



## National Guidelines

Mainstreaming the Water-Energy-Food Security  
Nexus into Sectoral Policies and Institutions  
in the Arab Region

# PROJECT DOCUMENT

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## **Table of Contents**

<b>1</b>	<b>Introduction</b>	<b>1</b>
<b>2</b>	<b>The WEF-Nexus Situation, Critical Interlinkages and Recommendations in Jordan</b>	<b>2</b>
2.1	Resources and Human Securities in Jordan	2
2.2	Critical Interlinkages, Risks and Opportunities in Jordan	4
2.2.1	Energy for Water Production, Treatment and Distribution	4
2.2.2	Water for Power Generation	5
2.2.3	Water for Agriculture and Food Production	5
2.2.4	Energy for Agriculture and Food Production	6
2.3	Mapping Relevant Institutions to the Critical Interlinkages in Jordan	7
2.3.1	Key Sectoral Institutions for WEF-Nexus Mainstreaming	7
2.3.2	Cross-Sectoral Institutions for WEF-Nexus Mainstreaming	9
2.4	Recommendations for Jordan	10
2.4.1	Mainstreaming WEF Nexus Within Existing Coordination Mechanisms	10
2.4.2	Mainstreaming WEF Nexus Through a New Coordination Mechanism	12
2.4.3	Mainstreaming WEF Nexus Within the Existing Planning Processes	13
2.4.4	Capacity Development Needs for Mainstreaming WEF Nexus	14
<b>3</b>	<b>The WEF-Nexus Situation, Critical Interlinkages and Recommendations in Egypt</b>	<b>18</b>
3.1	Resources and Human Securities in Egypt	18
3.2	Most Critical Interlinkages, Risks and Opportunities in Egypt	20
3.2.1	Water for Agriculture and Food Production	20
3.2.2	Energy for Water Production, Treatment and Distribution	21
3.2.3	Water for Power Generation	21
3.2.4	Energy for Agriculture and Food Production	22
3.3	Mapping Relevant Institutions to the Critical Interlinkages in Egypt	23
3.4	Recommendations for Egypt	26
3.4.1	Mainstreaming WEF Nexus Within Existing Institutions and Planning Processes	26
3.4.2	Mainstreaming WEF Nexus Within Existing or New Cross-Sectoral Institutions and Coordination Mechanisms	29
3.4.3	Mainstreaming WEF Nexus Through the Sustainable Development Process	30
3.4.4	Capacity Development Requirements for WEF-Nexus Mainstreaming in Egypt	32
<b>4</b>	<b>Common Trends, Nexus Challenges and Opportunities, and Best Practices Within and Between Countries</b>	<b>37</b>
	Strengthening Communication and Outreach with Respect to WEF Nexus	40
<b>5</b>	<b>References</b>	<b>42</b>

## **List of Figures**

Figure 1:	Schematic Representation of Interlinkages Between the Water-Energy-Food Security / Agricultural Sectors .....	1
Figure 2:	Mapping of Critical Interlinkages – Trade-Offs and Risks (Jordan).....	4
Figure 3:	Mapping of Critical Interlinkages – Opportunities (Jordan) .....	7
Figure 4:	Mapping of Relevant Institutions to Critical Interlinkages (Jordan).....	10
Figure 5:	Mainstreaming WEF Nexus Within Existing Coordination Mechanisms .....	12
Figure 6:	Mainstreaming WEF Nexus Through a New Coordination Mechanism.....	13
Figure 7:	Mainstreaming WEF Nexus Within Existing Planning Processes .....	14
Figure 8:	Capacity Development Requirements for Mainstreaming WEF Nexus.....	15
Figure 9:	Mapping of Critical Interlinkages – Trade-Offs and Risks Egypt).....	20
Figure 10:	Mapping of Critical Interlinkages – Opportunities (Egypt).....	23
Figure 11:	Mapping of Relevant Institutions to Critical Interlinkages (Egypt) .....	26
Figure 12:	Mainstreaming WEF Nexus Within Existing Institutions and Planning Processes .....	29
Figure 13:	Mainstreaming WEF Nexus Within Existing or New Cross-Sectoral Institutions and Coordination Mechanisms .....	30
Figure 14:	Mainstreaming WEF Nexus Through the Sustainable Development Process.....	32
Figure 15:	Capacity Development Requirements for Mainstreaming WEF Nexus.....	33

## **List of Tables**

Table 1:	Key Sectoral Policies and Plans to be considered for WEF-Nexus Mainstreaming .....	14
Table 2:	Key Performance Indicators in Jordan's Vision 2025 Related to WEF-Nexus Interlinkages .....	15
Table 3:	SDG Targets and Indicators Most Relevant to WEF Nexus in Jordan .....	40

## **List of Boxes**

Box 1:	Regional Water Resources Plans at the Governorates Level and the National Framework for Decentralized Wastewater Management as a Model for Integrated-Resource-Efficiency Policies and Actions.....	38
Box 2:	Institutionalizing the German National Strategy for Sustainable Development <b>Institutionalizing the German National Strategy for Sustainable Development</b> .....	40

## Acronyms

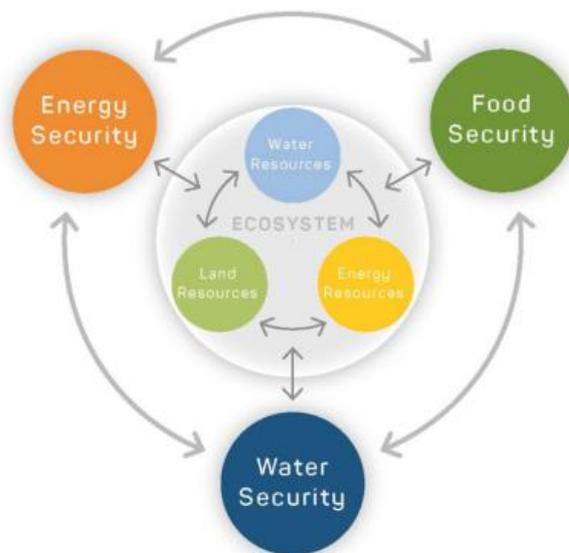
<b>ACCWaM</b>	Adaptation to Climate Change in the Water Sector in the MENA Region
<b>ARC</b>	Agriculture Research Center Egypt
<b>ARDC</b>	Agriculture Research and Development Council Egypt
<b>CAPMAS</b>	Central Agency for Public Mobilization and Statistics Egypt
<b>CEDARE</b>	Centre for Environment and Development for the Arab Region and Europe
<b>CSP</b>	concentrated solar power
<b>DDC</b>	Desert Development Center Egypt
<b>DOS</b>	Department of Statistics
<b>DRR</b>	disaster risk reduction
<b>EDP</b>	Executive Development Program Jordan
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>GDP</b>	gross domestic product
<b>GHG</b>	greenhouse gas
<b>GIZ</b>	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
<b>HCSD</b>	Higher Council for Sustainable Development
<b>HLMC</b>	High Level Ministerial Committee Egypt
<b>HNCSD</b>	Higher National Committee for Sustainable Development Jordan
<b>INDC</b>	intended nationally determined contribution of Jordan
<b>JD</b>	Jordanian dinar
<b>JRV</b>	Jordan Rift Valley
<b>JVA</b>	Jordan Valley Authority
<b>kW</b>	kilowatt
<b>KWh</b>	kilowatt hour
<b>LAS</b>	League of Arab States
<b>M&amp;E</b>	Monitoring and Evaluation
<b>MALR</b>	Ministry of Agriculture and Land Reclamation
<b>MCM</b>	million cubic meters
<b>MEMR</b>	Ministry of Energy and Mineral Resources Jordan
<b>MENA</b>	Middle East and North Africa
<b>MERE</b>	Ministry of Electricity and Renewable Energy
<b>MHUUD</b>	Ministry of Housing, Utilities and Urban Development Egypt
<b>MIC</b>	Ministry of International Cooperation Egypt
<b>MOA</b>	Ministry of Agriculture Jordan
<b>MOENV</b>	Ministry of Environment
<b>MOPIC</b>	Ministry of Planning and International Cooperation
<b>MPAR</b>	Ministry of Planning and Administrative Reform Egypt
<b>MW</b>	megawatt
<b>MWI</b>	Ministry of Water and Irrigation Jordan

<b>MWRI</b>	Ministry of Water Resources and Irrigation Egypt
<b>NDC</b>	nationally determined contributions
<b>NWRC</b>	Water Research Center Egypt
<b>PV</b>	photovoltaic
<b>R&amp;D</b>	Research & Development
<b>RCREEE</b>	Regional Center for Renewable Energy and Energy Efficiency
<b>RISE</b>	Research Institute for a Sustainable Environment Egypt
<b>RJGC</b>	Royal Jordanian Geographic Center
<b>RSS</b>	Royal Scientific Society
<b>SCP</b>	sustainable consumption and production
<b>SDG</b>	Sustainable Development Goals
<b>SDS</b>	Sustainable Development Strategy
<b>SWERI</b>	Soil, Water and Environment Research Institute Egypt
<b>SWRI</b>	Soil, Water Research Institute Egypt
<b>USD</b>	US dollar
<b>WAJ</b>	Water Authority of Jordan
<b>WEF</b>	Water, Energy and Food Security Nexus
<b>WWTP</b>	wastewater treatment plant

## 1 Introduction

Water, energy, and food security, as well as the underlying resources water, energy, and land, are **closely interrelated** (Figure 1). Conventional sectoral approaches entail significant trade-offs and negative externalities in other respective sectors. **Integrated nexus approaches**, which manage and govern resources in a holistic manner, provide significant **potential for creation of synergies and opportunities** for increasing resource efficiency, and overcome scarcities in resources.

Taking an integrated approach in managing and governing water, energy, and land resources requires coordination and cooperation of the relevant institutions, as well as a coherent legal and policy framework.



*Figure 1: Schematic Representation of Interlinkages Between the Water-Energy-Food Security / Agricultural Sectors*

The National Guidelines are part of a series of studies and policy guides prepared within the assignment “Mainstreaming the Water-Energy-Food Security (WEF) Nexus into Policies and Institutions in the MENA Region”.<sup>1</sup> The report builds upon the most critical interlinkages, as identified in the WEF Nexus Evidence Base (Hoff et al. 2017) and is complemented by a Regional Policy Guide (Carius and Kramer 2017).

This report summarizes the situation for **Egypt** and **Jordan** in terms of water, energy, and land resources, as well as their related human securities, their critical interlinkages, trade-offs and their synergies, as identified in the Nexus Evidence Base<sup>2</sup>. It maps key institutions and policies in each of these two countries to those critical interlinkages. Based on that, the report identifies **institutional entry points** (processes and partners) for increased coordination and cooperation of national (sectoral) institutions in Egypt and Jordan, in order to **achieve nexus synergies** and **minimize trade-offs**.

Finally, it provides recommendations for nexus mainstreaming, the building of capacity and data harmonization.

<sup>1</sup> The study »Mainstreaming the Water-Energy-Food Security Nexus into Policies and Institutions in the MENA Region« (02/2016 – 05/2017) was subcontracted to GFA Consulting Group by GIZ and was implemented in the frame of the GIZ regional programme »Adaptation to Climate Change in the Water Sector in the MENA Region« (ACCWaM).

<sup>2</sup> Hoff H, Al-Zubari W, Mansour L, Abaza H, Biad M, Al Ouran N, Ulrich A. 2017. Mainstreaming the Water-Energy-Food Security Nexus into Policies and Institutions in the MENA Region: Nexus Evidence Base. GIZ, GFA.

## 2 The WEF-Nexus Situation, Critical Interlinkages and Recommendations in Jordan



### 2.1 Resources and Human Securities in Jordan

The water, energy, and agricultural sectors in Jordan are characterized by rapidly **growing demands and scarcity of resources**. These scarcity conditions have been exacerbated by the country's geopolitical situation, having received large waves of **immigration** over the past decades (Palestinians, Iraqis, and Syrians). This has increased the demands on resources dramatically and has created large deficits in the water, energy, and food sectors.

#### Water

Jordan is one of the most water-scarce countries in the world with per-capita water availability below 100 m<sup>3</sup> per year. The country's **critical water situation** is increasingly aggravated by population growth, by climate change and by the region's geopolitical situation. The water deficit in 2015 is estimated at around 391 million cubic meters (MCM); by 2025, water demand is expected to exceed the available water resources by more than 26% (*National Water Strategy (2016-2025)*), although this deficit is expected to be reduced to 6% once phases 1 and 2 of the Red-Dead Conduit have been implemented.

Water scarcity poses a serious challenge affecting human well-being, security and the economic future of the country. There is severe **competition between socio-economic sectors**, domestic use and environmental water needs. The issues of water scarcity and management of resources in Jordan were fully reflected in **Vision 2025**, the **Jordan Response Plan 2016-2018**, and the newly approved **National Water Strategy 2016-2025**. The latter includes, among other things, the objectives of increasing the efficiency of water use, of allocating water resources between sectors according to water productivity, of managing demand and losses, and to augment supply through increased use of treated wastewater and desalination.

These objectives are translated into a set of **quantitative targets for 2025**, as compared to the 2014 baseline, which include among others:

#### Targets for 2025

- Reducing the energy used per m<sup>3</sup> billed from 4.31 to 3.66 KWh
- Increasing percentage of wastewater service coverage from 63% to 80%
- Increasing available water resources from 832 to 1341 m<sup>3</sup>/year
- Reducing non-revenue water rates from 52% to 30%

Goals in the water sector are not necessarily fully consistent with those of other sectors (Hoff et al. 2017). Sustainable development, management and use of water resources depends on a nexus approach, which takes into account, and balances out, the demands of all sectors (according to national development plans), also including environmental water requirements.

#### Energy

Jordan's energy sector is strongly **import-dependent**, 97% of its fossil fuels being imported. Accordingly, more than 17% of Jordan's GDP is spent on energy (2014). Thus, Jordan's energy bill, until recently, contributed largely to the public deficit. Increased demand due to the new population of Syrian refugees has further exacerbated Jordan's energy bill.

The demand for energy has been growing rapidly, electricity consumption increasing by about 25% over 5 years (*National Electric Power Company, 2013*). Renewables in 2012 provided less than 1% of primary energy generation (most of which has been hydropower from the King Talal Dam), although the Ministry of Energy and Mineral Resources (MEMR) has targeted 10% of its energy from renewable resources by 2020.

To overcome this challenge, Jordan is continuously **evaluating the energy options and developing new policies and strategies** (e.g. the De-risking Renewable Energy/Energy Efficiency/Energy Investment framework). This includes incentives to encourage technologies that promote **sustainable energy production** – from the perspective of cost effectiveness, reduction of GHG emissions, and energy security.

Over the past years, Jordan has **increasingly installed facilities for generating renewable energy**, especially **on-shore wind and solar photovoltaic power plants** (*IRENA database*). Moreover, Jordan hosts one of the region's first **waste-to-energy recovery systems** at a landfill in the greater Amman municipality, with a capacity of 2000 tons/day.

With its **National Energy Strategy 2007-2020**, Jordan has set its goals on diversification of energy resources

and increased self-sufficiency, which include increasing domestic production, by attracting investments in the following fields:

#### Targeted fields in the energy sector

- oil shale (planned to reach 14% of the energy mix by 2020)
- renewable energy (planned to reach 10% of the energy mix by 2020, including installed facilities with capacities of 600 - 1000 MW from wind, 300 - 600 MW from solar, and 30 - 50 MW from waste to energy; and additional hydropower could be generated from the planned Red-Dead Canal project)
- exploring oil reservoirs
- nuclear power as "a strategic choice" (the energy strategy envisions that by 2020, nuclear energy will provide 6% of electricity)

Goals in the energy sector are not necessarily fully consistent with those of other sectors (Hoff et al. 2017). A nexus approach requires accounting for and reducing energy demands across all sectors through **improved energy efficiency** and demanding management.

