacts they will be mainly on the costs of land (8%) and electricity prices (6%) (table 18).

	VERY POSITIVE IMPACT	SOMEWHAT POSITIVE IMPACT	NO IMPACT	SOMEWHAT NEGATIVE IMPACT	VERY NEGATIVE IMPACT	TOTAL	WEIGHTED AVERAGE
Job creation (direct, indirect induced jobs)	45.10% 23	37.25% 19	15.69% 8	0.00% 0	1.96% 1	51	4.24
Quality of infrastructure (roads, water, electricity)	35.29% 18	41.18% 21	21.57% 11	0.00% 0	1.96% 1	51	4.08
Tourists coming to Jordan	21.57% 11	37.25% 19	33.33% 17	3.92% 2	3.92% 2	51	3.69
Electricity price	43.14% 22	25.49% 13	19.61% 10	5.88% 3	5.88% 3	51	3.94
Traditional values	21.57% 11	25.49% 13	45.10% 23	3.92% 2	3.92% 2	51	3.57
Costs of land	32.00% 16	44.00% 22	12.00% 6	4.00% 2	8.00% 4	50	3.88

Table 18: Expectations of socio-economic impacts (Question: How will oil shale power plant affect the following issues?)

Even more people (86%) expect that oil shale extraction projects will have very positive impact on job creation as well as quality of infrastructure such as roads, water and electricity (60%) and electricity prices (56%), followed by costs of land (36%), traditional values (40%) and tourism (28%). People are even more optimistic about positive socio-economic impacts of oil shale extraction projects than of oil shale power station. Nobody thinks that they will have very negative impacts on jobs, quality of infrastructure, tourism or electricity. Only 6% expect very negative impacts on the costs of land (table 19).

	VERY POSITIVE IMPACT	SOMEWHAT POSITIVE IMPACT	NO IMPACT	SOMEWHAT NEGATIVE IMPACT	VERY NEGATIVE IMPACT	TOTAL	WEIGHTED AVERAGE
Job creation (direct, indirect induced jobs)	86.00% 43	12.00% 6	0.00% 0	2.00% 1	0.00% 0	50	4.82
Quality of infrastructure (roads, water, electricity)	60.00% 30	30.00% 15	8.00% 4	2.00% 1	0.00% 0	50	4.48
Tourists coming to Jordan	28.00% 14	26.00% 13	44.00% 22	2.00% 1	0.00% 0	50	3.8
Electricity price	56.00% 28	26.00% 13	14.00% 7	4.00% 2	0.00% 0	50	4.34
Traditional values	40.00% 20	14.00% 7	42.00% 21	2.00% 1	2.00% 1	50	3.88
Costs of land	36.00% 18	30.00% 15	26.00% 13	2.00% 1	6.00% 3	50	3.88

Table 19: Expectations about socio-economic impacts from oil shale extraction projects (Question: What do you think will be socio-economic impacts from oil shale extraction projects on the following issues?)

People think that these positive impacts from oil shale power station will be distributed mostly unequally and the rich will benefit most (33%). Some people (18%) think that poor will benefit most. 14% think that the impacts will be distributed equally and 18% are not sure how impacts will be distributed (table 20).

ANSWER CHOICES	RESPONSES	
Equally	13.73%	7
Unequally the rich will benefit the most	33.33%	17
Unequally the poor will benefit the most	17.65%	9
People somewhere else will benefit the most, not the Jordanian population	5.88%	3
Don't know or not sure	17.65%	9
No positive impacts	11.76%	6
Total		51

Table 20: Expectations about distribution of socio-economic impacts (Question: How do you think positive impacts will be distributed across the Jordanian population?)

However, the bigger share of people (38%) thinks that positive impacts from oil shale extraction projects will be distributed mainly equally. 22% think that rich will benefit more and 6% think that poor will benefit more. 10% of people say that people outside Jordan will benefit more (table 21).

ANSWER CHOICES	RESPONSES	
Equally	38.00%	19
Unequally the rich will benefit the most	22.00%	11
Unequally the poor will benefit the most	6.00%	3
People somewhere else will benefit the most, not the Jordanian population	10.00%	5
Don't know or not sure	24.00%	12
No positive impacts	0.00%	0
Total		50

Table 21: Expectations on distribution of socio-economic impacts from oil shale extraction projects (Question: How do you think positive impacts will be distributed across the Jordanian population?)

While speaking about people living in community nearby the oil shale extraction projects even a large share of people (48%) think that positive socio-economic impacts will be distributed equally. 18% think that rich will benefit more, 10% think that poor will benefit more and 2% think that people outside of Jordan will benefit more (table 22).

ANSWER CHOICES	RESPONSES	
Equally	48.00%	24
Unequally the rich will benefit the most	18.00%	9
Unequally the poor will benefit the most	10.00%	5
People somewhere else will benefit the most, not the Jordanian population	2.00%	1
Don't know or not sure	22.00%	11
No positive impacts	0.00%	0
Total		50

Table 22: Expectations about distribution of socio-economic impacts (Question: How do you think positive impacts will be distributed across the Jordanian population?)

When people were asked to rank the most important issues about large-scale projects, they ranked economic profits for local community (29%) and transparency of the planning process (29%) as the most important issues. Quality of infrastructure projects was ranked next (26%) and environmental impacts as the least important issue (16%).

As about negative impacts from oil shale power station people (45%) think that they will be distributed unequally, and poor will be hurt most. 20% were not sure about the impacts and 14% think that negative impacts will be distributed equally. 10% think that people outside Jordan will benefit and Jordanian population will be hurt and 6% think that rich will be hurt more than poor.

As about negative impacts from oil shale extraction projects people think that they will be distributed equally (34%). A significant share (24%) is not sure what to answer and 10% expect no negative impacts. However, 22% think that negative impacts will be distributed unequally, and that poor will be harmed more. The share of people who think that rich (6%) or people outside of Jordan (4%) will be harmed is much less significant (table 23).

ANSWER CHOICES	RESPONSES	
Equally	34.00%	17
Unequally, the rich will be harmed	6.00%	3
Unequally, the poor will be harmed	22.00%	11
People somewhere else will be harmed, not the local population	4.00%	2
Don't know or not sure	24.00%	12
No negative impacts	10.00%	5
Total		50

Table 23: Expectation about distribution of negative impacts of oil shale extraction projects (Question: How do you think the negative impacts will be distributed across the Jordanian population?)

Many people (20%) don't expect negative impacts from oil shale extraction projects on their community or are not sure what to answer (32%). 26% think that impacts will be distributed equally. 16% think that the distribution will be unequal and poor or rich (6%) will be harmed (table 24).

ANSWER CHOICES	RESPONSES	
Equally	26.00%	13
Unequally, the rich will be harmed	6.00%	3
Unequally, the poor will be harmed	16.00%	8
People somewhere else will be harmed, not the local population	0.00%	0
Don't know or not sure	32.00%	16
No negative impacts	20.00%	10
Total		50

Table 24: Expectations on distribution of negative impacts from oil shale extraction projects in community nearby the project (Question: How do you think the negative impacts will be distributed across the population living in the community nearby of the project?)

Many people expect negative (28%) and very negative (16%) impacts from the oil shale power station. At the same time as another half think that these impacts will be positive (28%) and very positive (18%). 10% could not answer this question (table 25).

ANSWER CHOICES	RESPONSES	
Very positive impact on the environment	34.00%	17
Somewhat positive impact on the environment	6.00%	3
Does not affect the environment	22.00%	11
Somewhat negative impact on the environment	4.00%	2
Very negative impacts on the environment	24.00%	12
Total	10.00%	5

Table 25: Expectations of impacts on environment from oil shale power station (Question: Thinking of the environmental impacts do you think that the oil shale power station will have?)

People expect that oil shale power station will have positive (32%) and very positive (18%) impacts on water availability. Positive expectations are also connected with impacts of the oil shale power station on the quality of water. 18% expect very positive impacts and 24% expect positive impacts. Opinions regarding impacts of the oil shale power station on water are polarized as expectation of negative impacts are also high. 14% expect very negative and 22% negative impacts on water availability. 16% expect very negative and 22% negative impacts on the quality of water.

It seems that people are aware that oil shale extraction projects might have negative impacts on environment and 34% expect somewhat negative and 2% very negative impacts. However, 30% expects very positive impacts and 18% somewhat positive impacts on environment and 16% think that there will be no impacts (table 26).

ANSWER CHOICES	RESPONSES	
Very positive impact on the environment	30.00%	15
Somewhat positive impact on the environment	18.00%	9
Does not affect the environment	16.00%	8
Somewhat negative impact on the environment	34.00%	17
Very negative impacts on the environment	2.00%	1
Total		50

Table 26: Expectations regarding impacts on environment from oil shale extraction projects (Question: Thinking of the environmental impacts do you think that the oil shale extraction projects will have)

While speaking about negative impacts, people think that the oil shale will have negative (28%) and very negative (26%) impacts on human health, also negative (32%) and very negative (22%) impacts on the quality of air. Expectations of people regarding impacts on biodiversity are rather positive than negative. 32% think that impacts will be positive and 16% think it will be very positive. Pinions about impacts on landscape esthetics are polarized as similar shares of people expect positive and negative impacts.

	VERY POSITIVE IMPACT	SOMEWHAT POSITIVE IMPACT	NO IMPACT	SOMEWHAT NEGATIVE IMPACT	VEGY NEGATIVE IMPACT	TOTAL	WEIGHTED AVERAGE
Water availability	18.00% 9	32.00% 16	14.00% 7	22.00% 11	14.00% 7	50	3.18
Land-use (e.g. competition with agriculture)	16.00% 8	36.00% 18	24.00% 12	12.00% 6	12.00% 6	50	3.32
Biodiversity	16.00% 8	32.00% 16	32.00% 16	8.00% 4	12.00% 6	50	3.32
Aesthetics of the landscape	16.00% 8	26.00% 13	20.00% 10	26.00% 13	12.00% 6	50	3.08
Quality of water	18.00% 9	24.00% 12	20.00% 10	22.00% 11	16.00% 8	50	3.06
Quality of soil	10.00% 5	22.00% 11	24.00% 12	28.00% 14	16.00% 8	50	2.82
Quality of air	10.00% 5	10.00% 5	26.00% 13	32.00% 16	22.00% 11	50	2.54
Human health	16.00% 8	12.00% 6	18.00% 9	28.00% 14	26.00% 13	50	2.64

Table 27: Expectations of impacts from oil shale power station (Question: What impacts will oil shale power station have on the following issues?)

People were cautious about impacts of oil shale extraction projects and think that these projects might have somewhat negative impacts on quality of air (30%), human health (30%) and quality of soil (22%). Interestingly people think that oil shale extraction projects will have very positive impacts on water availability (26%) and land-use (26%) as well as biodiversity (22%), quality of water (22%) and aesthetics of landscape (20%).

	VERY POSITIVE IMPACT	SOMEWHAT POSITIVE IMPACT	NO IMPACT	SOMEWHAT NEGATIVE IMPACT	VEGY NEGATIVE IMPACT	TOTAL	WEIGHTED AVERAGE
Water availability	26.00% 13	24.00% 12	38.00% 19	12.00% 6	0.00% 0	50	3.64
Land-use (e.g. competition with agriculture)	26.00% 13	20.00% 10	42.00% 21	12.00% 6	0.00% 0	50	3.60
Biodiversity	22.00% 11	30.00% 15	40.00% 20	8.00% 4	0.00% 0	50	3.66
Aesthetics of the landscape	20.00% 10	24.00% 12	42.00% 21	12.00% 6	2.00% 1	50	3.48
Quality of water	22.00% 11	18.00% 9	52.00% 26	8.00% 4	0.00% 0	50	3.54
Quality of soil	26.00% 13	14.00% 7	38.00% 19	22.00% 11	0.00% 0	50	3.44
Quality of air	14.00% 7	22.00% 11	32.00% 16	30.00% 15	2.00% 1	50	3.16
Human health	14.00% 7	20.00% 10	34.00% 17	30.00% 15	2.00% 1	50	3.14

Table 28: Perceptions of impacts from oil shale extraction projects on environment (Question: I will now read a number of environmental features for each, please tell me whether you think that the construction of the oil shale extraction projects will have a very positive, somewhat positive, a somewhat negative, a very negative or no impact?)

6.1.4

Risk perception

People think that water scarcity and drought are the major risks for their community (43%), followed by waste management (33%) and environmental degradation or pollution (28%). Political risks (20%) and socio-economic development (20%) are much less significant risks. And energy availability or energy costs (12%) are least significant risks (table 29).

	VERY SERIOUS	SERIOUS	NOT SERIOUS	TOTAL	WEIGHTED AVERAGE
Political risk in the region	19.61% 10	43.14% 22	37.28% 19	51	2.18
Energy availability or energy costs	11.76% 6	47.06% 24	41.18% 21	51	2.29
Water scarcity/drought	43.14% 22	33.33% 17	23.53% 12	51	1.80
Socio-economic development	19.61% 10	35.29% 18	45.10% 23	51	2.25
Environmental degradation or pollution	28.00% 14	48.00% 24	24.00% 12	50	1.96
Waste management	33.33% 17	35.29% 18	31.37% 16	51	1.98

Table 29: Risks perceptions for own community (Question: How serious are the following risks for your community?)

People in Lajoun think that water scarcity and drought (32%) as well as environmental degradation (32%) are the most serious risks for them personally followed by political risks in the region (26%), waste management (24%) and energy availability or energy costs (16%).

	VERY SERIOUS	SERIOUS	NOT SERIOUS	TOTAL	WEIGHTED AVERAGE
Political risk in the region	26.00% 13	36.00% 18	38.00% 19	50	2.12
Energy availability or energy costs	16.00% 8	34.00% 17	50.00% 25	50	2.34
Water scarcity/drought	32.00% 16	40.00% 20	28.00% 14	50	1.96
Socio-economic development	20.00% 10	34.00% 17	46.00% 23	50	2.26
Environmental degradation or pollution	32.00% 16	40.00% 20	28.00% 14	50	1.96
Waste management	24.00% 12	46.00% 23	30.00% 15	50	2.06

Table 30: Risks' perceptions (Question: How serious are these risks for you personally?)

While speaking about accidents at the oil shale power station the majority of people think that these accidents are not probable. 56% think that a small accident might happen every 20 years. However, a significant share (16%) think that it could happen one in every five years or in every ten years (14%) (table 31).

ANSWER CHOICES	RESPONSES	
About once in every five years or more often	16.00%	8
About once in every 10 years	14.00%	7
About once in very 15 years	10.00%	5
About once in very 20 years	4.00%	2
Less than once in every 20 years	56.00%	28
Total		50

Table 31: Perceptions of small accidents (Question: How probable, do you think is a small accident with impacts on the population if the oil shale power plant is completed?)

People also think that accidents at the oil shale extraction projects are not probable. The larger share of interviewees (44%) think that a small incident is possible in less than once in every 20 years (table 32).

ANSWER CHOICES	RESPONSES	
About once in every five years or more often	20.00%	10
About once in every 10 years	4.00%	2
About once in very 15 years	18.00%	9
About once in very 20 years	14.00%	7
Less than once in every 20 years	44.00%	22
Total		50

Table 32: Perceptions of the likelihood of small accident during the operation of the oil shale extraction projects (Question: How probable, do you think is a small accident with impacts on the population if the oil shale extraction projects is built?)

However, people are more concerned about large accidents and think that a large accident at the oil shale power station which will have impact on population might happen every fifty years (32%) or even every 20 years (24%). The share of people who think that the accident is very unlikely (every 500 years) is also significant (22%) (table 33).

ANSWER CHOICES	RESPONSES	
About once in every 20 years or more often	24.00%	12
About once in every 50 years	32.00%	16
About once in every 100 years	18.00%	9
About once in every 500 years	4.00%	2
Less than once in every 500 years	22.00%	11
Total		50

Table 33: Perceptions of the likelihood of large accident during the operation of the oil shale extraction projects (Question: How probable, do you think is a large accident with impacts on the population if the oil shale extraction projects is built?)

The opinions about large accidents during the oil shale extraction projects are polarized. While some people (32%) think that it is likely in every 500 years. Other people (24%) think that it is likely in every 20 years or even more often. And 24% think that it is likely in every 50 years (table 34).

ANSWER CHOICES	RESPONSES	
About once in every 20 years or more often	24.00%	12
About once in every 50 years	24.00%	12
About once in every 100 years	12.00%	6
About once in every 500 years	8.00%	4
Less than once in every 500 years	32.00%	16
Total		50

Table 34: Perceptions about likelihood of a large-scale accident from oil shale extraction projects (Question: How probable, do you think is an accident with impacts on the population if the oil shale power plant is built?)

When people were asked to evaluate how safe will be the oil shale power station on the scale between 1 (the lowest risk) and 10 (the highest risk) the average number was 3.7 meaning that people don't perceive the oil shale power station being particularly dangerous. Interesting that people perceive oil shale extraction projects as being much less safe than oil shale power station. On the scale between 1 (the lowest risk) and 10 (the highest risk) the average number was 6.8.

But the majority of people would like oil shale power station to be as far as possible from their home and they also don't live in the direct vicinity to the oil shale power station. 68% selected the option of more than 100 km from their home, followed by 24% who would prefer it will be 50-100 km. Only 2% have the power station less than 20 km to their home and 6% in between 20-50 km. People also don't think that this distance to the oil shale power station is particularly risky for them. When they were asked to evaluate on the scale between 1 (lowest risk) and 10 (highest risk) the average number of 3.5.

ANSWER CHOICES	RESPONSES	
<20 km from my home	6.00%	3
20-50 km from my home	4.00%	2
50-100 km from my home	28.00%	14
>100 km from my home	62.00%	31
Total		50

Table 35: Expectation to the distance of oil shale extraction projects to own home (Question: Include the distance aspect. How close to your home do you expect the oil shale power plant to be?)

ANSWER CHOICES	RESPONSES	
Yes fully	76.00%	38
Partially	16.00%	8
No	8.00%	4
Total		50

Table 36: Level of trust that authorities will be able to control the risk if something happens at the oil shale power station (Question: If something happens, do you think authorities will be able to control the risk?)

ANSWER CHOICES	RESPONSES	
Yes fully	66.00%	33
Partially	30.00%	15
No	4.00%	2
Total		50

Table 37: Level of trust that authorities will be able to control the risk if something happens at the oil shale extraction projects (Question: If something happens, do you think authorities will be able to control the risk?)

ANSWER CHOICES	RESPONSES	
Better than other countries	52.00%	26
Worse than other countries	18.00%	9
Equal	30.00%	15
Total		50

Table 38: Level of trust to Jordanian disaster risk reduction authorities in comparison to other countries (Question: How do you evaluate capacities of disaster risk reduction in Jordan in comparison to the European countries to control the risk if accident happens at the oil shale power station?)

Regarding oil shale extraction projects people also prefer to have them as far away from their home as possible. The majority (62%) selects the option of more than 100 km from home or at the distance between 50-100 km (28%). The number of people who would tolerate it closer, such as less than 20 km (6%) and 20-50 km (4%) is much less significant (table 35). People perceive such distance to oil shale extraction projects as being not very risky to them. When they were asked to evaluate on the scale between 1 (lowest risk) and 10 (highest risk) the average number of 4.1.

People also have high confidence that if something happens authorities will be able to control the risk. 76% believe that authorities will be able to control fully the risk and 16% think that they will be able to control partially the risk. 8% think that authorities will not be able to control the risk (table 36).

Also, regarding the oil shale extraction projects people are confident that authorities in Jordan will be able to control the risk in case if something will happen. However, the level of trust regarding the oil shale extraction projects is lower than regarding oil shale power station. 66% of people think that authority will fully control the risk, 30% think that they will partially control the risk and 4% think that they will not be able to control the risk (table 37).

A bigger share of people (52%) think that the capacities of disaster risk reduction in Jordan to control accident if something happens at the oil shale power station are even better than in other countries. However, 18% think that it is worse than in other countries (table 38).

