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Water Security and Water-Energy-Food Nexus Got it, What is Next?

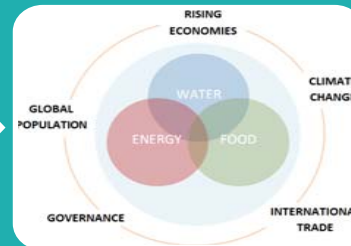
Rabi H. Mohtar

Professor and Executive Director, Qatar Environment and Energy Research Institute

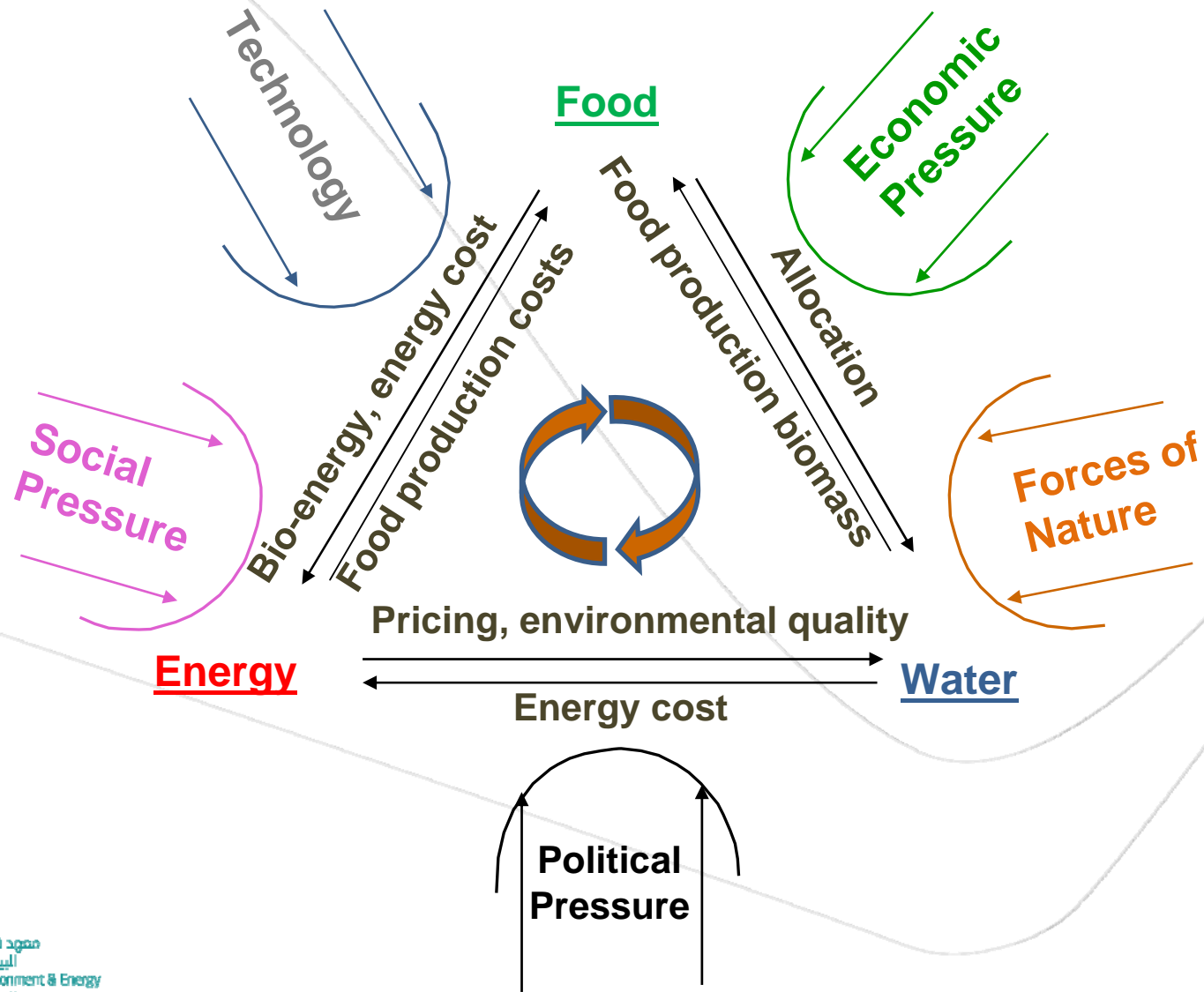
May 23, 1, 2013

Third session of OWG on SDGs, Water and Sanitation UN GA

from Carbon to Creativity



Water-Energy-Food Nexus



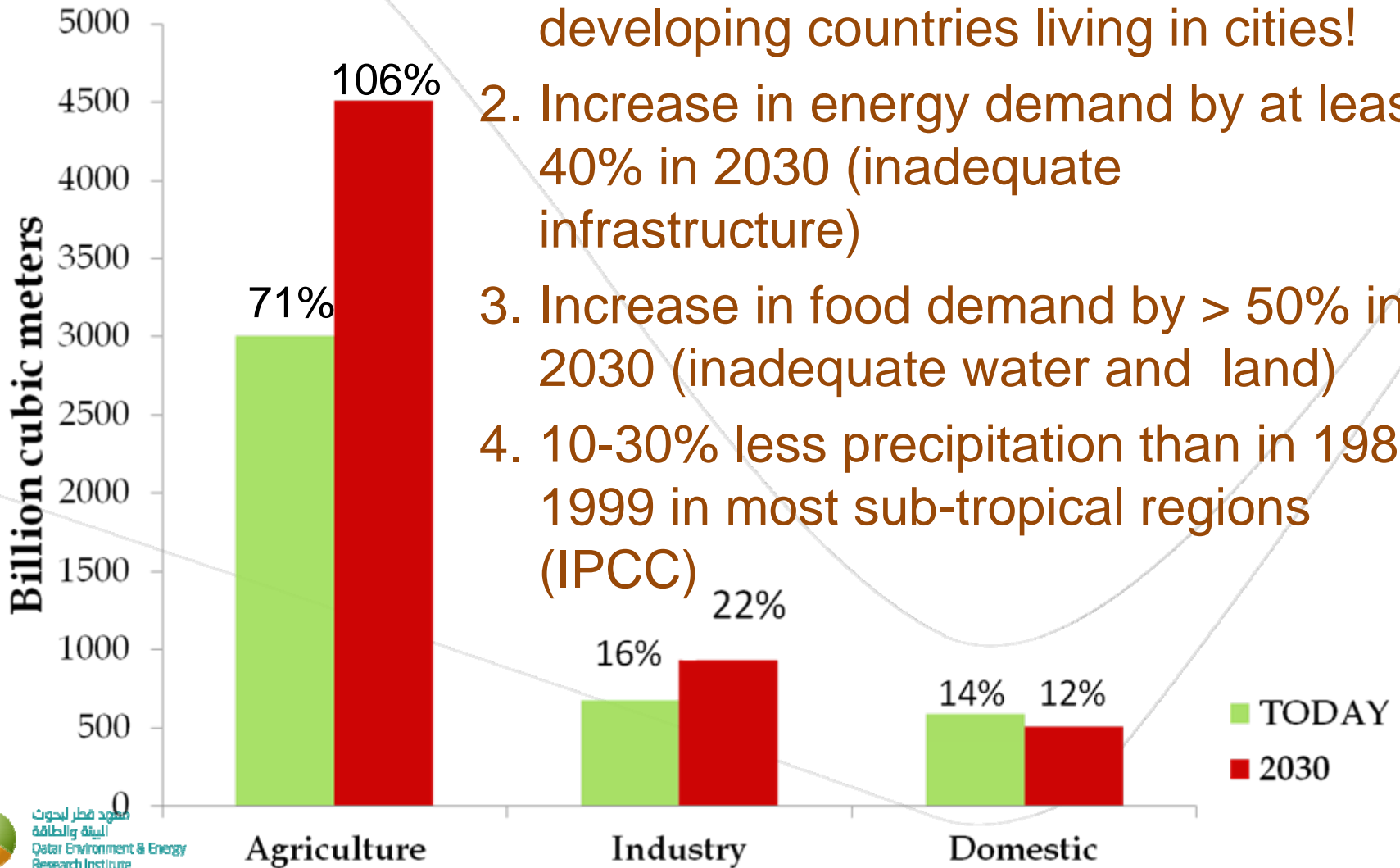
Nexus Discussions on Global Stages

- **Bonn conference (2011)** focused on **interdependency of water, energy, and food security** to “explicitly identified in decision making”.
- **Rio+20** highlighted the linkages between water, food security and nutrition and sustainable agriculture; sustainable cities; health; biodiversity; desertification etc.
- **UNFCCC Executive Secretary** during **COM** the **food-water-energy nexus** as the “**human solution to climate change**” (WMO, 2012)
- **UN Secretary General** highlighted the use of **nexus approach** and urged the inclusion of environmental, social and economic dimensions (GIZ, 2012)



Business as Usual: HEAD-ON CRASH!!