#### Agriculture and Food Production

Around 80% of Jordan's land area is classified as **arid** receiving less than 150-200 mm of rainfall and is thus **inappropriate for rain-fed agriculture**. Only 5% of land receives enough rainfall to support cultivation. Water scarcity strongly **limits further expansion of agricultural production**. Climate change, population growth and urban encroachment further threaten availability of arable land. This combination of factors is projected to reduce irrigated and rain-fed areas by about 30% by 2050 compared to 2010 (*Al Bakri, 2013*). Population growth and increasing food demand has further led to the spread of crop cultivation to vulnerable low-rainfall areas and steep slopes, which accelerates land degradation. In addition, the expansion of irrigated farming to areas with minimal water resources puts the land at risk of salinization.

Against this background, Jordan **needs to import most of its food**, which makes it vulnerable to food prices volatility. Moreover, 5.7% of all Jordanian households are vulnerable to food insecurity. Around 95% of consumed cereals are imported, and up to 100% of rice and sugar. On the other hand Jordan is **self-sufficient for almost all vegetables**, mainly grown in the Jordan valley, and even exports vegetables worth around 750 million USD a year, making up 8% of total exports in 2014 (*OEC, 2017*).

**Agriculture also is an important source of livelihoods and employment in rural areas**, especially for the rural poor. It is estimated that about 25% of the total poor in Jordan live in rural areas, where they depend mostly on agriculture (livestock keepers, smallholder farm households and landless former agriculturalists) (*Assessment of the Agricultural Sector in Jordan 2012*). Moreover, the influx of Syrian refugees has pushed up the demand on agricultural products/food, and has caused prices to increase and thus exacerbated food insecurity:

Jordan's targets for **food security** as projected in **Vision 2025** compared to the baseline levels in 2014 include the following

#### Targets for food security as projected in the Vision 2025

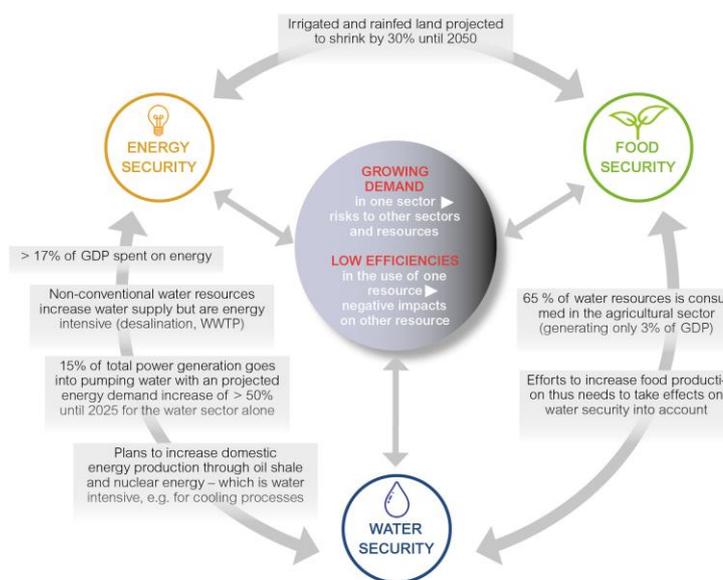
- increasing the fraction of domestically produced food from 18% to 24%
- phasing out tariffs on key food imports such as barley, wheat and rice by 2020
- increasing the area of agricultural land with drip irrigation from 900,000 acres to 962,000 acres

Goals in the agriculture / food sector are not necessarily fully consistent with those of other sectors (Hoff et al. 2017).

## 2.2 Critical Interlinkages, Risks and Opportunities in Jordan

The critical interlinkages, as identified by stakeholders in the national dialogues in Jordan, are associated with certain risks and trade-offs. These are visualized by mapping them onto the basic nexus diagram (Figure 2). These risks on the one hand, as well as the opportunities arising from innovative nexus approaches on the other, are explained in detail in the following.

Figure 2: Mapping of Critical Interlinkages – Trade-Offs and Risks (Jordan)



### 2.2.1 Energy for Water Production, Treatment and Distribution



The increasing use of non-conventional water resources and the need for pumping water across large distances and vertical gradients, make the Jordanian water system very **energy-intensive**. About 12% of Jordan's total power production goes into pumping water. The energy bill of the Jordanian water sector in 2014 amounted to 301 million JD (of which 163 million were energy subsidies the government paid).

According to MWI projections, **energy demand** of the water sector will **increase by more than 50% from 2017 to 2025**, with associated energy costs for pumping of more than 600 million JD.

The projected increase in desalination and wastewater treatment / reuse, as well as the pumping of water to the location of consumption, will require additional energy.

Given the nature of water resources and their scarcity, stakeholders and the relevant authorities are generally aware of the need to manage the trade-offs between water and energy across sectors at all levels. **Jordan is ahead of most countries in the region**, by having begun to mainstream nexus into the water sector, for example by complementing its National Water Strategy 2016-2025 with a dedicated policy on "Energy Efficiency and Renewable Energy in the Water Sector". The energy targets of the water sector for the year 2025<sup>3</sup> include the following:

- reducing the overall energy consumption in public water facilities by 15%,
- increasing the share of the water sector's overall power supply from renewable energy to 10%.

Rising energy demand through increase in desalination, wastewater treatment and pumping of water calls for a nexus approach

<sup>3</sup> National Water Strategy. 2016-2025

<p><b>Opportunities</b></p> <p>to address improved energy-efficiency in the water sector, making it more energy-smart</p>	Increasing energy-efficiency in water utilities through <b>optimization and rehabilitation of infrastructure</b>
	Deploying <b>photovoltaic technology</b> where possible, for pumping and other uses in the water sector, including for desalination
	Using the energy potential of <b>biogas</b> and <b>bio-solids</b> in <b>wastewater treatment plants</b> (WWTPs) to offset the energy needs of WWTPs. As an example, Jordan is introducing energy recovery from wastewater (biogas) in the As Samra treatment plant
	Establishing <b>hydropower plants</b> at <b>water dams</b> and main carrier pipelines where feasible

Potential to make water sector more energy-smart

### 2.2.2 Water for Power Generation



Several of the options considered under Jordan’s Energy Strategy can be water-intensive, including producing oil shale and solar concentration power technologies. Moreover, nuclear power can be more water-intensive than electricity generation from fossil fuels, depending on the cooling process. According to MWI, the current average daily water consumption for power generation in Jordan is between 3,500-4,200 m<sup>3</sup> (this estimation does not include the needs of the refinery sector). The water needs for oil shale and nuclear power have been included in the national water strategy and are estimated to reach 70 MCM per year by 2025.

In order to avoid trade-offs between energy and water security, **energy projects need to be adapted to the respective water context and water availability**. For example, placing water-intensive power production in very arid regions would require long-distance pumping of water, which in turn would cause significant additional energy demands. Water and wastewater systems may also cause unnecessary additional energy demands for vertical pumping if their planning ignores topography (vertical gradients).

Recommendations to improve planning and water-efficiency in energy sector

<p><b>Opportunities</b></p> <p>to improve water-efficiency in the energy sector, making it more water-smart</p>	<b>Integrated planning</b> of new energy systems and infrastructure jointly with other sectors, in particular with the water sector, to generate co-benefits.
	For example, by using <b>solar energy in desalination</b> , using <b>wastewater or seawater for cooling</b> , and switching to <b>water-smart energy solutions</b> (such as wind or PV) in cases of extreme water scarcity
	Strategically using <b>subsidies</b> to promote those water (and energy) systems that are sustainable in the long-term

### 2.2.3 Water for Agriculture and Food Production



The agricultural sector is currently the **largest user of water (51% of the total water needs)** while it contributes only 3% to the GDP of the country and only 2% to employment. At the same time, Jordan’s food self-sufficiency level remains very low; in the case of cereals production, it currently stands at about 5-10%.

Efforts to reduce water use by the agricultural sector in favor of other sectors therefore have to be **carefully balanced with concerns of food security and related trade policies** (as well as those of rural livelihoods). The new policy and trend is to reduce the amounts of fresh water allocated to irrigated agriculture, particularly in the highlands, and to replace it by **treated wastewater**. According to MWI’s National Water Strategy a ceiling of 700 MCM/year of water allocation (including treated wastewater) will be set for the agricultural sector, which will force the sector to

Agricultural sector is the largest user of water

Replace fresh water by treated wastewater

optimize its use of water in future (700 MCM are approximately equivalent to the total water use in agriculture in 2015)<sup>4</sup>.

Jordan's **Sustainable Consumption and Production (SCP) Strategy for Agriculture and the Food Industry** of 2016 has set goals to increase water-use efficiency in agriculture, which are linked to the targeted scenarios of the "Priority Initiatives" of Jordan's Vision 2025. SCP-related key performance indicators related to the Targeted Scenarios under Food and Agriculture in the Jordan Vision 2025 included "increasing the area of agricultural land in which drip irrigation is used by 0.1% per annum", from 900 thousand acres in 2014 to 962 thousand acres in 2025.

**Potential for improving water-efficiency in food production**

<p><b>Opportunities</b></p> <p>to improve water-efficiency in agriculture and food production, making it more water-smart</p>	Providing appropriate <b>incentives</b> and reduce <b>subsidies</b> to promote efficient use of water in irrigation.
	<b>Promoting non-water-intensive crop varieties</b> in order to increase production and achieve high economic returns on irrigated products.
	Promoting reuse of <b>treated wastewater</b> in agricultural use. This requires increased connection rates to the sewer system or wastewater treatment in decentralized plants.
	Encouraging the shift of 30% of exposed irrigated agriculture area in the Jordan Valley and the highlands towards protected agriculture.

**2.2.4 Energy for Agriculture and Food Production**



Large amounts of energy are not only required for pumping irrigation water, but also for **operating machinery** and for the **production of fertilizer and other agricultural inputs**. Hence expansion and intensification of agriculture always come with additional energy demands, which are typically met by using more fossil fuels (which in the case of Jordan all need to be imported).

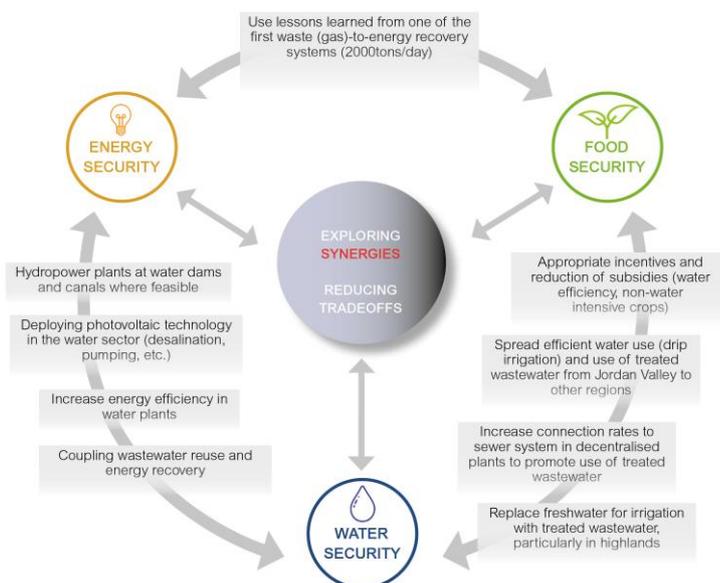
**Opportunities to make agricultural sector more energy-smart**

<p><b>Opportunities</b></p> <p>to improve energy-efficiency in the agriculture and food sectors, making them more energy-smart</p>	Shifting to energy- (and climate-) smart agricultural practices, such as applying <b>agro-ecological and recycling principles</b> , e.g. in tillage, nutrient management and crop rotation
	Switching to renewable energy in agriculture, e.g., <b>solar pumping</b> , possibly also using in <b>future solar-desalinated water</b> (if that becomes economically viable)
	Increasing water use efficiency and with that <b>reducing the overall water demand</b> and accordingly also energy demand in agriculture
	Using food imports strategically as a mean to reduce agricultural water and energy demands

Similar to Figure 2, the identified opportunities can be visualized on the nexus diagram (Figure 3).

<sup>4</sup> MWI Water Reallocation Policy p. 5

Figure 3: Mapping of Critical Interlinkages – Opportunities (Jordan)



## 2.3 Mapping Relevant Institutions to the Critical Interlinkages in Jordan

Key nexus sectors include:

- **Water** Resources Development, Distribution, Use and Security
- **Energy** Production, Distribution, Use and Security
- **Agriculture**, Land Use, Food Processing and Food Security
- **Environmental** Protection
- **Sustainable Development** (including SDG implementation and Integrated Climate Mitigation and Adaptation).

Key sectoral and inter-sectoral institutions in Jordan and gaps and opportunities for enhanced cooperation are detailed in the following.

### 2.3.1 Key Sectoral Institutions for WEF-Nexus Mainstreaming

The **Ministry of Water and Irrigation (MWI)** is the official body responsible for the overall monitoring of the water sector, water supply, the wastewater system and related projects. Furthermore, the ministry is in charge of planning and management, the formulation of national water strategies and policies, research and development, information systems, and procurement of financial resources. MWI embraces the following two most important entities dealing with water in Jordan:

- **The Water Authority of Jordan (WAJ)**, in charge of water and sewage systems.
- **The Jordan Valley Authority (JVA)**, responsible for the socio-economic development of the Jordan Rift Valley (JRV), including water development and distribution of irrigation.

Entry points for MWI for enhanced cooperation and alignment of sectoral and national strategies are:

- ensuring that water demands for the different economic sectors (e.g. energy and food/agriculture) are balanced according to priorities set in **national development plans, strategies and visions**, e.g. in terms of economic growth, human well-being and environmental protection
- minimization of additional energy demands from new water plans and projects and alignment of these plans with the energy-sector planning
- assessment as to whether the substitution of fossil energy with renewables in the water sector is progressing in line with Jordan's climate commitments

**Entry points for MWI for enhanced cooperation and policy coherence**

- monitoring whether energy recovery from wastewater and sludge is implemented in all new and existing treatment plants
- checking that the issue of **non-sustainable water subsidies** and subsidies for cross-resources is being tackled and solved

**Entry points for MEMR to align sectoral and national strategies**

The **Ministry of Energy and Mineral Resources (MEMR)** is entrusted with administering and organizing the energy sector in a way that achieves Jordan's national objectives.

Entry points for MEMR for enhanced cooperation and alignment of sectoral and national strategies are:

- ensuring that energy demands for the different economic sectors (e.g. water, food/agriculture) are balanced according to the priorities set in national development plans, strategies and visions, e.g. in terms of economic growth, human well-being and environmental protection
- minimization of additional water demands from new and renewable energy systems and coordination of how these can be in line with water-sector planning
- monitoring the alignment of land demands for new energy systems and infrastructure with spatial and urban planning

**MEMR not mandated to influence policies, plans, consumption patterns, and sources of energy for other sectors**

Another important energy institution working on nexus is **NERC**, the National Energy Research Center. Energy research centers need to **collaborate with research centers from other sectors**, e.g. through joint projects, to address the critical interlinkages described above. As in the case of other line ministries, **MEMR is not currently mandated to interfere with or influence policies, plans, consumption patterns, and sources of energy for the other sectors**, so there is a need for closer collaboration, e.g. with MWI and MOA.