Similarly, to the question about oil shale power station, people in Jordan think that the capacity of disaster risk reduction in Jordan to control the risk in case if something will happen during the operation of the oil shale extraction project is better than in other countries (56%). However, more people think that the capacity is worse than in other countries (30%). And 14% think that it is equal (table 39).

ANSWER CHOICES	RESPONSES	
Better than other countries	56.00%	28
Worse than other countries	30.00%	15
Equal	14.00%	7
Total		50

Table 39: Level of trust to Jordanian disaster risk reduction authorities in comparison to other countries (Question: How do you evaluate capacities of disaster risk reduction in Jordan in comparison to the European countries to control the risk if accident happens at the oil shale extraction projects?)

6.1.5 Participation and procedural justice

The bigger share of interviewees (66%) thinks that people in Jordan are not encouraged to provide their opinion on oil shale power station. However, 64% think that people are encouraged to provide opinion on oil shale extraction projects.

In case of concerns about oil shale power station the majority of people (54%) will contact owners of the project or the local government represented mainly by the mayor (18%). Some of them will contact the Ministry of Energy (14%) or go to social media (10%) or private media (4%). Interestingly, nobody will contact the Ministry of Environment (table 40).

ANSWER CHOICES	RESPONSES	
Owner of the project	54.00%	27
Governor/ Mayor of your area	18.00%	9
Parliament representative	0.00%	0
Ministry of Energy	14.00%	7
Ministry of Environment	0.00%	0
Social media	10.00%	5
Private media	4.00%	2
Total		50

Table 40: Expression of concerns about oil shale power station (Question: If you are in need to express your concerns regarding oil shale whom would you approach?)

In case of concerns about oil shale extraction projects the bigger share (42%) will contact project owner. However, the percentage of people who would contact local government (26%) or the Ministry of Energy (18%) will be higher as in the case of oil shale power station. Approximately the same number of people will go to social media (10%). However, instead of going to private media (as in the case of oil shale power project) people will go the Ministry of Environment (4%).

ANSWER CHOICES	RESPONSES	
Owner of the project	42.00%	21
Governor/ Mayor of your area	26.00%	13
Parliament representative	0.00%	0
Ministry of Energy	18.00%	9
Ministry of Environment	4.00%	2
Social media	10.00%	5
Private media	0.00%	0
Total		50

Table 41: Expression of concerns about oil shale extraction projects (Question: If you are in need to express your concerns regarding oil shale extraction projects whom would you approach?)

6.2 ATTARAT AND UM ALRASAS

6.2.1 Social acceptance

While looking at the patterns of social acceptance we could distinguish two results: social acceptance for large scale projects in Jordan and high rate of social acceptance for everything which is connected with energy security issues which are understood mainly as independence from imported energy (table 42).

While speaking about energy security, 72% of all interviewed people fully agree that oil shale is important for Jordan to become independent from energy imports and 64% fully agree and 28% somewhat agree that oil shale power plant will provide a reliable source of electricity for the community. Only 2% fully disagree that oil shale is important for energy independence of Jordan and that it can become a reliable source of energy.

Renewable energy sources are also considered to be an important source which can provide reliable electricity to the community by 62% (fully agree) and 20% (somewhat agree). So, it seems that people perceive oil shale as being more reliable electricity source than renewable energy sources, but this result might be due to the high share of people who could not provide their answer about renewable energy sources (16%).

During this survey we tested three drivers of social acceptance which are connected with procedural justice, such as trust, engagement and availability of information. 44% of people fully agree and 36% somewhat agree that new energy infrastructure in Jordan is constructed according to the public regulations. People also believe that it is important to consult local population on decisions about large scale infrastructure (32% fully agree and 42% somewhat agree). However, 14% fully agree and 26% somewhat with the statement that it is not necessary that population is informed about details of large-scale infrastructure projects. 32% don't have opinion about this issue and only 12% fully disagree and 16% somewhat disagree. People are mainly worried that new infrastructure projects will not be completed. 28% fully agree and 36% somewhat agree to this statement.

	I FULLY AGREE	I SOMEWHAT AGREE	I NEITHER AGREE NOR DISAGREE	I SOMEWHAT DISAGREE	I FULLY DISAGREE	TOTAL	WEIGHTED AVERAGE
I am worried that new infrastructure projects will not be completed.	28.00% 14	36.00% 18	24.00% 12	10.00% 5	2.00% 1	50	3.78
The oil shale plant will provide a reliable source of electricity for our community.	64.00% 32	28.00% 14	6.00% 3	0.00% 0	2.00% 1	50	4.52
Renewable energy will provide a reliable source of electricity for our community.	62.00% 31	20.00% 10	16.00% 8	0.00% 0	2.00% 1	50	4.4
It is important that the local population is consulted on decisions about large scale infrastructure.	32.00% 16	42.00% 21	20.00% 10	2.00% 1	4.00% 2	50	3.96
It is not necessary that the population is informed about the details of large-scale infrastructure project.	14.00% 7	26.00% 13	32.00% 16	16.00% 8	12.00% 6	50	3.14
New energy infrastructure in my community is constructed according to public regulations.	44.00% 22	36.00% 18	10.00% 5	4.00% 2	6.00% 3	50	4.08
Shale oil is important for Jordan to become independent from energy imports.	72.00% 36	14.00% 7	12.00% 6	0.00% 0	2.00% 1	50	4.54

Table 42: Patterns of social acceptance (Question: I will now read to you a set of statements, please tell me how you feel about them on a scale from 1-5 (where 1=I fully disagree and 5=I fully agree))

While speaking about the size of the projects many people in Attarat support deployment of large-scale projects with answers “very much” (36%) and “yes somewhat” (44%). However, 12% would prefer not to have any large-size infrastructure projects in their community (12%).

It seems that environmental impacts criterion has currently the lowest priority in the list of concerns about large-scale infrastructure in Jordan. 29% of all interviewed gave to criterion “economic profits” the highest rank, followed by transparency of planning processes (28%), quality of infrastructure (25%) and then environmental impacts (18%).

6.2.2

Awareness and information sources

From all planned infrastructure projects, the oil shale power station is the most known one. The rate of awareness about this infrastructure among interviewees of Attarat area was almost universal. 90% of all interviewed people were aware that the oil shale power plants will be constructed in their community and 73% of all interviewed people are completely in favor that the oil shale power station will be constructed in their community.

The rate of awareness is lower for planned oil shale extraction projects with 42% of people are not being aware that such projects are planned in Jordan. A significant share of interviewed (73%) mentioned that they are completely in favor for oil shale extraction projects however many (32%) preferred to skip this question, therefore so high rate of support cannot be considered as credible.

Even though people in Attarat support deployment of oil shale power station, they don't feel themselves being well informed about it. Most of them (50%) are "somewhat informed" and 4% feel themselves being badly informed. Government media such as TV, newspapers, radio or official homepages, are the main source of information. 49% of all interviewed selected this as a primary source. This is followed by private media (19%) and social media (13%). The role of friends and family is less significant (10%) and information campaigns from local government (2%), NGOs (2%) and private developers (2%) are almost not existent. Also, the majority of people (66%) are not aware that any public information campaign about planned oil shale power station exists.

People feel being well-informed (52%) and somewhat informed (34%) about oil shale extraction projects. The sources of information on oil shale extraction projects is the same as for oil shale power station. 49% receive information from publicly controlled sources, followed by private media (15%) and social media (13%). 54% of people are also not aware of any information campaign on oil shale extraction projects.

While speaking about trustful sources of information, most people trust scientists (50%), project developers (37%) and foreign investors (32%). Politicians (0%) and mass media (4%) enjoy the lowest level of trust. International institutions (16%) and NGOs (12%) rank below such trustful sources of information as project developers and foreign investors (table 43).

	Complete Trust	Some Trust	Little Trust	Very Little Trust	No Trust	Total	Weighted Average
Mass media	4.00% 2	30.00% 15	34.00% 17	14.00% 7	18.00% 9	50	2.88
Scientists	50.00% 25	38.00% 19	8.00% 4	4.00% 2	0.00% 0	50	4.34
Project developers	36.73% 18	32.65% 16	22.45% 11	4.08% 2	4.08% 2	50	3.94
International institutions (UN etc.)	16.00% 8	32.65% 16	24.00% 12	18.00% 9	10.00% 5	50	3.26
Foreign investors	32.00% 16	28.00% 14	16.00% 8	12.00% 6	12.00% 6	50	3.56
NGOs	12.00% 6	34.00% 17	22.00% 11	12.00% 6	20.00% 10	50	3.06
Politicians	0.00% 0	16.00% 8	12.00% 6	34.00% 17	38.00% 19	50	2.06

Table 43: Trustful sources of information (Question: How much do you trust information from the following sources?)

6.2.3

Expected impacts

Surprisingly, people in Attarat are very positive about impacts of oil shale extraction projects. Most of them (64%) think that oil shale extraction projects will have very positive and somewhat positive (20%) impacts on their lives. No one mentioned that impacts might be negative. People also expect very positive (66%) and somewhat positive (24%) impacts at their community. At the same time 4% expect very negative and 2% somewhat negative impacts.

People expect that oil shale extraction projects will bring jobs. 86% of all interviewees selected direct, indirect and induced jobs and expect that oil shale extraction projects will have very positive development here. On the second place are expectations about the quality of infrastructure (60%) (roads, water and electricity) as well as positive impacts on electricity prices (56%), traditional values (40%), costs of land (36%) and tourism (28%). At the same time 6% think that oil shale extraction projects will have very negative impact of costs of land and 2% think it will be very negative impacts on traditional values (table 44).

	VERY POSITIVE IMPACT	SOMEWHAT POSITIVE IMPACT	NO IMPACT	SOMEWHAT NEGATIVE IMPACT	VERY NEGATIVE IMPACT	TOTAL	WEIGHTED AVERAGE
Job creation (direct, indirect induced jobs)	86.00% 43	12.00% 6	0.00% 0	2.00% 1	0.00% 0	50	4.82
Quality of infrastructure (roads, water, electricity)	60.00% 30	30.00% 15	8.00% 4	2.00% 1	0.00% 0	50	4.48
Tourists coming to Jordan	28.00% 14	26.00% 13	44.00% 22	2.00% 1	0.00% 0	50	3.80
Electricity price	56.00% 28	26.00% 13	14.00% 7	4.00% 2	0.00% 0	50	4.34
Traditional values	40.00% 20	14.00% 7	42.00% 21	2.00% 1	2.00% 1	50	3.88
Costs of land	36.00% 18	30.00% 15	26.00% 13	2.00% 1	6.00% 3	50	3.88

Table 44: Expectations on socio-economic impacts from oil shale extraction projects (Question: Which impacts will oil shale extraction projects have on the following issues?)

People also expect mostly positive impacts from oil shale power station. The major positive impacts which people expect from oil shale power plant will be created jobs (92%) and improved quality of road, water and electricity infrastructure (62%). The projects might have positive impacts on electricity prices (54%). Traditional values (34%), costs of land (32%) and tourism in Jordan (30%) are at the bottom of the ranking (table 45).

	VERY POSITIVE IMPACT	SOMEWHAT POSITIVE IMPACT	NO IMPACT	SOMEWHAT NEGATIVE IMPACT	VERY NEGATIVE IMPACT	TOTAL	WEIGHTED AVERAGE
Job creation (direct, indirect induced jobs)	92.00% 46	6.00% 3	0.00% 0	0.00% 0	2.00% 1	50	4.86
Quality of infrastructure (roads, water, electricity)	62.00% 31	28.00% 14	8.00% 4	0.00% 0	2.00% 1	50	4.48
Tourists coming to Jordan	30.00% 15	24.00% 12	44.00% 22	0.00% 0	2.00% 1	50	3.80
Electricity price	54.00% 27	32.00% 16	8.00% 4	4.00% 2	2.00% 1	50	4.32
Traditional values	34.00% 17	20.00% 10	42.00% 21	4.00% 2	0.00% 0	50	3.84
Costs of land	32.00% 16	34.00% 17	24.00% 12	10.00% 5	0.00% 0	50	3.88

Table 45: Positive impacts from oil shale power plant (Question: How will oil shale power plant affect the following issues?)

Opinion about how positive impacts will be distributed is quite polarized with 38% thinking that it will be distributed equally among various social groups in Jordan and 38% thinking that the distribution will be unequal when rich people will benefit most (58% of those who think that the distribution will be unequal) or that people outside of Jordan will benefit more (10%). The group of people who were not sure what to answer was also significant (24%) (table 46).

ANSWER CHOICES	RESPONSES	
Equally	38.00%	19
Unequally the rich will benefit the most	22.00%	11
Unequally the poor will benefit the most	6.00%	3
People somewhere else will benefit the most, not the Jordanian population	10.00%	5
Don't know or not sure	24.00%	12
No positive impacts	0.00%	0
Total		50

Table 46: Expectations about distribution of positive impacts from oil shale generation and extraction projects (Question: How do you think positive impacts will be distributed across the Jordanian population?)

However, this picture changes when we spoke about distribution of benefits from the Attarat oil shale power station in the community of Attarat. Almost a half of all interviewed (48%) think that these benefits will be distributed equally in their community, 22% could not answer and 18% that rich will benefit more. Interestingly, the share of people who think that people outside of Jordan will benefit was much lower (2%) (table 47).

ANSWER CHOICES	RESPONSES	
Equally	48.00%	24
Unequally the rich will benefit the most	18.00%	9
Unequally the poor will benefit the most	10.00%	5
People somewhere else will benefit the most, not the Jordanian population	2.00%	1
Don't know or not sure	22.00%	11
No positive impacts	0.00%	0
Total		50

Table 47: Expectation about distribution of positive impacts within community nearby the project (Question: How do you think will positive impacts be distributed across the population living in the community nearby the project?)

Majority of interviewed people think that the negative impacts will be distributed equally (34%), followed by people who are not sure about the answer (24%) and those who think that negative impacts will be distributed equally and that the poor will be harmed (22%). A significant share of all interviewed (10%) think that there will be no negative impacts. The number of people who thought that rich will be harmed (6%) or that people outside Jordan will be harmed (4%) was minor (table 48).

ANSWER CHOICES	RESPONSES	
Equally	34.00%	17
Unequally, the rich will be harmed	6.00%	3
Unequally, the poor will be harmed	22.00%	11
People somewhere else will be harmed, not the local population	4.00%	2
Don't know or not sure	24.00%	12
No positive impacts	10.00%	5
Total		50

Table 48: Expectations about distribution of negative impacts (Question: How do you think will negative impacts be distributed across the Jordanian population?)

While speaking about the oil shale power station in their own community a larger share of people (32%) simply don't know what the impacts will be and 20% think that there will be no negative impacts. Many people (20%) also think that the negative impacts will be distributed equally and 16% think that poor people will be harmed. The share of people who think that the rich will be harmed was minor (6%) and nobody thought that the oil shale power station in Attarat can harm people outside of Jordan (table 49).

ANSWER CHOICES	RESPONSES	
Equally	26.00%	13
Unequally, the rich will be harmed	6.00%	3
Unequally, the poor will be harmed	16.00%	8
People somewhere else will be harmed, not the local population	0.00%	0
Don't know or not sure	32.00%	16
No positive impacts	20.00%	10
Total		50

Table 49: Expectations about distribution of negative impacts in community nearby the project (Question: How do you think will the negative impacts be distributed across the population living in the community nearby the project?)

A significant share of people (34%) think that oil shale power station will have negative and very negative (2%) impacts on environment and 30% think that these impacts will be positive or somewhat positive (18%). Water availability (26% think that impacts on water availability from oil shale power station will be very negative), land-use (26%) and quality of soil (26%) will be the most impacted parts of environment. Impacts on biodiversity (22%) and quality of water (22%) will be also high followed by aesthetics of landscape (20%), quality of air (14%) and human health (14%) (table 50).

	VERY POSITIVE IMPACT	SOMEWHAT POSITIVE IMPACT	NO IMPACT	SOMEWHAT NEGATIVE IMPACT	VEGY NEGATIVE IMPACT	TOTAL	WEIGHTED AVERAGE
Water availability	22.00% 11	8.00% 4	4.00% 20	30.00% 15	0.00% 0	50	3.22
Land-use (e.g. competition with agriculture)	18.00% 9	18.00% 9	56.00% 28	8.00% 4	0.00% 0	50	3.46
Biodiversity	22.00% 11	24.00% 12	44.00% 22	10.00% 5	0.00% 0	50	3.58
Aesthetics of the landscape	22.00% 11	24.00% 12	40.00% 20	14.00% 7	0.00% 0	50	3.54
Quality of water	24.00% 12	8.00% 4	58.00% 29	6.00% 3	4.00% 2	50	3.42
Quality of soil	22.00% 11	10.00% 5	50.00% 25	14.00% 7	4.00% 2	50	3.32
Quality of air	16.00% 8	10.00% 5	34.00% 17	34.00% 17	6.00% 3	50	2.96
Human health	20.00% 10	4.00% 2	40.00% 20	30.00% 15	6.00% 3	50	3.02

Table 50: Impacts of oil shale power station (Question: What impacts will oil shale have on the following issues?)

Some people even think that oil shale power station will have positive (24%) and very positive (16%) impacts on environment (table 51).

ANSWER CHOICES	RESPONSES	
Very positive impact on the environment	16.00%	8
Somewhat positive impact on the environment	24.00%	12
Does not affect the environment	28.00%	14
Somewhat negative impact on the environment	30.00%	15
Very negative impacts on the environment	2.00%	1
Total		50

Table 51: Impacts of oil shale power station on environment (Question: Thinking of environmental impacts do you think that oil shale power station will have?)

People think that impact of oil shale extraction projects on environment will be even better than of the oil shale power station. 30% expect very positive impacts on environment and 18% somewhat positive. However, 34% expect somewhat negative and 2% expect very negative impacts on environment.

Interestingly people think that oil shale extraction projects will have very positive impacts on water availability (26%), land-use issues (26%) and quality of soil (26%). But they expect somewhat negative impacts on quality of air (30%) and human health (30%) (table 52).

	VERY POSITIVE IMPACT	SOMEWHAT POSITIVE IMPACT	NO IMPACT	SOMEWHAT NEGATIVE IMPACT	VEGY NEGATIVE IMPACT	TOTAL	WEIGHTED AVERAGE
Water availability	26.00% 13	24.00% 12	38.00% 19	12.00% 6	0.00% 0	50	3.64
Land-use (e.g. competition with agriculture)	26.00% 13	20.00% 10	42.00% 21	12.00% 6	0.00% 0	50	3.60
Biodiversity	22.00% 11	30.00% 15	40.00% 20	8.00% 4	0.00% 0	50	3.66
Aesthetics of the landscape	20.00% 10	24.00% 12	42.00% 21	12.00% 6	2.00% 1	50	3.48
Quality of water	22.00% 11	18.00% 9	52.00% 26	8.00% 4	0.00% 0	50	3.54
Quality of soil	26.00% 13	14.00% 7	38.00% 19	22.00% 11	0.00% 0	50	3.44
Quality of air	14.00% 7	22.00% 11	32.00% 16	30.00% 15	2.00% 1	50	3.16
Human health	14.00% 7	20.00% 10	34.00% 17	30.00% 15	2.00% 1	50	3.14

Table 52: Expectations of impacts on environment from oil shale extraction projects (Question: What do you think will be impacts from the oil shale extraction projects on the following issues?)

6.2.4 Risk perceptions

These findings also correlate with the risk perceptions of inhabitants of Attarat. Environmental degradation or pollution is considered as very serious (14%) or serious risk (32%), followed by water scarcity and drought (12% and 22%) and waste management (10% and 35%). Political risks in the region are considered as not being serious (76%) as well as energy availability (84%) or socio-economic development (74%) (table 53).

