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Water, Energy and Food Nexus Assessment for Egypt

Training workshop: “Integration of Water- Agriculture Sectors: Concepts and Applications”

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The WEF Nexus Project/ ACCWaM Programme

GIZ aimed to mainstream the Nexus approach in the Arab region to policies and institutions, to better link existing sectoral strategies, policies and activities and to contribute to cross-sectoral goals such as SDGs and integrated climate change adaptation and mitigation.

The WEF Nexus Project:

- Regional level: Facilitate a process of developing a roadmap to harmonize regional sectoral strategies in an integrated approach towards WEF security and sustainable development in the Arab region, through LAS ministerial councils.

- National level: Identify entry points, processes and partners for increased coordination and cooperation of national (sectoral) policies and institutions in Egypt and Jordan, to harvest synergies and address trade-offs across the WEF Nexus.

Implementation Approach of the WEF Nexus Project

1. Evidence base: on resources and human security situation and trends
2. Institutional and Capacity Assessment
3. Identification of a steering body at regional level- Nexus coordination mech.
4. A regional policy guiding document on mainstreaming the WEF Nexus
5. Guidelines for mainstreaming the WEF Nexus in Egypt & Jordan

Mainstreaming the WEF Nexus through consultation of national stakeholders and a Nexus stakeholder workshop.

Recommendations were validated in a regional workshop under the auspices of LAS in April 2017.

Identification of critical trends & interlinkages

critical interlinkages between **water** and **energy** security

critical interlinkages between **water** and **food** security

critical interlinkages between **energy** and **food** security

Implemented by giz commissioned to GFA Consulting Group

Priority WEF Nexus Inter-linkages in Egypt

Water use for food production

Energy use for treatment and coveyance of water

Most critical inter-linkages in Egypt (W-F)

Water use for food production

- **Agricultural sector is the largest user of water resources**: 80% of the total water needs.
- Limited food self-sufficiency levels by scarce water resources (**50- 60% of food is imported**).
- In-efficient irrigation techniques
- Over-use of ground water.
- Government plans for a **20% expansion of current agricultural land** to increase food security is limited by existing water resources (mainly the Nile).
- Most of the land reclamation projects are in desert areas, often i**rrigated with fossil groundwater** only provides an unsustainable and a short-term solution.

Critical inter-linkages in Egypt (W-F)

Options to address the interlinkages between water scarcity and food production:

- Increase water-use **efficiency in irrigation**, adopt sustainable agricultural practices and promote cultivation of **non-water intensive crop** varieties

  Vision 2030: reduce production of water intensive crops, such as rice, switch from flood irrigation to modern irrigation systems and promote efficiency in agricultural practices.

- Provide appropriate **incentives and reduce subsidies** to promote efficient use of water in irrigation. Agricultural subsidies continue to dominate the sector in the form of almost cost free water.
- Promoting **reuse of treated wastewater** for agriculture use and desalinated water initially for drinking purposes and for other economic activities if proven economically feasible.

  Vision 2030: increase the share of unconventional water sources from 20% today to 40% by 2030).

Critical inter-linkages in Egypt (W-E)

Energy use for water treatment & conveyance

Water sector requires large amounts of water

- There exists no land in Egypt that is irrigated without the **need to lift water from waterways and ground water**, except in Aswan and Fayoum.
- There are around 1,500 water lifting plants in Egypt, which are energy intensive installations, requiring costly fuel.
- **Efforts to increase water supply in the future through desalination and wastewater reuse will require additional energy** as well as for pumping and distribution of obtained water to the location of their use.

Critical inter-linkages in Egypt (E-W)

Options to increase energy-efficiency in the water sector:

- Using **renewable energy for irrigation systems** in Egypt, whether for pumping ground water or for the operation of generators used for lifting water from waterways.

- Using the **energy potential of biogas and bio-solids** in wastewater treatment plants to offset the energy needs of these plants.

- Promoting the use or **renewable energy for desalination**.

