Jordan
Green
Jobs

Green Jobs Assessment of Six Economic Sectors in Jordan

Synthesis Report

Exploring Current and Potential Employment of Green Activities

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of Six Economic Sectors in Jordan
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Dear esteemed reader,

It fills me with joy to present to you Jordan's first ever Green Jobs Assessment Report (G-JAR) as part of the national efforts led by the Ministry of Environment towards transition to green economy.

This report has been designed to act as a knowledge product and a tool for informed policymaking for all our partners from the public and private sector, academic institutions, civil society, local communities, and the media that wish to learn more about the promising potential of creating additional employment in Jordan by implementing green policies and sustainable economic activities.

This report's completion marks a first cornerstone in a promising journey Jordan is embarking on. As the Ministry of Environment is spearheading the Green Jordan Driver under the national Economic Modernization Vision (EMV) 2030, we seek to ensure that future economic growth is both socially inclusive and environmentally friendly. The generation of green employment, meanwhile, will be an outcome of this and has been a designated goal of this government and aligned with the strategic objectives of the EMV in creating more employment opportunities.

I therefore like to view the G-JAR as a conversation starter that should inspire us, as decision-makers in the public and private sphere, to work jointly towards the promotion of meaningful green jobs. It provides a clear definition and an initial assessment of existing and potential green jobs in selected economic sectors, which are in line with our national priorities expressed in the EMV and in the National Green Growth Action Plan (2021-2025).

The process of developing the G-JAR required contributions from various section of society and national consultations meetings among private and public sectors, academia, civil society, international institutions, and experts. It produced valuable policy implications to support effective greening of our national developmental priorities which will result in green employment generation in promising sectors.

Based on a participatory approach which the Ministry of Environment always adopts during green growth planning, policy and action development, and implementation, the Ministry looks forward for a continuous and real engagement of line ministries developing the proper policies towards creating green jobs in line with EMV objectives.

Finally, I would like to thank all experts who are part of this effort for their indispensable contributions and extend my gratitude to the Government of Germany for having supported this report through the GIZ-implemented "Green Action in Enterprises" (GAIN) project.

As we navigate through numerous ecological and economic challenges, it is pivotal to act in the right direction in alignment with our international commitments and national priorities. This G-JAR report represents one key quantitative piece of evidence for us to feel emboldened and work towards the green economy transition.

Dr. Muawieh Khalid Radaideh
Minister of Environment

Acknowledgements

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Abbreviations

EMV	Economic Modernization Vision
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
ICE	Internal combustion engine
ILO	International Labour Organization
I-O	Input-Output
NDC	Nationally determined contribution
NRW	Non-Revenue Water
PSF	Polyester staple fibres
PET	Polyethylene terephthalate

1 Background

1 Background

Efforts to identify and facilitate the transition towards a green economy are intensifying in Jordan. The Government of Jordan is currently supporting various policies, initiatives, and programmes aimed at achieving a green economy. First and foremost is the recently adopted Economic Modernization Vision 2033 (EMV) which aims to accelerate sustainable economic growth. The adoption of the 'Renewable Energy and Energy Efficiency Law of 2012' (Jordan Government, 2012) and the 'Waste Management Framework Law for the year 2020' (Jordan Government, 2020) or the National Green Growth Plan (2021 – 2025)[1] are other key examples. Furthermore, Jordan submitted its first Nationally Determined Contribution (NDC) in 2016 and an updated version in 2021 which encompasses a goal to reduce greenhouse gas (GHG) emissions by 31% in 2030 compared to a 'Business As Usual' scenario (Ministry of Environment, 2021).

Unemployment, particularly among young people holding qualifications of at least Bachelors, is a persistent issue in Jordan and the creation of green jobs is high on the policy agenda. With the Ministry of Labour's latest strategy, the National Employment Plan, the government aims to support sustainable job creation and has set itself an ambitious goal of 10% of jobs being green jobs by 2030.

For a first ever assessment of current and potential green jobs in Jordan, the "Green Action in Enterprises" (GAIN) project, commissioned by the German Federal Ministry for Economic Cooperation and Development and implemented by the *Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH*, cooperated with Cambridge Econometrics using the International Labour Organization (ILO) GAIN methodology (Jarvis, Varma and Ram, 2011). This produced report depicts the Kingdom's first ever green jobs assessment and aims to:

- estimate the current levels of green jobs (direct, indirect and induced) in six selected economic sectors, and
- showcase the potential for green jobs based on the results of "what if" scenarios (i.e. employment effects from investing in a given green economy activity) using econometric modelling.

This assessment reveals that Jordan has considerable potential of green jobs, in the six selected economic sectors, namely the agriculture, transport, water and waste, manufacturing, tourism, and energy sectors.

Jordan's transition to a green economy

Green jobs as a solution for high unemployment

Jordan has considerable potential for green jobs

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[1] Reports — Global Green Growth Institute (gggi.org)

2 Methodology

2 Methodology

There is no standard definition of green jobs. According to the ILO, green jobs can be found in many sectors of the economy, covering work in agricultural, manufacturing, research and development, administrative and service activities, and are linked to economic activities within sectors that "help preserve or restore the environment by:

- Improving energy and raw materials efficiency
- Limiting greenhouse gas emissions
- Minimising waste and pollution
- Protecting and restoring ecosystems
- Supporting adaptation to the effects of climate change."(ILO, 2016)

What are
green jobs?

To assess the number of green jobs, it is therefore important to first identify those green economic activities within sectors, and then the number of jobs associated with them. Green activities within a sector are generally identified using one of three methods:

1 the process-based method,
2 the output-based method, and
3 the natural resource conservation method.