	VERY SERIOUS	SERIOUS	NOT SERIOUS	TOTAL	WEIGHTED AVERAGE
Political risks in the region	8.00% 4	16.00% 8	76.00% 38	50	2.68
Energy availability or energy costs	8.00% 4	8.00% 4	84.00% 42	50	2.76
Water scarcity/drought	12.00% 6	22.00% 11	66.00% 33	50	2.54
Socio-economic development	4.00% 2	22.00% 11	74.00% 37	50	2.70
Environmental degradation or pollution	14.00% 7	32.00% 16	54.00% 27	50	2.40
Waste management	10.00% 5	34.00% 17	56.00% 28	50	2.46

Table 53: Risks perceptions regarding Attarat community (Question: How serious are these risks for your community?)

Personally, people think they will be mainly affected by environmental degradation or pollution risks (12%). Other risks are not considered to be very serious (table 54).

	VERY SERIOUS	SERIOUS	NOT SERIOUS	TOTAL	WEIGHTED AVERAGE
Political risks in the region	2.00% 1	22.00% 11	76.00% 38	50	2.74
Energy availability or energy costs	4.00% 2	18.00% 9	78.00% 39	50	2.74
Water scarcity/drought	6.00% 3	28.00% 14	66.00% 33	50	2.60
Socio-economic development	2.00% 1	24.00% 12	74.00% 37	50	2.72
Environmental degradation or pollution	12.00% 6	24.00% 12	64.00% 32	50	2.52
Waste management	4.00% 2	30.00% 15	66.00% 33	50	2.62

Table 54: Risks perceptions for each interviewed person (Question: How serious are these risks for you personally?)

At the same time people don't bring the issues of electricity generation and environmental degradation together. While being asked about what is the most important criteria regarding electricity generation, they think that this is mainly energy security (being independent from imports from other countries (78%)) or reliability of providing electricity without interruptions (64%). Safety of technology (60%) and low electricity prices (58%) rank much lower in terms of importance. Avoiding negative environmental impacts has the lowest priority (56%) (table 55).

	Most important	Very important	Important	Little important	Not Important	Total	Weighted Average
Low electricity prices	58.00% 29	28.00% 14	12.00% 6	2.00% 1	0.00% 0	50	4.42
Safety of the technology	60.00% 30	24.00% 12	10.00% 5	6.00% 3	0.00% 0	50	4.38
Reliability of providing electricity without interruption	64.00% 32	24.00% 12	10.00% 5	0.00% 0	2.00% 1	50	4.48
Avoiding negative environmental impacts	56.00% 28	22.00% 11	20.00% 10	0.00% 0	2.00% 1	50	4.30
Being independent from imports from other countries	78.00% 39	12.00% 6	8.00% 4	2.00% 1	0.00% 0	50	4.66

Table 55: Various criteria of electricity generation according to their importance (Question: What is the most important about electricity generation?)

It seems that people don't have concerns about safety of the oil shale power station. While speaking about small accidents people think that they can happen in less than 20 years (56%) but many also think that they can happen much more frequently - every five years or even more often (16%), every 10 years (14%) and every 15 years (10%) (table 56).

ANSWER CHOICES	RESPONSES	
About once in every five years or more often	16.00%	8
About once in every 10 years	14.00%	7
About once in every 15 years	10.00%	5
About once in every 20 years	4.00%	2
Less than once in every 20 years	56.00%	28
Total		50

Table 56: Probability of small accidents at the oil shale power station with impacts on population (Question: How probable, do you think, is a small accident with impacts on population if the oil shale power plant is completed?)

While speaking about large accidents, the majority (32%) think that an accident is not really probably and can happen less than in 500 years. However, 24% think that it can happen every 20 years or even more often and other 24% think it can happen every 50 years (table 57).

ANSWER CHOICES	RESPONSES	
About once in every 20 years or more often	24.00%	12
About once in every 50 years	32.00%	16
About once in every 100 years	18.00%	9
About once in every 500 years	4.00%	2
Less than once in every 500 years	22.00%	11
Total		50

Table 57: Probability of large accidents at the oil shale power station with impacts on population (Question: How probable, do you think, is a large accident with impacts on population if the oil shale power station is completed?)

When people were asked to evaluate the safety of the oil shale power station in Attarat on the scale from 1 (least safe) to 10 (most safe), the average number was 6.8. But still the majority of people will prefer oil shale power station to be as far away from their home as possible (62% for distance over 100 km and 28% for the distance between 50 and 100 km). Only 6% would agree that the power station will be less than 20 km to their homes (table 58).

ANSWER CHOICES	RESPONSES	
<20 km from my home	2.00%	1
20-50 km from my home	6.00%	3
50-100 km from my home	24.00%	12
>100 km from my home	68.00%	34
Total		50

Table 58: Safe distance to oil shale power station (Question: How close to your home can the oil shale power station be?)

While speaking about the distance to homeplaces the majority of people feel that power station is not really safe. When they were asked to evaluate the distance for them personally and how risky it is, the average number was 6.4, whole 1 is the riskiest and 10 is the least risky.

But even if something happens, the majority of people believe that their authorities can fully (76%) or partially (16%) control the risk. The majority of people (56%) also think that the capacities of disaster risk reduction authorities in Jordan to control the risk are even better than in other countries (table 59).

ANSWER CHOICES	RESPONSES	
Better than other countries	52.00%	26
Worse than other countries	18.00%	9
Equal	30.00%	15
Total		50

Table 59: Ability of disaster risk reduction authorities in Jordan to control the risk in comparison to other countries (Question: How do you evaluate capacities of disaster risk reduction in Jordan in comparison to other European countries to control the risk if accident happens at the oil shale power station?)

If people have concerns about oil shale power station, they will mainly approach the owner of the project (54%), the governor or the mayor of the area (18%) or the minister of energy (14%). Some people will communicate their concerns via social media (10%) or private media (4%) (table 60).

ANSWER CHOICES	RESPONSES	
Owner of the project	54.00%	27
Governor/ Mayor of your area	18.00%	9
Parliament representative	0.00%	0
Ministry of Energy	14.00%	7
Ministry of Environment	0.00%	0
Social media	10.00%	5
Private media	4.00%	2
Total		50

Table 60: To whom communicate concerns about oil shale power station (Question: If you are in need to express your concerns regarding oil shale whom would you approach?)

The majority of people (64%) also think that they are encouraged to provide opinion on oil shale extraction projects.

6.2.5 Participation and procedural justice

The question if people in Attarat are encouraged to provide opinion about the oil shale power station showed that 50% think that people are encouraged and 50% think that they are not encouraged to provide their opinion. But many people think that they are encouraged to provide opinion about oil shale extraction projects (64%).

If people have concerns regarding the power station, they will approach the owner of the project first (54%), some of them will go to the local government (18%) and the Ministry of Energy (14%). Others (10%) will go to social media or private media (4%). Nobody will go to the Ministry of Environment.

ANSWER CHOICES	RESPONSES	
Owner of the project	54.00%	27
Governor/ Mayor of your area	18.00%	9
Parliament representative	0.00%	0
Ministry of Energy	14.00%	7
Ministry of Environment	0.00%	0
Social media	10.00%	5
Private media	4.00%	2
Total		50

Table 61: The source for communication of concerns regarding oil shale power station (Question: If you are in need to express your concerns regarding oil shale power station whom you would approach)

In case if people have concerns about oil shale extraction projects, they will contact owner of the project (42%). Many people will contact local government (26%) and the Ministry of Energy (18%). Some people will contact the Ministry of Environment (4%). Many people will go to the social media (10%) (table 62).

ANSWER CHOICES	RESPONSES	
Owner of the project	42.00%	21
Governor/ Mayor of your area	26.00%	13
Parliament representative	0.00%	0
Ministry of Energy	18.00%	9
Ministry of Environment	4.00%	2
Social media	10.00%	5
Private media	0.00%	0
Total		50

Table 62: The source for communication of concerns regarding oil shale power station (Question: If you are in need to express your concerns regarding oil shale power station whom you would approach)

6.3 WIND TURBINES

6.3.1 Social acceptance

The majority of people (67%) are aware of planned wind projects in Jordan and are also in favor for these projects. 32% are completely in favor and 43% are in favor for the projects with 1% who are against and 3% who are completely against.

6.3.2

Awareness and information

The majority of people (67%) are aware of planned wind projects in Jordan and are also in favor for these projects. 32% are completely in favor and 43% are in favor for the projects with 1% who are against and 3% who are completely against.

The majority of people in Tafila and Ma'an feel themselves being somewhat informed (51%) and well informed (22%) about wind projects. At the same time 11% say that they are not at all informed or (3%) badly informed (table 63).

ANSWER CHOICES	RESPONSES	
Well informed	0.2212	23
Somewhat informed	0.5096	53
Neither well nor badly informed	0.1346	14
Badly informed	0.0288	3
Not at all informed	0.1058	11
Total		104

Table 63: Level of awareness about wind projects (Question: How well informed do you feel about the wind projects?)

People get their information about wind projects mainly from social media (32%), information campaigns of NGOs (21%) or government-controlled media such as TV, newspapers or radio (21%) or from social media (22%). Information campaigns by project developers (8%) or local authorities (3%) are not considered currently as important source of information (table 64). The majority of people (61%) is also not aware of any public information campaign.

	1	2	3	4	5	6	7	Total	Score
Media (internet, newspapers, tv, radio) – government controlled	38.14% 37	20.62% 20	7.22% 7	6.19% 6	4.12% 4	3.09% 3	20.62% 20	97	4.91
Media (internet, newspapers, tv, radio) – private	14.43% 14	30.93% 30	21.65% 21	8.25% 8	8.25% 8	8.25% 8	8.25% 8	97	4.77
Friends and family	9.28% 9	17.53% 17	19.59% 19	17.53% 17	15.46% 15	7.22% 7	13.40% 13	97	4.12
Information campaigns by local or national authorities	0.00% 0	4.30% 4	32.26% 30	25.81% 24	17.20% 16	17.20% 16	3.23% 3	93	3.80
Information campaigns by developers	3.23% 3	9.68% 9	10.75% 10	22.58% 21	27.96% 26	18.28% 17	7.53% 7	93	3.53
Information campaigns by NGOs	8.42% 8	8.42% 8	0.00% 0	10.53% 10	20.00% 19	31.58% 30	21.05% 20	95	2.96
Social media (e.g. Facebook, twitter, blogs, etc.)	22.45% 22	6.12% 6	6.12% 6	8.16% 8	8.16% 8	17.35% 17	31.63% 31	98	3.48

Table 64: Source of information (Question: Where do you get information about the wind projects? Please rate according to priority (7 - highest importance, 1 - lowest importance))

6.3.3

Expectation of impact

The majority of people expects very positive (37%) and somewhat positive (38%) impact from wind projects on their lives. 22% think that there will be no impact. The number of people who expect negative impacts is minor (4%) and nobody is expecting very negative impacts (table 65).

ANSWER CHOICES	RESPONSES	
Very positive socio-economic impacts	36.54%	38
Somewhat positive socio-economic impacts	37.50%	39
No socio-economic impacts	22.12%	23
Somewhat negative socio-economic impacts	3.85%	4
Very negative socio-economic impacts	0.00%	0
Total		104

Table 65: Expectations of impacts for own life (Question: How do you think your life will be impacted by the wind projects?)

People expect even more positive impacts on own communities. 42% expect very positive impacts and 39% expect positive impacts from wind projects (table 66).

ANSWER CHOICES	RESPONSES	
Very positive socio-economic impacts	42.31%	44
Somewhat positive socio-economic impacts	39.42%	41
No socio-economic impacts	12.50%	13
Somewhat negative socio-economic impacts	3.85%	4
Very negative socio-economic impacts	1.92%	2
Total		104

Table 66: Expectations of impacts for own community (Question: What do you think will be effects on the community as a whole from wind projects?)

In terms of socio-economic impacts people expect mainly jobs (43%) and positive impacts on electricity prices (38%). Further positive impacts are costs of land (24%), quality of infrastructure (20%) and tourism (20%). Wind projects will have the least positive impact on traditional values (table 67).

	VERY POSITIVE IMPACT	SOMEWHAT POSITIVE IMPACT	NO IMPACT	SOMEWHAT NEGATIVE IMPACT	VEGY NEGATIVE IMPACT	TOTAL	WEIGHTED AVERAGE
Job creation (direct, indirect induced jobs)	43.27% 45	37.50% 39	11.54% 12	2.88% 3	4.81% 5	104	4.12
Quality of infrastructure (roads, water, electricity)	20.19% 21	47.14% 49	20.19% 21	7.69% 8	4.81% 5	104	3.70
Tourists coming to Jordan	20.19% 21	35.58% 37	38.46% 40	2.88% 3	2.88% 3	104	3.67
Electricity price	37.86% 39	29.13% 30	26.21% 27	2.91% 3	3.88% 4	103	3.94
Traditional values	16.67% 17	31.37% 32	45.10% 46	2.94% 3	3.92% 4	102	3.54
Costs of land	24.04% 25	38.46% 40	22.12% 23	11.54% 12	3.85% 4	104	3.67

Table 67: Expectations of socio-economic impacts (Question: What do you think will be socio-economic impacts from wind projects on the following issues?)

The bigger share of people (44%) think that the socio-economic benefits from wind projects will be distributed unequally across Jordan and that rich people will benefit more. 22% say that these impacts will be distributed equally and 12% think that people outside Jordan will benefit more. 15% are not sure about impacts (table 68).

ANSWER CHOICES	RESPONSES	
Equally	22.12%	23
Unequally the rich will benefit the most	44.23%	46
Unequally the poor will benefit the most	3.85%	4
People somewhere else will benefit the most, not the Jordanian population	11.54%	12
Don't know or not sure	15.38%	16
No positive impacts	2.88%	3
Total		104

Table 68: Expectations about distribution of benefits from wind projects across Jordan (Question: How do you think positive impacts will be distributed across the Jordanian population?)

While speaking about distribution of benefits from wind projects within own community people still think that rich will benefit more (39%) and 20% are not sure about impacts. 19% say that impacts will be distributed equally and 9% think that people outside Jordan will benefit more (table 69).

ANSWER CHOICES	RESPONSES	
Equally	19.23%	20
Unequally the rich will benefit the most	39.42%	41
Unequally the poor will benefit the most	8.65%	9
People somewhere else will benefit the most, not the Jordanian population	8.65%	9
Don't know or not sure	20.19%	21
No positive impacts	3.85%	4
Total		104

Table 69: Expectation about distribution of benefits from wind projects within own community (Question: How do you think positive impacts will be distributed across the population living in the community nearby of the project?)

While speaking about negative impacts people think that poor will be harmed (30%) and 26% are not sure about impacts. 14% think that negative impacts will be distributed equally and 9% say that people somewhere else will be harmed but not in Jordan (table 70).

ANSWER CHOICES	RESPONSES	
Equally	14.42%	15
Unequally, the rich will be harmed	16.35%	17
Unequally, the poor will be harmed	29.81%	31
People somewhere else will be harmed, not the local population	8.65%	9
Don't know or not sure	25.96%	27
No negative impacts	4.81%	5
Total		104

Table 70: Expectations about distributions of negative impacts from wind projects (Question: How do you think the negative impacts will be distributed across the Jordanian population?)

While speaking about distribution of negative impacts within community nearby the wind projects people think that poor will be mainly harmed (29%) or they are not sure about the impacts (29%). 17% think that rich people will be harmed and 12% say that the distribution will be equal. 7% expect no negative impacts (table 71).

ANSWER CHOICES	RESPONSES	
Equally	11.65%	12
Unequally, the rich will be harmed	17.48%	18
Unequally, the poor will be harmed	29.13%	30
People somewhere else will be harmed, not the local population	5.83%	6
Don't know or not sure	29.13%	30
No negative impacts	6.80%	7
Total		103

Table 71: Expectation about distribution of negative impacts from wind projects within communities nearby (Question: How do you think the negative impacts will be distributed across the population living in the community nearby of the project?)

People expect very positive (47%) and somewhat positive (28%) impacts on environment. 14% think that wind projects will not affect environment. 9% expect somewhat negative and 2% expect very negative impacts on environment (table 72).

ANSWER CHOICES	RESPONSES	
Very positive impact on the environment	47.12%	49
Somewhat positive impact on the environment	27.88%	29
Does not affect the environment	14.42%	15
Somewhat negative impact on the environment	8.65%	9
Very negative impact on the environment	1.92%	2
Total		104

Table 72: Expectations of impacts on environment (Question: How do you think the negative impacts will be distributed across the population living in the community nearby of the project?)

People expect mainly positive impacts from wind projects on water availability (32% very positive impact and 31% somewhat positive impact), on human health (27% very positive and 32% somewhat positive) and on the quality of air (26% very positive and 29% somewhat positive). The lowest positive impact is on aesthetic of landscape (16% very positive and 44% somewhat positive) and biodiversity (13% very positive and 32% somewhat positive). People also expect somewhat negative impacts on aesthetics of landscape (13%), land-use (12%) and biodiversity (10%) (table 73).

	VERY POSITIVE IMPACT	SOMEWHAT POSITIVE IMPACT	NO IMPACT	SOMEWHAT NEGATIVE IMPACT	VEGY NEGATIVE IMPACT	TOTAL	WEIGHTED AVERAGE
Water availability	32.00% 32	31.00% 31	30.00% 30	6.00% 6	1.00% 1	100	3.87
Land-use (e.g. competition with agriculture)	22.33% 23	35.92% 37	27.18% 28	11.65% 12	2.91% 3	103	3.63
Biodiversity	12.75% 13	32.35% 33	43.14% 44	9.80% 10	1.69% 2	102	3.44
Aesthetics of the landscape	16.35% 17	44.23% 46	23.08% 24	13.46% 14	2.88% 3	104	3.58
Quality of water	19.23% 20	29.81% 31	42.31% 44	5.77% 6	2.88% 3	104	3.57
Quality of soil	19.23% 20	23.08% 24	45.19% 47	6.73% 7	5.77% 6	104	3.43
Quality of air	26.21% 27	29.13% 30	35.92% 37	4.85% 5	3.88% 4	103	3.69
Human health	27.18% 28	32.04% 33	31.07% 32	6.80% 7	2.91% 3	103	3.74

Table 73: Expectation of impacts from wind projects (Question: I will now read a number of environmental features for each, please tell me whether you think that the construction of wind projects will have a very positive, somewhat positive, a somewhat negative, a very negative or no impact?)

6.3.4 Risk perceptions

People think that small accidents from wind projects are quiet probable. The majority of people say that such accidents are probable every 5 years or more often (44%) and once every 10 years (22%) (table 74).

ANSWER CHOICES	RESPONSES	
About once in every five years or more often	41.35%	43
About once in every 10 years	22.12%	23
About once in every 15 years	7.69%	8
About once in every 20 years	16.35%	17
Less than once in every 20 years	12.50%	13
Total		104

Table 74: Perceptions of probability of small accidents from wind projects (Question: How probable, do you think is a small accident with impacts on the population if wind projects are built?)

The majority of people also think that a large accident is quite probable. 57% say it can happen every 20 years and 16% say it can happen every 50 years (table 75).

ANSWER CHOICES	RESPONSES	
About once in every 20 years or more often	56.73%	59
About once in every 50 years	16.35%	17
About once in every 100 years	11.54%	12
About once in every 500 years	4.81%	5
Less than once in every 500 years	10.58%	11
Total		104

Table 75: Perceptions of probability of large accidents from wind projects (Question: How probable, do you think is an accident with impacts on the population if the wind projects are built?)

People perceive wind projects to be quite safe. On the scale from 1 to 10 where 10 is the safest technology they rank wind as 6.6

Also, the majority of people would not mind having wind projects close to their homes. 35% would accept it 20 km and less to their homes and 31% would accept the projects at the distance 20-50 km. 19% of people would prefer to have the projects at more than 100 km from their homes (table 76).

ANSWER CHOICES	RESPONSES	
<20 km from my home	34.95%	36
20-50 km from my home	31.07%	32
50-100 km from my home	14.56%	15
>100 km from my home	19.42%	20
Total		103

Table 76: Perception of distance aspect (Question: Include the distance aspect. How close to your home do you expect the wind projects could be?)