Critical inter-linkages in Egypt

(W- E) Water use for power generation

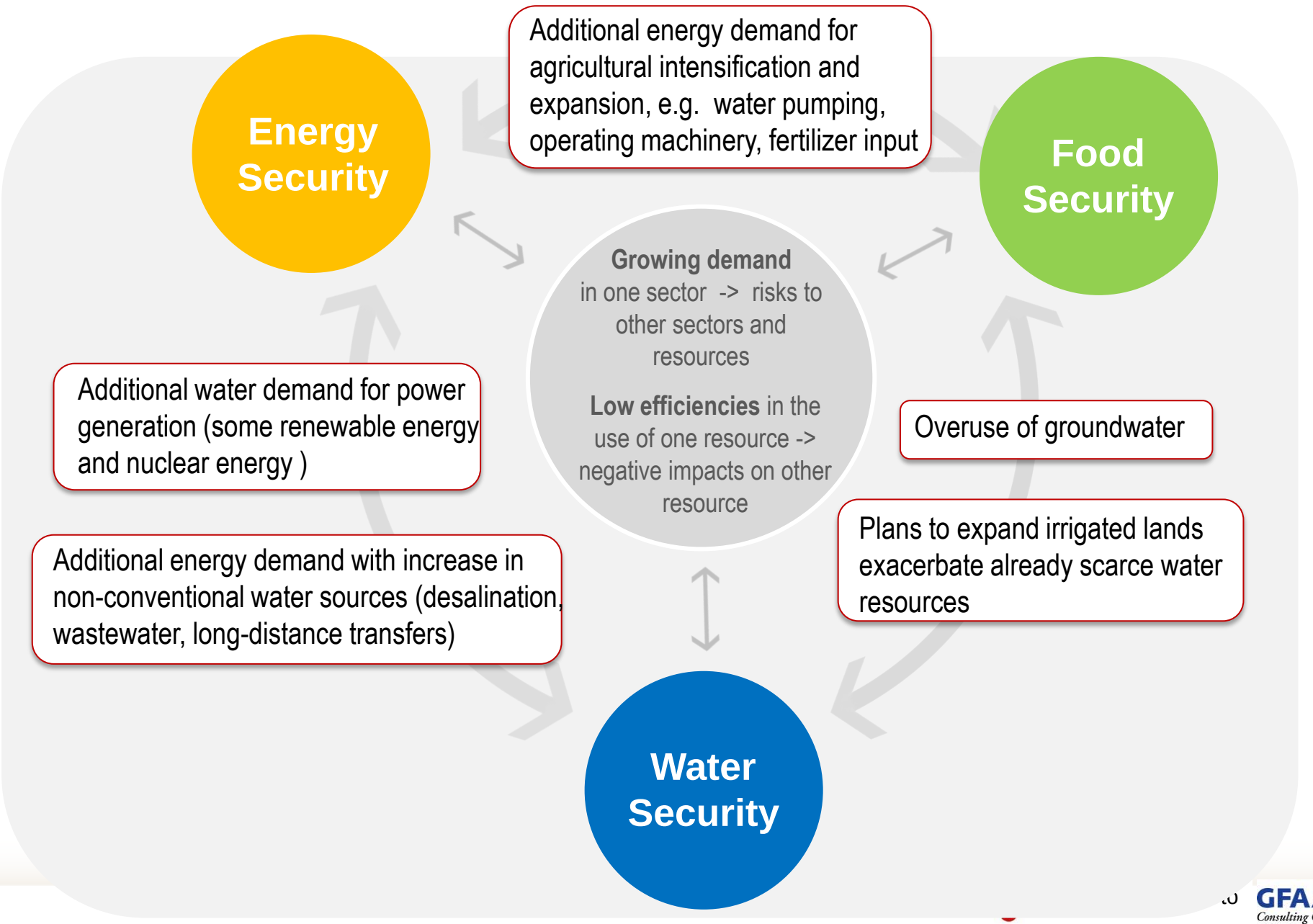
Additional water demand from energy sector; New power generation systems (renewables such as solar power) are often more water intensive than conventional systems.

Plans to increase use of RE and nuclear energy, can be water intensive.