The process-based method defines green activities as those whose production processes involves lower energy and resource intensity, lower need for virgin inputs and/or using recycled inputs, and/or lower generation of waste. In other words, the product is not necessarily helping to preserve or restore the environment, but the production process is organised with minimal impact on the environment and innovations are actively introduced to eliminate this impact.

The output-based method refers to the environmentally beneficial characteristics of final products or services in the sector. Examples of environmentally friendly products or services include: organic agricultural products (certified), green textiles (green labelling), eco-tourism (certified), green construction (certified) and green financing.

The natural resource conservation method examines activities that directly contribute to nature conservation. Examples of such activities include ecosystem support and natural resource management.

The ILO further emphases that green jobs should be decent. This means that a green job is sustainable from an environmental perspective, and inclusive and equitable from a social perspective, by offering fair wages and social security. In the absence of reliable information, in this report only those employees with a formal employment contract are considered being in decent jobs without considering other aspects such as wages, working conditions etc. As a result, informal jobs, even if they help preserve or restore the environment are not considered to be green jobs.

What are the steps of this Green Jobs Assessment?

The assessment carried out for this study follows the ILO GAIN methodology for green jobs assessments. This is an established methodology and has been used in several countries around the world[2].

Figure 2.1: Methodological framework

Steering Committee

Profiles of six economic sectors

Identify green activities witrhin those six economic sectors

Estimate direct, indirect, and induced green employment

Run 'what-if' Scnarios based on specific green economy investments within those six economic sectors

Identify if and to what extend Jordan has green jops potential in those six economic sectors

Develop policy implications for green jobs promotion in jordan

IIn the first step, a governmental steering committee was established consisting of the Ministry of Environment, the Ministry of Industry, Trade and Supply, the Ministry of Labour, and the Prime Ministry. Based on the availability of data and government priorities, the committee chose for the assessment six economic sectors, namely agriculture, transport, water and waste, manufacturing, tourism, and energy, within the Jordanian economy. The second step entailed a more detailed assessment to identify existing green activities within those sectors. In step three, current direct employment associated with green activities identified in the previous step were estimated, based on official employment data and various assumptions. Current indirect and induced effects associated with the green activities were estimated, too, using Input-Output (I-O) tables.

Step five is then forward-looking. Potential green economy investments within the six selected sectors were identified to showcase the extent to which Jordan holds green jobs potential. Those green economy investments were chosen based on the availability of necessary data and whether they could help Jordan achieve its EMV. Using a macroeconomic model, the future employment impact of these investments is then assessed through the simulation of 'what-if' scenarios. Finally, based on the results from the modelling and expert views, policy implications are formulated in step six.

What are direct, indirect, and induced employment?

Direct jobs are those jobs directly linked to the generation of economic output within a green activity in a given sector. Indirect employment impacts relate to supply chain effects of green activities, and the jobs generated in other sectors by these green activities. Each green activity has linkages with other sectors through its supply chains. Induced jobs refer to the jobs associated with changes in output as a result of changing prices and household incomes, which lead to further expenditure.

[2] See list of reports at: https://www.ilo.org/global/topics/green-jobs/areas-of-work/gain/reports/lang--en/index.htm

Only direct jobs are considered green, but to estimate the economy-wide employment potential from an investment or policy, it is important to also account for indirect and induced employment.

This analysis uses the FRAMES model. FRAMES is a single-country macroeconometric model designed to examine economy-wide socioeconomic and environmental effects of changes in investment and/or policy. FRAMES can be considered a simplified version of the global dynamic The E3ME model is a global, macro-econometric model designed to address major economic and economy-environment policy challenges; E3ME simulates a demand-led economy with supply constraints based on time series econometrics. FRAMES does not include the supply constraints that are included in E3ME. E3ME and FRAMES are simulation tools, well-suited for comparing a baseline (business-as-usual) projection with outcomes of alternative scenarios.

For this study, a baseline (business-as-usual) projection was first derived. In the baseline, annual growth of the Jordanian economy of 2.7% pa to 2024 and 3% pa from 2025 to 2030 is assumed, in line with the IMF's most recent economic outlook for Jordan (IMF, 2023). In the absence of public sectoral forecasts, each sector of the economy is expected to grow in line with GDP.

'What if' scenarios show alternative pathways relative to the baseline, identifying which sectors gain or lose from investing, whether by the adoption of or substitution with new technology, and/or substitution of inputs. The term used throughout this report is 'What-if scenarios' because they are not forecasts of the most likely future outcomes, but simulations of what could happen if a certain promising green economy investment takes place.
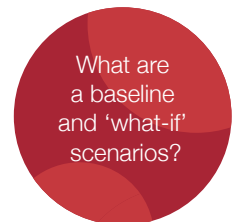
The analysis incorporates various assumptions and estimates the direct, indirect, and induced employment impacts by 2030 of the chosen potential green economy investments beyond the expected baseline growth. The results of the what-if scenarios are thus presented as additional to the baseline scenario. Already in the baseline, there is employment growth over time, but the aim of the scenarios is to assess whether a specific green economy investment would lead to higher or lower employment compared to the business-as-usual investment and other economic patterns reflected by the baseline.

Positive externalities on the environment are not captured in the modelling of the scenarios.

There is no single unique source of data on green activities in Jordan, which presents a challenge for the estimation of green jobs. Data have been collected through desk research and comprehensive stakeholder engagement. The 2016 I-O table, an essential piece of data for the analysis, as well as most of the other secondary data (e.g. labour force and employment data) was acquired from the Department of Statistics. Other secondary data sources include the IMF, the World Bank and the GIZ.

