The Region Water & Energy Nexus: Future outlook

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Unprecedented Challenges

Increasing Water Scarcity

Threat of Waterborne Illness

Growth & Demand

Rising Cost of Energy &Rising Demand

New Stringent Regulations

Massive Infrastructure Needs

Water & Energy Interlink

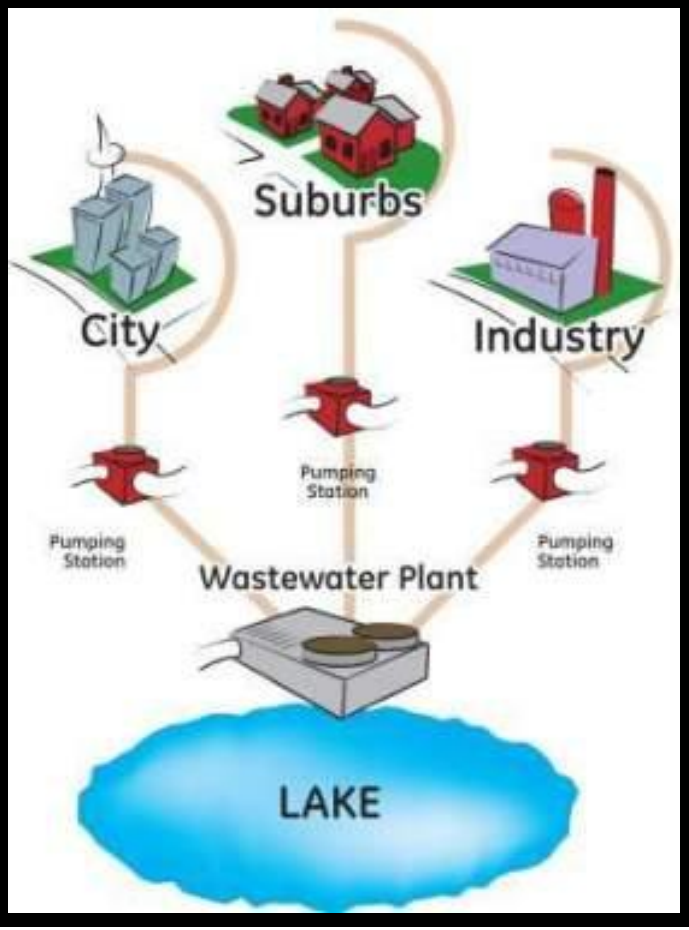
- First, Large sum of the potable water in the region is produced from desalination plants, commonly coupled with electricity plants driven by natural gas.
- Second, future population growth and development in the region will place increasing demands on the limited water resources. Thus, efforts to strengthen water policies and to increase water supplies will lead to a further increase in energy requirements.
- Third, the interlinkage of energy and water production in the region gives rise to ongoing environmental issues. These include, among others, brine pollution from the desalination industry; salination of aquifers, with impacts on agricultural production; and oil spills and tanker waste which threaten the marine ecology and security of water intakes for desalination plants.

Water : Energy Nexus

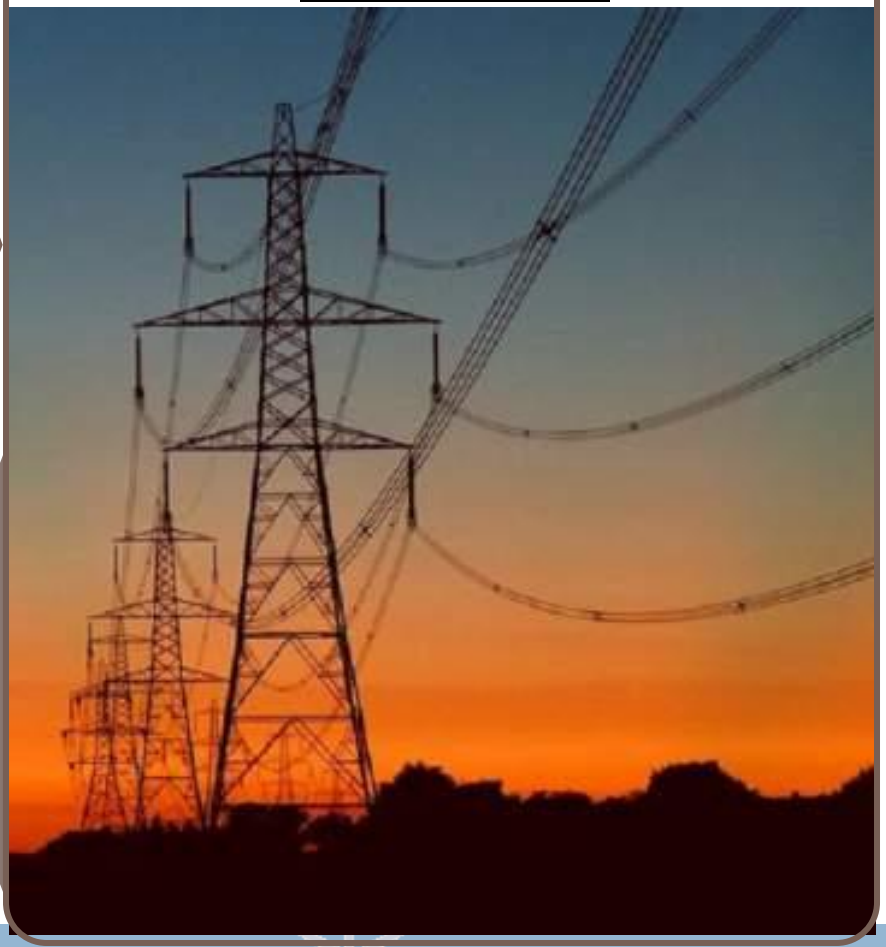
both challenges must be addressed together