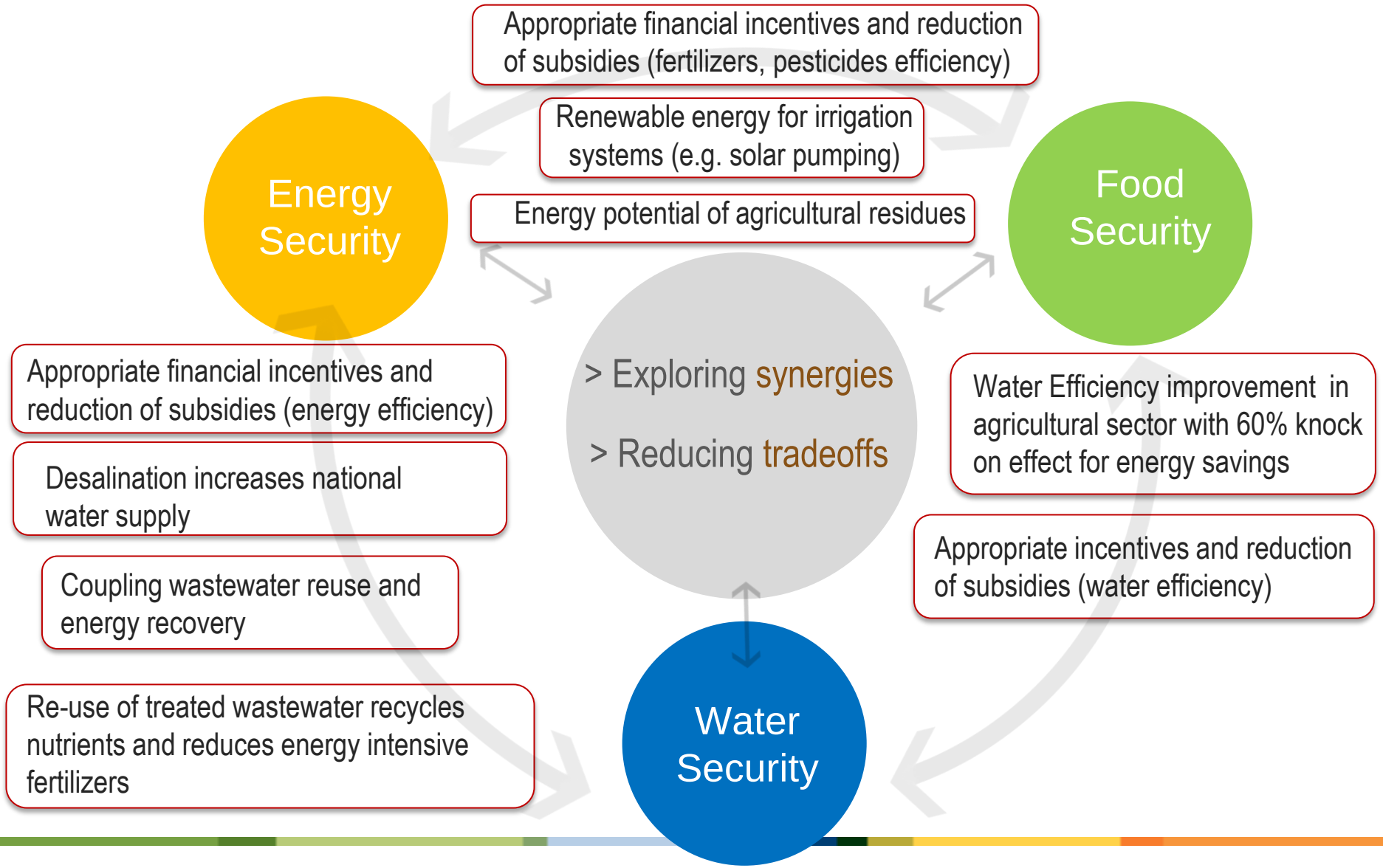
(E-F) Energy use for agriculture

Agricultural intensification and expansion require additional energy, e.g. for machinery, fertilizer, water pumping.

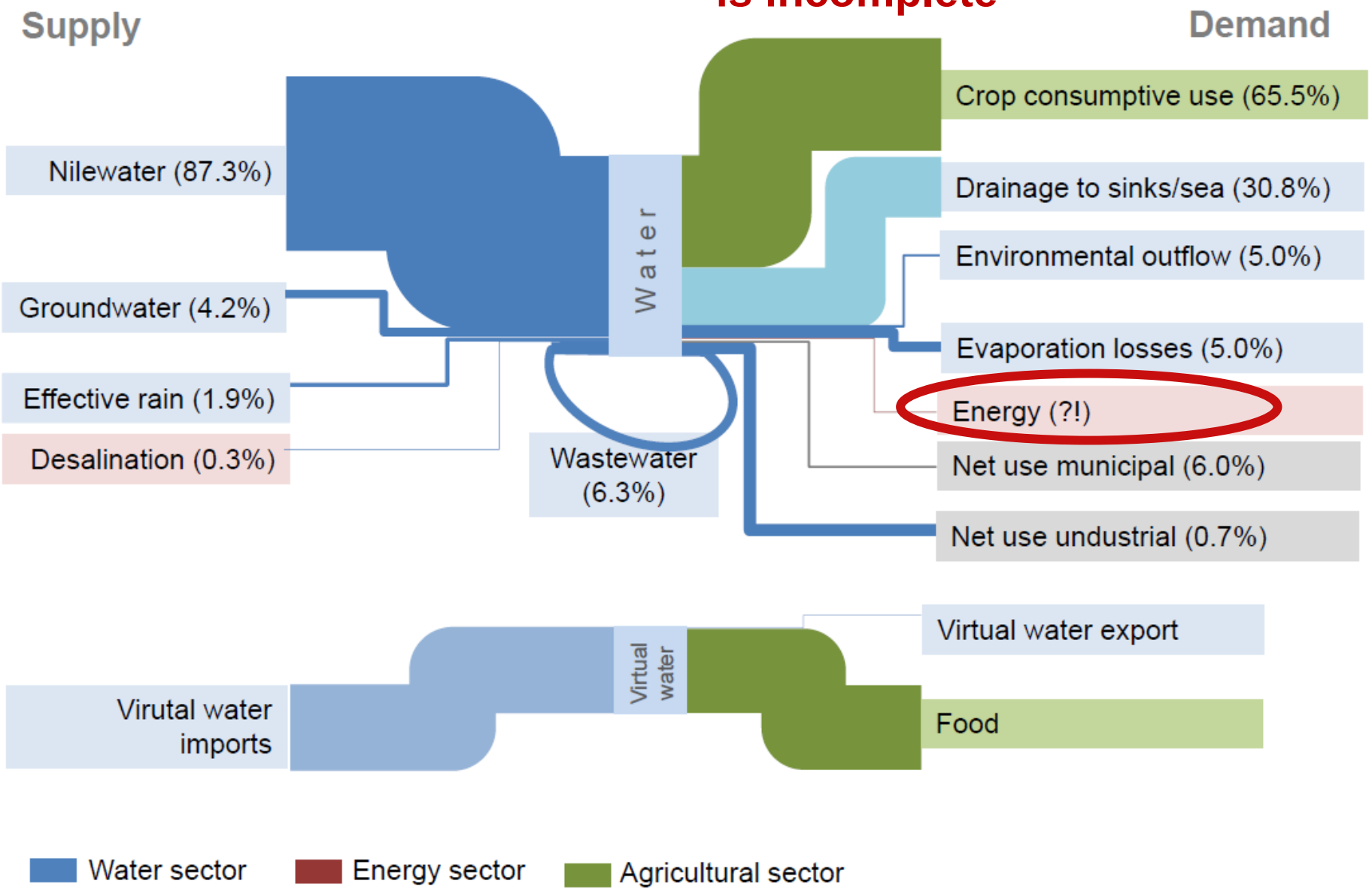
Tradeoffs and risks related to silo approaches in EGYPT