1. 40% new water (1669 bn m³ by 2030) for 9 bn inhabitant majority in developing countries living in cities!
2. Increase in energy demand by at least 40% in 2030 (inadequate infrastructure)
3. Increase in food demand by > 50% in 2030 (inadequate water and land)
4. 10-30% less precipitation than in 1980-1999 in most sub-tropical regions (IPCC)



Problem Statement

Decision makers, in general, do not have access to comprehensive tools that:

1. Quantify relationship between water, energy, and food,

2. Define their interconnectivity, and

3. Develop a strategy that allows integrative management and planning for the future of these resources,

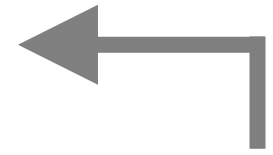
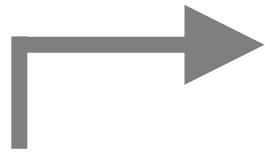
Thus posing a threat to socioeconomic sustainability and resilience of global resources.



Web-based WEF Nexus Tool



A Resource Management Strategy Guiding Tool



ADMIN interface

Local Characteristic

Local Yields

Water Requirements

Energy Requirements

Land Availability

Import Data

Other

Science

USER

Scenario

Components
Food Self-Sufficiencies

Water Sources and Amounts

Energy Sources and Amounts

Sources of Import Countries

Tool Output

Water Requirement (m3)

Financial Requirements (\$)

Local Requirement (ha)

Energy-Import (kJ)

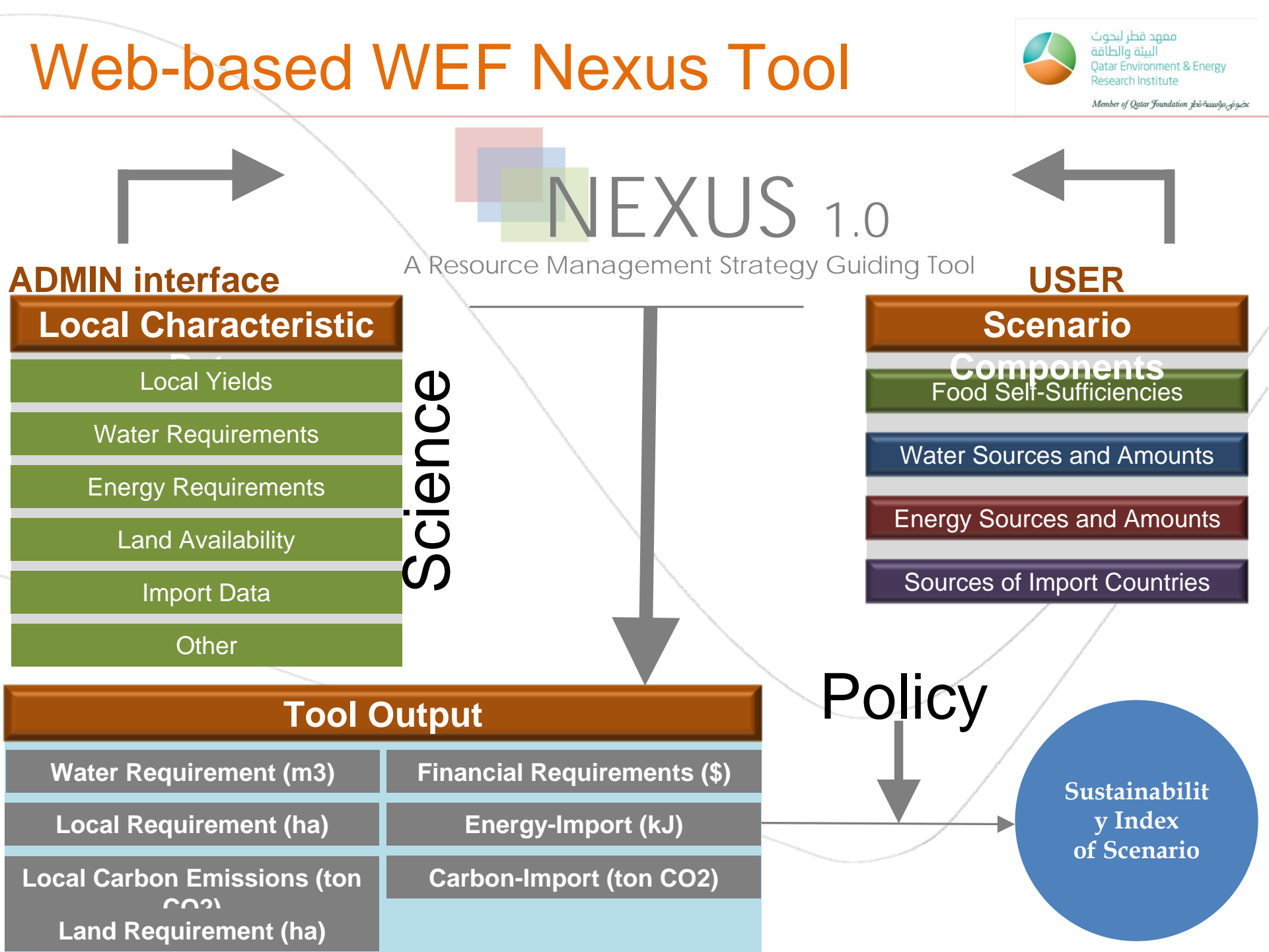
Local Carbon Emissions (ton CO₂)