Which macroeconomic model has been used?

What are a baseline and 'what-if' scenarios?

What are the main data sources?

3 Current green jobs in selected economic sectors

3 Current green jobs in selected economic sectors

The assessment on current green jobs focuses on the six selected economic sectors, namely agriculture, waste and water, manufacturing, energy, tourism, and transport. Each sector was disaggregated into a sustainable component and a conventional component by identifying green activities with environmentally friendly processes (i.e. applying the process-based method) or environmentally friendly products (i.e. by the output-based method). Given the nature of the conservation method, this was used only for the tourism sector for employment in natural reserves. The estimation method differs from activity to activity and, given the data limitations, green jobs can be considered as having different shades of green depending on the sustainability criteria (e.g. process, output, nature conservation) considered.
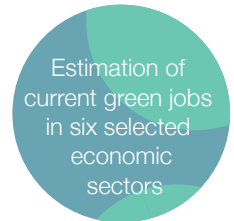
Between 24% and 31% of the employment in the selected sectors and subsectors can be considered as green. Table 3.1 presents the summary of the estimated number of green jobs by sector/subsector and the method used to estimate them. In some cases, a range of estimates are provided, owing to data limitations and uncertainty.

In the agricultural sector, the identified green activities are organic farming, drip-irrigation and hydro-/aquaponics. Around 10,000 permanent workers in agriculture are assumed to work in these green activities.

The generation of energy using solar PV, wind, hydropower, and biomass is a green activity. At least half of the employment in the energy sector is assumed to be linked with this type of energy generation and thus deemed green. Around 1,600 green jobs are in activities such as retrofitting old buildings to make them energy efficient, building efficient new buildings and increasing industry efficiency.

In the manufacturing sector, green activities were identified in sub-sectors where production processes are either reducing energy and resource intensity, more eco-efficient, or reducing and recycling waste. Around 8,000 green jobs are in facilities that use either recycled plastic or recycled paper as raw material. Over 700 green jobs can be found in food-processing, textile or pharmaceutical/ chemicals companies that hold an environmental-related certification.

Collection of waste and water-treatment are green activities with over 8,000 green jobs.

Green jobs in green hotels and eco-tourism represent more than a third of jobs in the tourism sector. Public or shared transport of people are also greener options than individual transportation. As much as a third of employment in transport is estimated to be green.

Estimation of current green jobs in six selected economic sectors

Table 3.1: Estimated current green jobs in selected sectors

Sector (activity)	Current employment	Of which are green jobs	
		Number	**Share of employment (%)**
Agriculture (crop production)	18,349	10,145 - 10,163	55
Energy	9,435	4,750	50
Energy efficiency*	1,686	1,686	
Manufacturing-Clean technology*	1,178	1,178	
Manufacturing-Food processing	59,646	61	0
Manufacturing-Packaging	11,875	4,160	35
Manufacturing-Pharma and Chemicals	26,655	592	2
Manufacturing-Plastic	11,875	3,713	31
Manufacturing-Textile	68,489	66	0
Tourism	12,418	3,166 - 5,416	25 - 44
Transport (land and railways)	81,031	30,920 - 63,500	38 – 78
Waste*	6,300	6,300	
Water*	7,966	1,957	
Total	**316,903**	**68,781 – 103,542**	**22 - 33**

Note(s): For the sectors with *, current employment is unknown, so green jobs estimation is used to assume employment levels.

Source(s): Cambridge Econometrics estimation on a variety of sources.

Figure 3.1 shows the number of green jobs and total employment in the sub-sectors with green activities. The estimation is the between 69,000 and 104,000 jobs are currently green, i.e. between 2.9 - 4.3% of total employment. A range is provided rather than one precise figure because of data limitations and uncertainty.

In global comparison

The share of green jobs in total employment in Jordan is similar to results found in other countries' green jobs assessments. For example, the share of green jobs in Mauritius is 6% (Sultan and Harsdorff, 2014), 4.5% in Mexico (ILO, 2014), and between 1% and 5% in Bangladesh (GHK, 2010). These results should only be considered as a reference, because the economic structure differs between countries.

Figure 3.1: Summary of the green jobs in selected green activities
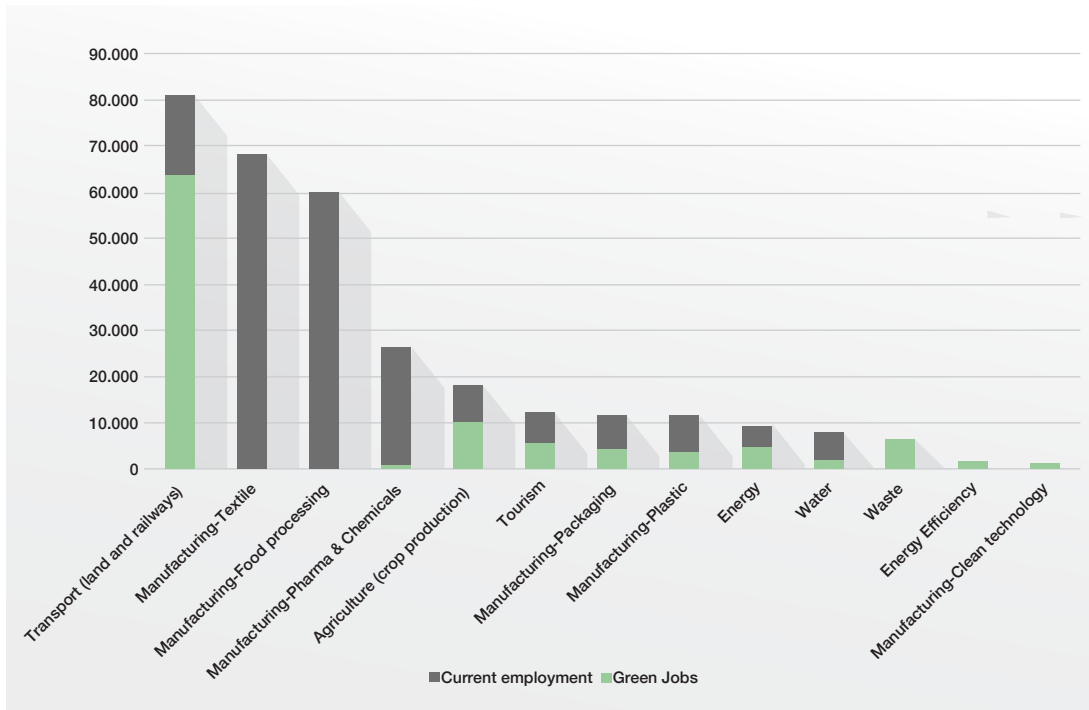
Source(s): Cambridge Econometrics estimation using official sources and stakeholders'
interviews