Opportunities from a Nexus Approach in Egypt



The quantitative evidence base: (cross-) resource flows (Egypt) is incomplete



Source: ASME, estimated figures 2015

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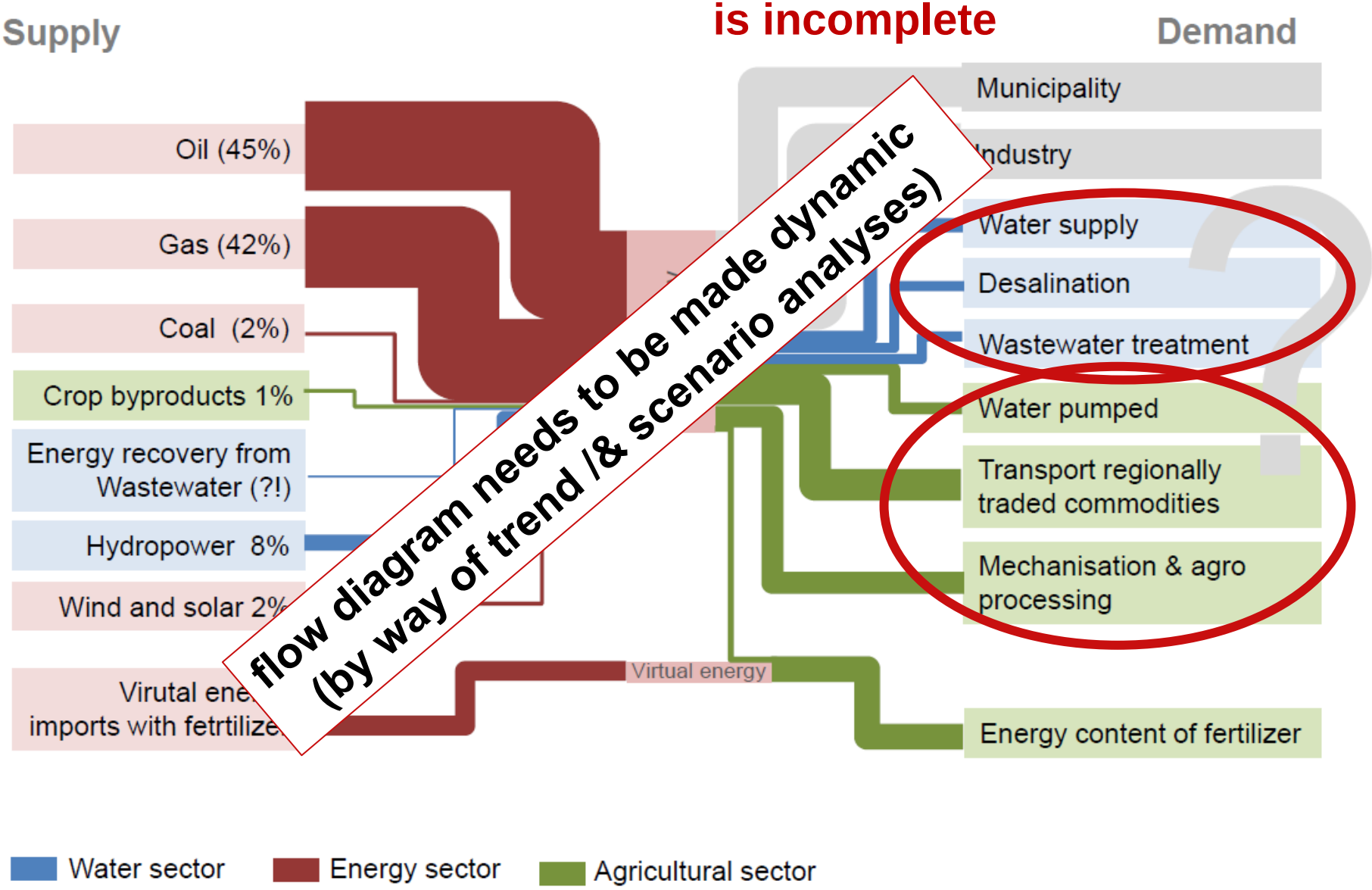