People think that if something happens during the functioning of wind projects the authorities in Jordan will be only partially be able to control the risk (49%). 33% think that the authorities will fully control the risk and 18% think that they will not be able to control the risk (table 77)

ANSWER CHOICES	RESPONSES	
Yes fully	32.69%	34
Partially	49.04%	51
No	18.27%	19
Total		104

Table 77: Perception of how well authorities in Jordan can control the risk if an accident will happen during the functioning of the wind projects (Question: If something happens, do you think authorities will be able to control the risk?)

People also think that the capacities of disaster risk reduction in Jordan to control the risk if an accident happens at the wind project are worse than in other countries (44%). A significant share thinks that it is equal to other countries (31%) or even better (25%).

ANSWER CHOICES	RESPONSES	
Better than other countries	25.00%	26
Worse than other countries	44.23%	46
Equal	30.77%	32
Total		104

Table 78: Perception of how well authorities in Jordan can control the risk if an accident will happen during the functioning of the wind projects in comparison to other countries (Question: How do you evaluate capacities of disaster risk reduction in Jordan in comparison to other countries to control the risk if accident happens at the wind projects?)

6.3.5 Participation and procedural justice

People (65%) think that they are not really encouraged to provide opinion about wind projects. If people have concerns, they will mainly communicate it via social media (26%). They might also go to the local government (20%), owner of the project (17%) or Ministry of Energy (17%). The Ministry of Environment (9%), a parliament representative (7%) or private media (5%) would be the last instances where people would go with concerns (table 79).

ANSWER CHOICES	RESPONSES	
Owner of the project	16.50%	17
Governor/ Mayor of your area	20.39%	21
Parliament representative	6.80%	7
Ministry of Energy	16.50%	17
Ministry of Environment	8.74%	9
Social media	26.21%	27
Private media	4.85%	5
Total		103

Table 79: Communication of concerns (Question: If you are in need to express your concerns regarding wind projects whom would you approach)

People also perceive that it is important to consult local communities where infrastructure is being planned, especially if it is about large-scale infrastructure. The rank this concern among top priorities together with concerns about energy security and that projects are finalized (table 80).

	I FULLY AGREE	I SOMEWHAT AGREE	I NEITHER AGREE NOR DISAGREE	I SOMEWHAT DISAGREE	I FULLY DISAGREE	TOTAL	WEIGHTED AVERAGE
I am worried that new infrastructure projects will not be completed.	39.42% 41	37.50% 39	15.38% 16	4.81% 5	2.88% 3	104	4.06
The oil shale plant will provide a reliable source of electricity for our community.	14.56% 15	48.54% 50	23.30% 24	9.71% 10	3.88% 4	103	3.60
Renewable energy will provide a reliable source of electricity for our community.	26.92% 28	44.23% 46	18.27% 19	8.65% 9	1.92% 2	104	3.86
It is important that the local population is consulted on decisions about large scale infrastructure.	36.89% 38	37.86% 39	16.50% 17	5.83% 6	2.91% 3	103	4.00
It is not necessary that the population is informed about the details of large-scale infrastructure project.	12.50% 13	27.88% 29	20.19% 21	24.04% 25	15.38% 16	104	2.98
New energy infrastructure in my community is constructed according to public regulations.	12.50% 13	32.69% 34	43.27% 45	11.54% 12	0.00% 0	104	3.46
Shale oil is important for Jordan to become independent from energy imports.	34.62% 36	33.65% 35	25.00% 26	4.81% 5	1.92% 2	104	3.94

Table 80: Patterns of social acceptance (Question: I will now read to you a set of statements, please tell me how you feel about them on a scale from 1-5 (where 1=I fully disagree and 5=I fully agree))

6.4 SOLAR ENERGY (PV)

6.4.1 Social acceptance

People in general are supporting large-scale PV projects in Jordan with 41% saying that they support very much and 32% saying that they somewhat support. However, the share of people who are not supporting the projects is also significant with 16% saying that “no very little support” and 11% saying “no, not at all”.

The major factor of social acceptance of electricity infrastructure is low electricity price, followed by independent from imports from other countries. When people were asked to rank the most important criteria related to electricity generation, they selected low electricity prices (67%) followed by being independent from imports from other countries (50%) and reliability of providing electricity without interruption (43%). Avoiding negative environmental impacts (36%) and safety of technology (31%) are two least important criteria (table 81).

	Most important	Very important	Important	Little important	Not Important	Total	Weighted Average
Low electricity prices	66.99% 69	19.42% 20	8.74% 9	1.94% 2	2.91% 3	103	4.46
Safety of the technology	31.07% 32	45.63% 47	19.42% 20	1.94% 2	1.94% 2	103	4.02
Reliability of providing electricity without interruption	42.72% 44	32.04% 33	20.39% 21	2.91% 3	1.94% 2	103	4.11
Avoiding negative environmental impacts	35.92% 37	37.86% 39	17.48% 18	3.88% 4	4.85% 5	103	3.96
Being independent from imports from other countries	50.49% 52	27.18% 28	14.56% 15	2.91% 3	4.85% 5	103	4.16

Table 81: Rank of criteria according to their importance for electricity generation (Question: What is in your opinion the most important about electricity generation?)

6.4.2 Awareness and information

The majority of people (69%) is aware of PV projects planned in Jordan. People are also mostly completely in favor (53%) or in favor (34%) to these projects. Only 3% were against and 10% were neither in favor nor against. People (70%) are also aware that other than PV renewable energy sources projects are planned in Jordan. The bigger share of people is in favor (43%) or completely in favor (32%) to these projects. Only 3% is completely against or against (1%). 21% of people are indifferent.

People (70%) are also aware of PV projects planned in their community and the majority is completely in favor (41%) or in favor (37%) to these projects. Nobody is against and 22% are indifferent. However, people don't feel being well informed about PV projects. The larger share (43%) said that they are somewhat informed and 16% think that they are not informed at all (table 82).

ANSWER CHOICES	RESPONSES	
Well informed	13.95%	14
Somewhat informed	42.72%	44
Neither well nor badly informed	21.36%	22
Badly informed	6.80%	7
Not at all informed	15.53%	16
Total		103

Table 82: Level of awareness

People get information on PV projects mostly from social media (31%) as well as from government-controlled media such as TV, newspapers and radio (24%). Some people receive information from information campaigns by NGOs (17%) or from friends and family (15%). Project developers (10%) and private media (9%) rank low as an information source. Information campaign by local or national authorities is the least popular source to get information (2%) (table 83).

	1	2	3	4	5	6	7	Total	Score
Media (internet, newspapers, tv, radio) – government controlled	32.26% 30	19.35% 18	9.68% 9	8.60% 8	4.30% 4	2.15% 2	23.66% 22	93	4.66
Media (internet, newspapers, tv, radio) – private	16.30% 15	32.61% 30	16.30% 15	8.70% 8	7.61% 7	9.78% 9	8.70% 8	92	4.77
Friends and family	12.09% 11	16.48% 15	13.19% 12	19.78% 18	9.89% 9	13.19% 12	15.38% 14	91	4.00
Information campaigns by local or national authorities	11.24% 10	6.74% 6	28.09% 25	17.98% 16	23.60% 21	10.11% 9	2.25% 2	89	4.25
Information campaigns by developers	0.00% 0	7.69% 7	17.58% 16	21.98% 20	24.18% 22	18.68% 17	9.89% 9	91	3.42
Information campaigns by NGOs	4.44% 4	6.67% 6	7.78% 7	13.33% 12	23.33% 21	27.78% 25	16.67% 15	90	3.06
Social media (e.g. Facebook, twitter, blogs, etc.)	19.15% 18	7.45% 7	7.45% 7	9.57% 9	7.45% 7	18.09% 17	30.85% 29	94	3.44

Table 83: Sources of information about solar PV projects (Question: Where do you get information about the solar PV projects? Please rate according to priority (7 - highest importance, 1 - lowest importance))

People are also not aware about any public information campaign for solar PV projects. 56% told that they are not aware of any such campaign.

While speaking about information sources which people trust mostly scientists is the highest trusted source of information (28% complete trust and 46% some trust) followed by project developers (16% complete trust and 36% some trust). The opinion about international organizations and foreign investors is polarized. 13% of people completely trust international organization however 11% don't trust at all. Also 12% completely trust foreign investors however 11% don't trust at all. NGOs enjoy quiet low level of trust, with 6% of people saying that they completely trust NGOs and 14% who don't trust NGOs. Politicians enjoy the lowest level of trust, with 36% of people who completely distrust them (table 84).

	COMPLETE TRUST	SOME TRUST	LITTLE TRUST	VERY LITTLE TRUST	NO TRUST	TOTAL	WEIGHTED AVERAGE
Mass media	6.73% 7	29.81% 31	38.46% 40	9.62% 10	15.38% 16	104	3.03
Scientists	28.43% 29	46.08% 47	13.73% 14	8.82% 9	2.94% 3	102	3.88
Project developers	15.53% 16	35.92% 37	33.98% 35	6.80% 7	7.77% 8	103	3.45
Intenational institutions (UN etc.)	12.50% 13	32.69% 34	32.69% 34	11.54% 12	10.58% 11	104	3.25
Foreign investors	12.00% 12	34.00% 34	28.00% 28	15.00% 15	11.00% 11	100	3.21
NGOs	5.83% 6	28.16% 29	38.83% 40	13.59% 14	13.59% 14	103	2.99
Politicians	0.97% 1	17.48% 18	24.27% 25	21.36% 22	35.92% 37	103	2.26

Table 84: Trust to various sources of information. (Question: How much do you trust information from the following sources?)

6.4.3 Expectation of impact

A bigger share of people believes that solar PV projects will have a very positive (44%) and somewhat positive (37%) impact on their lives. People don't expect any negative impacts from solar projects (table 85).

ANSWER CHOICES	RESPONSES	
Very positive socio-economic impacts	44.23%	46
Somewhat positive socio-economic impacts	36.54%	38
No socio-economic impacts	16.35%	17
Somewhat negative socio-economic impacts	2.88%	3
Very negative socio-economic impacts	0.00%	0
Total		104

Table 85: Expectations of impacts from solar projects (Question: How do you think your life will be impacted by the solar PV projects?)

They are also optimistic about overall impacts on Jordan. 42% think that these impacts will be very positive and 42% think that they will be positive.

People expect that solar PV will have mainly positive impacts on electricity prices (48%) and job creation (46%). However, 7% expect very negative impacts from renewable energy sources on electricity prices. Other positive impacts will be on the costs of land (32%), tourism (24%) and quality of infrastructure (24%). PV will have quiet little impact on traditional values (17%) (table 86).

	VERY POSITIVE IMPACT	SOMEWHAT POSITIVE IMPACT	NO IMPACT	SOMEWHAT NEGATIVE IMPACT	VEGY NEGATIVE IMPACT	TOTAL	WEIGHTED AVERAGE
Job creation (direct, indirect induced jobs)	46.15% 48	41.35% 43	9.62% 10	0.96% 1	1.92% 2	104	4.29
Quality of infrastructure (roads, water, electricity)	24.04% 25	50.96% 53	19.23% 20	4.81% 5	0.96% 1	104	3.92
Tourists coming to Jordan	24.04% 25	37.50% 39	34.62% 36	0.96% 1	2.88% 3	104	3.79
Electricity price	47.57% 49	20.39% 21	21.36% 22	3.88% 4	6.80% 7	103	3.98
Traditional values	17.48% 18	32.04% 33	38.83% 40	8.74% 9	2.91% 3	103	3.52
Costs of land	31.73% 33	34.62% 36	18.27% 19	10.58% 11	4.81% 5	104	3.78

Table 86: Expectations on socio-economic impacts (Question: How will solar PV projects affect the following issues?)

However, people think PV is a technology which is benefiting rich people or people outside of Jordan. They think that the impacts of solar PV will be distributed unequally and that rich will benefit the most (42%) or people somewhere else outside of Jordan will benefit more (13%). Only 10% think that impacts will be distributed equally (table 86). At the same time poor will be the ones who will be hurt mostly (38%).

ANSWER CHOICES	RESPONSES	
Equally	9.62%	10
Unequally the rich will benefit the most	42.31%	44
Unequally the poor will benefit the most	8.65%	9
People somewhere else will benefit the most, not the Jordanian population	12.50%	13
Don't know or not sure	23.08%	24
No positive impacts	3.85%	4
Total		104

Table 87: Expectations about distribution of impacts (Question: How do you think positive impacts from solar PV projects will be distributed across the Jordanian population?)

People expect very positive (42%) and somewhat positive (27%) impacts on environment or at least no impact (21%). Only very few people think that solar PV will have negative impacts on environment (table 88).

ANSWER CHOICES	RESPONSES	
Very positive impact on the environment	41.75%	43
Somewhat positive impact on the environment	27.18%	28
Does not affect the environment	21.36%	22
Somewhat negative impact on the environment	8.74%	9
Very negative impacts on the environment	0.97%	1
Total		103

Table 88: Expectations on impacts on environment (Question: Thinking of the environmental impacts do you think that the solar PV projects will have)

According to the interviewed people solar PV projects will have the highest positive impacts on human health (29% very positive, 35% somewhat positive), on water availability (29% very positive, 32% somewhat positive) and on quality of air (25% very positive, 40% somewhat positive). The lowest impact will be on quality of soil (12% very positive, 40% somewhat positive) and biodiversity (15% very positive, 40% somewhat positive) (table 89).

	VERY POSITIVE IMPACT	SOMEWHAT POSITIVE IMPACT	NO IMPACT	SOMEWHAT NEGATIVE IMPACT	VEGY NEGATIVE IMPACT	TOTAL	WEIGHTED AVERAGE
Water availability	28.85% 30	31.73% 33	35.58% 37	2.88% 3	0.96% 1	104	3.85
Land-use (e.g. competition with agriculture)	19.23% 20	50.96% 53	18.27% 19	6.73% 7	4.81% 5	104	3.73
Biodiversity	14.71% 15	40.20% 41	34.31% 35	7.84% 8	2.94% 3	102	3.56
Aesthetics of the landscape	19.23% 20	45.19% 47	28.85% 30	3.85% 4	2.88% 3	104	3.74
Quality of water	16.35% 17	40.38% 42	38.46% 40	2.88% 3	1.92% 2	104	3.66
Quality of soil	12.50% 13	40.38% 42	37.50% 39	6.73% 7	2.88% 3	104	3.53
Quality of air	25.00% 26	40.38% 42	28.85% 30	2.88% 3	2.88% 3	104	3.82
Human health	29.41% 30	35.29% 36	28.43% 29	4.90% 5	1.92% 2	102	3.85

Table 89: Expected impacts of PV projects on environment (Question: What impacts will solar PV projects have on the following issues?)

6.4.4

Risk perceptions

People perceive water scarcity and drought as being the most serious risks for their community (38% as very serious and 38% as serious). The second most important risk is environmental degradation and pollution (33% perceive it as very serious and 40% perceive it as serious), followed by waste management (27%) and political risks in the region (27%). Energy availability or energy costs are perceived as being the least serious risk (24% perceive it as very serious and 45% as not serious (table 90).

	VERY SERIOUS	SERIOUS	NOT SERIOUS	TOTAL	WEIGHTED AVERAGE
Political risks in the region	26.92% 28	44.23% 46	28.85% 30	104	2.02
Energy availability or energy costs	24.04% 25	30.77% 32	45.19% 47	104	2.21
Water scarcity/drought	38.46% 40	34.46% 40	23.08% 24	104	1.85
Socio-economic development	31.73% 33	35.58% 37	32.69% 34	104	2.01
Environmental degradation or pollution	32.69% 34	40.38% 42	26.92% 28	104	1.94
Waste management	26.92% 28	33.65% 35	39.42% 41	104	2.13

Table 90: Perceptions of risks for own community (Question: How serious are the following risks for your community?)

Many people perceive that these risks are less serious for them personally than for their community. Water scarcity and drought is still perceived as the most serious risk (34%), followed by socio-economic development (27%) and environmental degradation (27%). Waste management (22%) and energy availability or costs (21%) are perceived as least serious risks (table 91).

	VERY SERIOUS	SERIOUS	NOT SERIOUS	TOTAL	WEIGHTED AVERAGE
Political risks in the region	26.47% 27	36.27% 37	37.25% 38	102	2.11
Energy availability or energy costs	21.36% 22	39.81% 41	38.83% 40	103	2.17
Water scarcity/drought	34.31% 35	38.24% 39	27.45% 28	102	1.93
Socio-economic development	27.45% 28	39.22% 40	33.33% 34	102	2.06
Environmental degradation or pollution	27.18% 28	45.63% 47	27.18% 28	103	2.00
Waste management	21.57% 22	37.25% 38	41.18% 42	102	2.2

Table 91: Perceptions of risks for own life (Question: How serious are these risks for you personally?)

People think that small accidents from functioning of PV projects are possible every 5 years and even more often (38%) and every 10 years (24%) (table 92).

ANSWER CHOICES	RESPONSES	
About once in every five years or more often	37.86%	39
About once in every 10 years	24.27%	25
About once in every 15 years	14.56%	15
About once in every 20 years	7.77%	8
Less than once in every 20 years	15.53%	16
Total		103

Table 92: Risk perception of small accidents during the functioning of PV projects

They also think that large accidents are probable. Almost 60% think that such accidents could happen every 20 years and even more often (table 93).

ANSWER CHOICES	RESPONSES	
About once in every 20 years or more often	58.65%	61
About once in every 50 years	15.38%	16
About once in every 100 years	11.54%	12
About once in every 500 years	4.81%	5
Less than once in every 500 years	9.62%	10
Total		104

Table 93: Risk perceptions of large-scale accidents (Question: How probable, do you think is a large accident with impacts on the population if solar PV projects are completed?)

On the scale from 1 to 10 people think that PV is a quiet safe technology, with the average evaluation of 4.4

Many people would not mind having PV close to their homes. For 40% is it convenient to have it with the distance of less than 20 km, for 22% with distance between 20-50 km. But many (29%) would prefer to have it at the distance of over 100 km (table 94).

ANSWER CHOICES	RESPONSES	
<20 km from my home	39.81%	41
20-50 km from my home	22.33%	23
50-100 km from my home	8.74%	9
>100 km from my home	29.13%	30
Total		103

Table 94: Risk perception and distance aspect (Question: Include the distance aspect. How close to your home are solar PV projects could be?)

The majority of people (54%) think that the government authorities in Jordan can only partially control the risk if something happens during the operation of solar PV.

ANSWER CHOICES	RESPONSES	
Yes fully	33.98%	35
Partially	54.37%	56
No	11.65%	12
Total		103

Table 95: Perception of how well the authorities can control the risk (Question: If something happens, do you think authorities will be able to control the risk?)

People also think that the capacities of disaster risk reduction authorities in Jordan to control the risk if an accident happens at PV projects are worse than in other countries (42%), better than in other countries (29%) and equal (29%) (table 96).

ANSWER CHOICES	RESPONSES	
Better than other countries	29.13%	30
Worse than other countries	41.75%	43
Equal	29.13%	30
Total		103

Table 96: Perception of how well the authorities can control the risk in comparison to other countries (How do you evaluate capacities of disaster risk reduction in Jordan in comparison to the European countries to control the risk if accident happens at the solar PV projects?)

6.4.5 Participation and procedural justice

The majority of people (59%) also say that they are not encouraged to provide opinion about solar PV projects. Social media are playing much more important role for renewable energy sources if people want to express their concerns than for oil shale. In case of concern 25% of interviewed people will go to social media. 19% will go to owner of the project or governor of the area. 16% will go to the Ministry of Energy and 12% to a representative of parliament. Only 5% will go to private media or to Ministry of Environment (4%) (table 97).

ANSWER CHOICES	RESPONSES	
Owner of the project	19.42%	20
Governor/ Mayor of your area	19.42%	20
Parliament representative	11.65%	12
Ministry of Energy	15.53%	16
Ministry of Environment	3.88%	4
Social media	25.24%	26
Private media	4.85%	5
Total		103

Table 97: Communication of concerns (Question: If you are in need to express your concerns regarding solar PV projects whom you would approach)

7

CONCLUSIONS

The received data allowed us making following conclusions.