On the one hand, the numbers of green jobs are likely underestimated for two reasons:

- The analysis has looked at those 6 sectors known to have considerable potential for green economic activities. It may be that there are green jobs in other sectors not considered in this analysis (i.e. construction, services).

- Considering the openness of the Jordanian manufacturing sector, and that more exporting companies are implementing environmentally friendly processes to comply with destination country requirements than the number assumed here.

On the other hand, these numbers may be subject to at least some overestimation since many formal jobs do not fully comply with the 'decent' aspect of the ILO green jobs definition.

A few caveats

4 Potential for green jobs

4 Potential for green jobs

Jordan's EMV fosters the ambition of Jordan "to be a low-carbon, resource efficient and socially inclusive nation that serves as a regional hub for green entrepreneurship and innovation" (Jordan Government, 2022). It targets the creation of one million jobs by 2033, activating eight main drivers of growth in 35 sectors, via a broad portfolio of 366 initiatives.

The ILO Global Employment for Youth 2022 report (ILO, 2022) shows that the path to net zero would bring a 3% increase in employment in the Arab States region by 2030, compared to a business-as-usual pathway. Jordan is expected at a minimum to experience in a similar growth in employment if the measures in the NDCs would be implemented, according to the ILO.
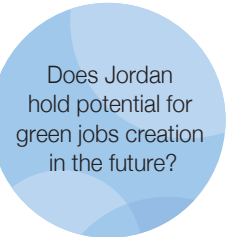
In order to underline the potential for Jordan to create green jobs by investing into green economy, six specific initiatives within the chosen economic sectors were selected for scenario analysis:
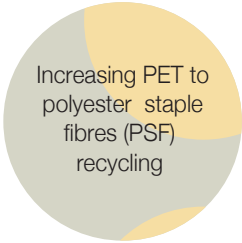
1 recycled plastic

2 recycled textile

3 resource efficiency in the food-processing sector

4 sustainable value extraction of sludge

5 water scarcity

6 green public transport

The selection by the steering committee was made at the beginning of March 2023 and based primarily on two criteria: i) the availability of detailed information on the expected pathway (data from feasibility studies or government sources), ii) and relevance to the Economic Modernization Vision 2033.

In May 2023, the assumptions used for the modelling and the initial set of results were discussed with national experts in the field and amendments were made based on the feedback received.

In a business-as-usual scenario (no further green investment), the total employment in Jordan would grow with 127,000 jobs, while the number green jobs could grow with around 5,500 jobs. If the green initiatives considered in this study were implemented, the number of green jobs in the economy could grow with 113,000 jobs.

Does Jordan hold potential for green jobs creation in the future?

Yes, Jordan's economy is able to create additional green jobs from green economy investments

4.1. Recycled plastic

Increasing PET to
polyester staple
fibres (PSF)
recycling

The aim of this scenario is to measure the impact of an increase in the reuse of plastic waste i.e. material recycling in manufacturing. There is currently no large facility for polyethylene terephthalate (PET) plastic recycling in Jordan and this scenario focuses on the development of recycling for post-consumption PET plastic in the country.
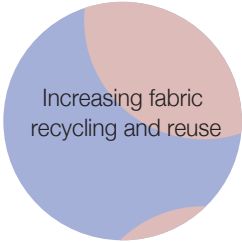
The assumptions made in the scenario are partly based on the Feasibility Study for Establishing Polyethylene Terephthalate Recycling Facility in the Jordan Valley (Hijjawi, 2021). Assumptions were discussed and – where needed – updated based on experts' feedback to the preliminary results during a workshop held on 15 May.

Based on the economic modelling, the impact of the investment and operations cost for implementing PET recycling by 2030 are as follows: The impact of the investment to build the facility is assumed to be in 2023, though this may be proved infeasible in practice, with just half the year to go. It is assumed that the facility will produce at 70% of its capacity in 2024, 90% in 2025 and 100% in 2026. The capacity of the facility will from that point be 6,000 tons of PSF production per annum. In the modelling, it is assumed that the new recycling facility can operate competitively and displace current and forecasted imports of PSF.

The indirect and induced effects are observed largely in construction during the initial phase. In the operational phase (2026-30), the benefits of increased output of the plastic sector are observed in supply chain effects (such as manufacture of chemicals, transport, and wholesale trade).