The **Ministry of Agriculture (MOA)** is responsible for all aspects related to the development of the agricultural sector in Jordan, including the exploitation of surface water resources through construction and operation of small dams and other facilities for crop production. As such, MOA's policies have a profound effect on the water resources of the country, since they affect the planning, governance and management of water resources. Several institutions are also affiliated to MOA and play an important role in nexus aspects, including the following:

- **National Center for Agricultural Research and Technology Transfer.**
- **The Agricultural Credit Corporation**
- **National Center for Agricultural Research and Extension**

➡ Entry points for MEMR for enhanced cooperation and alignment of sectoral and national strategies are:

- ensuring that water and energy demands for agricultural intensification are minimized and are **in line with the priorities of these (water and energy) sectors** – and assessing whether the required water and energy is available at all
- assessing to what extent agricultural production and in particular **agricultural residues** contribute to Jordan's energy system, and monitoring whether that potential is exploited
- quantifying the potential of applying **agro-ecological principles** to reduce the demand for water and energy, without compromising food security
- monitoring the extent to which **agricultural and trade strategies** are aligned to maximizing food security, while minimizing the domestic demand for water and energy and the strain on the national budget

**MOA has no direct responsibility for the governance and management of water or energy in the agricultural sector**

The agricultural research centers need to collaborate closely with research centers of the other sectors on nexus issues. As in the case of other line ministries, **MOA has no direct responsibility for the governance and management of water or energy in the agricultural sector.**

### 2.3.2 Cross-Sectoral Institutions for WEF-Nexus Mainstreaming

The **Ministry of Environment (MOENV)** is responsible for the maintenance and improvement of the quality of Jordan's environment, and for conservation of natural resources, contributing to sustainable development through effective policies, legislation, strategies, monitoring and by mainstreaming environmental concepts in all national development plans. MOENV is also responsible for the implementation of Rio - as well as other international environmental conventions and agreements.

- ➔ Nexus questions to be addressed by the Ministry of Environment relate to its role and contribution to ensure **environmental sustainability** in the implementation of water, energy and agricultural strategies. Also **ecosystem-based solutions** and **“soft” natural infrastructure** complementing “hard” technical infrastructure are to be promoted by the Ministry of Environment and to be integrated into other sectors' strategies.

The **Ministry of Planning and International Cooperation (MOPIC)** plays an important role in Jordan in the overall coordination of sectoral policies and plans, as well as in project proposals and feasibility studies. It ensures alignment of the national planning process, including alignment and implementation of **Jordan's Vision 2025**. MOPIC also coordinates with **international donors** and financing agencies for funding of plans and projects.

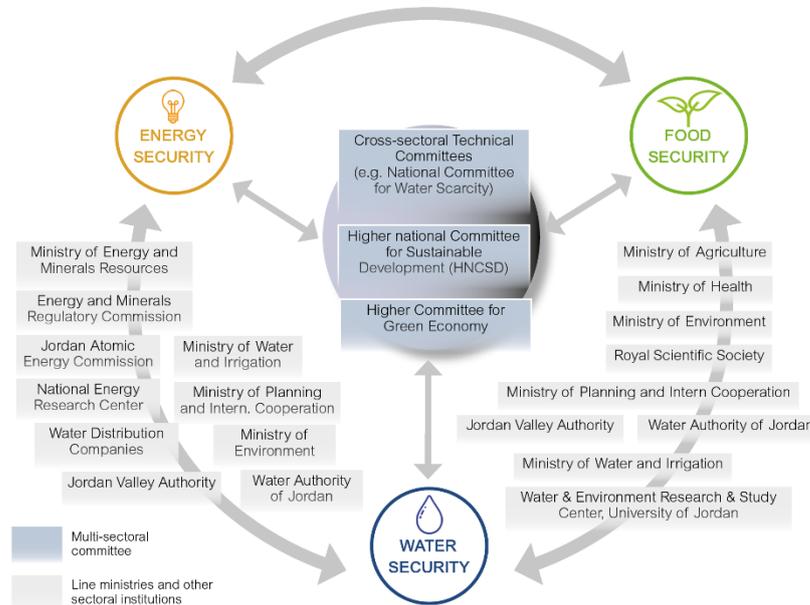
**MOPIC plays important role for alignment of national planning process and implementation of Jordan's Vision 2025**

In addition to these institutions a number of cross-sectoral cooperation mechanisms already exist in Jordan, such as:

- **Technical committees** established to oversee specific needs and advance the mandates of different sectors. Although the composition of these committees is cross-sectoral in nature, and as such includes several of the ministries and institutions concerned with WEF nexus, their mandates are not explicitly dedicated to nexus mainstreaming in national policies and institutions. Examples include the:
  - **National Committee for Water Scarcity** under MWI
  - **National Committees for the Rio Conventions (Climate Change, Desertification and Biodiversity)** under MOENV
  - **Higher National Committee for Sustainable Development (HNCSD),**
  - **Higher Committee for Green Economy**
  - **Prime Minister's Delivery Unit to Follow-Up on Vision 2025.**

Key sectoral and inter-sectoral institutions in Jordan are mapped to critical interlinkages (Figure 4).

Figure 4: Mapping of Relevant Institutions to Critical Interlinkages (Jordan)



## 2.4 Recommendations for Jordan

Harvesting synergies and reducing negative trade-offs across sectors and resources, including efforts to increase cross-resource efficiencies and subsequently to also increase water, energy, and food (and political) security, requires coordination and cooperation across institutions, strategies, policies, and activities. Only a coordinated approach will ensure that efforts in one sector do not cause harm in other sectors but complement each other and generate synergies.

**Need for economic assessment and quantification of the cost of inactivity vis-à-vis benefits from adopting a nexus approach**

It is essential to demonstrate the value added and benefits derived from adopting and mainstreaming a nexus approach. This is important in order to capture the attention and interest of policy-and-decision-makers and to secure their political commitment. This should equally address all three sustainability dimensions, the economic, social and environmental benefits. Stakeholder engagement needs to be ensured from the onset of the process.

In the following section, we identify opportunities for:

- improved coordination, cooperation and potential integration;
- related individual and institutional capacity-building;
- data harmonization.

### 2.4.1 Mainstreaming WEF Nexus Within Existing Coordination Mechanisms

Although governance and management of water, energy and agriculture is still predominantly sectoral, there are a number of coordination mechanisms among the three sectors that enable basic coordination and integration. These could be entry points for promoting synergies and reducing trade-offs. This requires, however, **further clarification of each institution's mandate, to ensure a clear focus when addressing nexus and its operationalization**, also to avoid redundancy among institutions.

At the level of each sector, **technical committees** have been established to oversee specific needs and to advance the mandates of the sectors. Such committees are often cross-sectoral in nature, having included several ministries and institutions concerned with nexus, although they're not explicitly mandated to mainstream nexus into policies and institutions. Their tasks could thus be to address specific nexus issues related to their main mandates. As an example, the National Committee for Water Scarcity, which includes institutions from several other sectors, has been entrusted with the development of the national report on water scarcity. However it does not include the Ministry of Energy and Mineral Resources.

**Technical committees, often cross-sectoral in nature, can be mandated to address specific nexus issues**

At a more **cross-sectoral level**, the national committees for the Rio Conventions (Climate Change, Desertification and Biodiversity), hosted at the MoEnv, have representatives of all involved institutions, including the three sectors water, energy and agriculture / food. MoEnv also hosts the EIA committee, which includes representatives of the institutions concerned with WEF nexus. These committees could be entrusted with ensuring a nexus perspective in, for example, integrated climate change adaptation and mitigation (including interlinkages between water security and energy security), or combating desertification (including interlinkages between water security and food security).

**National committees for the Rio Conventions hosting representatives of all three sectors to be mandated to ensure a nexus perspective in integrated climate change mitigation and adaptation**

Other inter-sectoral mechanisms which have been mandated with aspects related to WEF nexus also exist at the highest political levels in Jordan and should be further strengthened. These include the following:

- The **HNCS**, established in 2002 as a “national platform for dialogue on sustainable development issues, challenges and opportunities towards achieving sustainable development goals in Jordan”<sup>5</sup>. The committee includes representatives from 22 different institutions. It is chaired by the Minister of Planning and International Cooperation (MoPIC) and co-chaired by the Minister of the Environment. It has an Executive Secretariat established in the Sustainable Development Division at MoPIC. Three sub-committees have been formed, one for each of the dimensions of sustainable development: the social, environmental and economic dimensions. The committee’s main responsibilities include:
  - participating in the design of national priorities, to ensure coherence and consistency among programs and national plans;
  - incorporating environmental issues in national plans and sectoral strategies;
  - reviewing and amending legislation, to be consistent with sustainable development requirements;
  - reviewing and endorsing national reports about progress in sustainable development.
- The **Higher Committee for Green Economy** chaired by the Minister of Environment, which aims at encouraging investments to protect the environment in six sectors: energy, water, tourism, agriculture, transport and waste.
- The **Prime Minister’s Delivery Unit to Follow-Up on Vision 2025**. This Special Unit at the Prime Ministry was re-established to follow up the most important initiatives proposed under Vision 2025, to overcome obstacles, and to assure effective implementation<sup>6</sup>.

- ➔ We recommend making **better use of the opportunities for coordination and cooperation that these existing mechanisms and committees offer**. They need to be better motivated and staffed, which requires acknowledgement of the need for a nexus approach at the highest level. Also Jordan may want to consider mandating (formally and by a supreme decision) one of the committees mentioned above with “WEF Nexus”, as an interim solution to nexus mainstreaming until the national agenda has sufficiently progressed, raising further interest in nexus by decision-makers.

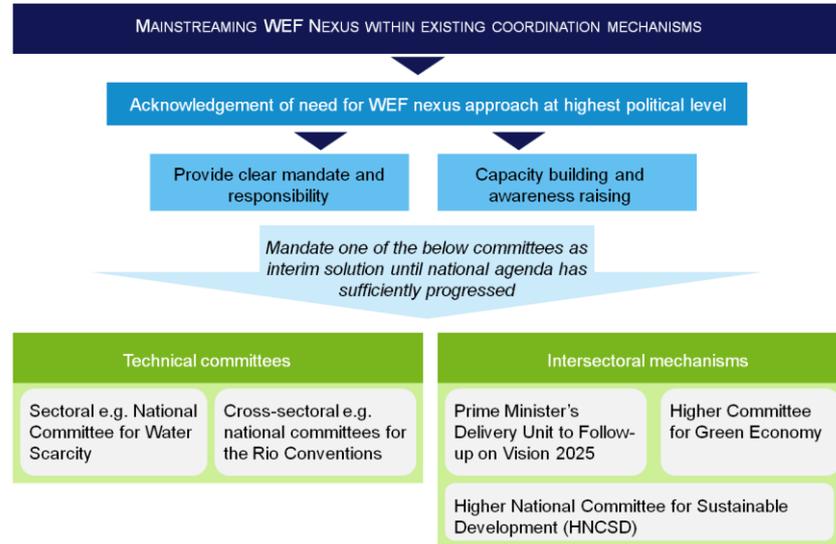
**Political will at highest level and clear mandates needed for WEF nexus mainstreaming**

<sup>5</sup> MoPIC 2016: “Implementing the 2030 Agenda Through Policy Innovation and Integration” <https://www.un.org/ecosoc/sites/www.un.org.ecosoc/files/files/en/integration/Jordan.pdf>

<sup>6</sup> <http://inform.gov.jo/en-us/By-Date/Report-Details/ArticleId/247/Jordan-2025>

For an overview of options for WEF-nexus mainstreaming within existing coordination mechanisms, see Figure 5.

Figure 5: Mainstreaming WEF Nexus Within Existing Coordination Mechanisms



#### 2.4.2 Mainstreaming WEF Nexus Through a New Coordination Mechanism

The establishment and acceptance of a new “stand-alone” coordination mechanism and a special committee mandated for the mainstreaming of WEF nexus in policies and institutions, would take time and require lengthy procedures. Nevertheless, the **planning of such a new body can be envisaged, especially in light of the importance given to nexus aspects in Jordan's Vision 2025.**

In light of importance of Jordan Vision 2015 planning of new coordination mechanism may be envisaged

- ➡ If a new coordination mechanism is envisaged in Jordan in the long run, we recommend **two options** for consideration, namely establishing a WEF Nexus Council at the level of the Prime Ministry, or establishing a WEF Nexus Committee at the level of the Ministry of Planning and International Cooperation (MOPIC)

Establishing a WEF Nexus Council at the level of the Prime Ministry	Establishing a WEF Nexus Committee at the level of the Ministry of Planning and International Cooperation (MOPIC)
<p>Such a <b>WEF Nexus Council</b> could have a structure similar to the Economic and Social Council, which is <b>constituted by experts and specialists</b> (including some from sectoral ministries) to <b>provide short-term and long-term recommendations</b>.</p> <p>As in the case of the Economic and Social Council, the WEF Nexus Council could provide an opportunity for Jordan to advance needed reforms towards more-integrated approaches in a participatory manner.</p> <p>The composition of the WEF Nexus Council would include professionals from all relevant fields and allow the institutionalization of participatory actions and <b>partnerships between the public and private sectors</b> in order to advance WEF Nexus interlinkages at the highest political level in Jordan.</p>	<p>A <b>WEF Nexus Committee</b> would be composed of “Liaison Officers” (ارتباط ضباط) tasked with the review of policies and programs under the Executive Development Program (EDP) of Jordan, in line with Jordan's Vision 2025.</p> <p>While MOPIC has appointed liaison officers related to all 3 nexus-related sectors, the current intervention of these officers takes place mainly at a sectoral level, which does not allow for the needed coordination and development of synergies among the 3 sectors.</p> <p>As such, a coordination mechanism among the “<b>Liaison Officers</b>” could significantly enhance the mainstreaming of WEF-nexus priorities within these sectors.</p>

For an overview of options for WEF-nexus mainstreaming through a new coordination mechanism, see Figure 6.

Figure 6: Mainstreaming WEF Nexus Through a New Coordination Mechanism



### 2.4.3 Mainstreaming WEF Nexus Within the Existing Planning Processes

The backbone of **nexus mainstreaming can be anchored within Jordan’s Vision 2025 component related to “Resources Security”** as one of the important fields of government intervention to ensure the sustainability of resources. It explicitly addresses water, energy, and food security, highlighting the significant national challenges facing Jordan due to the extreme scarcity of water, energy and arable land, in combination with rapidly increasing consumption trends. The Vision 2025 also indicates that lack of diversification in these resources contributes to the vulnerability of the economy to external shocks. This requires major efforts for the diversification and integrated management and governance of resources, and for launching strategic integrated projects in these sectors to address such issues.

As such, the “Resource Security” component of Jordan’s Vision 2025 calls, among other things, for initiatives addressing the critical WEF-nexus interlinkages, such as:

- creating an **innovation fund** on agriculture, food, water and energy security to foster water-efficiency in agriculture;
- **providing incentives** for water-use efficiency in agriculture and reducing over-pumping of groundwater for agricultural irrigation;
- improving energy **efficiency in water utilities** and introducing **renewable forms of energy in the water sector.**

It is **envisaged that MOPIC would play a key role in coordinating the line ministries to ensure the mainstreaming of the nexus approach within sectoral policies and plans.** Although a great opportunity has been provided through Jordan’s Vision 2025 by flagging “Resource Security” as a main pillar of government action, the sectoral nature of the planning has led to its translation into an equally sectoral Executive Development Programme (2016-2018), without capturing critical interlinkages between these sectors and without paying sufficient intention to environmental issues. As such, it would be a **timely opportunity to ensure that the preparation of the next EDP addresses the critical interlinkages**, as described above.

Other opportunities also exist for mainstreaming the nexus approach in sectoral planning and decision-making processes within the nexus-related sectors. An example for cross-sectoral integration is the **ongoing development of a National Drought Resilient Strategy.** The governance and management of droughts and their impacts have always been issues of cross-sectoral concern, given the overlap in relevant jurisdiction. In the process of developing the drought strategy the three **ministries involved (MWI, MOA & MOENV) agreed on the basic roles played by each of them with respect to drought management and decided to establish a collaboration/coordination mechanism.** The coordination mechanism established within the process of the national drought resilient strategy will allow Jordan to institutionalize disaster risk reduction (DRR) through mainstreaming the strategy into all relevant sectors.