SOCIAL ACCEPTANCE

First, social acceptance for large-scale projects in Jordan is very high (80% of all surveyed people support large-scale projects).

It is interesting that the oil shale project in Attarat enjoys the highest level of acceptance, followed by wind and oil shale in Lajiun. The share of people who are completely in favor for solar projects is the lowest. This may be connected to the fact that solar has equal share of people who are also in favor for solar PV. So, it seems that people are more cautious about solar PV but at the same time it seems that opinion on other technologies are much more polarized. For example, some people are against oil shale in Attarat and completely against wind projects. However, solar PV does not have voices of people who would be completely against solar PV projects.

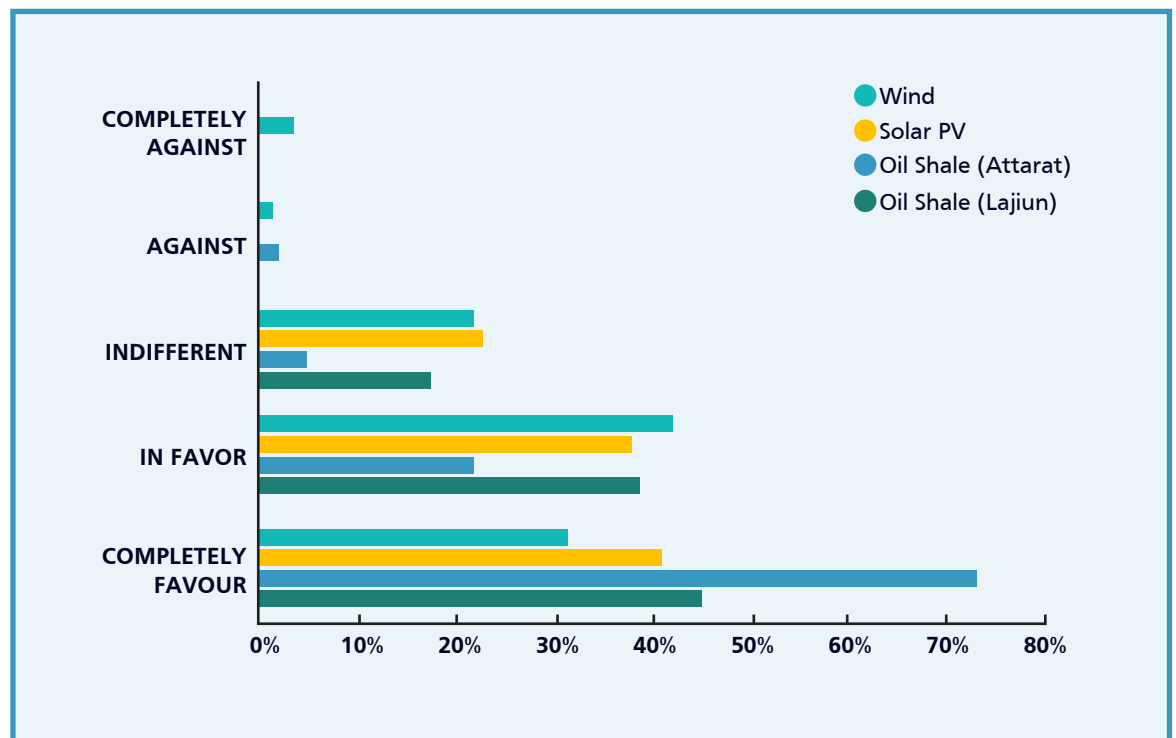


Figure 1: Social acceptance for solar, wind and oil shale

If all positive choices are counted together such as “completely in favor” and “in favor”, then oil shale in Attarat has the highest level of acceptance, followed by oil shale in Lajiun, solar PV and wind. The fact that wind is the least acceptance technology is connected to the fact that there are many people who are indifferent about wind technology. This is also the only technology that some people are completely against.

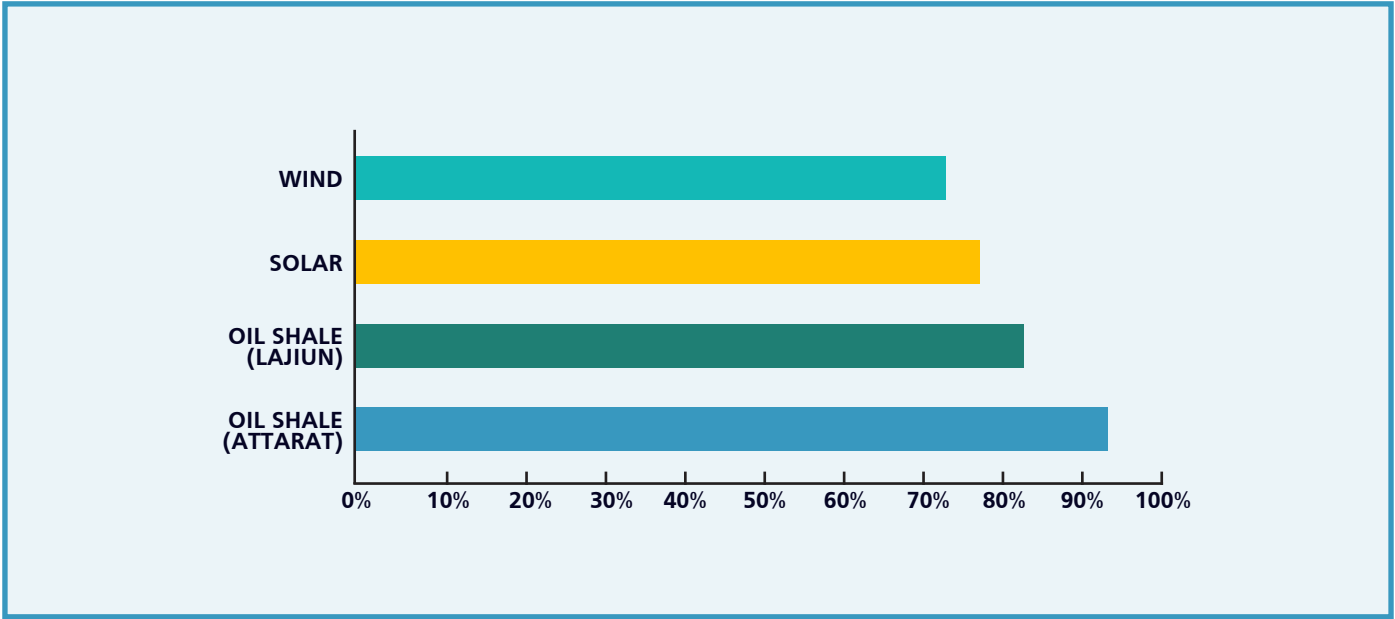


Figure 2: Percentage of people who answered “completely in favor” and “in favor”

So high level of acceptance for oil shale power station in Attarat can be connected to the fact that there is a massive information campaign about this project. 98% of all interviewees know about it. The level of awareness for other technologies and projects is much lower.

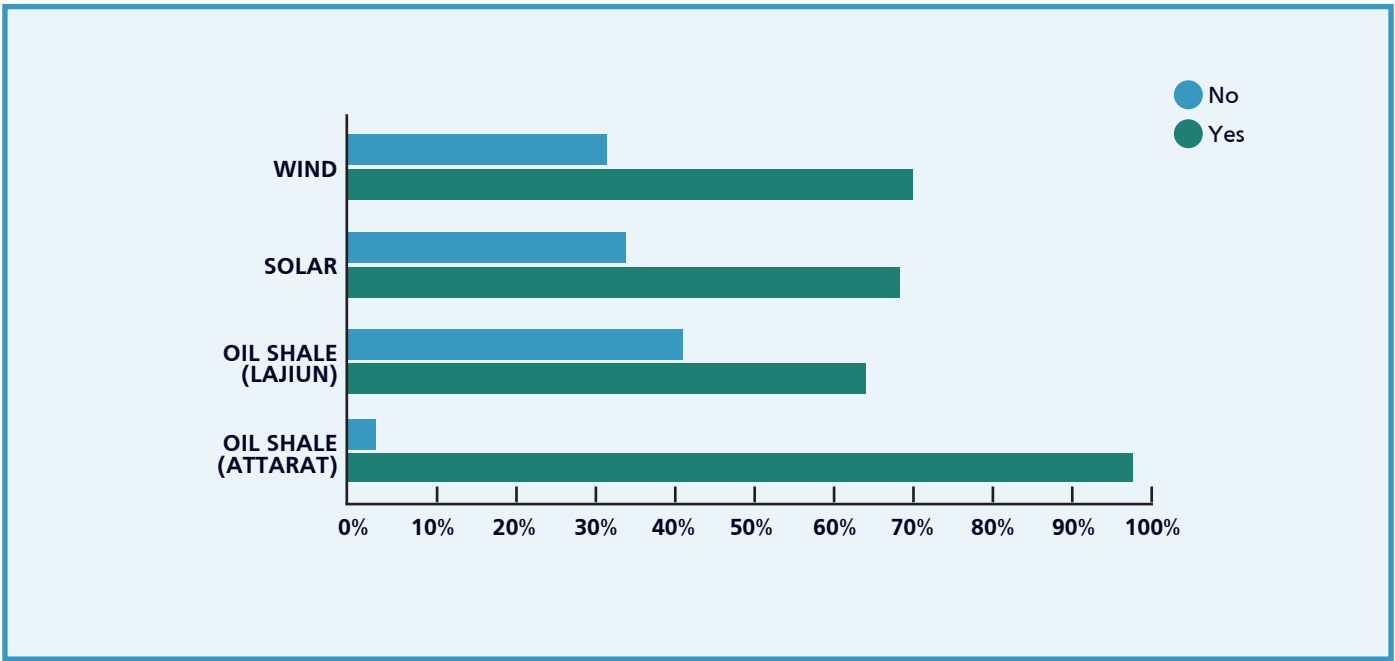


Figure 3: Level of awareness about oil shale, wind and solar

Another reason might be that people in Attarat seem to carry much less about possible risks than in other communities. In Attarat preferences for the option “very serious risk” were the lowest among all communities. Among possible risks people in Attarat rank environmental risks as high however they are not very much concerned about them. People in Lajiun are concerned about water scarcity, environmental degradation and waste management and the percentage of very concerned people is higher than in Attarat. People in communities where renewable energies are planned, such as Ma’an and Tafila, are also concerned about environment but they are also concerned about socio-economic development in an equal extend as well as about political risks.

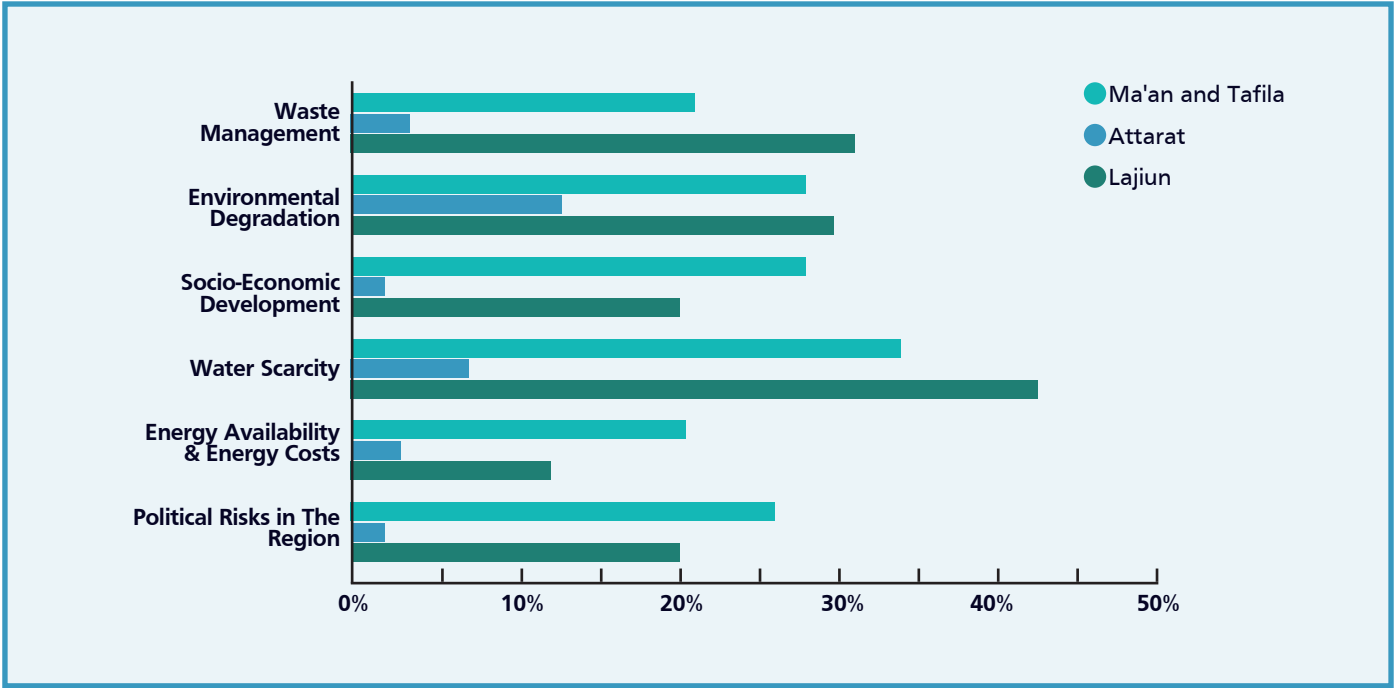


Figure 4: Concerns about various risks in Ma’an, Tafila, Attarat and Lajiun

The high level of social support towards the oil shale power station in Attarat can be connected with the high level of social support for large-scale infrastructure projects in general. In all case study areas, the level of support for large-scale projects is high.

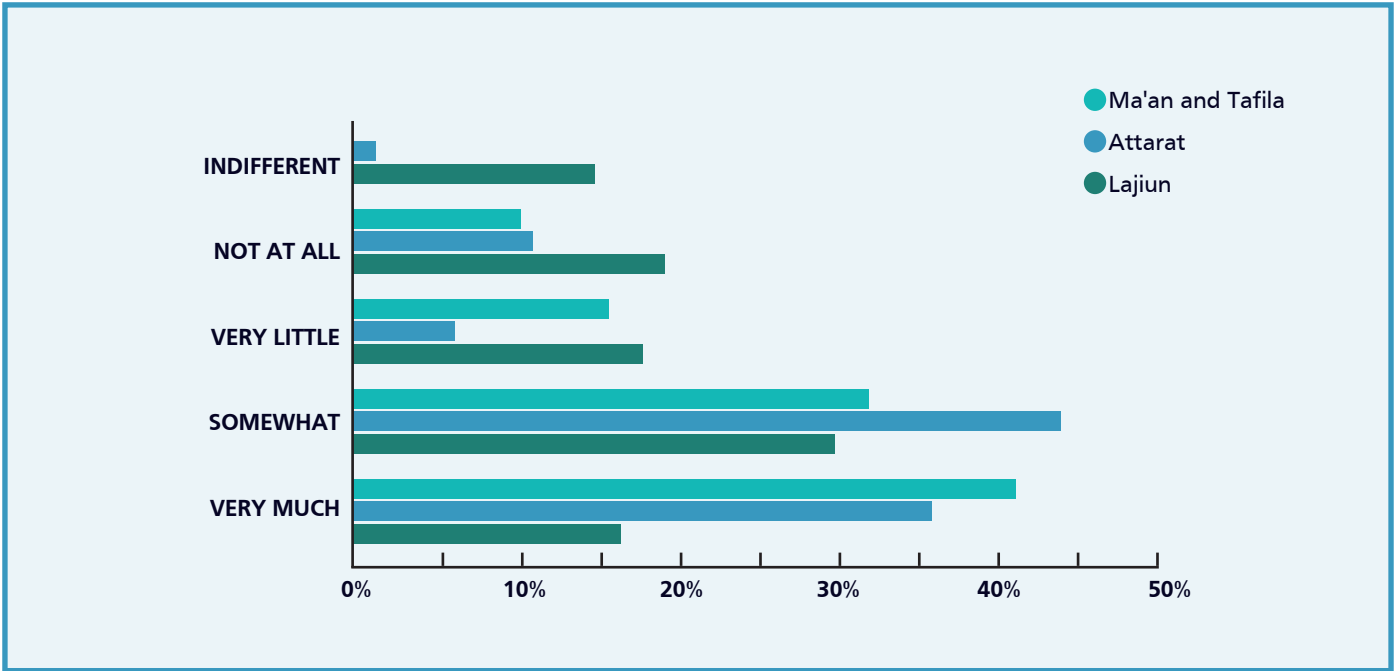


Figure 5: Social support for large-scale projects

High rate of social acceptance is present in Jordan for everything which is connected with energy security issues which are understood mainly as independence from imported energy. 72% of all interviewed people fully agree that oil shale is important for Jordan to become independent from energy imports and 64% fully agree and 28% somewhat agree that oil shale power plant will provide a reliable source of electricity for the community. Renewable energy sources are also considered to be an important source which can provide reliable electricity to the community by 62% (fully agree) and 20% (somewhat agree). So, it seems that people perceive oil shale as being more reliable electricity source than renewable energy sources, but this result might be due to the high share of people who could not provide their answer about renewable energy sources (16%).

Data of our research show that the importance of being independent from imported energy is the highest in Attarat. This shows the influence of this argument on the level of acceptance of oil shale power station as well as to availability of information campaigns about importance of energy independence for Jordan. People in other case study areas are much less concerned about independence from energy imports. People in Ma'an and Tafila, communities with renewable energy projects, are mostly concerned about low electricity prices. This shows another time importance of communication campaigns on contribution of renewable energies to socio-economic development, including low electricity prices.

Recommendations on further research:

- Further research on very negative attitudes towards wind energy is needed. For example, if some people are completely against wind technology it is important to understand their reasons
- Fact of high level of acceptance of oil shale projects might be connected to the fact that projects like Attarat are supported by the government and people in Jordan, in general, have high level of trust to the activities of the government. At the same time renewable energy projects don't represent one large-scale flagship project with backing of the government. Therefore, high level of support can be connected with the role of the government rather than with technology itself
- Further research is needed to understand social attitudes towards large-scale projects and why they enjoy so high level of support in Jordan. Patterns of social support for large scale versus small decentralized projects should be also researched.

Recommendations on action:

- Actions should target social groups which are indifferent regarding wind energy. Here awareness raising campaigns about contribution of wind technology to energy security in Jordan can be helpful
- Renewable energies enjoy significantly lower level of awareness than oil shale, especially oil shale power station in Attarat. These results show the need of further information campaigns about wind and solar technologies, but especially about concrete wind and solar projects in Jordan
- Awareness raising campaigns on renewable energy sources should highlight socio-economic benefits which renewable energies will bring to their communities. Awareness raising campaigns on environmental benefits alone will not be sufficient as people in these communities are concerned about socio-economic benefits much stronger than in other communities

EXPECTATIONS OF BENEFITS

Second, acceptance for infrastructure projects is driven by expectations of economic benefits. 29% of all interviewed gave to criterion "economic profits" the highest rank, followed by transparency of planning processes (28%), quality of infrastructure (25%) and then environmental impacts (18%). People have expectations of very positive (64%) and somewhat positive (20%) impacts on own lives and own community from oil shale projects. The majority of people expect that oil shale projects will create jobs (86%) or improve infrastructure (60%) as well as will have positive impacts on costs of electricity (56%). People think that distribution of benefits from oil shale in their own community will be equal (48%) but that poor people will harm more from negative impacts (22%).

Especially people in Attarat expect very positive socio-economic benefits from the oil shale power station. In comparison in Lajiun people are much more critical in their expectations of socio-economic benefits from oil shale.