Source: ASME, estimated figures 2015; BMWI 2011, 2012, 2013, 2014

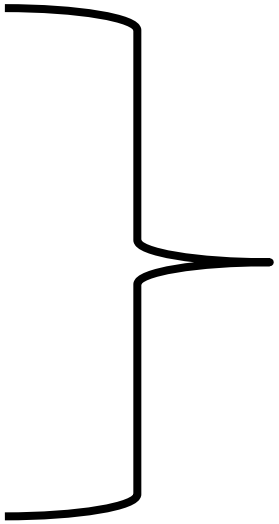
Our participatory Nexus approach

1) identification of critical trends & interlinkages

2) mapping of institutions onto these interlinkages, identifying entry points for mainstreaming

3) focus on existing institutions first

4) proposing new nexus institutions as necessary



how to operationalize and apply the nexus?

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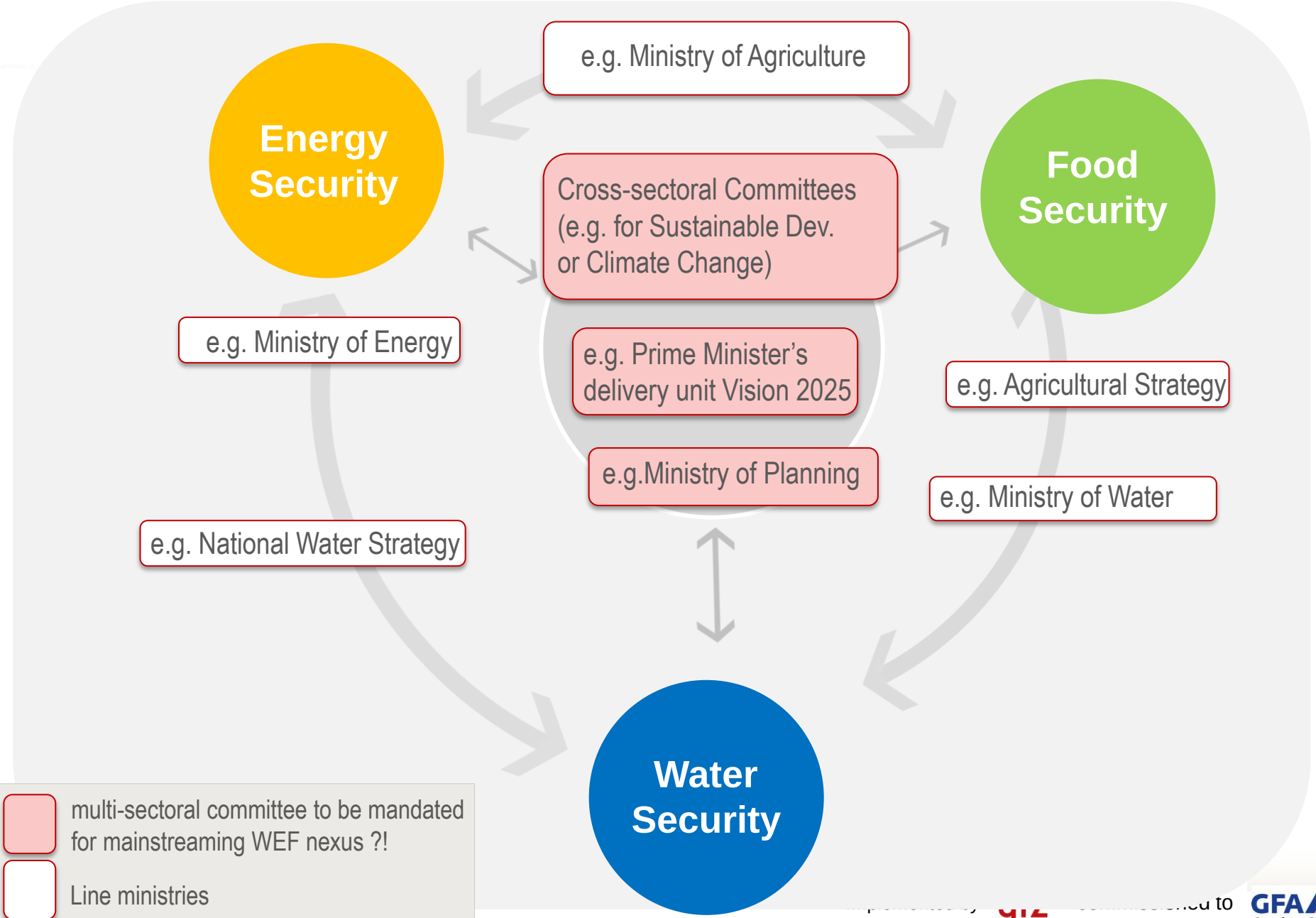
Mapping existing institutions onto these critical interlinkages