4.2 Recycled textile

Increasing fabric
recycling and reuse

The aim of this scenario is to measure the impact of an increase in the quantity of fabric waste recycled and used as input material in manufacturing.

The assumptions are based on a series of circular economy business cases in the ready-made garment (RMG) sector developed by the GIZ-implemented GAIN project. Two types of recycling are assumed to take place in the textile and waste sectors under this scenario: i) mechanical recycling for industry symbiosis (waste to felt), ii) and mechanical recycling for fibre-to-fibre yarn production. It is assumed first that a sorting facility in the waste sector is built over 2023-24, and that from 2025, 25 tons of textile waste per day are processed into felt. The fine sorted waste is sold for felt fluff production (to the construction and furniture sectors), and for yarn production (to the textile sector).

The economic modelling shows the employment impact of adopting circularity in the textile sectors, which would also green the entire sector identified by the process-based method. By 2030, the modelling calculates 249 expected new jobs in the textile sector from increased recycling capacity at the scale assumed. Most of the additional jobs are driven by the production of extra output (i.e. recycled yarn) which, in turn, leads to the generation of more output by the entire textile industry (benefiting from domestic raw materials).

These changes in the production process will lead to changes in the demand and supply from other sectors, such as waste collection, and therefore have positive indirect and induced effects leading to even further employment gains.

Indirect effects are expected through the supply chains of the textile and waste sectors. The increase in energy demand will also lead to a small increase in employment in the electricity sector. Induced effects in service sectors from increased domestic income are also accounted for.

4.3 Resource efficiency in food-processing

The aim of this scenario is to estimate the impact of implementing resource efficiency measures in food processing in 60% of medium and large companies in the sector.

High energy bills for production are one of the main challenges confronting Jordan's industrial sector. The assumptions in the scenario are based on the investment and cost savings reported in a number of collected audits, particularly those undergone by manufacturers as part of their engagement with the GIZ-implemented GAIN project.

Improving
resource efficiency
in food processing

The economic modelling shows the employment impact of the investment and operations costs of implementing resource efficiency measures in the food-processing sector by 2030. The impact of the investment in technology is captured in the figures for 2023. A reduction in costs for electricity and water from 2024 onwards is assumed.

It is assumed that the 60% of medium and large-sized manufacturers invest to become energy and water efficient from 2024 onwards. By introducing these efficiency measures, all the jobs in these companies (from the baseline) become green. In addition to these green jobs, 44 additional jobs could be added to the sector from higher output driven by cost savings.

If the reduction in demand for water and electricity is not offset by demand from other sectors (e.g. electric cars), then it could lead to a small reduction in employment in those sectors (and their supply chains). The net aggregate employment impact is 89 jobs by 2030. The strongest employment impacts are in the initial year in which there is an investment demand stimulus; in 2023, aggregate employment increases by 219, with 132 more jobs in construction and 37 in manufacturing based on the modelling.

4.4 Sustainable value extraction of sludge

Extracting
economic
and ecological
value of sludge

The aim of this scenario is to measure the impact of developing value addition through economic and ecological sustainability of sludge management.

An estimated 105,000 solid tonnes of dried sewage sludge were produced in 2020 with most of this quantity currently dumped onsite or transported to unsanitary landfills; this is based on a study prepared by the Water, Environment, and Energy Centre at University of Jordan. The assumptions used in this scenario are based on the market analysis and sales channels for sludge-based products (Alokab Consulting, 2023) and the sector expert's feedback on the preliminary results. It is assumed that 54,000 tonnes of sludge are sold every year by Al-Samra wastewater treatment plant to be used as an energy carrier.

Positive externalities on the environment from greening of the water sector through the reuse of sludge are not captured in the modelling of the scenarios. The value of this is likely to outweigh the employment effects. Sustainable value extraction of sludge is expected to add seven green jobs to the water sector by 2030 in addition to baseline employment. The greening of the water and other sectors through investment is expected to bring higher employment in the short term.

Short-term jobs impacts in the economy are large because of the scale of construction activity needed to build the facilities to dry the sludge. Construction will benefit from these effects. Switching from diesel to sludge will also benefit eight companies from manufacture of wood, paper and printing, manufacture of other non-metallic mineral products and manufacture of basic metals and fabricated metal products.

Longer-term jobs impacts are lower owing to low ongoing labour requirements for operation and longer-term efforts to recoup water sector investment costs.

4.5 Enhancing water efficiency

Reducing water
scarcity

The aim of this scenario is to measure the impact of developing value addition through economic and ecological sustainability of sludge management

Here, the water sector is investing in increased efficiency of water infrastructure as well as the production of water by desalinisation by 2030. The operational costs involved are linked to increased electricity consumption by the water sector. Therefore, in the water sector, no change in employment is expected. However, the investment demand increases employment elsewhere in the economy, e.g. construction, mechanical engineering and logistics.

The direct impacts are very small, as the modelling does not assume higher water demand from the rest of the economy, relative to the baseline. The modelling results suggest that over 6,000 new jobs could be added during the (short-term) construction phase of the investments in the water sector.

The effects of higher water supply on households and the effect on the price of water are not captured.
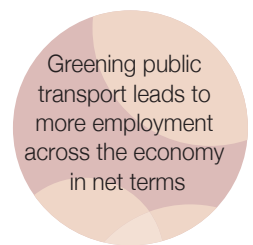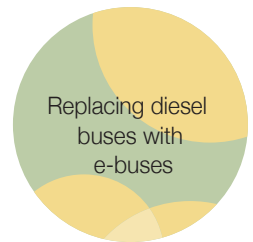
4.6 Greening public transport

The aim of this scenario is to measure the impact of promoting the adoption of e-mobility in the public transport sector. The level of ambition of the scenario is to replace the current fleet of polluting internal combustion engine (ICE) public buses with cleaner e-buses so that by 2030 they represent close to 50% of the buses used for public transport (both government and privately owned).