**Anchor nexus mainstreaming within Jordan’s Vision 2025**

**Next Executive Development Programme (EDP) is a key entry point to address critical interlinkages**

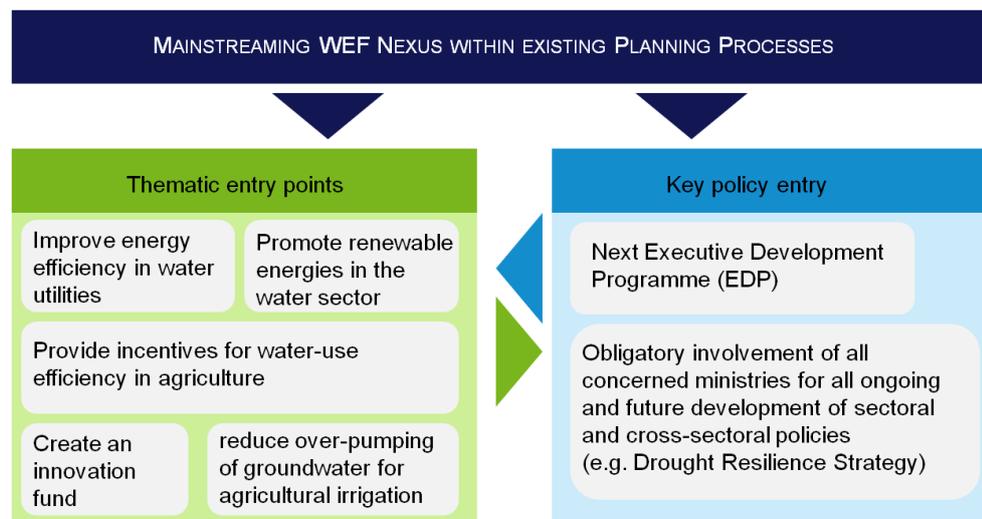
**Ongoing development of National Drought Resilience Strategy is an example of cross-sectoral integration**

**Obligatory involvement of all concerned ministries for revisions, implementation planning, and monitoring of sectoral policies**

A similar approach can be adopted during the implementation of **key national policies and plans** for the related sectors, provided a solid policy framework which can be used as an entry point for nexus mainstreaming in Jordan (the key existing policies are summarized in Table 1 below), has been established. Promoting a nexus perspective in sectoral and cross-sectoral policies could be promoted by the obligatory involvement of all three sectoral ministries in any revisions, implementation-planning, and monitoring of sectoral policies and legislation.

For an overview of options for WEF-nexus mainstreaming within existing planning processes, see Figure 7.

*Figure 7: Mainstreaming WEF Nexus Within Existing Planning Processes*



*Table 1: Key Sectoral Policies and Plans to be considered for WEF-Nexus Mainstreaming*

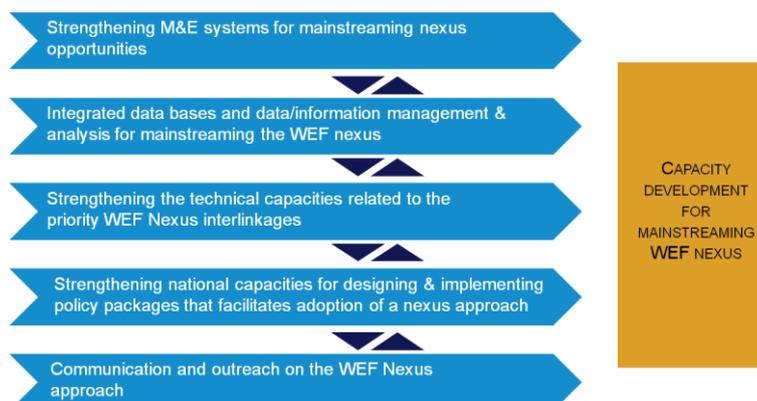
Policy/plan	Lead institution
The National Water Strategy 2016-2025 and the related Water Sector Policies	Ministry of Water and Irrigation
The National Energy Strategy 2007-2020	Ministry of Energy and Natural Resources
The National Strategy for Agricultural Development 2016-2025	Ministry of Agriculture
Pathways towards a Green Economy (2011) and the National Framework for Green Economy (in final stage of endorsement)	Ministry of Environment
Intended Nationally Determined Contribution (INDC) of Jordan in 2016	Ministry of Environment

**2.4.4 Capacity Development Needs for Mainstreaming WEF Nexus**

The following capacity development needs were identified for operationalization and mainstreaming of the nexus approach (see Figure 8):

- strengthening M&E systems for mainstreaming nexus opportunities;
- integrated data bases, as well as data/information management and analysis, for mainstreaming WEF nexus;
- strengthening the technical capacities related to the priority of WEF-nexus interlinkages;
- strengthening national capacities for designing and implementing policy packages that facilitate and promote the adoption of a nexus approach;
- communication and outreach of the WEF-nexus approach.

Figure 8: Capacity Development Requirements for Mainstreaming WEF Nexus



Once the entry points for mainstreaming WEF nexus at the policy and institutional levels are agreed upon (see the recommendations in the previous chapter), it is expected that several capacity-development activities will be required to ensure the implementation of a nexus approach at operational levels.

➔ **Strengthening M&E Systems for Addressing Priority WEF-Nexus Interlinkages**

A specific framework for **monitoring** and **evaluating** the progress made with regard to nexus mainstreaming is an essential step in supporting national efforts. Moreover, it is important to **establish indicators** with specific baselines and targets as part of the M&E system. Such efforts should be associated with **related training**.

While Jordan's Vision 2025 has established key performance indicators for "Resource Security" under the targeted scenario, addressing all three WEF sectors, only a limited number of these indicators are related to the critical interlinkages of WEF nexus, as presented in Table 2. In fact, the **Vision 2025 provides an extensive and strategic number of indicators at the level of each of the sectors** related to "Resource Security", namely with regards to Water Security, Energy Security, and Food and Agriculture. However, these do **not reflect clearly the WEF-nexus interlinkages**.

Table 2: Key Performance Indicators in Jordan's Vision 2025 Related to WEF-Nexus Interlinkages

"Resource Security" Sectors	Indicator	Baseline in 2014	Target in 2025
<b>Water Security</b>	Energy used per billed m <sup>3</sup> (billed kW/m <sup>3</sup> )	7.2	4.6
<b>Energy Security</b>	% contribution of renewable energy in the energy mix	1.5%	11%
<b>Food &amp; Agriculture</b>	Increase in the area of agricultural land in which drip irrigation is used (1000 acres) by 0.1% per annum	900	962

➔ It is thus recommended that **additional indicators** covering all the critical WEF-nexus interlinkages be adopted, together with measuring and monitoring of the following aspects:

**Adopt additional indicators covering critical WEF nexus interlinkages**

Amount of Water Used and Water Efficiency for Food Production and Agriculture	Amount of Energy Used and Efficiency of Energy Use for Water Treatment and Conveyance	Amount of Water Used and Efficiency of Water Use for Energy and Power Generation
<ul style="list-style-type: none"> <li>Increasing water-use efficiency</li> <li>Improving agricultural practices, including rain-fed agriculture</li> <li>Promoting reuse of treated wastewater and non-conventional water sources for agricultural irrigation</li> <li>Reducing disincentives, such as energy subsidies for pumping water in the agricultural sector</li> </ul>	<ul style="list-style-type: none"> <li>Exploiting the potential of generating energy from wastewater</li> <li>Increasing the use of renewable energy in the water sector</li> <li>Increasing energy efficiency in water treatment and conveyance (reducing pressure and leakages)</li> <li>Reducing disincentive subsidies</li> </ul>	<ul style="list-style-type: none"> <li>Objectives for promoting renewable energy (solar and wind, planned to reach 10% of the energy mix by 2020), focusing on non-water-intensive renewable energy sources</li> </ul>

Ongoing efforts by MOPIC to identify national priorities related to the SDG targets is key entry point to address these critical interlinkages

It is important to **identify the related SDG indicators as an entry point** facilitating the adoption of the nexus approach. Efforts are being made by **MOPIC to identify national priorities** related to the SDG targets to be adopted by Jordan. This offers an opportune timing to ensure that critical interlinkages of WEF nexus are captured as part of the national priorities and the long-term planning process. Thus, it is important to ensure that MOPIC supports the **inclusion of nexus-specific indicators** related to the critical interlinkages, **during the process of setting the SDG targets and indicators and during integrated SDG implementation**. More specifically, it is possible to adopt additional indicators, as part of the SDG targets and indicators addressing related WEF-nexus interlinkages identified in Jordan, such as:

- water / energy intensity in the food / agricultural sector
- energy intensity in the water sector
- energy recovery from wastewater
- water intensity of the energy sector

#### Integrated Information Management for Mainstreaming the WEF Nexus

Jordan has developed a number of data base systems for the three nexus-related sectors; water, energy and agriculture. However, **concerted action is needed to revisit these data base systems and evaluate the completeness and coherence across sectors** of the existing data and data sharing mechanisms in support of a nexus approach. The possibility of having all three of them operating and functioning under **one integrated metadata system** for improved cross-sectoral data access should be figured out.

Strengthen DOS as an institution for providing cross-sectoral data on WEF interlinkages

Data analysis and management have been identified as areas that need further “capacity development”.

The **Department of Statistics (DOS)** has specified the information required and GIS systems, for the various sectors in Jordan including WEF nexus. Assuming that DOS ensures the bridging of the water, energy, and agricultural (as well as environmental) sectors, it must be seen as an important institution for nexus mainstreaming from a data perspective. It is therefore important to ensure that the baseline information for the critical interlinkages is available from DOS and is accessible to all stakeholders involved.

Furthermore, there are specialized information systems in Jordan which should also have the relevant data and information related to the critical interlinkages identified. As an example, the **National Water Information System** is currently being developed and will be able to provide access to all ministries, DOS, the Royal Scientific Society (RSS) and the Royal Jordanian Geographic Center (RJGC).

### ➔ **Strengthening the Technical Capacities Related to the Priority WEF-Nexus Interlinkages**

There is a need to change mindsets and understanding towards stronger integration. The **technical know-how** of the staff involved at the line ministries and other stakeholders of the interlinkages between WEF sectoral institutions needs to be enhanced to enable the technical staff to support policy and decision-makers. This includes the capacity to **deal with the additional complexity** involved in nexus approaches. Accordingly, some of the immediate action required would be to **invest in technical training** related to the critical interlinkages of WEF nexus in Jordan.

As part of the training and capacity-building, the need for and importance of mainstreaming/integration of the nexus approach must be explained and motivation must be given, this also addressing the additional complexity involved. The scenario and cost of “no-integration” can be presented in an appropriate manner. Policy-makers must become fully aware of the pros and cons of WEF nexus. This should be followed by targeted capacity-development on the approach, methods, instruments and best practices required for integrating the WEF-nexus approach, as identified during the national consultations.

**Technical training to deal with the additional complexity and awareness raising**

### ➔ **Communication and Outreach of the WEF-Nexus approach**

The nexus approach is considered to have a direct significance on citizens' well-being. The socioeconomic aspects of nexus identified during the consultation process should therefore be considered a priority.

The **linkage** between **eradicating poverty, improving livelihoods and environmental sustainability, resource efficiency, combating land degradation and reducing vulnerability to climate change** (which are core elements of the Green Economy) cannot be overestimated.

Communicating the benefits and co-benefits of a nexus approach is another immediate task requiring capacity-development initiatives with respect to WEF nexus and the most critical interlinkages.

The adoption of a nexus approach implies **regular communication** between **different institutions** with different mandates and with the broader public. Therefore, and in order to avoid the “silo” way of acting, there is a need for developing the communication capacities of the staff involved and their negotiation skills. A positive narrative also needs to be developed and communicated.

**Need to train concerned staff on communication and negotiation skills**

### 3 The WEF-Nexus Situation, Critical Interlinkages and Recommendations in Egypt

#### 3.1 Resources and Human Securities in Egypt

The water, energy, and agricultural/food sectors in Egypt are characterized by growing demand, degradation of resources, shrinking availability and severe scarcities (with the exception of solar energy and seawater, which are the region's two natural resources and are available in almost unlimited quantities). The main macro drivers for demands on resources are population size and growth, economic development and rural-urban migration.

In the following, the situation in each sector will be briefly synthesized.

##### Water

Egypt is facing **growing water scarcity**. With **decreasing per-capita water availability** (currently at 630 m<sup>3</sup> per year), it is approaching acute water poverty (500 m<sup>3</sup>/cap/yr). The situation in the water sector is being rapidly aggravated by **population and economic development, climate change, the region's geopolitical environment**, and unsustainable consumption and production patterns. The urban, industrial, agricultural, and tourism sectors are increasingly **competing for the limited water resources**. Blanket subsidies also contribute to excessive demand.

Egypt's water supply depends almost entirely on **one river (the Nile)** whose run-off originates outside Egypt. Water entering Egypt with the Nile is used, returned to the river and reused about 3-4 times before it either evaporates or flows into the Mediterranean. It should be pointed out that there is a minimum amount of drainage water that must be discharged into the Mediterranean Sea, in order to maintain the salt balance in the Delta. **Water quality decreases with every cycle of use** and along the river course, due to saline drainage water from agricultural fields and discharge of untreated or insufficiently treated municipal and industrial wastewater. Deterioration of the water quality is thus putting additional pressure on limited water resources. **Virtual water imports** from trading should be systematically integrated into policy design. Through food trading Egypt already imports 30-34 billion m<sup>3</sup> of virtual water annually – a figure which comes close to Egypt's total use of water in agriculture.

In order to promote more sustainable water use, Egypt is now developing plans to tap water resources at the governorate (Mohafaza) level, in addition to central national planning.

Plans to reclaim 1.5 million feddans of desert land for agriculture and other purposes, increase the demand on the already-strained water and energy resources in the country. Serious consideration is being given to use of renewable sources of water for the reclamation of desert land, rather than relying heavily on non-renewable groundwater. This includes the use of **treated municipal wastewater** for the cultivation of specific agricultural crops. Furthermore, there is the possibility of using **desalination** and water condensation techniques, as means of increasing water supply for agriculture.

**Egypt's Vision 2030** acknowledges that the limited water resources constrain the country's development. Moreover, the new National Water Resources Plan aims mainly at achieving water security through:

##### Egypt Vision 2030 / National Water Resources Plan

- development of additional water resources, whether conventional or non-conventional
- increasing the efficiency of water usage in all sectors, including agriculture, industry, and households
- protection of water quality by combating pollution of water resources and improving the quality of water in all waterways
- improving the integrated management of water-resource systems

Goals in the water sector are not necessarily fully consistent with those of other sectors (Hoff et al. 2017). Sustainable development, management and use of water resources will require a **nexus approach**, which takes into account and balances the current and future demands of all sectors (according to national development plans), including environmental water requirements.

## Energy

Egypt experiences energy problems in the form of **rapidly rising demand for energy** at an annual average rate of 7% (Hegazy, 2015). Associated problematic issues are aging infrastructure, inadequate generation and transmission capacities, supply shortages and frequent electricity blackouts. Energy subsidies have contributed to the rising demand for energy and to a high national budget deficit. Around 90% of Egypt's total energy demand is met by fossil fuel (from domestic natural gas and oil reserves, but increasingly also from imports of oil, gas, and coal, turning Egypt into a net importer). **About 10% of its electricity production is from renewables** (8% from hydropower, 2% from other sources). Egypt has vast unexploited potential for generating energy from wind and solar.

Recent plans of the **Supreme Council of Energy** include:

providing 20% of the electricity from renewable sources by 2020, including 12% from wind energy, 6% from hydropower, 2% from solar energy – concentrated solar power (CSP) and photovoltaic

**Egypt Vision 2030** aims at:

30% of electricity generated from wind and as solar energy by 2030. In addition, Egypt aims to increase energy generation from nuclear power plants to 9% of its total electricity generation by 2030

A nexus approach must account for and reduce energy demand across all sectors, through improved energy efficiency, demand management, etc. Goals in the energy sector are not necessarily fully consistent with those of other sectors, such as agriculture or water (Hoff et al. 2017).

## Agriculture and Food Production

Between 50% and 60% of Egypt's food requirements are met by **imports**. Egypt is one of the largest importers of wheat in the world (FAO, 2014). The Egyptian government aims to **reduce import dependency** and **increase domestic food production** mainly because i) devaluation of local currency leads to an increase in the cost of food imports and ii) world market prices of some of the imported crops are very volatile.