Interlinkages	Relevant institutions
Energy use for water	• Ministry of Water / Energy • …….
Water use for food	• Ministry of Water / Agriculture / Planning • ……

Mapping strategies and planning processes onto these critical interlinkages - see country presentations

Policy/plan	Lead institution
The National Water/Energy/Agriculture Strategy	Ministry of Water/Energy/ Agriculture &…..
SDG Implementation	Ministry of Environment / Planning &…..
Paris Climate Agreement / NDC implementation	Ministry of Environment &……

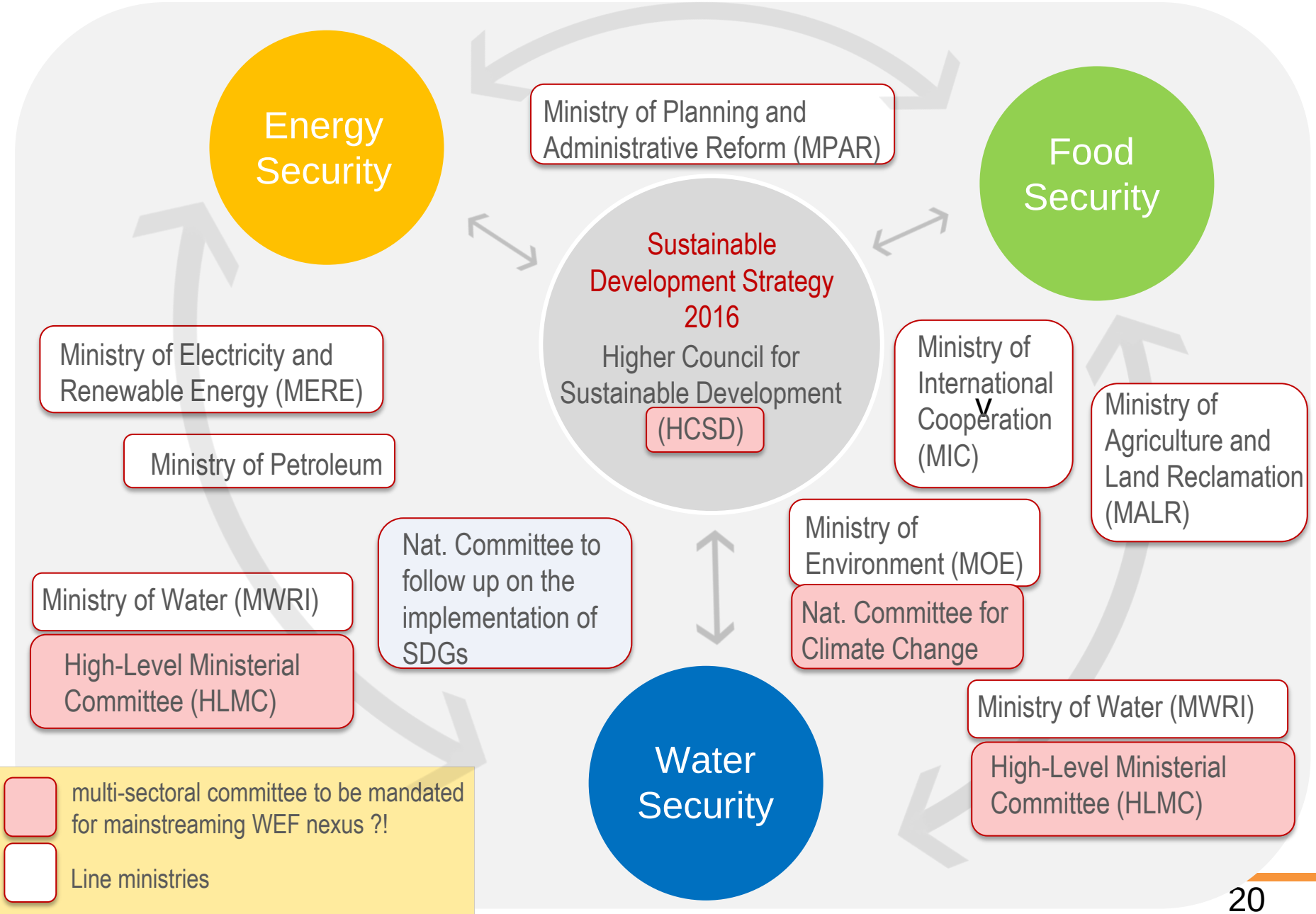
A nexus approach for institutional coordination and policy coherence