The economic modelling shows the employment impact from the investment and operations costs of greening the public fleet by 2030. It is assumed that a carbon trading system for the power sector is put in place in Jordan[3] and revenues from the system are used to help the government / local authorities purchase e-buses and chargers. Privately held buses are paid for by the private sector.

World Bank data suggest that 5,400 buses (including large buses and minibuses) were in use in 2020-21 and that only 24% are owned by the public sector (World Bank, 2022b). This suggests that there are currently 0.5 buses per thousand inhabitants available in Jordan, which is well below the target of 1.5 per thousand inhabitants by 2025 as stipulated in the 'Green Growth National Action Plan 2021-2025' (Jordan Government, 2020). The growth in the number of buses for our assessment is set to maintain the 0.5 ratio over time and grow in line with Jordan's population.

The switch from diesel buses and minibuses to e-buses is expected to maintain the current level of green jobs in public transport, which was estimated to be between 30,920 and 63,500[4]. By 2030, the additional jobs in road transport will arise mostly through supply chain effects of the investment in charging and grid infrastructure.

The deployment of e-buses requires investment in charging infrastructure, and therefore leads to higher employment in mechanical engineering, electronics, and construction. The highest positive employment effects are observed in these sectors.

Replacing diesel buses with e-buses

Greening public transport leads to more employment across the economy in net terms

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[3] According to the World Bank, Jordan has built digital infrastructure that includes monitoring, reporting, and verification (MRV) systems that link greenhouse gas emissions and emission reduction data to national or international registries, see (World Bank, 2022a).

[4] The range of estimates is based on the data provided by the different stakeholders.

Increased demand for electricity requires investment in electricity generation, EV charging stations and grid reinforcements, and therefore more activity and employment in this sector. However, because of the increased electricity demand, as well as the carbon trading system increasing the cost of electricity generation with fossil fuels relative to electricity generated with renewables, the price of electricity is projected to go up by a small margin, leading to small negative effects as higher prices curb demand slightly.

On the one hand, the increase in electricity demand also increases employment in the gas supply sector, as most electricity in Jordan is still being produced with gas, even if the share of renewables is going to increase over time. On the other hand, the fuel switching leads to considerable savings in spending on diesel, and cost savings overall. As diesel is mostly imported, this also means a reduction of international dependencies (conversely improved energy security).

As e-buses require less maintenance and are imported, this leads to a small negative employment effect in related sectors (repair of motor vehicles, transport equipment), but these are offset by the positive effects inside the road transport sector from increased overall demand for transport offsetting the impacts in other sectors as well as the operational cost savings.

All effects considered, the greening of the public bus fleet leads to more employment, not less. This is in addition to the considerable benefits of improved air quality and health from reduced emissions. Higher benefits would be reaped if the extra electricity demand would be met by renewable electricity generation.

5 Policy implications

5 Policy implications

The results of desk research, data analysis and expert consultations in the frame of the present green jobs assessment enabled the identification of some key sectors which appear to be particularly promising in terms of a job-rich greening of the economy. In line with the EMV, the considered sectors are manufacturing (with specific attention on plastics, textiles, food processing), water and waste, transportation, as well as energy, agriculture, and eco-tourism. The above sectors have been selected and reconfirmed by the steering committee.

The **water sector** is a strategic sector for the Jordanian economy and has around 2000 green jobs, representing around 25% of employment in the sector. In the absence of any further targeted initiatives, the water sector is expected to grow by 5% in the period 2023-30.
Despite a good performance in terms of wastewater reuse, there is still need and potential for improving water efficiency and quality, including the use of non-conventional water sources to compensate for the extreme water stress in the country.

In line with the government's plans for NRW reduction and the Aqaba-Amman desalination plant, the what-if scenario shows that the investments will lead to additional jobs during the construction phase (up to 2028) compared to baseline, i.e. between 6,000-8,000 new jobs per year, alongside a modest employment increase in the water sector compared to the baseline. Furthermore, these initiatives would also lead to a higher share of green jobs in the sector since it would increase the supply of sustainable water supply.

The level of investment used in the what-if scenario is of around JOD 2 billion and most of the amount is linked to building the Aqaba-Amman desalination plant. In the 'Jordan Green Growth National Action Plans 2021-2025: Water sector', the Jordanian Government announced its plan to spend between USD 173-188 million in the water sector (Jordan Government, 2020f), not considered in the scenario analysis. Building new water treatment plants would bring additional green jobs to the current estimation.

The **manufacturing sector** is the second largest in terms of output creation and employs 9% of the labour force in Jordan. The green jobs assessment of the sector was performed only in selected sub-sectors for which information was available about the current green practices or initiatives. Around 10,000 green jobs were identified.

The promotion of environmentally friendly practices, energy efficiency, and the use of sustainable water in manufacturing are among the goals of the EMV and of the Jordanian government's green growth strategy.

Specifically in relation to the industrial sector, progress is to be achieved by 2025 in implementing "circular economy practices in industrial activities by supporting transition to resource efficiency and cleaner production with a focus on eco-industrial parks" (EMV). Moreover, transparency and sustainability of supply chains are focus areas for action identified by the government. In parallel, efforts should be invested into the availability of green skills and in fostering public awareness of climate change related issues.