Only 3.5% of land in Egypt is regarded as arable land, the rest being mainly desert land. During the last three decades, the total **cultivated land area has increased by around 10%** through land reclamation efforts. However, **water resources limit further land reclamation**, as indicated above. Land and water productivity is reduced by uncontrolled urban sprawl on the most fertile productive land (in the Nile valley). Unsustainable agricultural practices result in **land degradation**, including soil salinization, which leaves land unsuitable for agriculture, or reduces land and water productivity. In addition, land fragmentation may have had negative effects on the development and modernization of the agricultural sector, e.g. with respect to the adoption of improved and efficient irrigation systems and crop-productivity techniques and practices (*Sustainable Agricultural Development Strategy Towards 2030, 2009*).

**Agriculture is a major component of the Egyptian economy**, contributing about 15% to the national GDP and accounting for 28% of all jobs (up to 55% in Upper Egypt). Agriculture is an important basis for livelihoods and employment in particular in the rural areas and especially for the rural poor. **Integrated rural development** (a nexus approach) represents one of the main challenges facing the agricultural sector in Egypt. This involves providing the needed physical infrastructure, such as electricity, road networks, housing, and sanitation, as well as social services such as health, education and cultural services. Such an integrated approach is necessary to support the sustainable development of the agricultural sector in Egypt.

It should be pointed out that **lack of integrated planning and policy-making** between the agriculture sector and the urban sector has led to the encroachment of urban areas on fertile agricultural land. It is estimated that annually about 20,000 feddans of the most productive agricultural land are lost to non-agricultural uses in Egypt. Moreover, **climate change** is expected to have a severe impact on crop productivity, and water availability, which requires integrated adaptation measures across the agriculture and water sectors.

Sustainable Agriculture Development Strategy

- aims at self-sufficiency in grain production and at achieving a 4.1% annual growth rate, while continuing the land-reclamation program of 150,000 feddans annually.
- aims at a self-sufficiency rate which rises from 54% to 81% for wheat, from 53% to 92% for maize, and from 77% to 93% for sugar by the year 2030

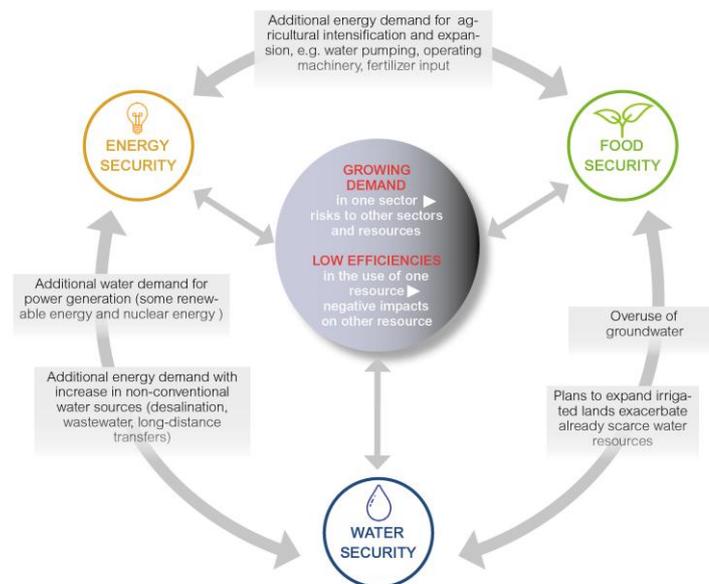
- aims at reducing the area cultivated with very-water-intensive rice from 1.673 million feddans in 2007 to 1.3 million feddans by 2030 in order to reduce water consumption in the agriculture sector. This, it is estimated, will save about 12.4 billion m<sup>3</sup> of water annually.
- aims - as one of its main components - at achieving a gradual improvement in the efficiency of irrigation systems to 80% in the cultivated area of 8 million feddans.<sup>1</sup>

The nexus approach requires assessing these agricultural objectives in terms of the availability of the additional water (and energy) resources required and the actual value of crops produced, in comparison to the costs of importing the same amounts, and relating these to the costs of the amounts of water and energy required for domestic production.

### 3.2 Most Critical Interlinkages, Risks and Opportunities in Egypt

The critical interlinkages, as identified by stakeholders in the national dialogues in Egypt, are associated with certain risks and trade-offs. These are visualized by mapping them to the basic nexus diagram (Figure 9). These risks on the one hand, as well as the opportunities (Figure 10) arising from innovative nexus approaches on the other, are explained in detail in the following.

Figure 9: Mapping of Critical Interlinkages – Trade-Offs and Risks Egypt)



#### 3.2.1 Water for Agriculture and Food Production



The agricultural sector uses about **85% of the total water resources** in Egypt. Much water is lost due to inefficient irrigation techniques (flood irrigation) and seepage or evaporation of water from open canals. Water demand continues to increase with population growth, economic development, and urbanization. Future water availability remains strictly limited and is moreover uncertain due to the construction of the Ethiopian dam (which serves energy and possibly also food production) and to the potential impact of climate change. Plans to increase food self-sufficiency and expand agricultural land by 20%, cultivating up to an additional 1.5 million feddans of agricultural land, put enormous pressure on water resources. These new agricultural developments are often located in less-productive desert land, as compared to the Nile valley, and may be less efficient in their use of water. They largely depend on **fossil groundwater**, which is will be

depleted sooner or later and hence only provides a short-term and a non-sustainable solution. The objective, to increase food production for food self-sufficiency, is seriously constrained by water scarcity.

<p><b>Opportunities</b></p> <p>to improve water-efficiency in the agriculture and food sector, making it more water-smart</p>	<p>Increasing <b>water-use efficiency in irrigation</b> (with positive knock-on effects for energy savings), adopting sustainable agricultural practices and promoting the cultivation of less-water-intensive crop varieties;</p>
	<p>Promoting <b>reuse of treated wastewater</b> and <b>desalinated water for agricultural</b> and others uses, including decentralized wastewater reuse systems in remote locations, with positive knock-on effects in the energy sector through recycling of water, nutrients and potentially recovery of energy (biogas), reducing water pollution and saving of energy-intensive industrial fertilizer. However, desalination requires additional energy, for which the use of <b>renewable sources of energy</b> should be seriously considered. The recovery of energy from wastewater is already being implemented in Egypt (e.g. Gabal El Asfar)</p>
	<p>Using <b>food imports strategically</b> as a means reducing the demand for water (and energy) in the agriculture and food sectors.</p>
	<p>Supporting the sustainable development of rural areas by creating <b>water-smart employment opportunities</b> (e.g. solar energy farming), thus improving human well-being and human and environmental health at reduced water-intensity.</p>
	<p>Conserving the environment and natural resources and <b>promoting ecosystem services</b>, by establishing agro-ecological principles, selecting less-water-intensive crops, and rehabilitation of degraded land.</p>

**Potential for the agricultural and food sector to become more energy and water efficient**

### 3.2.2 Energy for Water Production, Treatment and Distribution



Water in Egypt used to be a net source of energy (via hydropower), but is now turning into a net energy reducer, due to the large and growing energy demands of the water sector, e.g. for water pumping, treatment and in future also for desalination.

There are around 1,500 **energy-intensive water-lifting plants** in Egypt. And national plans to increase the use of non-conventional water sources (**desalination, treated wastewater and long-distance water transfers**) will result in **additional energy requirements** in the future. Current desalination technologies rely on GHG-intensive fossil fuel (of which more needs to be imported in the future).

<p><b>Opportunities</b></p> <p>to improve energy-efficiency in the water sector, making it more energy-smart</p>	<p>Switching <b>desalination</b> and <b>water pumping to renewable energy</b> which increasingly becomes economically viable (also for other food, water, and energy security solutions).</p>
	<p>Using the potential of <b>treated wastewater in agriculture</b> to reduce water and energy demand. Coupling wastewater treatment and reuse with the recovery of energy from the sludge (biogas) to improve the productivity of scarce water and energy / land resources to generate co-benefits in terms of avoided pollution of water resources.</p> <p>Similarly, <b>energy recovery from agricultural residues</b> through composting and production of biogas can also have co-benefits in terms of avoided pollution associated with the burning of the residues.</p>
	<p>Increasing <b>water use efficiency</b> and <b>reducing losses</b> (large potential in the agricultural and urban sectors) to reduce overall water demand and accordingly energy demand in the water sector;</p> <p><b>Strategically using subsidies</b> to promote those water (and energy) systems that are sustainable in the long term.</p>

**Recommendations to make the water sector more energy-smart**

### 3.2.3 Water for Power Generation



**Egypt's 2030 Strategy** includes an increase in **renewable** and **nuclear energy**. Egypt's goal, to reach a 20% renewable energy contribution to the total energy supply by 2030, could be water-

intensive, e.g. in terms of **demand for hydropower**, for **solar concentration power plants** and for **cooling of nuclear power plants**. These energy options are therefore only feasible if the associated water demand can be met sustainably at the planned locations. Nuclear energy represents additional environmental risks and can be expected to generate higher costs (e.g. for decommissioning) than originally budgeted for. Renewable energy, on the other hand, will show further decreasing cost curves.

**Potentials for improved water-efficiency in the energy sector**

<p><b>Opportunities</b></p> <p>to improve water-efficiency in the energy sector, making it more water-smart</p>	<p>Joint integrated planning and management of <b>new energy systems and infrastructure</b> with other sectors, in particular with the water sector, to generate co-benefits, e.g. by using <b>solar energy in desalination, using treated wastewater or seawater for cooling</b>, switching to water-smart energy solutions (such as wind or PV) in cases of extreme water scarcity.</p>
	<p>Introducing a <b>regulatory framework</b> that promotes the efficient and sustainable use of water resources in energy (and food) production as well as improving the efficiency of other cross-resource uses.</p>
	<p><b>Strategically using subsidies</b> to promote those water (and energy) systems that are sustainable in the long term.</p>

**3.2.4 Energy for Agriculture and Food Production**



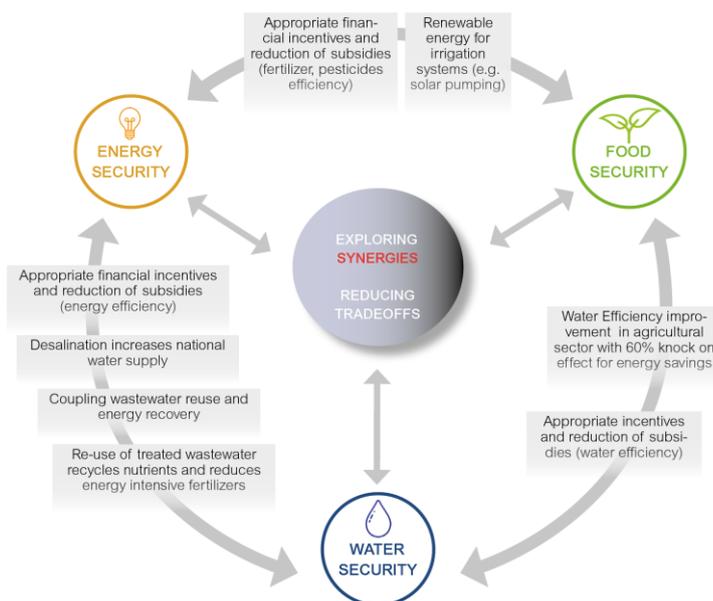
Large amounts of energy are not only required for pumping irrigation water, but also for operating machinery and for fertilizer production and other agricultural inputs, as well as for developments in the rural sector necessary to support agricultural activities. This includes the necessary physical infrastructure, such as electricity, road networks, housing, and sanitation, as well as social services such as health, education and cultural services. Plans for agricultural expansion and for intensifying agriculture generally create **additional energy demand**, which is typically met by using more fossil fuel (which increasingly need to be imported).

**Opportunities for energy-smart agricultural practices and energy-efficiency in the food sector**

<p><b>Opportunities</b></p> <p>improve energy-efficiency in the agriculture and food sectors, making them more energy-smart</p>	<p>Shifting to <b>energy- (and climate-) smart agricultural practices</b>, such as applying agro-ecological and recycling principles, e.g. in tillage, nutrient management and crop rotation.</p>
	<p>Switching to <b>renewables in agriculture</b>, e.g. <b>solar pumping</b> (with strict regulations to avoid over-pumping of groundwater), also using <b>solar-desalinated water</b> (once that becomes economically viable).</p>
	<p>Increasing <b>water-use efficiency</b>, in particular in <b>irrigation</b>, and thereby reducing the overall demand of water and accordingly for energy in agriculture and in the rural sector in general.</p>
	<p>Aligning domestic food production with <b>food-import strategies</b> to reduce energy, as well as the demand for water in the agriculture and food sectors.</p>

The opportunities identified above are visualized by mapping them to the basic nexus diagram (Figure 10). They call for enhanced cross-sectoral cooperation and policy coherence (Figure 11).

Figure 10: Mapping of Critical Interlinkages – Opportunities (Egypt)



### 3.3 Mapping Relevant Institutions to the Critical Interlinkages in Egypt

Key nexus sectors include:

- **Water** Resources Production, Treatment, Distribution, Use and Security
- **Energy** Production, Distribution, Use and Security
- **Agriculture**, Land Use, Food Processing and Food Security
- **Environmental** Protection
- **Sustainable consumption** and production patterns.
- **Sustainable Development** (including SDG implementation and Integrated Climate Mitigation and Adaptation).

Key sectoral and inter-sectoral institutions in Egypt, and related gaps and opportunities for enhanced cooperation along the critical interlinkages, are detailed in the following.

The **Ministry of Water Resources and Irrigation (MWRI)** is responsible for all water-related issues.

- ➔ Entry points for MWRI for enhanced cooperation and alignment of sectoral and national strategies are for example:
  - ensuring that the demand for water from the different economic sectors (e.g. energy and agriculture/food) are balanced according to priorities set in **national development plans, strategies and visions**, e.g. in terms of economic development, human well-being and environmental protection
  - monitoring to ensure that additional **demand for energy** from **new water plans** and **projects** are minimized and are in line with energy-sector planning
  - ensuring that the **substitution of fossil energy with renewables** in the water sector is progressing at the maximum possible speed
  - monitoring that **energy recovery from wastewater and sludge** is implemented at the maximum possible speed
  - addressing and solving the issue of **non-sustainable water subsidies** and cross-resource subsidies

#### Research centers of MWRI and of other sectors need to collaborate closely

The various MWRI research centers and those of the water sector in general need to collaborate closely with the research centers of the other sectors, in order to identify and address the critical interlinkages described above.

The **Holding Company of Water and Wastewater**, which functions

through 25 individual companies and which has the main responsibility of ensuring high quality water for consumers, needs to address nexus questions very similar to those for MWRI, but at a more **practical implementation level**.

The **Ministry of Electricity and Renewable Energy (MERE)**, which is responsible for Egypt's energy transition to renewable energy, needs to coordinate the energy-related issues and priorities of the different economic sectors and their strategies, coordinating allocation and expansion of energy provision, including energy for new communities and urbanization.

- ➡ Entry points for MERE for enhanced cooperation and alignment of sectoral and national strategies are, for example:
  - ensuring that energy demand in the different economic sectors (e.g. water, agriculture/food) is balanced according to the priorities set in **national development plans, strategies and visions**, e.g. in terms of economic development, human well-being and environmental protection
  - monitoring to ensure that **additional demand for water** from new and renewable energy systems is minimized and is in line with the local water context and overall water-sector planning
  - coordinating to ensure that **land demand** for new energy systems and infrastructure is in line with spatial and urban planning

**Mandate needed for MERE to closer collaborate with MWRI and MALR on formulation of sector strategies and action plans**

As in the case of other line ministries, MERE is currently not mandated to interfere with or influence the policies, plans, consumption patterns or sources of energy of the other sectors, so there is a need to develop incentives, mechanisms and mandates for closer collaboration, e.g. with MWRI and MALR. The fact that fossil fuels are governed through a separate ministry, i.e. the Ministry of Petroleum, poses additional problems for integrated energy planning and should be reconsidered from a nexus perspective.

The **Egyptian Electricity Holding Company** needs to address nexus questions very similar to those for MERE, but at a more practical implementation level.