Carbon-Import (ton CO₂)

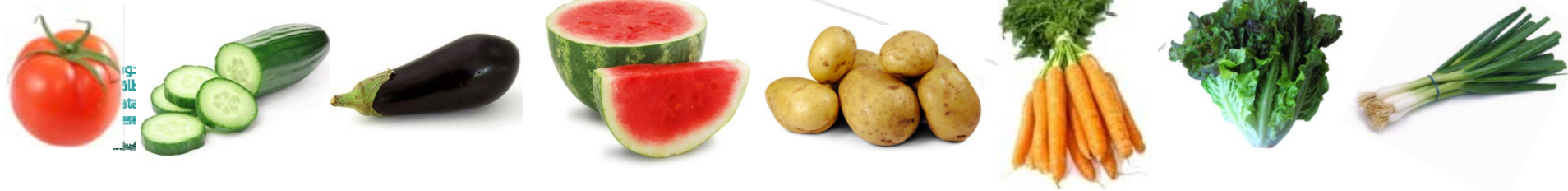
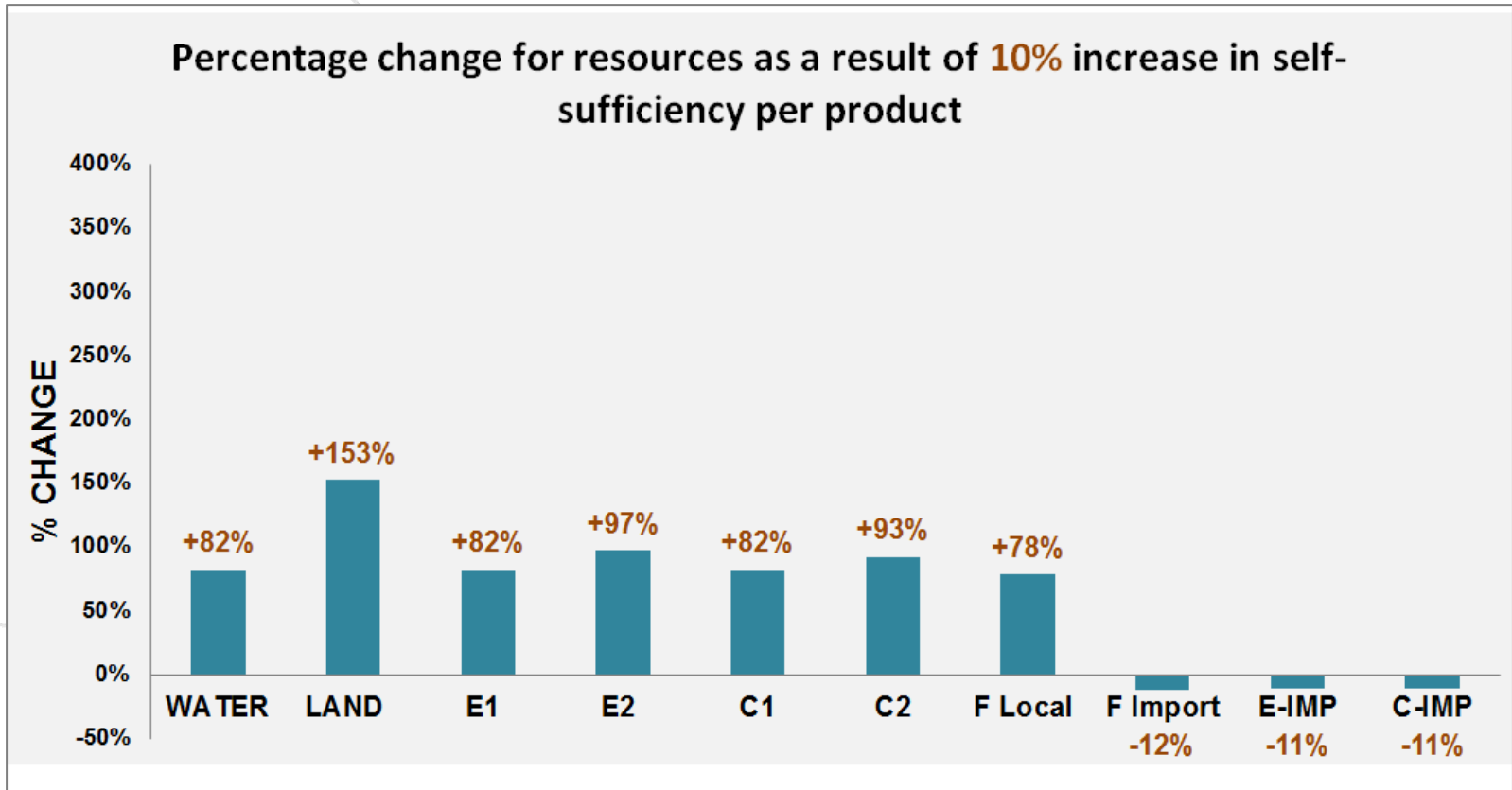
Land Requirement (ha)