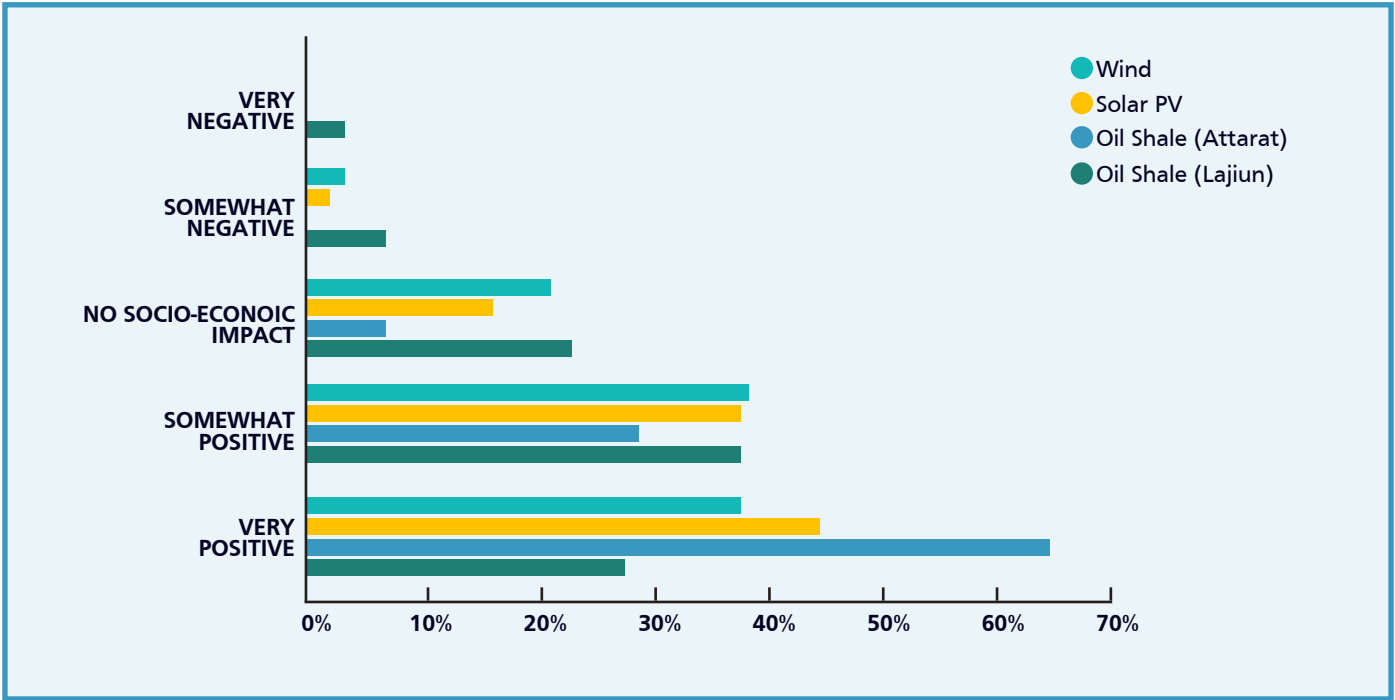


Figure 6: Expectations of socio-economic benefits from oil shale, wind and solar PV

People in Attarat are most positive in their expectations of socio-economic impacts and think that the oil shale power station will have positive impacts on infrastructure and will lead to creation of new jobs. They also expect positive impacts on electricity prices, costs of land and traditional values. People in Ma’an and Tafila are much less positive about impacts on infrastructure or on job creation processes.



Figure 7: Expectation of impacts on socio-economic development from oil shale, wind and solar PV

Recommendations on further research:

- Further research is needed on projects and quantifications of impacts from oil shale, wind and solar projects in various locations in terms of direct, indirect and induced employment
- Further research is needed on quantification of multiplier effects from investment into oil shale, wind and solar projects and the distribution of these effects in local communities

Recommendations on action:

- Policy and institutional mechanisms are needed and have to be implemented to guarantee fair distribution of risks, benefits and costs from oil shale, wind and solar power projects

EXPECTATIONS OF IMPACTS ON ENVIRONMENT

In general, people are aware that various infrastructure projects will bring not only benefits but also sometimes negative impacts on their community. Especially in Lajiun people are concerned that oil shale might have negative and very negative impacts on environment. People in communities of Ma'an and Tafila expect that wind and solar projects will mainly have positive impacts on environment in their communities. Also people in Attarat are cautious in their evaluations of impacts from oil shale power station on environment while expecting somewhat negative impacts or not expressing their opinion.

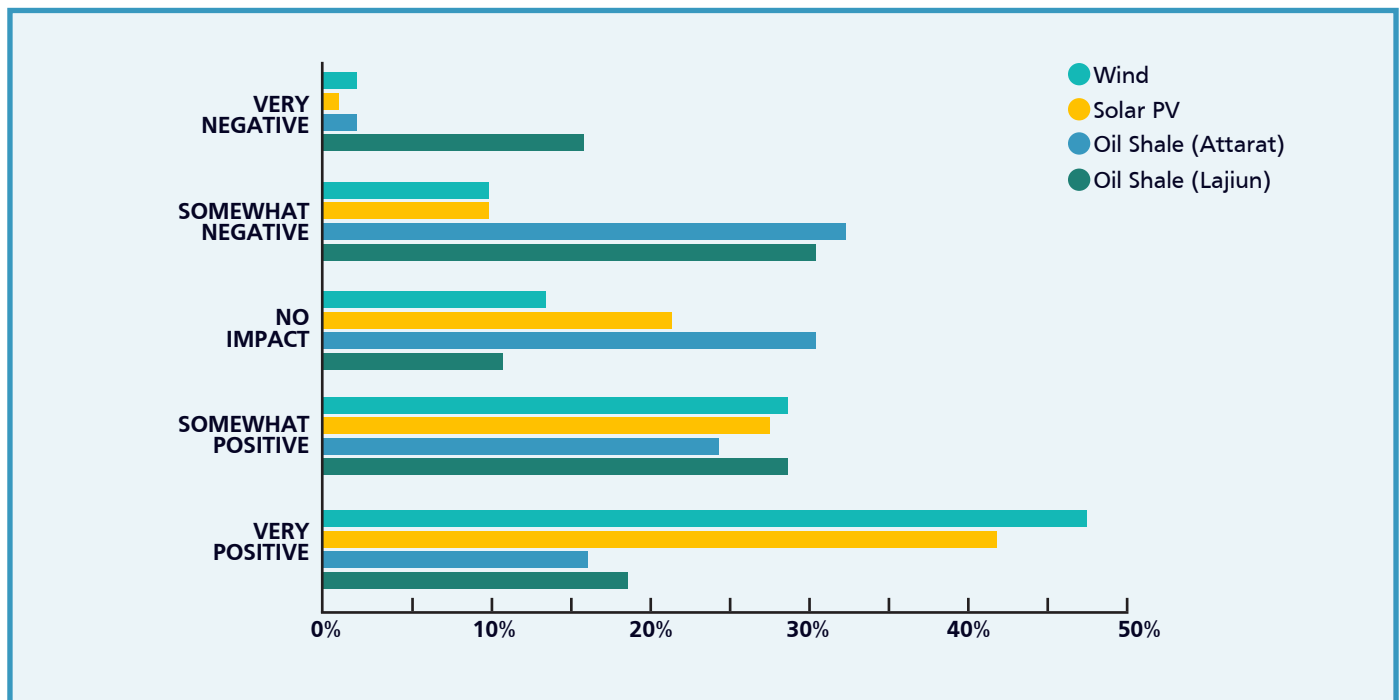


Figure 8: Expectations of impacts on environment

However, if we look to the results about expectations of impacts on various components of environment such as water, soil, air etc. as well as on human health and biodiversity, we could see the existing awareness or the lack of information on certain issues. For example, people expect that oil shale projects will have very positive impacts on water availability or quality of water.

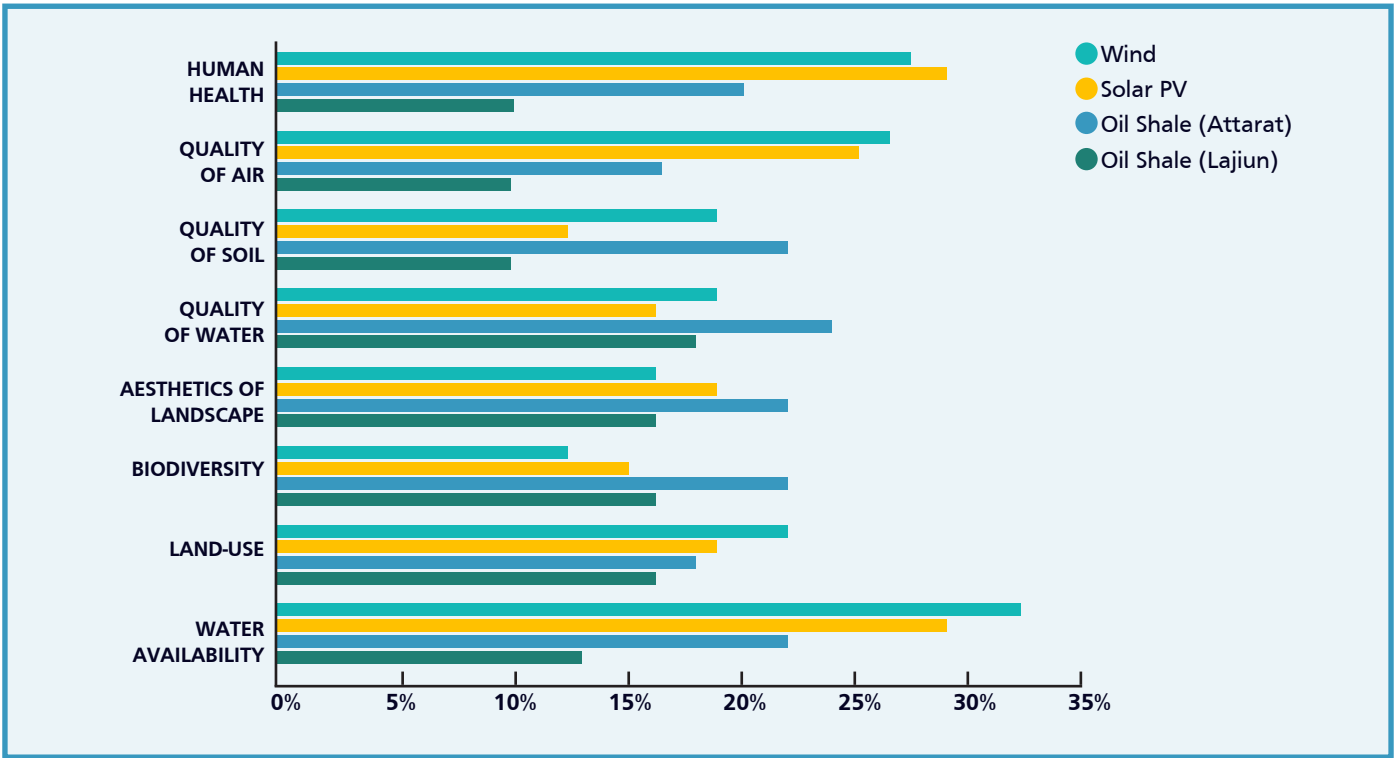


Figure 9: Expectations of very positive impacts on environment from oil shale, wind and solar projects

People in Lajiun are more critical in terms of their expectations about impacts from oil shale on environment than people in Attarat. People in Ma'an and Tafila don't expect significant negative impacts from solar and wind projects on environment.

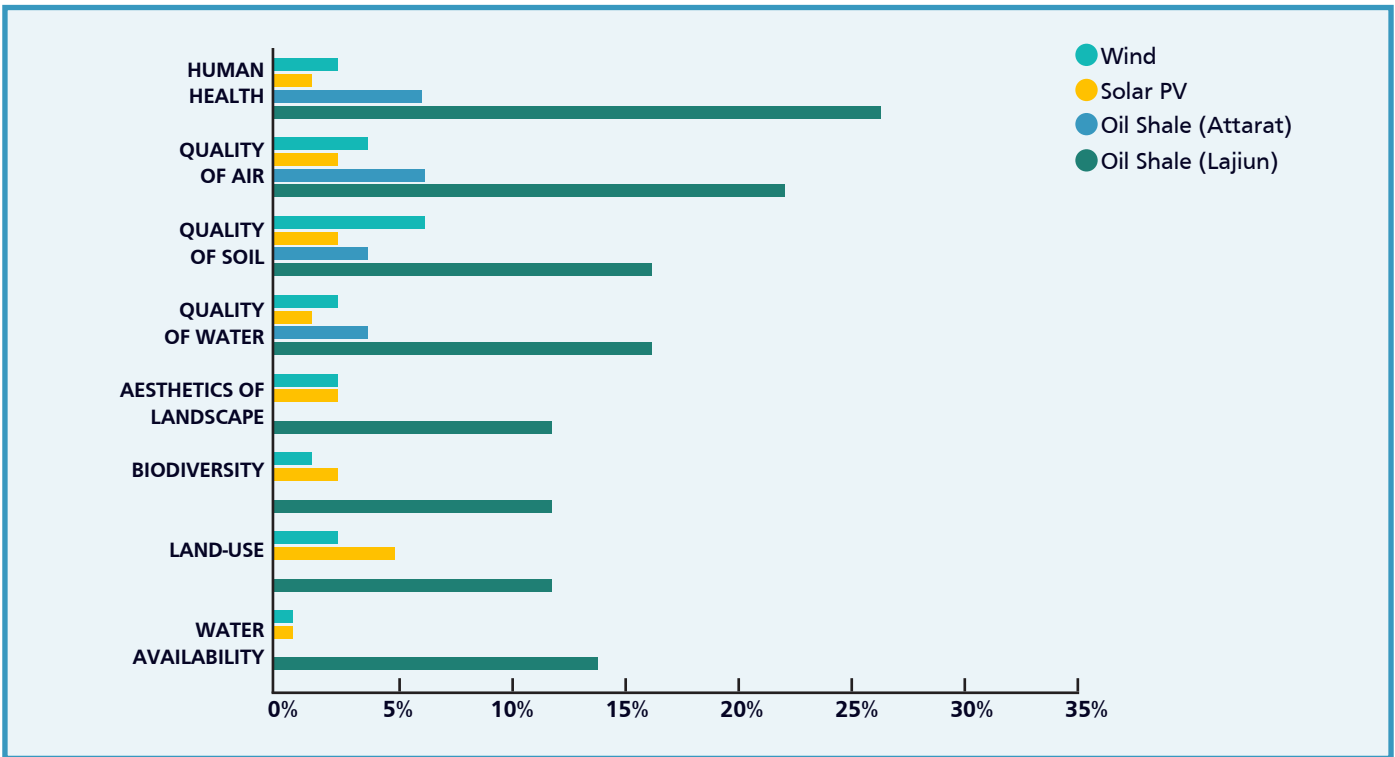


Figure 10: Expectations of very negative impacts on environment from oil shale, wind and solar projects

Recommendations on further research:

- Further research is needed on how environmental impacts assessments are being conducted and implemented and if their results are communicated to people, especially in regard to impacts from various technologies on environment, human health and biodiversity

Recommendations on action:

- Information and awareness raising campaigns are needed on impacts from various technologies on environment
- These awareness raising campaigns should use various information channels
- Social media channel should be also used for dissemination of information about impacts of oil shale on environment

IMPACT OF MISINFORMATION

Third, people are aware about the planned renewable energy or oil shale projects and are accepting however there is also a high share of perceptions which deviate from reality and it seems that some people don't have access to proper information. For example, people say that they are not aware about public information campaigns about infrastructure projects in their communities. Or the analysis of their perceptions shows that there might be some misinformative. For instance, many people believe that oil shale projects will allow improvement of water availability or of water quality, which is in reality would be rather a contrary. 90% of people say that they are aware about planned infrastructure 73% are completely in favor for these projects. High share of people recognize that they are not well informed (50% somewhat informed and 4% badly informed). People mostly get information about the projects from government sources (49%), private media (19%) and social media (13%). Scientists are the most trusted sources of information (50%) followed by private developers (37%). Politicians (0%) and mass media (4%) have the lowest level of trust.

Scientists enjoy the highest level of trust as a source of information in all three communities. The level of trust is the highest in Attarat and the lowest in Lajiun. The level of trust to various sources on information in Attarat is much higher than in other communities and a significantly higher percentage of people selected an option of "complete trust". Project developers and foreign investors are second and third trusted source of information in Attarat and the level of trust to information coming from project developers and foreign investors in Attarat is much higher than in other communities. Politicians and media enjoy the lowest level of trust.

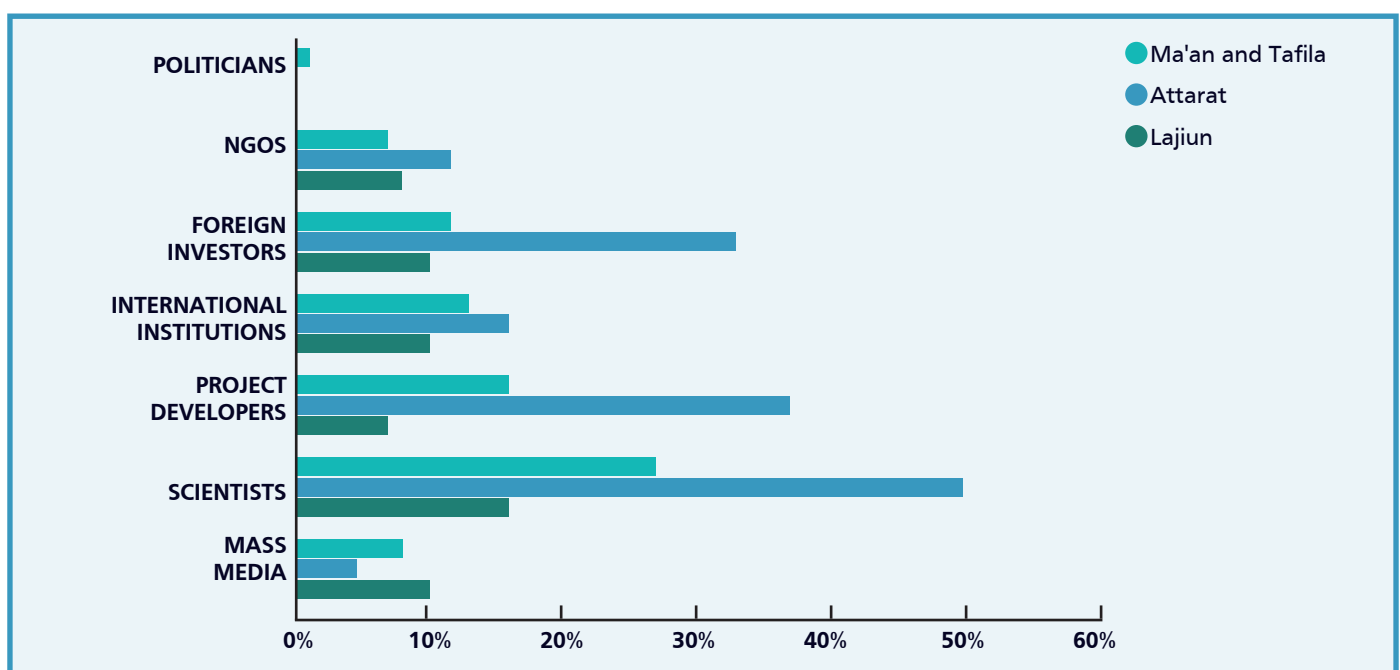


Figure 11: Complete trust in various information sources

Also, the answers to the question which information sources have no trust showed that politicians enjoy the lowest level of trust in all case study communities. People in Lajiun seem to be the most critical.