The **Ministry of Agriculture and Land Reclamation (MALR)**, responsible for crop selection, production, food processing, land reclamation, the respective water intensities, and water and energy consequences.

**Key entry points for MALR and need for closer cooperation for policy coherence**

- ➡ Entry points for MALR for enhanced cooperation and alignment of sectoral and national strategies are, for example:
  - expansion are minimized and in **line with the priorities of these** (water and energy) **sectors** – and assessing whether the required water and energy is available at all
  - exploring what **agricultural production and residues** can contribute to Egypt's energy system and making sure that this potential is exploited
  - implementing **agro-ecological principles** to reduce the demand for water and energy without compromising food security
  - aligning **agricultural and trade strategies** to maximize food security, while minimizing domestic demand for water and energy and the strain on the national budget

As in the case of other line ministries, **MALR has no direct responsibility for the governance and management of water or energy in the agricultural sector**. Other agricultural institutions that are indirectly involved in water and energy use in the agricultural sector include, for example, the Agriculture Research Center and the Desert Research Center. These research centers need to closely cooperate with the respective research centers of the water and energy sectors.

**Ministry of Environment is key body for nexus mainstreaming**

The **Ministry of Environment** is responsible for all environmental sectors (water, land, air, ecosystems, etc.) and so has a more cross-cutting mandate than the other line ministries. It also plays a **leading role in integrated SDG and NDC implementation**.

- ➡ Nexus questions to be addressed by the Ministry of Environment relate to its role and contribution to ensuring environmental sustainability in the implementation of water, energy and agricultural strategies. Also **ecosystem-based solutions** and **“soft” natural-infrastructure solutions** complementing “hard” technical

infrastructure are to be promoted by the Ministry of Environment for integration into sectoral strategies.

**Specialized research institutions associated with water/energy/food** and affiliated to the different ministries in Egypt should be actively involved in the adoption and mainstreaming of the nexus approach in Egypt. These include the National Water Research Center (NWRC), the Soil, Water and Environment Research Institute (SWERI), the Soil, Water Research Institute (SWRI), the Agriculture Research Center (ARC), Agriculture Research and Development Council (ARDC), the High Council for the Nile River, the Desert Research Center, the Research Institute for a Sustainable Environment (RISE) and the Desert Development Center (DDC) at the American University in Cairo.

Regional intergovernmental entities that can support the adoption and mainstreaming of a nexus approach in Egypt and beyond include the **Center for Environment and Development for the Arab Region and Europe (CEDARE)** and the **Regional Center for Renewable Energy and Energy Efficiency (RCREE)**. The most important recommendation to these institutions is to collaborate more closely across the traditional sectoral boundaries, on cross-cutting nexus issues as described above, but also to collaborate with other Arab countries.

In addition to these institutions a number of cross-sectoral or “bridging” institutions already exist:

#### High Level Ministerial Committee (HLMC) on Water Resources

This committee **has units in nine different ministries**, which provides an excellent opportunity for coordination and cooperation in the planning of water resources and management across all relevant sectors, including energy and agriculture.

#### National Committee for Climate Change

This committee has **representatives from all relevant ministries**, which provides an excellent opportunity for coordination, cooperation and integration of climate-change adaptation and mitigation, e.g. :

- adaptation in the water and agricultural sectors through increasing drought resistance, and adaptation to water scarcity
- mitigation in the energy and land-use sectors through shifting to renewables, climate-smart agriculture and land-use planning and protection of ecosystems.

#### National Committee on the implementation of the SDGs

This committee is coordinated by the **Ministry of International Cooperation (MIC)** in close cooperation with the **Ministry of Planning and Administrative Reform (MPAR)**.

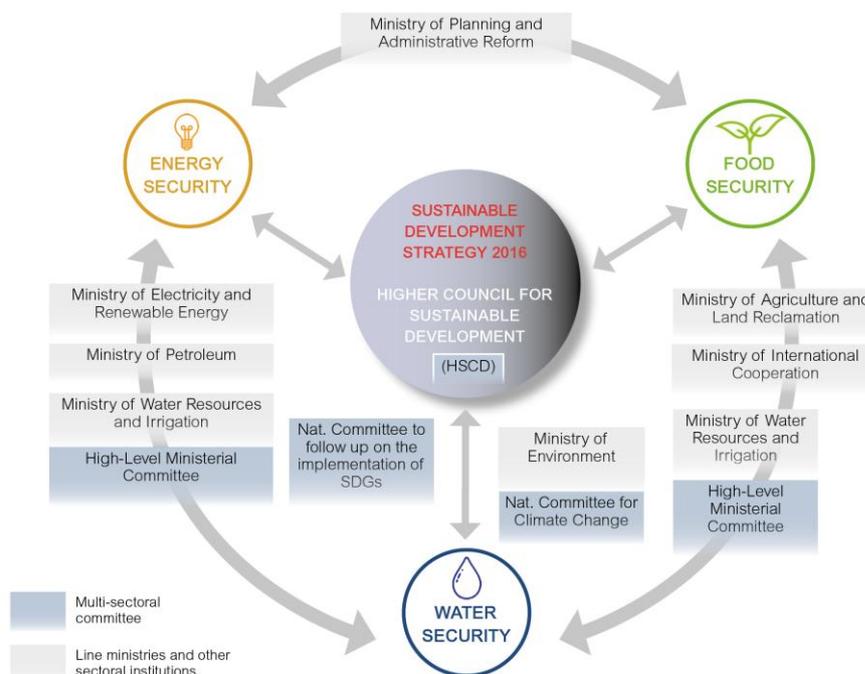
It provides an excellent entry point for coordination and cooperation between the water (SDG 6), energy (SDG7), agricultural (SDG2) and environmental (SDG 15) sectors, as well as with a number of other environment-and-development-related goals and targets

**Specialized research institutions related to WEF should be actively involved**

**Key cross-sectoral “bridging” institutions related to WEF nexus exist that should be strengthened and further mandated**

Key sectoral and inter-sectoral institutions and potential coordination mechanisms in Egypt are mapped to critical interlinkages (Figure 11).

Figure 11: Mapping of Relevant Institutions to Critical Interlinkages (Egypt)



### 3.4 Recommendations for Egypt

Harvesting synergies and reducing negative trade-offs across sectors and resources, including efforts to increase cross-resource efficiencies and subsequently to also increase water, energy, and food (and political) security, requires coordination and cooperation between sectoral institutions, strategies, policies, and activities, as well as the strengthening of bridging institutions. Only a **coordinated approach** will ensure that efforts in one sector **do not cause negative effects** in another, but complement each other and generate synergies.

It is essential to demonstrate the value added and benefits derived from adopting and mainstreaming a nexus approach in biophysical and socio-economic terms. This is important in order to capture the attention and interest of policy-and-decision-makers and to secure their political commitment. This should equally address all three sustainability dimensions, the economic, social and environmental benefits. Stakeholder engagement needs to be ensured from the onset of the process.

In the following section, we identify opportunities for:

- improved coordination, cooperation and potential integration;
- related individual and institutional capacity-building;
- data harmonization.

#### 3.4.1 Mainstreaming WEF Nexus Within Existing Institutions and Planning Processes

Although governance and management of water, energy and agriculture/food is still largely organized by sectors, there are a number of opportunities for coordination and cooperation among these sectors, and for mainstreaming a nexus approach that would add value.

- ➔ **points in terms of existing or newly developed sectoral strategies, policies and plans, action required and potential benefits of nexus mainstreaming** include, for example:

#### **Institutional and policy reforms for water resources management – MWRI**

management of water resources will be reorganized. This includes financial policy reform, and economic instruments for sustainable management and use of water and other natural resources, with the focus on water-demand management, conservation and virtual water policies.

Several relevant ministries will be involved, such as ministries of agriculture and energy. It will be important to also include the **Ministry of Housing, Utilities and Urban Development (MHUUD)** which is responsible for constructing new urban communities and ensuring the provision of water and sanitation networks. A coordination body such as the **HLMC on Water Resources** or another national body (e.g. a ministry) should be assigned responsibility for comprehensively managing all water resources and uses across the sectors, including water distribution, wastewater treatment, recycling and reuse.

This cross-sectoral coordination is part of the institutional and policy reform (and reform of the system of subsidies), including the development of Egypt's new National Water Resources Strategy and Plan, already involves several relevant ministries (including MERE). Along the same lines, the Vision 2030 Economic Development Program includes initiatives related to rationalizing water use. The implementation of this vision from a water perspective should be led by **MWRI**, but needs to draw on strong support from all other relevant ministries involved in this process.

While water resources are severely and increasingly limited, or even overexploited, there is still room for maneuver in terms of further improvement in water-use efficiency and in sustainably generating new non-conventional water sources. These opportunities can only materialize if such close coordination and cooperation between the sectors is established and maintained.

**Institutional and policy reforms for water resources management as important entry point for nexus mainstreaming in Egypt**

#### **Reforming the legislative framework and system of subsidies in the energy sector - MERE, Supreme Council of Energy**

Egypt's energy-sector reform includes a new integrated strategy, policy and action plan (developed by MERE and the Supreme Council of Energy), including an increased share of renewables in the energy mix, improved energy efficiency and demand management, as well as management of the oil and gas sector in Egypt.

There are ample opportunities for nexus mainstreaming, when reforming the energy sector and its system of subsidies. For nexus to generate co-benefits and add value in this reform process, the **water and agricultural sectors** in particular need to carefully identify their energy needs, including those for desalination purposes and potential benefits from opportunities such as energy recovery from wastewater and agricultural residues today and over the coming decades. Scenario planning, governance and management need to be aligned accordingly. In particular, the shift towards renewables, which is accelerating across the MENA region, needs to be well coordinated by the energy, water, agriculture and land-use planning sectors, so that investments generate the maximum overall economic and societal benefits.

**Opportunities arise from reforming the legislative framework and system of subsidies in the energy sector**

#### **Sustainable Agricultural Development Strategy: Egypt Vision 2030**

The Sustainable Agricultural Development Strategy emphasizes the following:

- using natural resources more sustainably, in particular by enhancing **efficiency in the use of water in irrigation**
- increasing both land and water productivity simultaneously and synergistically<sup>7</sup>.

These agricultural development goals are not necessarily completely in line with those of other sectors, in particular the energy sector. **Enhancing the efficiency of water use in irrigation**, as well as **increasing land and water productivity**, may come at a **significant cost in terms of additional energy demands**

**Egypt Vision 2030 is a key entry point for integrated planning to achieve cross-sectoral Sustainable Development Goals**

<sup>7</sup> Summary, Sustainable Agricultural Development Strategy 2030, Ministry of Agriculture and Land Reclamation, January 2009

(e.g. for water-pumping, additional fertilizer, or use of machinery). As such, well-coordinated agricultural, water resources and energy planning processes can enhance overall benefits across the sectors, e.g. by applying principles of agro-ecology, recycling of agricultural residues and wastewater, biological nitrogen fixation, and integrated land and water management.

**The additional water and energy demands involved in the 1.5 million Feddans Development Project make a nexus approach almost mandatory**

### 1.5 Million Feddans Development Project

This project, one of the agricultural mega-projects promoted by the government, aims at **increasing the agricultural area** and **supporting agro-industrialization activities** in Egypt. Supporting the overall objective of Egypt's Vision 2030, the main objective of this development project, besides expanding agricultural land, is to "build integrated communities on desert land and increase the urban area by about 5% of the total area by 2030".

The project includes the creation of agro-industrial zones that add value to agricultural products. The additional demand for water and energy involved in this project make a nexus approach almost mandatory, drawing upon Vision 2030, which designates several different sectoral ministries and agencies to be involved in this project, including **MALR, MWRI, MHUUD**, and also the private sector. As with any large-scale project there are a number of trade-offs between the various sectoral goals, which can only be addressed comprehensively through an integrated (nexus) approach.

**The Sustainable Cities and Renewable Energy Unit in MHUUD should play a leading role in coordination of all relevant sectors**

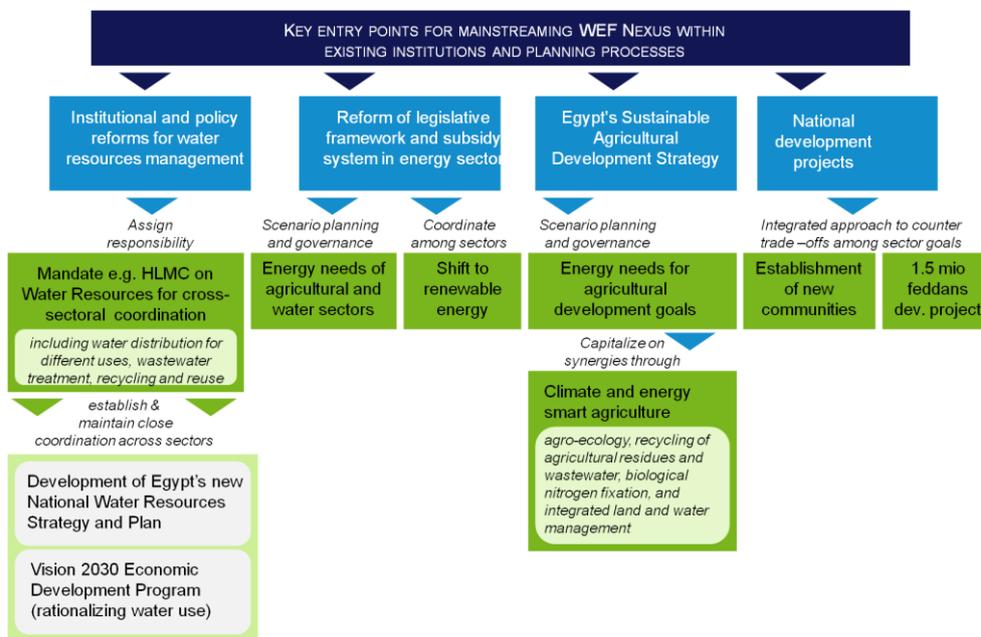
### Establishment of new communities

According to Vision 2030, Egypt is planning **new cities**, such as the new Administrative Capital City, the new **Alamein City**, new **Al Galala City**, new **El Obour City**, new **Ismailia City**, and others. These new cities come with enormous **additional demand for water, energy and food** to support the influx of new residents in these areas. This increased demand on resources may have undesirable side effects, such as increased greenhouse gas emissions, depletion of groundwater, and increased pressure on land and the ecosystem.

An integrated and comprehensive approach should be adopted in the planning, design, and development of these new communities, closely involving all relevant sectors. The **Sustainable Cities and Renewable Energy Unit in MHUUD** could play a leading role in coordinating with all relevant sectors for adopting a nexus approach. Such a nexus approach could indeed be included in the TORs of the new cities in accordance with the Strategic Plan.

For an overview of key entry points for mainstreaming WEF nexus within existing institutions and planning processes in Egypt, see Figure 12.

Figure 12: Mainstreaming WEF Nexus Within Existing Institutions and Planning Processes



### 3.4.2 Mainstreaming WEF Nexus Within Existing or New Cross-Sectoral Institutions and Coordination Mechanisms

Existing mechanisms may help to promote inter-sectoral coordination and cooperation between relevant institutions.

The **HLMC on Water Resources** has units in nine different ministries and has been mandated to coordinate water-related issues across all of these sectors, with a central HLMC unit as functional hub and platform. It will be important to include MERE in HLMC, so that the critical interlinkages between water and energy can also be addressed, and coordination of the water and energy sectors becomes possible through this committee.

The **National Committee for Climate Change** is headed by the Ministry of Environment (MOE) and includes representatives from relevant ministries, including the ministries of water, energy and agriculture. The committee can facilitate the integrated implementation of the Paris Agreement and the Nationally Determined Contribution (NDC), i.e. integrating climate adaptation and mitigation in national development planning and sectoral strategies, as well as in the SDGs in the Sustainable Development Strategy 2030. Given the strong international emphasis on these agreements, and the role they will play in Egypt's sustainability transformation, it will be important not to miss this opportunity for strengthening synergies through their implementation.