Policy

Sustainability Index
of Scenario



Sample Outcome



Water-Energy-Food Nexus

Water, energy, and food (WEF) securities are essential for a sustainable economy. In fact, a high level of interconnectedness exists between these resources form a nexus which itself is affected by external factors such as population, changing economies, international trade, governance, health impacts, environmental impacts, and climate change. Recognizing the intimate connection between these resources is necessary to move to more integrative approach for resource management.

The WEF Nexus Tool

QEERI is currently engineering a comprehensive tool, specifically tailored for Qatar, that is aimed at identifying sustainable resource management strategies governed by the water-energy-food (WEF) nexus. This tool will incorporate the following features:

- The tool will allow the creation of multiple scenarios composed of different variations of local food production levels, water sources, energy sources, and food import sources.
- The output will include a holistic summary of resource needs for a given scenario, including water, energy, land and financial requirements, as well as identify environmental impacts. Current and foreseen bottlenecks could thus be recognized, leading to the initiation of resource management action plans.

With this tool in place, QEERI offers an innovative sustainability model that could be adopted locally as well as in similar arid environments.

Check out the beta version: [Water-Energy-Food Nexus Tool](#)



- Home
- Background
- Key Concepts
- Tool Utility
- Help
- About Us
- Contact Us
- Log-on
- New User

beta - version

Welcome to NEXUS 1.0

Username :

Password :

[New User](#)

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What's next?

- New tool version
- Regionalizing tool
- Applying case studies for different eco-zones and socioeconomic zones

Science Recommendations

1. **Identify and quantify linkages** of the “Water System”: food and energy
2. Create a global **Water Knowledge Hub** that is relevant, visible, credible and at low cost.
3. Establish “**water value**” as an economic, social and political good.
4. Deploy **tools for managing and planning water resources and risk management strategies**
5. Deploy technologies to improve **water use efficiency** at local and regional scales.
6. Understand water physical and human systems for **improved science based decision making.**



Policy Recommendations

1. No **fuel from food**
2. Consider **non-stationarity** in policy decisions
3. Improve resource **conservation** & awareness
4. Facilitate dialogue of **policy makers & scientists**
5. Include **all stakeholders** in water discussions
6. Create **intergovernmental structures** for water
7. Promote **nexus friendly** & site specific tech
8. Develop local **capacity for R&D** in sustainability
9. Develop **renewable** sources of energy
10. Regulate **virtual water** and water trade



Thank You



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