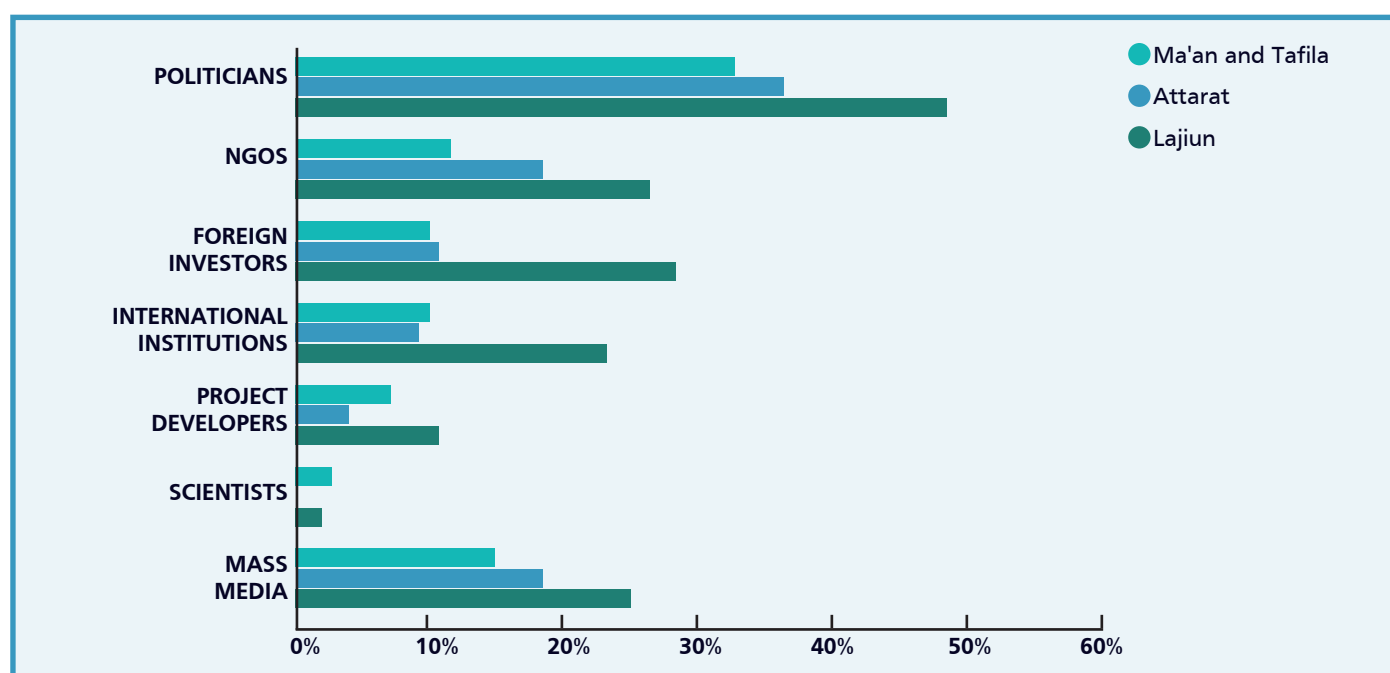


Figure 12: No trust to various information sources

Recommendations on further research:

- Further research is necessary on impacts of social media on perceptions of various projects
- Media analysis is needed for a certain period of time on how information about various technologies and projects is being communicated

Recommendations on action:

- Most trustful sources of information should be used to provide information about various projects
- More information campaigns are needed from various organizations such as NGOs to mitigate impacts of misinformation

PERCEPTIONS OF SAFETY

Fourth, people believe that oil shale is a safe technology. Paradoxically, more people perceived renewable energy sources as being the technology prone to both large and small accidents than oil shale. People believe that Jordan authorities can fully (76%) or partially (16%) control the risk at the oil shale station or extraction projects. However, they think that government can only partially control the risk if something happens at renewable energy projects. The majority of people (56%) also think that the capacities of disaster risk reduction authorities in Jordan to control the risk if something happens at the oil shale projects are even better than in other countries. However, they think that capacities of disaster risk reduction authorities in Jordan to control the risk if something happens at renewable energy projects is not so good as in other countries.

The review of risks perceptions showed that people perceive oil shale station in Attarat as being very safe, actually the most secure technology from existing alternatives. The majority of people think that a small accident is probable in a perspective of more than 20 years. The share of people who think that a minor accident is possible

in less than five-year period is minor. For other technologies, including wind and solar, people think that a small accident can happen every five years and even more frequently. There is almost no difference in risk perceptions of renewable energy sources as oil shale. Renewable energy sources are considered to be as risky as oil shale, even though solar energy is perceived to be a little bit less risky than oil shale.

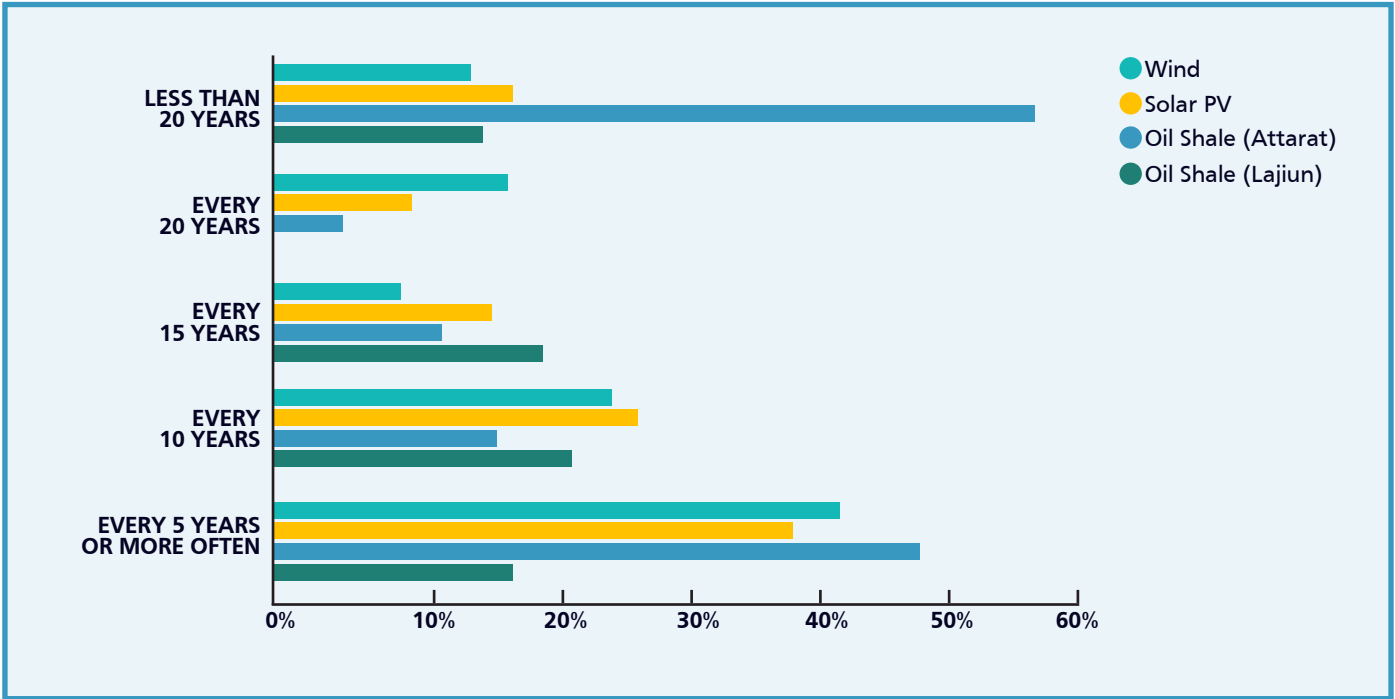


Figure 13: Perceptions of probability for small accidents

A very astonishing fact is that people perceive wind and solar to be riskier technologies even in terms of large-scale accidents. Majority of people (almost 60%) in Ma’an and Lajiun think that large scale accidents with impacts on population from wind and solar projects are possible every 20 years and even more often. At the same time less than 30% of people think that such accidents are possible when oil shale power station in Attarat will be working. Also, from all people who think that a large-scale accident is possible only every 500 years or even less the significant share are people from Attarat.

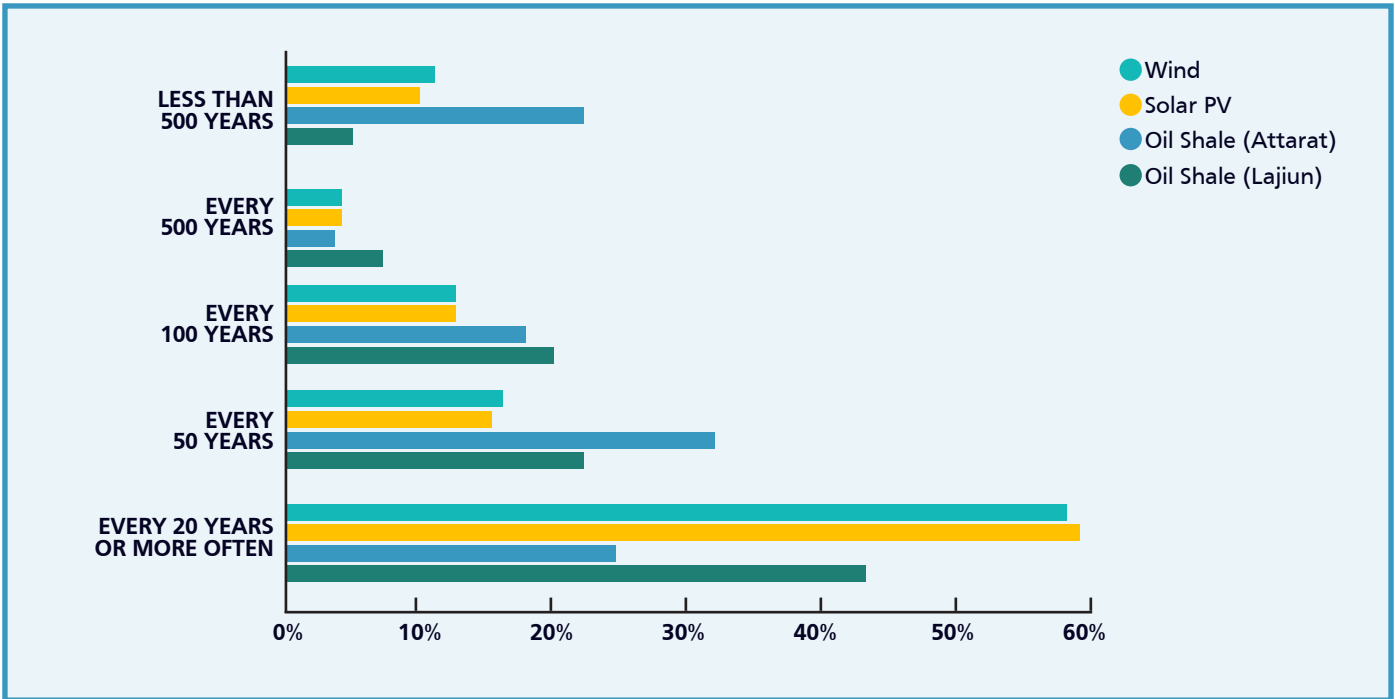


Figure 14: Perceptions of risks of large-scale accidents from oil shale, wind and solar projects

Such perceptions can be connected to the fact that the oil shale power station in Attarat is perceived as being a government - realized project and the majority of people believe that the government will be able to mitigate the risks from functioning of power station or to control it if something happens. There is a huge difference in answers to the question “Do you believe that authorities will be able to control the risk?” for the answer “yes fully”, which shows complete trust, for various technologies. 76% of people in Attarat believe that authorities will fully control the risk. The number of people in Ma’an and Tafila are equal for wind and solar technologies and is around 33%. People in Lajiun are the most critical ones as 22% selected the answer “yes fully” and 30% selected the answer that authorities will not be able to control the risk.

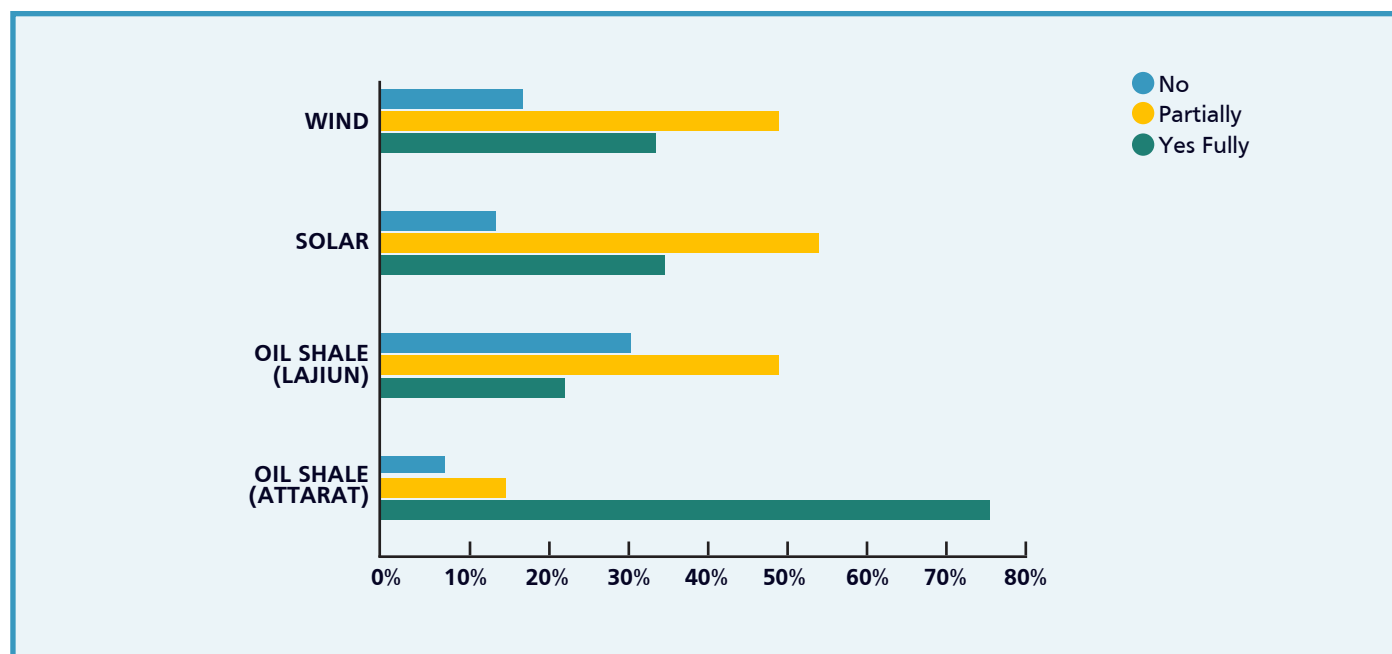


Figure 15: Perception of authorities being able to control the risk

It is also interesting that a significant share of people in Attarat thinks that disaster risk reduction capacities to control the risk if something happens during the functioning of oil shale power station from Attarat are in Jordan even better than in other countries. Such perception is not so dominant in three other locations (Lajiun, Ma’an and Tafila).

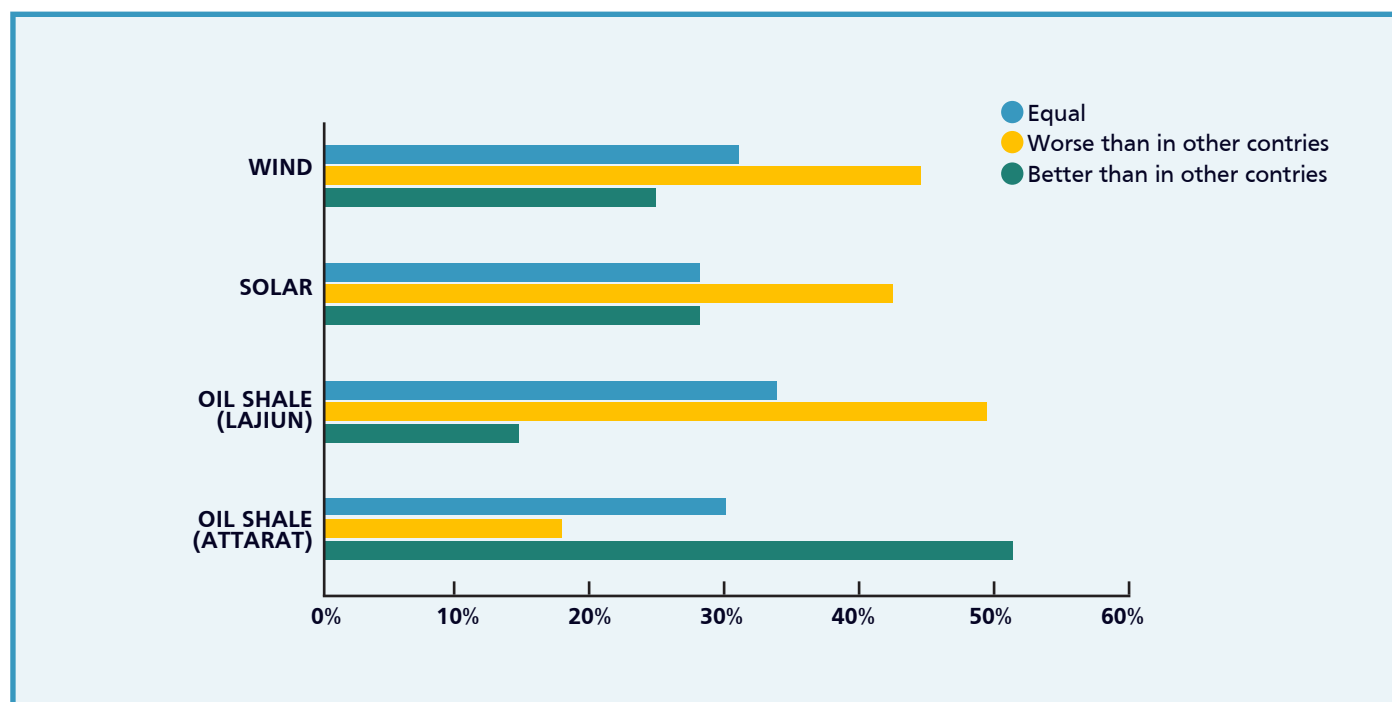


Figure 16: Expectations on how disaster risk reduction can deal with the risk if something happens during operation of power stations in comparison to other countries

However, these responses are corrected when people are asked to rank safety of power stations or when questions about safety are asked indirectly, for example, how far people would like a power station to be from their homes.

When people were asked to evaluate on the scale from 0 (high risk) to 100 (low risk) how risky different power projects are, their evaluations showed that people think that oil shale power station in Attarat will be the riskiest project and wind projects in Tafila are the safest projects. Surprising is that people perceive solar PV to be a quiet risky technology.

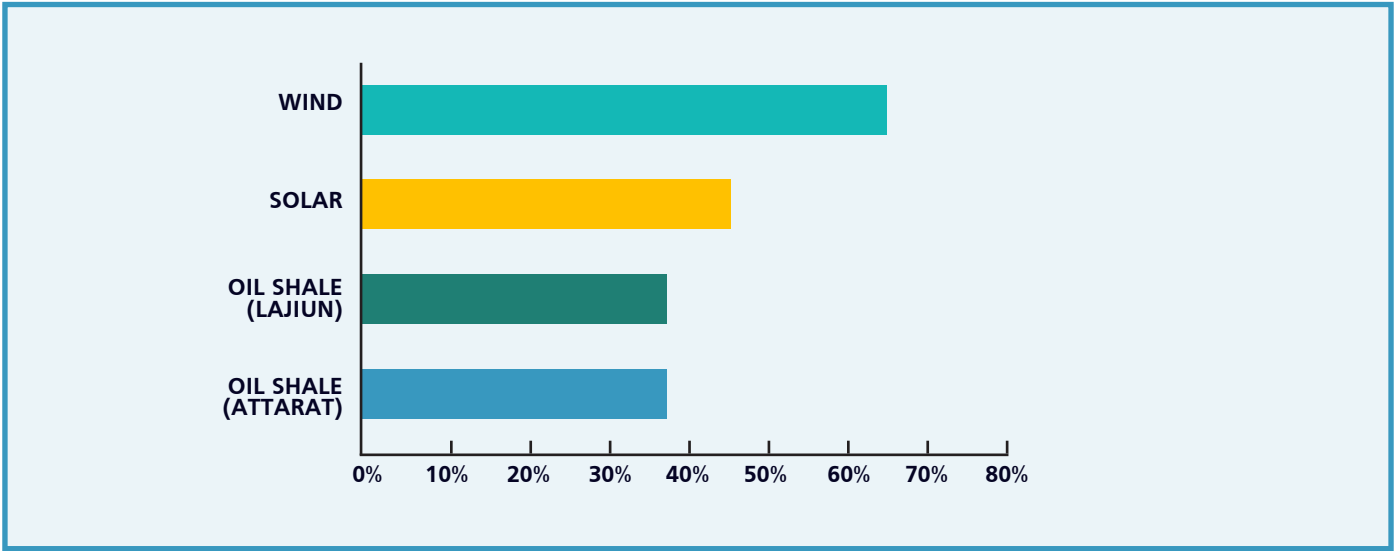


Figure 17: Perceptions of how risky oil shale, solar and wind projects are

The indirect question about distance aspect, namely how far away people would like to have oil shale, wind or solar projects from their homes also showed that people perceive Attarat power station as risky even though they don't recognize or confirm this when they are asked directly. The majority of people (68%) would like to have the Attarat oil shale power station as far as possible from their homes but a significant share of people (around 40%) would not mind having solar and wind projects less than 20 km close to their homes.