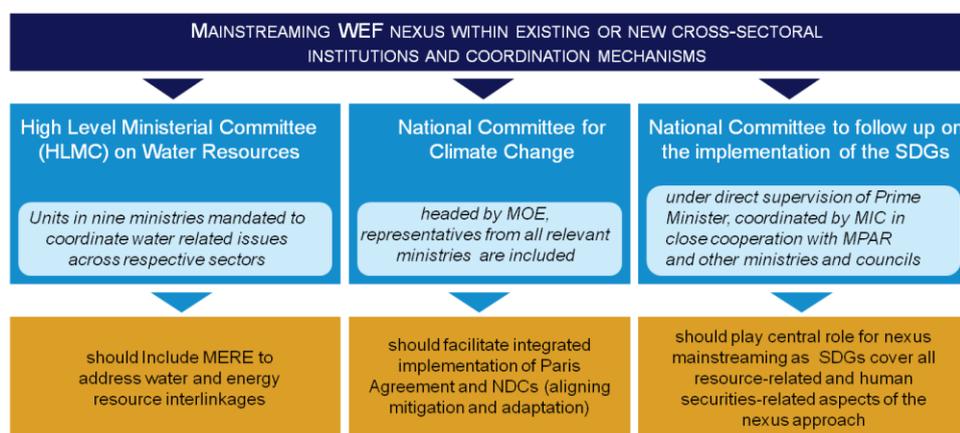
**Committees related to Paris Climate Agreement and implementation of SDGs to be involved in mainstreaming the nexus approach**

**The National Committee to Follow-Up on the Implementation of the SDGs**, which falls under the direct supervision of the Prime Minister, is coordinated by the Ministry of International Cooperation (MIC), in close cooperation with the Ministry of Planning and Administrative Reform (MPAR) and a range of other ministries and councils<sup>8</sup>. It could well play a central role in the mainstreaming and implementation of the nexus approach in Egypt, because the SDGs cover all natural resources-related and human-security-related aspects of the nexus approach. The German institutional approach to integrated SDG implementation may also be quite instructive for Egypt.

- ➡ Given that the implementation of the Paris Climate Agreement and of the SDGs have been identified as key entry points for mainstreaming a nexus approach in national policy-making, both of these related committees are key bodies in mainstreaming the nexus approach.

For an overview of key entry points for mainstreaming WEF nexus within existing or new cross-sectoral institutions and coordination mechanisms in Egypt, see Figure 13.

*Figure 13: Mainstreaming WEF Nexus Within Existing or New Cross-Sectoral Institutions and Coordination Mechanisms*



**3.4.3 Mainstreaming WEF Nexus Through the Sustainable Development Process**

**Making use of the momentum of Green Economy initiatives, and providing quantitative data to reduce trade-offs and promote synergies between sectors**

Egypt's **initiatives to promote the Green Economy** - MPAR and MOE: the Green Economy working group, established in 2015 and led by MPAR and MOE, also includes representatives of various other ministries, academic institutions and the private sector. The study on greening the economy and the **action plan on sustainable consumption and production (SCP)** both focus on the water, energy, agriculture, and waste sectors. Both have been guided by WEF nexus in their development. The **Blue Plan** (MoE) integrates environmental consideration into five priority sectors – Water, Energy, Agriculture, Biodiversity, Human Settlements, and Solid Waste, accounting for the interlinkages between sectors. So the momentum and institutionalization of the Greening of the Economy or the Green Economy can be used for further operationalization and mainstreaming of the nexus approach. The results of this nexus study can provide a **quantitative base for making Egypt's Green Economy more sustainable**, by reducing trade-offs and promoting synergies between sectors.

The **Sustainable Development Strategy (SDS): Egypt's Vision 2030** explicitly recognizes the fact that scarcity of natural resources, such as water and arable land (and energy, though this is not really scarce when taking renewables into account), and environmental degradation, pose severe challenges to sustainable development in Egypt. SDS further acknowledges that food and water security are among the priority

<sup>8</sup> Egypt's national review report for input to the 2016 HLPF. <https://sustainabledevelopment.un.org/content/documents/10738egypt.pdf>

national security issues. The consultative process adopted in the development of SDS is a clear realization of the need to take a multisectoral and integrated approach to policy formulation and implementation, as opposed to the conventional sectoral approach (“mainstreaming nexus”). The results of this nexus study can provide a quantitative base for meeting the ambitions of Egypt’s Sustainable Development Strategy in terms of sound natural management of resources and human welfare simultaneously, by reducing trade-offs and promoting synergies between sectors.

**Egypt's Vision 2030** specifies, for example:

- reducing the cultivation of **water-intensive crops**
- switching from flood irrigation to **modern irrigation systems**
- enhancing the **efficiency of canals** (e.g. covered drainage networks)
- increasing the share of non-conventional water resources from 20% today to 40% in 2030

Vision 2030 foresees the **establishment of a Higher Council for Sustainable Development (HCSD), attached to the Prime Minister’s office and reporting to the Cabinet**. This HCSD will be entrusted with overall coordination and supervision of the work of the different ministries. Subcommittees or special units may be created and one of the subcommittees could focus on mainstreaming nexus in policies and institutions. Additionally each **ministry should mainstream nexus into its portfolio** by assigning to its planning department the responsibility of coordinating with other sectors and adopting an integrated approach in policy design, planning and implementation<sup>9</sup>. A Civil Society Council could be created to work closely with the HCSD, which would include representatives from the water, energy and agricultural sector, as well as from other sectors.

Subcommittee of the foreseen HCSD could be entrusted with WEF nexus mainstreaming

However, more efforts are still needed to ensure cross-sectoral integration, as well as the full integration of environmental and social aspects into the different sectoral strategies, policies and action plans, aligned with the implementation of Vision 2030 and its overall goals.

More specifically, HCSD will be entrusted with the following tasks<sup>10</sup>:

- continuous coordination of all governmental authorities to ensure the **integration of sustainable development criteria** into the **strategies of various ministries** in order to raise the efficiency of utilizing natural resources and to protect the environment;
- development of various economic policies aimed at achieving sound and **sustainable management of natural resources** and monitoring progress and the achievement of objectives by the different authorities;
- development of policies and mechanisms that promote the shift to more **sustainable production and consumption patterns**, while ensuring the environmental and social sustainability of economic activities;
- development of efficient, transparent, and accountable **monitoring and environmental performance assessment systems** for the various ministries”.

Emphasis on (economic) efficiency and market mechanisms to convince sector representatives

The HCSD should ensure the adoption and mainstreaming of an integrated approach, HCSD should ensure the adoption and mainstreaming of an integrated approach, by **reviewing cross-sectoral trade-offs and synergies of sectoral strategies, policies and action plans**. Especially emphasis on (economic) efficiency and market mechanisms can help to convince sector representatives, and also the national government, to change their conventional modus operandi and adopt the integrative elements of a nexus approach, provided they can see the resulting value added and the financial benefits. Adopting a nexus approach should not only ensure synergies and complementarities across the sectors, but should also ensure that social, economic, and environmental considerations are taken into account in a balanced and sustainable manner. Moreover, enabling conditions such as regulatory frameworks, market-based incentives, finance and trade policies, as well as research and development,

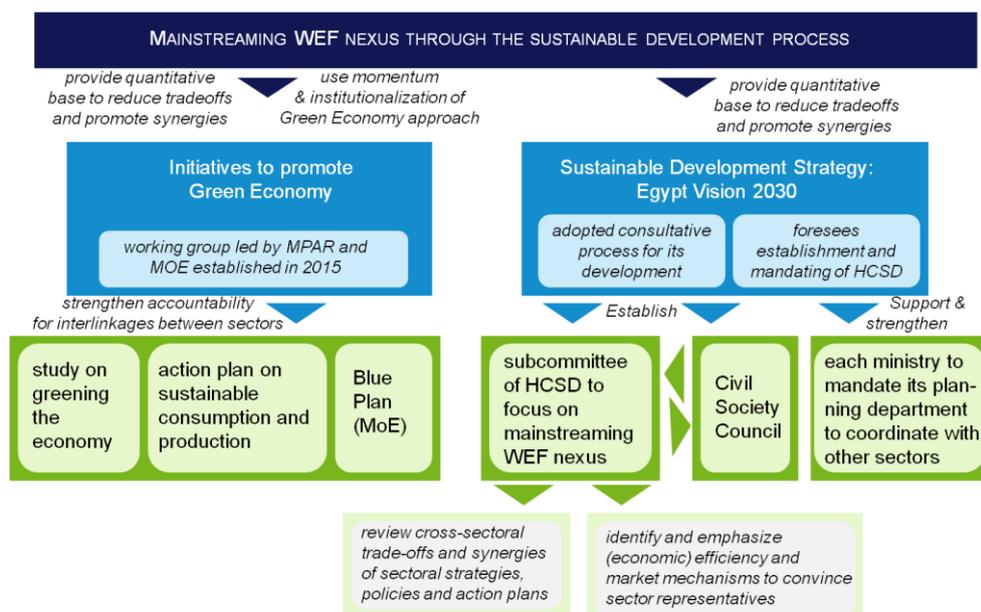
<sup>9</sup> Egypt national review report for input to the 2016 HLPF.  
<https://sustainabledevelopment.un.org/content/documents/10738egypt.pdf>

<sup>10</sup> Egypt's Vision 2030

innovation, public awareness and communication, and capacity-development, should be planned and implemented in a coherent manner.

For an overview of key entry points for mainstreaming WEF nexus through the sustainable development process in Egypt, see Figure 14.

*Figure 14: Mainstreaming WEF Nexus Through the Sustainable Development Process*

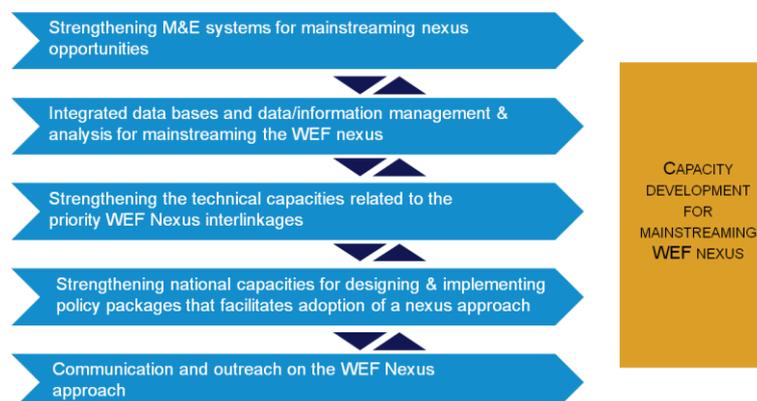


### 3.4.4 Capacity Development Requirements for WEF-Nexus Mainstreaming in Egypt

Capacity development requirements were identified for the operationalization and mainstreaming of a nexus approach along the following lines (see Figure 15):

- strengthening M&E systems for mainstreaming priority WEF-nexus interlinkages;
- integrating databases and management and analysis of data/information for mainstreaming WEF nexus;
- strengthening the technical capacities associated with the priority WEF-nexus interlinkages and dealing with the additional complexity that a nexus approach involves;
- strengthening national capacities for designing and implementing policy packages that facilitate and promote the adoption of a nexus approach;
- communicating and reaching out with the WEF-nexus approach.

Figure 15: Capacity Development Requirements for Mainstreaming WEF Nexus



Integrated policy development remains a constant challenge, involving team work, coordination and the sharing of information and knowledge. This is a long-term challenge. The required mind shift and cultural change need to be developed and anchored in the education system and all planning processes in Egypt.

The government of Egypt has for some time realized the importance of **reforming the education system**. It is now the intention of the government to reform this to allow for innovative and integrative thinking, and the design and implementation of holistic and integrated approaches to strategies, policies, plans, and programs across the different sectors.

A nexus approach is more complex than conventional sectoral approaches. Hence, it requires **additional capacity development**. Effective integration and operationalization of the nexus approach should be aligned first of all with the existing functions and procedures of the concerned sector/institution, including ongoing planning processes, before creating new nexus institutions. This is why the assessment of capacity requirements starts with a review of the existing policy and institutional frameworks, including functions and procedures adopted by the sector/institution and their appropriateness for addressing the critical interlinkages. The existing governance system is strongly focussed on a sectoral approach and therefore requires adaptation and the adoption of some new practices and procedures, as well as proper and adequate capacity-development efforts in order to enable the adoption and mainstreaming of a nexus approach.

Once the entry points for mainstreaming WEF nexus at the policy-making and institutional levels are agreed upon (see recommendations in previous chapters), the following capacity-development activities are required for ensuring evidence-based and robust implementation of a nexus approach at operational levels.

#### ➔ Strengthening M&E Systems for Addressing Priority WEF Nexus Interlinkages

A specific framework for monitoring and evaluating the progress made, with regard to nexus mainstreaming, is an essential step in supporting national efforts. Moreover, it is important to **establish indicators for integrated sustainable development, with specific baselines and targets** as part of the M&E system. Such efforts should be associated with the necessary related training on interlinkages and integration.

Include specific cross-sectoral indicators in M&E system for Egypt's Vision 2030 and establish regular review to assess progress and introduce corrective action if needed

While **Egypt's Vision 2030** includes several initiatives and indicators aimed at addressing WEF nexus, it does not provide for specific **cross-sectoral indicators**. Monitoring, evaluation and reporting are essential in order to ensure that plans, programs, and projects are indeed being implemented as designed, and that corrective measures, where necessary, are taken. Plans, programs and projects may be assessed on a **semi-annual basis** in order to track progress, and to introduce corrective action as required and any measures needed to address critical and newly emerging issues (adaptive management).

Reporting on progress is also needed to continuously **provide integrated information to decision-makers** in order to ensure their effective engagement in efforts needed for promoting inter-sectoral coordination and cooperation, for tangible impact on resource efficiencies, environmental protection and improved human securities.

Key critical WEF-nexus interlinkages identified in Egypt require a new approach for M&E based on integrated cross-sectoral indicators, which could include the following:

- measuring the **efficiency** and **cost-effectiveness** of the **use of different sources of water** (Nile water, groundwater, recycled sewage water, desalinated water) taking into account the associated energy requirements (solar, wind, thermal, hydro, biogas, coal, and possibly nuclear) and the production costs involved;
- identifying **indicators that support the integrated development of the agricultural, energy and water sectors** and promote coordination between the sectors, ensuring energy efficiency in the production of water and food, as well as in electricity generation (energy requirement per unit of water and food, and for electricity production);
- **mapping of all water resources**, for their sustainable allocation to the different sectors based on the above nexus considerations, including decisions on whether and under what conditions (fossil) groundwater could be sustainably used in agriculture, or whether it should be limited to direct human consumption;
- **measuring physical and economic crop productivity** per water and energy input, with a view to increasing the productivity, and for integrated policy-making in terms of domestic food production vs. food imports;
- planning the **reuse of treated wastewater** in the agriculture sector with a view to allocating this most efficiently for the various uses of treated wastewater, freshwater and other water resources, including energy recovery from sewage sludge.

#### 🔄 *Integrated Databases and Data/Information Management for Mainstreaming the WEF Nexus*

Explicitly address critical interlinkages in data gathering, analysis, planning scenarios and modeling; respective need to harmonize

The availability of sufficient **reliable data** for each sector, and its thorough analysis and **harmonization** across the sectors is crucial for sound decision-making. The **Central Agency for Public Mobilization and Statistics (CAPMAS)** is the main government body entrusted with **data-gathering** and **analysis**. Critical interlinkages between water, energy and agriculture/food, also with other sectors, should be actively addressed in data analysis, modeling exercises, application of data, and information in policy-and-decision-making. Progress in data harmonization and analysis is a necessary requirement for sound policy and decision making at the international level, as well as at the regional and national levels.

The integration of **social considerations** (e.g. water-, energy- and food-security) and of **environmental considerations** (including sustainable use of natural resources), together with the **economic aspect**, ensures realization of the sustainability dimension

in the management of water, energy and land (see for example the international SEEA data-harmonization initiative<sup>11</sup>).