The current number of green jobs in this sub-sector was estimated to be around 3,700 green jobs. In a business-as-usual scenario, the sector is expected to grow with 500 new jobs during the period 2023-30. By 2030, the new PSF production facility using recycling PET is expected to further increase the number of green jobs in the plastics sector from 3,700 to almost 4,400.

The main potential for green jobs based on the above modelling lies with the **use of recyclable plastics**. Green jobs can already be found in the companies which are using recyclable plastic as raw material. This assessment illustrates that investing in the recycling of PET to produce PSF can generate additional green jobs and economic activity. PSF production is one example - and there are other ways in which plastic waste could be recycled and reused in Jordan, likely with similar employment effects.

Stakeholders emphasised that a more reliable and better supply of scrap and recyclable materials would be crucial to ensure the availability of sufficient inputs to production to feed a growing recycling business. The plastics sector is looking at this with growing interest. Furthermore, with waste collection currently dominated by informal workers, these are not currently considered to be green jobs whereas they could be, if formalised. Both to support the potential that plastic waste recycling holds and grant decent (green) job opportunities for a growing share of individuals; the formalisation of waste collection would make a large contribution.

To achieve this, the government could provide incentives in the form of tax exemptions and/ or attractive social protection schemes. Besides reducing the size of the informal economy, this may yield a more transparent flow of recyclables and reduced environmental pollution while generating new economic activity in the domestic economy.

A further promising green business for Jordan is **recycled textiles**. Green jobs can already be found in the RMG companies which hold an environment management certification. The current scenario analysis shows that investing in textile waste collection and recycling it into felt and then yarn would benefit both the waste and textiles sectors. In addition to creating green jobs, the production of felt and yarn will reduce the import dependency of Jordanian manufacturers.

Introducing circularity in the textile sector, increases the number of green jobs from around 70 in 2022 to over 72,000 in 2030. This is achieved by both greening the existing jobs and by the creation of around 250 new green jobs (generated by the one facility that produces yarn). The waste sector is also benefitting from this initiative by becoming greener as well as a slight employment increase to the baseline growth of 450 green jobs by 2030.

One of the challenges relating to recycled textiles is the need to create appropriate skills. The stakeholders suggested to capitalise on existing capacity building interventions and to direct them towards the creation of green skills. Better professional profiles of green textile specialists could also result into attracting more Jordanians to work in the sector.

Green initiatives should target **resource efficiency in food processing**. This will help alleviate the high cost of production (in particular, energy) and may, in line with the EMV, improve environmental compliance by food manufacturers.

Due to lack of information of the employment in these companies, the number of green jobs is currently underestimated. In a business-as-usual scenario, the sector would grow with around 3,000 jobs by 2030. However, the what-if scenario analysis illustrates that by investing in resource efficiency, Jordanian food-processing manufacturers can create more green jobs than in the baseline. Therefore, if this green initiative is assumed to be implemented in 60% of the medium-to-large companies, so from 2024 onwards, the share of green jobs within the sector could be more than 60%.As a result, the number of green jobs is expected to increase to over 34,000 jobs, of which 50 new green jobs.

The cost savings will help both the sector to expand their output, and indirectly the households which would benefit from higher local production through raised incomes. Stakeholders suggested that, for implementing resource efficiency measures, skills are crucial and currently represent a bottleneck to greening the sector. Therefore, increasing attention should be dedicated to skills and capacity building as well as to building workers' awareness of green processes in food production.

As a by-product of the expansion and improvements in wastewater, **sustainable management of sludge** is becoming another priority, due to the high cost of disposal. The what-if scenario analysis shows additional green employment generated in the water sector from selling the sludge. The investment benefits the entire economy in the short term, with 1000 additional jobs being generated to build the facility to dry the sludge. An extra seven green jobs would be added to the water sector for each water treatment facility that would adopt sustainable value extraction of sludge management.

In addition to the benefits explored by the what-if scenario on using sludge for energy production in other sectors, the experts recommended its use for electricity generation in water treatment plants. Experts estimate that this would yield a reduction of electricity costs in wastewater facilities by 30%. More wastewater treatment plants adopting sustainable management of sludge could heighten the relevance and profitability of this option.Investments in R&D are a precondition for improving sludge management and should be accompanied by capacity and skills development. Better sludge management will also result in higher demand for new professional occupations, such as sludge managers and technicians and both academic and vocational training institutions should respond swiftly to support this new trend.

Up to 75% of the jobs in **transport sector** are green jobs since public transport is considered to be a greener transportation than private transport. By 2030, in a business-as-usual case, the number of green jobs in the public sector would increase to almost 67,000 jobs.

Transport is one of the key sectors targeted by the EMV, aimed at fostering increased adoption of clean energy in transport and improving public transport. Current barriers are connected to the inadequacy of a reliable network of transportation for both people and goods, in particular in light of growing population and connectivity needs. Growing mobility demand in Jordan has not been met with the required development of public transport to enable passenger movement and accessibility (World Bank, 2022b), while road transport remains the only available way of transporting commodities in Jordan.

In line with the EMV's ambition for the sector, the what-if scenario simulates an increased adoption of e-buses for public transport and e-charging facilities throughout the Kingdom. The modelling results suggest that would have positive indirect, and induced employment effects, driven to a large extent by the investment in charging infrastructure. To support this greening of public transport, authorities should develop an appropriate regulatory framework including progressive plans and clear targets for the decarbonisation of mobility. Considering that except for the Greater Amman Municipality, public transport is mostly licensed to private providers, financial incentives to compensate investment in more expensive e-buses are needed and, in parallel, charging infrastructure should be built throughout the country. The results suggest that this holds considerable potential to add green jobs to the economy.