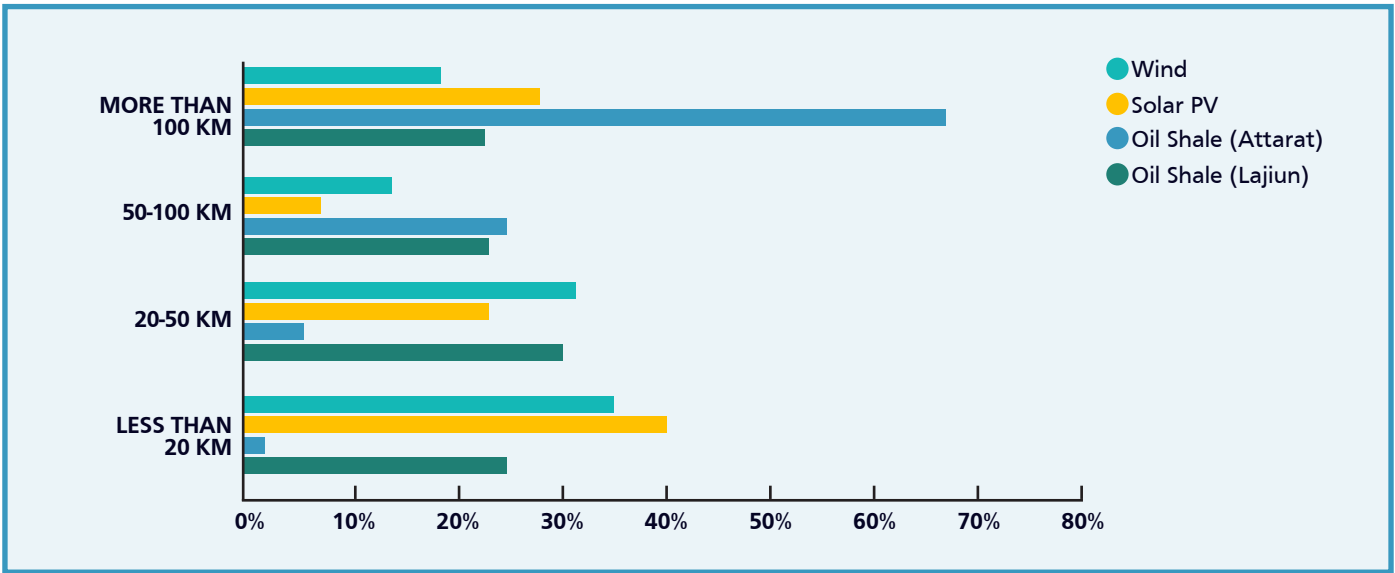


Figure 18: Acceptance distance from private homes to oil shale, wind and solar projects

Recommendations on further research:

- Further research is needed why people perceive solar and wind projects as risky projects
- Further research is needed to test the hypothesis that people perceive government own projects or projects with significant involvement of the government as less risky
- Additional indirect questions can clarify risk perceptions and separate influence of such factors as government ownership and perception of technology itself
- Further research is needed on risk perceptions in Attarat and what are the major factors which influence these perceptions

Recommendations on action:

- Targeted information campaign is needed on risks from renewable energy sources while providing correct information
- Targeted information campaign is needed about how government can control the risk of operating renewable energy sources
- Targeted information campaign is needed about renewable energy sources, their technological characteristics and capacities of technologies

PROCEDURAL JUSTICE

Fifth, people don't really think that they are encouraged to provide their opinion about infrastructure projects. In case of concerns they will mainly go to the owner of the project or to the government entities such as local government or ministry of energy. The share of people who will go to the ministry of environment is minimal. Social media are also an important source of communication in case if people have concerns about infrastructure projects.

When people were asked if they are encouraged to provide their opinion the majority in Ma'an, Tafila and Lajun said that they are not encouraged. At the same time the number of people in Attarat who think that they are encouraged to provide their opinion is much higher in comparison to other places.

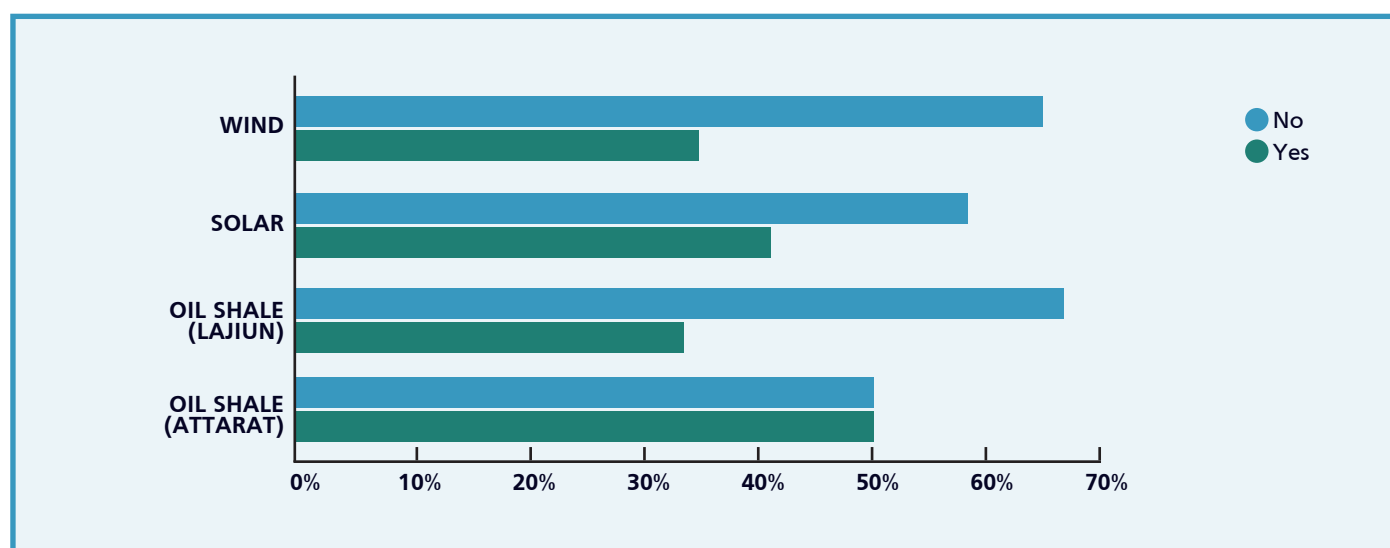


Figure 19: Encouragement to provide opinion about oil shale, wind and solar PV projects

At the same time a slightly higher share of people in Ma'an is aware about public information campaigns on solar PV than in other locations.

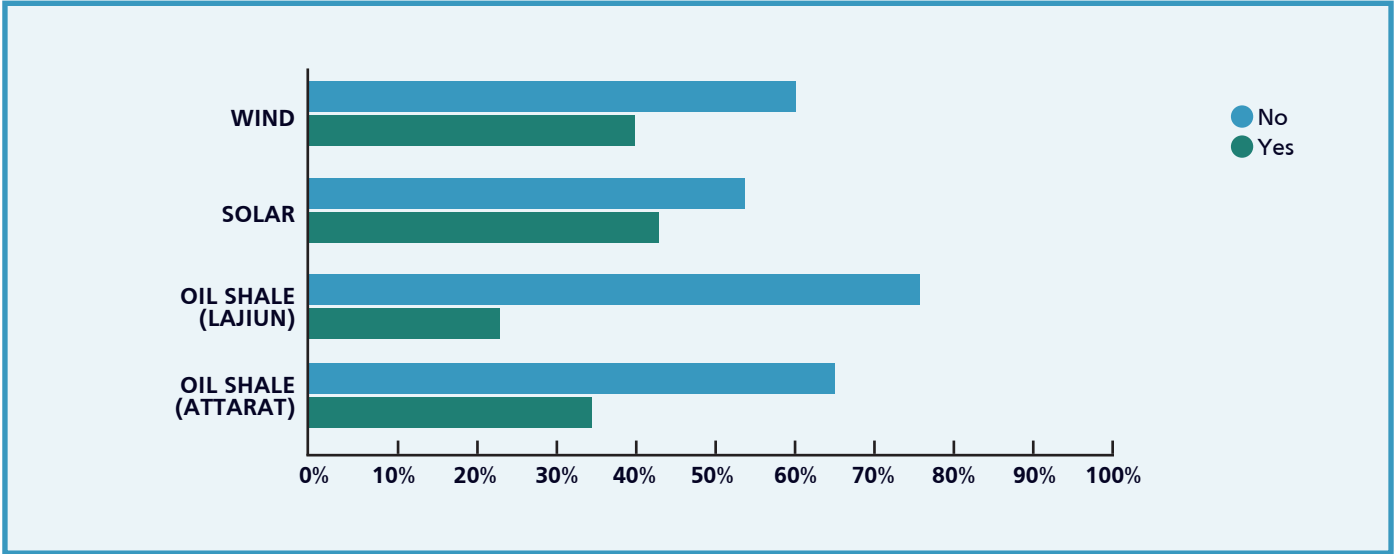


Figure 20: Awareness about public information campaigns about oil shale, wind and solar PV projects

Our results show that social media is gaining popularity and many people will go to social media in case of concerns about wind, solar or oil shale projects. This tendency is especially strong in Lajiun. The Ministry of Energy or local government are also trusted entities where people would go in case of concerns. A significantly lower number of people will go to the Ministry of Environment, private media or parliamentary representative. The surprising result was a very high level of trust to project developer in Attarat as 54% will go to project developer in case they have concerns about power station.

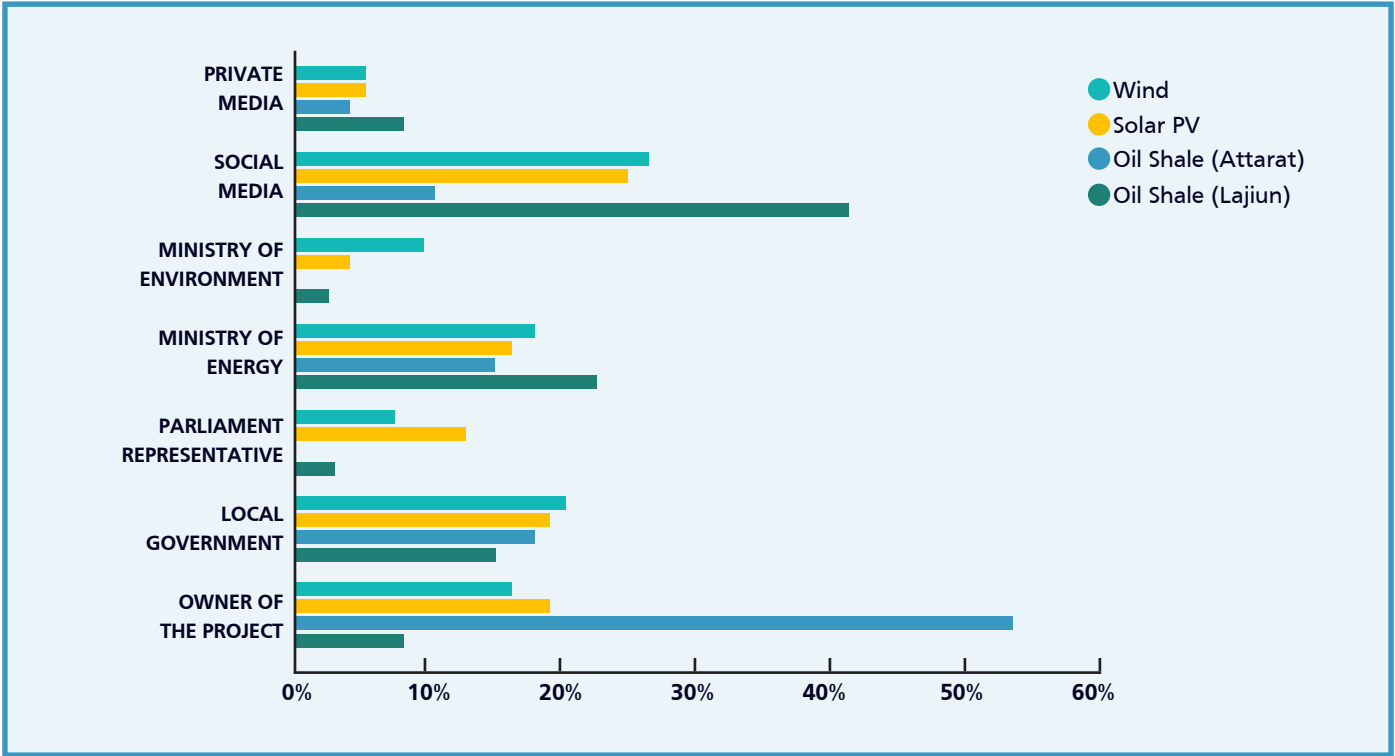


Figure 21: Contacts in case of concern

Recommendations on further research:

- Further research is necessary on the existing patterns of engagement into decision-making processes on energy transition and existing mechanisms of how people are encouraged to provide their opinion
- Further research is necessary on patterns how the provided feedback of people is addressed
- Further research is necessary on existing expectations about engagement into energy transition and to which parts of decision-making processes or projects themselves people would like to be engaged
- Further research is necessary on public information campaign in Attarat, how people are encouraged to provide their opinion and what are the drivers of high level of trust of people in Attarat to oil shale power station project developers

Recommendations on action:

- Provide people with opportunities to raise their concerns regarding various projects
- Provide opportunity for joint communication of these concerns to the government
- Organize mechanisms to ensure that people get response to their concerns
- Organize mechanisms to ensure that this response is recorded and transparently communicated to everybody

8

REFERENCES

Alnawafleh, A., Fraige, F., Al-Khatib, L., Dweirj, M., (2015). Jordanian Oil Shales: Variability, Processing Technologies, and Utilization Options. *Journal of Energy and Natural Resources*. Vol. 4, No. 4, 2015, pp. 52-55. doi: 10.11648/j.jenr.20150404.11

Al-Sayed, R., (2013). Status of Renewable Energy in Jordan. 1st International Conference and Exhibition on the Applications of Information Technology to Renewable Energy Processes and Systems.

Al Zou'bi, M., (2010). Renewable Energy Potential and Characteristics in Jordan. *Jordan Journal of Mechanical and Industrial Engineering*, 4(1), 45-48.

Besieso, M., (2007). Jordan's Commercial Oil Shale Strategy. 27th Oil Shale Symposium. Colorado School of Mines, Colorado, USA.

Brand, B., (2015). The Integration of Renewable Energies into the Electricity Systems of North Africa (Schriftenreihe technische Forschungsergebnisse, vol. 20). Verlag Dr. Kovac, Hamburg.

Burdge, R., (2003) The practice of social impact assessment background, *Impact Assessment and Project Appraisal*, 21:2, 84-88, DOI: 10.3152/147154603781766356

Dayyeh, A., (2015). From Energy Mess to Energy Management: Jordan as a Case Study (2007-2020). Friedrich-Ebert-Stiftung, Amman Office, 2015

EcoMENA, (2018). Solar Energy in Jordan

EDAMA Association and Friedrich Ebert Stiftung (2019). Recommendations for Energy Sector Strategy. November 2019.

Environmental Impact Assessment ("EIA") Regulation 37/2005

Esteves, A. M., Franks, D., & Vanclay, F. (2012). Social impact assessment: the state of the art. *Impact Assess. Proj. Apprais.*, 30(1), 34-42.

European Academies Science Advisory Council (EASAC), (2007). A study on the EU oil shale industry – viewed in the light of the Estonian experience.

Henning, H.-M., Palzer, A., Pape, C., Borggreffe, F., Jachmann, H., & Fishedick, M. (2015). Phasen der Transformation des Energiesystems. *Energiewirtschaftliche Tagesfragen*, 65(Heft 1/2).

Hildebrandt, L., and Sandham, L. A. (2014). Social impact assessment: The lesser sibling in the South African EIA process?. *Environmental Impact Assessment Review*, 48, 20-26.

Fischedick, M., Holtz, G., Fink, T., Sarra Amroune and Franziska Wehinger (2020). A phase model for the low-carbon transformation of energy systems in the MENA region. *Energy Transit* (2020). <https://doi.org/10.1007/s41825-020-00027-w>

Jordan Times, (2020), "Majority of Jordanians oppose gas deal with Israel — survey". Available at: <https://www.jordantimes.com/news/local/majority-jordanians-oppose-gas-deal-israel—survey>

Holtz, G., Fink, T., Amroune, S., Fischedick, M., (2018): Development of a Phase Model for Categorizing and Supporting the Sustainable Transformation of Energy Systems in the MENA Region. Report to the Friedrich-Ebert-Stiftung. Wuppertal.

Gharaibeh, A. (2017). "Environmental Impact Assessment on Oil Shale Extraction in Central Jordan." PhD diss., Freiberg University of Mining and Technology, 2017

GIZ (2017), Economic Trends in Jordan's local Job Market. Summary Report of the Desk Study. GIZ- Employment Promotion Programme – Jordan.

Koivurova, T., Lesser, P., Bickford, S., Kankaanpää, P., Nenasheva, M., 2016. Environmental Impact Assessment in the Arctic: A Guide to Best Practice. Edward Elgar Publishing, Cheltenham.

Komendantova, N., (2020). Transferring Awareness into Action: A Cross-Country Meta-Analysis About the Behavioral Drivers of Energy Transition. *Energy Research & Social Science* 71: e101826. DOI:10.1016/j.erss.2020.101826.

Komendantova, N., & Battaglini, A., (2016). Beyond Decide-Announce-Defend (DAD) and Not-in-My-Backyard (NIMBY) models? Addressing the social and public acceptance of electric transmission lines in Germany. *Energy Research and Social Science*, 22, 224-231.

Komendantova, N., Irshaid, J., Marashdeh, L., Al-Salaymeh, A., Ekenberg, L., & Linnerooth-Bayer, J., (2017). Country Fact Sheet Jordan: Energy and Development at a glance (Background Paper. Middle East North Africa Sustainable Electricity Trajectories (MENA-SELECT) project funded by the Federal Ministry for Economic Cooperation and Development (BMZ).

MEMR (2019). Annual Report 2019. Amman: Ministry of Energy and Mineral Resources.

MWI (2015). Energy Efficiency and Renewable Energy Policy for the Jordanian Water Sector. Amman: Ministry of Water and Irrigation.

Momtaz, S. (2003). The practice of social impact assessment in a developing country: The case of environmental and social impact assessment of Khulna-Jessore drainage rehabilitation project in Bangladesh. *Impact Assessment and Project Appraisal*, 21(2), 125-132.

NEPCO (2018). Annual Report. National Electro Power Company, Jordan.

Pöyry Management Consulting (2013), The environmental impact assessment for the power production project of Attarat Power Company.

Vanclay, F. (2019). Reflections on Social Impact Assessment in the 21st century. *Impact Assessment and Project Appraisal*, 1-6.