The task of collating, coordinating and integrating relevant data and information could be entrusted to **CAPMAS**, which could also build an **integrated data- and information base for water, food/agriculture, and energy** (and environment) **nexus** at the national and regional levels. This could also provide a **database of national, regional and international experts and institutions with expertise in sustainable nexus projects**.

### ➔ *Strengthening the Technical Capacities related to the Priority WEF Nexus Interlinkages*

There is a need for a change in mind sets and understanding towards stronger integration, with respect to how strategies, plans and programs are developed, coordinated and implemented. In order to achieve this, a generation of **new calibres** at the different levels needs to be developed to **support an integrated nexus approach** throughout all institutions in Egypt which **complements the existing sectoral expertise**.

This requires a **review of the education curricula** of the different disciplines with a view to integrating the environmental and social dimensions across the sectors, ensuring coordination and synergies between different sectors, and introducing nexus principles as described above. Capacity development is essential in order to develop and strengthen the calibres needed to implement the nexus approach in Egypt at all levels, including data analysis. This should involve capacity-building on cross-sectoral cooperation, information-sharing and improved teamwork.

**Review education curricula to strengthen technical capacities**

Reforming the **education system** and the generation of new calibres are long-term processes which should be started immediately, with appropriate training programs for policymakers and practitioners in all sectors. These training programs should be developed on the basis of a needs assessment to be conducted at the national level in order to determine existing capabilities and expertise, gaps in knowledge, and the capacity-development requirements of different target groups.

Practical efforts to increase necessary capacity would include, for example, a **long-term training program** for farmers working in greenhouses, which could be met through a 10-year plan to train 100,000 farmers (one person per greenhouse) in 10 governorates. This would require the training of approximately 1,000 farmers per governorate per year.

Furthermore, there is a need to strengthen **research & development (R&D)** in Egypt, particularly in the sectors of water, agriculture/food, and energy technology, but also in the context of integrated climate adaptation and mitigation, and integrated SDG implementation. It needs to encompass concepts, strategies, methods and tools for promoting efficient solutions and for strengthening coordination and cooperation between the sectors. In order to enhance outcomes, the research institutions of the various ministries and academic institutions should closely cooperate within a dedicated R&D nexus program. The private sector and civil society should also have a clear role to play in nexus planning, R&D capacity-building and training.

**Strengthen Research & Development and respective capacities for interdisciplinary collaboration and joint research programs**

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<sup>11</sup> <https://unstats.un.org/unsd/envaccounting/seea.asp>

Capacity building for concerned staff to improve communication and negotiation skills and media outreach

#### 👉 Communication and Outreach on the WEF Nexus Approach

Maintaining synergies and close linkages between the water, energy and agriculture/food (and environment) sectors is expected to have direct, significant impact on the citizens' well-being. Accordingly, **socioeconomic aspects** of the nexus approach should be considered as a priority, as was stressed during the stakeholder consultations. Linkages between eradicating poverty and improving livelihoods, and the need to improve environmental sustainability and resource efficiency, to combat land degradation and to reduce vulnerability to climate change (which are core elements of the Green Economy) cannot be over-emphasized. All of these aspects and the benefits and co-benefits of the nexus approach require **regular communication** between and within **different institutions** with different mandates, and with the broader public. Accordingly the **capacities of the staff involved in terms of communication and teamwork skills also need to be developed** and strengthened. Furthermore, the role of media in raising awareness of the benefits of adopting a nexus approach and the value added cannot be over-emphasized. A positive narrative needs to be developed and communicated.

## 4 Common Trends, Nexus Challenges and Opportunities, and Best Practices Within and Between Countries

The assessment for mainstreaming WEF nexus in policies and institutions at the national level provided a number of challenges and opportunities for nexus mainstreaming at various levels: **systemic, institutional, and individual**. This assessment has identified a number of common issues for each of these categories, which can be summarized as follows:

### I. The Systemic and Policy Levels

Major challenges are found in the implementation of integrated / nexus policies, legislation, strategies, and programs, particularly in terms of effective policy tools, such as fiscal instruments. These need considerable **support and promotion**.

However, there are also **significant opportunities** in terms of recently developed strategic and policy frameworks, including those for sustainable development. In particular the **SDGs** and related plans for their integrated implementation provide numerous opportunities for cross-sectoral coordination and collaboration, as do the Paris Climate Agreement and the related Nationally Determined Contributions (**NDCs**) for integrated climate adaptation and mitigation.

We recommend a critical review of the **EU Circular Economy and Sustainable Consumption and Production strategies, policies and plans of action**. These encompass nexus principles very well and are beginning to put these into practice. At the same time the EU holds a number of lessons for “**vertical nexus**”, i.e. integration across different levels or scales, from local to national to regional, which will also be essential for sustainable development in the MENA region.

Common challenges and opportunities in the region are identified at systemic, institutional and individual levels

### II. The Institutional Level

Nexus mainstreaming has to begin at the level of sectoral institutions, by better linking them and fostering collaboration, and by **developing and strengthening existing inter-sectoral coordination functions and institutions**, within the respective existing national policy framework. This requires breaking up the rigid and long-standing institutional silos, establishing bridges and collaboration mechanisms and adding **inter-sectoral and inter-disciplinary expertise** to the existing sectoral and disciplinary expertise.

The institutional development and set up needed for mainstreaming WEF nexus can also benefit from on-going national and international efforts towards **integrated SDG implementation**, which provide important opportunities for WEF-nexus mainstreaming. In particular, the institutions mandated with coordination of the different SDGs, such as ministries of environment or planning, can also play a key role in nexus mainstreaming.

### III. The Individual Level

This study identifies several challenges at the individual or group level. We found that integrated approaches run contrary to the established structures, political economies, and incentive systems (e.g. for making a career), including professional education. Nexus capacity-building at the institutional and individual levels needs to address all of these aspects.

It requires **changing mind sets, attitudes, behavior and professional functions** for nexus mainstreaming, and as such requires a comprehensive, individual, capacity-development response. The individual capacity gaps identified in this study related mainly to limitations in job requirements for promoting inter-sectoral coordination or linkages, and limited training of staff for implementing inter-sectoral coordination, dialogue and conflict resolution. Furthermore, limited access by the personnel involved to integrated data and information-management tools for promoting inter-sectoral efficiency, as well as a lack of technical competence in applying M&E systems associated with critical interlinkages and nexus approaches, were identified.

While this report has provided specific recommendations for Jordan and Egypt, some commonalities can be extracted from **these recommendations for up-scaling and transfer to other MENA countries** or the region as a whole. This can also pave the

way for future nexus assessments and implementation at the systemic, policy, institutional and individual levels.

*Supporting the Decentralization Process Associated with WEF Nexus*

This study highlights the need to **strengthen existing bridging institutions**, i.e. those institutions with a cross-sectoral mandate, which are often less powerful than sectoral institutions or line ministries. In some instances these existing “**nexus institutions**” need to be complemented with new institutions or mechanisms for addressing all critical interlinkages identified in this study. Furthermore, the decentralization processes taking place in Jordan and Egypt, as well as in other MENA countries, could be linked to the mainstreaming of integrated approaches and anchor nexus within the local-to-national political agenda.

**Decentralized water resource plans and wastewater management framework as model for integrated resource efficiency policies**

Despite the centralized institutional system in Egypt, the development of the regional water-resource plans at the governorates level can be used as a **model throughout the region for the development of integrated resource-efficiency policies and actions based on a participatory approach** that is in line with local specificities and the context (Box 1).

Similarly, an interesting **decentralization experience** related to nexus, and one that we should learn from, is the implementation of decentralized wastewater management in rural and suburban areas in Jordan (Box 1).

*Box 1: Regional Water Resources Plans at the Governorates Level and the National Framework for Decentralized Wastewater Management as a Model for Integrated-Resource-Efficiency Policies and Actions*

Egypt's Regional Water Resources Plans at the level of 6 Governorates	Jordan's National Framework for Decentralized Wastewater Management
<p>In 2015, as part of the efforts to update the existing national water-resources plan (2005–2017), Egypt initiated the <b>development of water-resources plans at the governorates level</b>, to ensure optimal allocation of water resources for</p> <ul style="list-style-type: none"> <li>(a) managing these valuable resources in a sustainable manner;</li> <li>(b) providing the various customer groups with the water they need (in terms of quantity and quality);</li> <li>(c) maximising the benefits of economic activity for all Egyptians.</li> </ul> <p>The regional water-resource plans of 6 governorates were selected, these representing the different contexts within the country (Nile Valley, delta, Fayoum oasis, Sinai peninsula, coastal zones). The plans were elaborated following a <b>participatory approach involving all stakeholders (ministries, governorates, large municipalities, civil society)</b>. The process has allowed consolidation and integration of existing information on water resources (in terms of quantity and quality) and water demand in the different project areas, processing and presenting this information in a manner (GIS, maps, tables) that facilitates the decision-making process.</p>	<p>In 2015, as part of the efforts to develop the National Water Strategy, the Jordanian Ministry of Water and Irrigation embarked on the development of a <b>framework for the implementation of decentralized wastewater management in rural and suburban areas in Jordan</b>.</p> <p>This integrated framework provides the regulatory, managerial and technical foundation for implementing a <b>decentralized approach to managing wastewater</b> in Jordan. Such an approach focuses on wastewater services that are robust, efficient, equally convenient, cost-effective, environmentally responsible, and responsive to water scarcity.</p> <p>This decentralized approach integrates <b>wastewater management</b> with the <b>protection of groundwater resources</b> against contamination, ensuring a safe supply of drinking water, advancing the potential for fresh-water substitution (reuse, managed aquifer recharge), and improving sanitation and public and environmental health.</p>

### *Strengthening the Technical Capacity Associated with Priority WEF-Nexus Interlinkages*

In specifying implementation and capacity development requirements for nexus mainstreaming in Jordan and Egypt, common priorities and recommendations have been identified:

- i. It is very important to consider **revisions of the educational and capacity-building curricula** (in particular at the university level) in order to strengthen interdisciplinary and integrated aspects complementing sector-specific training and expertise. These should aim at curricula contents at the theoretical as well as at the practical level, identifying appropriate specific courses and schools in which such curricula can be developed and integrated. Continuous evaluation and updating according to the dynamic national situation must be ensured.
- ii. Given the extensive efforts and expertise required of personnel in the different nexus-mainstreaming institutions, innovative management approaches and incentive systems that favour integration would need to be adopted in all relevant institutions. This could include **rewarding systems within and between institutions, fostering inter-sectoral coordination** and collaboration.
- iii. **Public policies and fiscal instruments**, including **subsidies, taxation and incentives**, need to be critically assessed for their sectoral and inter-sectoral (nexus) effects. Examples of policies and instruments that may not address the critical interlinkages and may not be in line with the nexus principles outlined above include water subsidies for irrigation, electricity subsidies in the agricultural sector and subsidies for fossil fuels.
- iv. There is a need to take a close look at the role of the different stakeholders and their preferences and behaviors. Specifically, stakeholders with a strong influence on the different nexus-relevant sectors, and on the implementation (or lack of implementation) of the sustainable policies and fiscal instruments needed, should be looked at.

**Revisions of the educational and capacity building curricula**

**Critical assessment of adverse effects of fiscal instruments on**

### *Strengthening M&E Systems for WEF Nexus Within the Efforts of the National SDGs*

Specific recommendations for **strengthening the M&E systems** of WEF nexus were identified for Jordan and Egypt, based on **national specificities**.

Beyond that, the **SDG indicators provide a good entry** point for an M&E system in support of nexus mainstreaming at the national level.

Efforts are on-going in all countries in the region to **identify national priorities** associated with the SDGs and their targets. As such, this offers opportune timing for ensuring that critical interlinkages of WEF nexus are captured as part of the national priorities and long-term planning processes. Thus, it is important to ensure that the institutions mandated with implementation of the SDGs account for the critical interlinkages and nexus challenges and opportunities identified in this study, so that nexus principles are captured during the process of national SDG implementation.

**Identification of national priorities and indicators related to SDGs offers opportune timing to align sectoral goals and monitor cross-sectoral goals**

More specifically, it is important that those SDG targets and indicators that address WEF nexus aspects are adopted at the national level (see Table 3). These cover the following issues:

- water/energy intensity in the food/agricultural sector
- energy intensity in the water sector
- energy recovery from wastewater
- water intensity of the energy sector

Table 3: SDG Targets and Indicators Most Relevant to WEF Nexus in Jordan

SDGs targets related to the WEF Nexus		SDGs indicators related to the WEF Nexus
Increasing resource use efficiency	6.1.4	water use efficiency
	7.3.1	energy intensity in terms of GDP
	8.4.1 / 12.2.1	material footprint per GDP
	11.3.1	ratio of land consumption rate to population growth rate
	12.3.1	global food loss index
Improving human securities	2.1.1 / 2.1.2	prevalence of undernourishment/food insecurity
	6.1.1	proportion of population using safely managed drinking water services
	7.1.1	proportion of population with access to electricity
Reducing pressure on the environment	6.6.1	change in water-related ecosystems
	15.1.1	forest area as a proportion of total land area
	15.3.1	proportion of land that is degraded over total land area

### Strengthening Communication and Outreach with Respect to WEF Nexus

It is very important for the institutions involved to provide **simplified and substantive content** and **positive narratives for supporting nexus communication and outreach**.

### Lessons to be learned from the institutionalization of the German National Strategy for Sustainable Development

This should be provided in the form of **successful examples of policy integration and policy coherence** (see German example below) as well as **successful case studies and success stories**, in order to facilitate the understanding of nexus benefits and co-benefits and to disseminate concrete and positive examples and messages to the policy-and-decision-makers, as well as to the general public.

This could include case studies from the developed countries (an example from Germany is presented in Box 2) or from the region

#### Box 2: Institutionalizing the German National Strategy for Sustainable Development Institutionalizing the German National Strategy for Sustainable Development

The **German National Strategy for Sustainable Development (NSDS)** was first launched in 2002; the revised version was launched recently in 2017. It formulates **long-term cross-sectoral sustainability goals** as guiding principles, as well as specific indicators for all sectors. With the NSDS as the centerpiece, entire **governance architecture** has been established, comprising various institutions, mechanisms and instruments for steering, monitoring and regularly updating and revising the strategy. This architecture allows **inter-ministerial and cross-sectoral coordination** towards sustainable development.

Since sustainable development is a guiding principle for all policies of the German government, overall responsibility for the NSDS does not lie with one of the ministries, but with the Federal Chancellery. The central steering body is the **State Secretaries' Committee on Sustainable Development**, which includes the state secretaries of all federal ministries and is chaired by the Head of the Federal Chancellery. Its tasks are to ensure that the principles of sustainable development are implemented in all fields of policy and to promote policy coherence. It further oversees the updating and monitoring of the NSDS. Based on **two-year work-programmes** and involving experts and parliamentarians, the committee works on specific relevant topics of sustainable development, especially on challenges for achieving SD goals. For these topics the committee reports on government positions and main achievements, formulates recommendations, and initiates concrete measures. Over the past years priority topics covered have included, for example, education for sustainable development, sustainable urban development, and land use.

The **Parliamentary Advisory Council on Sustainable Development**, composed of 17 members of Parliament, provides parliamentary advice, e.g. on improving sustainability in the national budget and subsidies. It further evaluates the sustainability-impact assessment of the Federal Government. Since 2009 a **sustainability-impact assessment has been obligatory for any new laws and regulations** to be issued, and for subsidies. This instrument allows identifying any un-intended, long-term and cross-sectoral effects of

laws, regulations and subsidies.

In order to benefit from external expertise, the German government also established a **Council for Sustainable Development** in 2001. The Council consists of **15 nominated members** proposed for their thematic expertise and personal background. These members come from the public and private sectors, civil society and academia. The council advises the Federal Government on all matters relating to sustainable development, and intensively engages in dialogues with the public on all matters of sustainable development.

With the new NSDS, additionally, sustainability officers will be appointed in each ministry. Their task will be to promote issues of sustainable development within their ministry and to ensure policy coherence.

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