Mapping WEF Nexus in existing Institutions in Egypt

Interlinkages	Related institutions
Energy use for water treatment and conveyance	• Ministry of Water Resources and Irrigation (MWRI) • The Holding Company for Water and Wastewater (HCWW) • Ministry of Housing, Utilities and Urban Development (MHUUD) • Ministry of Electricity and Renewable Energy (MERE) • Supreme Council on Energy • Egyptian Electricity Holding Company
Water use for food production	• Ministry of Water Resources and Irrigation (MWRI) • The Holding Company for Water and Wastewater (HCWW) • Ministry of Housing, Utilities and Urban Development (MHUUD) • Ministry of Agriculture and Land Reclamation

A Nexus approach for institutional coordination and policy coherence



Mainstreaming WEF Nexus into Policies and Strategies- Entry Points

1. Within existing coordination mechanisms:
2. Within on-going sustainable development process.
3. Within existing sectoral and cross-sectoral planning processes.
4. Within a new coordination mechanism.

Need for more policy coherence

Coordination across sectoral ministries (and other agencies) in setting development goals, strategies, & legal frameworks should be enhanced

- **MWRI** responsible for water resources management, including for agricultural irrigation, other sectors, and municipal water - need to **consider energy & agriculture requirements**

- **MALR** responsible for agricultural development, including selection of crops and land reclamation, decisions needs to **take into account water and energy requirements**

- **MERE** responsible for supplying sufficient energy to various sectors - needs to be better **involve in decision making in other sectors**

Mainstreaming WEF Nexus into policies and strategies
Entry point 1: existing coordination mechanism (1)

Entry point: existing intersectoral mechanisms could be mandated to adopt a WEF Nexus perspective in their planning and strategy development processes, promoting cross-sectoral synergies and preventing trade-offs

- **High Level Ministerial Committee (HLMC) on Water**
  - Development of a national water strategy in Egypt was initiated in 1996 with the participation of nine ministries, {Ministry of Electricity and Renewable Energy (MERE) was not included}, who met every two months for the purpose
  - **HLMC** on water was created in 2005 to follow up on the Plan, headed by the MWRI and co-chaired by one of the nine ministers
  - Functions through a technical committee and **Water Resources Units created in the nine ministries to support coordination**

Mainstreaming WEF Nexus into policies and strategies
Entry point 1: existing coordination mechanism (2)

National Committee for Climate Change responsible for preparing and up-dating national strategy for climate change.

- Headed by MoE and including representatives from relevant ministries
- Aims to ensure the integration of climate change in sectoral policies

National Committee to follow up on and coordinate implementation of the SDGs

- Under the direct supervision of the Prime Minister, led by Ministry of International Cooperation (MIC) and Ministry of Planning and Administrative Reform (MPAR)
- Further includes Ministries of: Environment; Social Solidarity; Local Development; Higher Education and Research; Health; Housing, Utilities, and Urban Communities; and Education and Technical education

Mainstreaming WEF Nexus into policies and strategies
Entry point 2: on-going sustainable development process

Egypt's Vision 2030, launched in 2016, strategy development was coordinated by the Ministry of Planning and Administrative Reform (MPAR) and followed a consultative process engaging all ministries and relevant stakeholders

Foresees establishing a **Higher Council for Sustainable Development (HCSD) attached to the Prime Minister's office**; coordinated by MPAR and MoE

- HCSD entrusted with coordination and oversight of work of sectoral ministries towards SD, development of economic instruments and market policies to support SD, monitoring and evaluation of achievements.
- **HCSD could be mandated to put special focus on a WEF Nexus** perspective; e.g. through subcommittees or special entities ;
- additionally each ministry should apply the Nexus approach by **assigning the planning department within the ministry the responsibility of coordinating** with other sectors;
- Moreover, a Civil Society Council including representatives of the WEF sectors may be created to bring in a cross-sectoral perspective.