The **agricultural sector** is depicted as one of the strategic sectors of the EMV, also due to its link to food security, resilience, and income opportunities of rural communities, as well as to its significant water use. Water scarcity, fragmentation of land ownership, low levels of investment, low productivity, and informality of operations are all factors constraining the growth of the sector (Jordan Government, 2022).

The potential for green jobs in the agricultural sector was assessed only for crop production. Around 10,000 jobs are currently green in the crop production. By 2030, around 11,000 green jobs are expected. This is without any further/other green initiatives being implemented, which would increase this figure further.

Based on the NDCs, improving the efficiency of irrigation should be achieved by boosting adoption and building capacity for water harvesting techniques, but also by increasing acceptance among farmers of using treated wastewater, and expanding drip irrigation. The use of drip irrigation makes agricultural production greener. The current green jobs estimated in agriculture are linked to vegetable production. By extending this green process to other types of crops, Jordanian agricultural sector could increase the number of green jobs in the sector.

Despite observing encouraging improvements in the deployment of renewable energy, **Jordan's energy** mix is still dominated by conventional (imported) fuels. Authorities are envisioning a green transition of the sector and energy is at the core of the Jordan Energy Strategy 2020-2030 (MEMR, 2020).

Currently, almost 4,750 green jobs are present in the electricity sector, and they are linked to the generation and distribution of electricity generated from renewables. In a business-as-usual scenario, the number of green jobs would be expected to grow to over 5,000 by 2030.

Reviewing the structure of the sector, energy efficiency improvements should guide a fully-fledged portfolio of interventions, targeting companies, as well as private individuals. Public awareness and a streamlined certification process should be regarded as a precondition for the success of this line of interventions. Green jobs are found in the part of electricity generation using renewables and in the adoption of energy efficiency technologies. The higher the share of renewables in electricity generation, the higher will be the number of green jobs in the sector

According to the EMV, **tourism** is both addressed as a driver of growth within the Destination Jordan flagship initiative and within the Quality-of-Life framework. The COVID-19 pandemic had a significant negative impact on tourism and led to major job losses in the sector.

Green jobs are currently found in eco-tourism and in green hotels and they represent between 25-44% of the jobs in the sector. The green transition of the tourism sector necessitates investment and emphasises the value of corporate social responsibility. Government incentives for certification may be crucial in facilitating this change and increasing the green jobs potential of the sector. For example, initiatives directed towards awareness and tailored marketing for eco-tourism in Jordan could be implemented and, once again, skills for qualified eco-tourism operators need to be fostered. Investing in awareness and skills can also benefit the entire supply chain, with potentially important employment and income effects among typically marginalised social groups, such as farming communities and agro-pastoral workers in rural areas.

6 Conclusions

6 Conclusions

This report allowed for an initial assessment of current green jobs in six economic sectors of the Jordanian economy - water and waste, energy, transport, agriculture, manufacturing, and tourism - and showcased through specific green economy investment initiative that Jordan hols great potential for green employment creation from additional capital investments in green technologies. Green investment promotion will play a pivotal role in creating and sustaining green jobs, as well as supporting a widespread transition towards a green economy in Jordan. Such investments need to be supported with a robust legal framework that creates enabling conditions for green financing, technology transfer, and capacity development of human resources in addition to market-based incentive systems that encourage the private sector to generate green jobs.

This current assessment serves as a starting point for more economy-wide and sector-specific scaling up of green jobs assessments, using new data sources and more in-depth investigation. Enabling economic and social policies should be explored to create the proper conditions for green job creation, greening of current jobs and the enhancement of practical skills in the labour force in Jordan to realise the emerging potential for green jobs.

While the analysis shows that the green transition has the potential to increase net jobs, the pattern of job gains and losses suggests that careful design of an appropriate policy package (including legislative changes) will be important to manage a smooth jobs transition. For example, it would be desirable to enact energy efficiency, EV deployment and renewables take-up as a package to support stable energy and employment demand, while also pursuing effective decarbonisation. Implementing a package of policies facilitates synergies and can help ensure that jobs created in one sector absorb the jobs losses in another sector. Education and training providers will also play a crucial role in the smooth transition of workers between the sectors/roles.

The impacts of new technological trends could either support or deter green job creation, depending on the strategic approach taken by both the public and private sectors. Technology will also redefine some jobs, so re-skilling opportunities would help current workers remain in employment as skills requirements change.

The transition to a green job market is a long process that requires political commitment, wide-ranging policy reforms, tools for measurement of green jobs creation and the adoption of appropriate technologies. If such commitments could be achieved, Jordan seems well-positioned to unlock the potential of the green economy in generating meaningful employment opportunities.
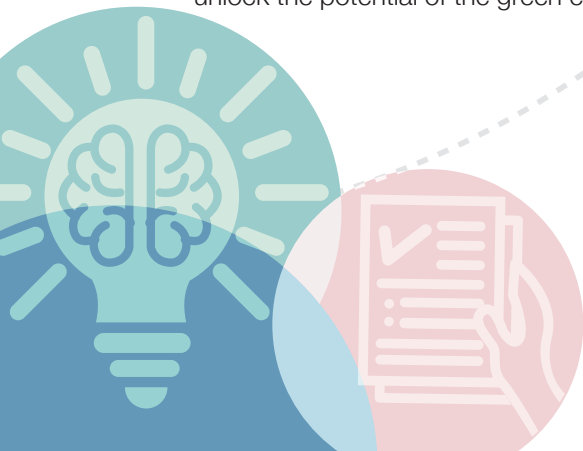
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