Mainstreaming WEF Nexus into policies and strategies
Entry point 3: existing sectoral & cross-sectoral planning processes

Institutional and policy reforms for water resources management

- Egypt's Vision 2030 foresees strengthening the institutional & legislative structure of the water resources management system, by re-identifying the roles of the sector's governing agencies & drafting the necessary legislation, including the use of economic instruments.
- MWRI main responsible ministry - to further involve ministries responsible for agriculture, energy, sewerage. Can build on High Level Ministerial Committee (HLMC) on Water.

Reforming current legislative framework & subsidization system in the energy sector

- Egypt's energy sector is currently in a process of reform. MERE has recently finalized a strategy, which has been endorsed by the Supreme Council of Energy.
- Action planning to implement the strategies provides opportunities for coordination of measures across the WEF nexus sectors and setting sector-specific energy-related targets

Promoting sustainable agricultural practices that reduces water and energy use & increases output

- Subsidy reform, and a package of incentive and regulatory reforms to promote sustainable agriculture.
- Development of rural communities – physical, social and environmental services.

Capacity needs assessment: M&E systems

Mainstreaming a WEF Nexus perspective in Egypt can be **supported by monitoring and evaluation (M&E) of cross sectoral interlinkages** through **indicators**, such as

- Measuring the **efficiency** and **cost-effectiveness** of the use of different sources of water taking into account the energy requirements and production costs involved
- **Indicators related to the agriculture and water sectors in the strategic plan for renewable energy** in order to promote coordination between the three sectors and ensure energy efficiency in the production of water, food, as well as electricity (energy requirement per unit of water, food, as well as electricity production in KW/hr
- **Measuring crop productivity per water (and energy) input** with a view of increasing it
- **Measuring trends in the reuse of treated wastewater in the agriculture sector** with a view of supporting efficient use of water resources, possibly also including the rate energy recovery from sewage sludge

Capacity needs assessment: Information management

Ensure harmonized baseline information for the critical WEF interlinkages are in place

- Central Agency for Public Mobilization and Statistics (CAPMAS) is the main government body entrusted with data gathering and analysis, but sectoral ministries also gather and analyse data.
- Critical interlinkages between water, energy and agriculture/food and with other sectors should be actively addressed in data analysis and modelling exercises.
- CAPMAS could also build an integrated database for the water, food/agriculture, and energy (and environment) Nexus.

Capacity needs assessment: Technical capacities

Strengthen technical know-how of concerned staff at the line ministries and other stakeholders related to WEF Nexus interlinkages

- **review curricula of the different disciplines** in order to integrate the environmental and social dimensions across sectors, ensure coordination and integration between different sectors, and introduces and operationalizes the water, energy, agriculture/food nexus

- **strengthen research and development capacities** in support of integrated WEF nexus approaches, support collaboration of sectoral research centers

Capacity needs assessment: Communication and outreach

Strengthen communication and outreach as an important pillar for raising awareness of policy makers on WEF Nexus interlinakges

- Raise **awareness** on
  - **Socioeconomic aspects** of the WEF Nexus, importance for improving livelihoods and **eradicating poverty**
  - **Positive effects** of a WEF Nexus perspective **for environmental sustainability** and resource efficiency, **combating land degradation and reducing vulnerability to climate change**

Challenges Faced

1. "Sector silos": different institutions are in charge of water, energy and agriculture policies.
2. Trade-offs: diverging interests among actors.
3. Limited experience in Nexus implementation: The Nexus perspective is a new concept
4. Insuffficient knowledge of Nexus dynamics on the national and regional levels.
5. Lack of a comprehensive data base on Nexus experts.




Lessons Learnt

- Nexus mainstreaming can only be achieved through participatory approaches.
- Besides “horizontal” integration across sectors, “vertical” integration across levels and scales is equally important.
- Water sector leading the Nexus mainstreaming process, may make other sectors (energy and agriculture) less interested.
- The Nexus approach provides excellent opportunities for cross-country sharing of technical, economic and institutional innovations, providing opportunities for regional cooperation and economic integration.
- Demonstration of success stories and quantification of financial gains from Nexus approach is the best buy in for policy makers.



Lessons Learnt

- Small size PPP could be an entry point to make WEF Nexus a business case- Awareness and incentives should be created among private investors for WEF Nexus projects.
- Private sector in MENA is active in the energy sector and could be the entry point for implementing WEF Nexus projects.
- Financial institutions lack knowledge on Nexus yet ready to be involved in Nexus projects: capacity building and Nexus examples are needed
- Policy-related activities; cross-ministerial Nexus processes should be complemented with Nexus projects demonstrating benefits for all stakeholders to create acceptance for institutional changes.

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Thank you for your attention