Nexus #1: 6-18% of a city's energy demand is used to produce, treat & transport water

WATER



ENERGY

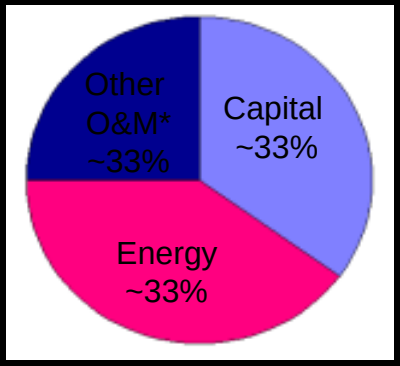


Nexus #2: Higher technology to treat impaired water requires higher energy demand

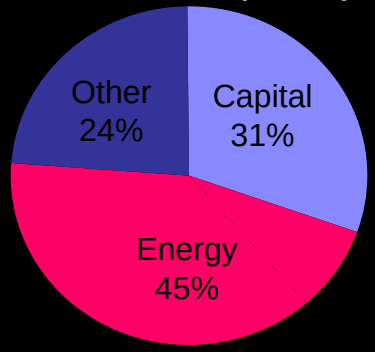
WATER

ENERGY

Membrane



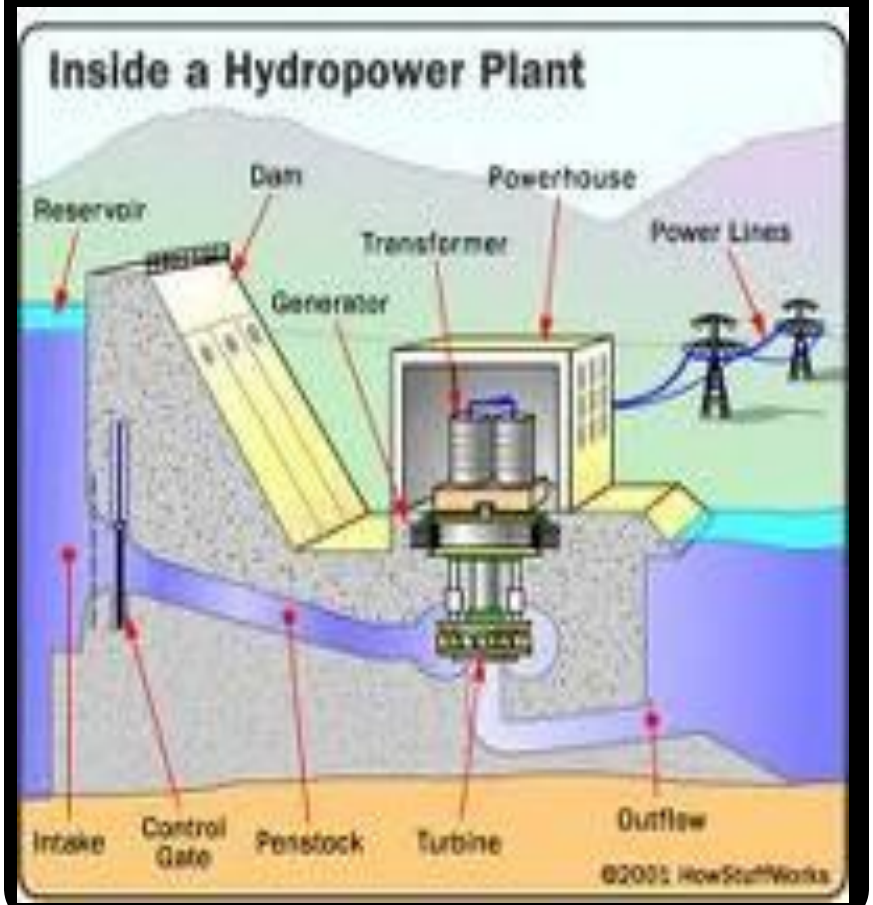
Thermal (MED)



* Membrane replacement, Chemicals, Labor, Maintenance

Nexus #3: Declining reservoir levels reduce hydro generating capacity

WATER



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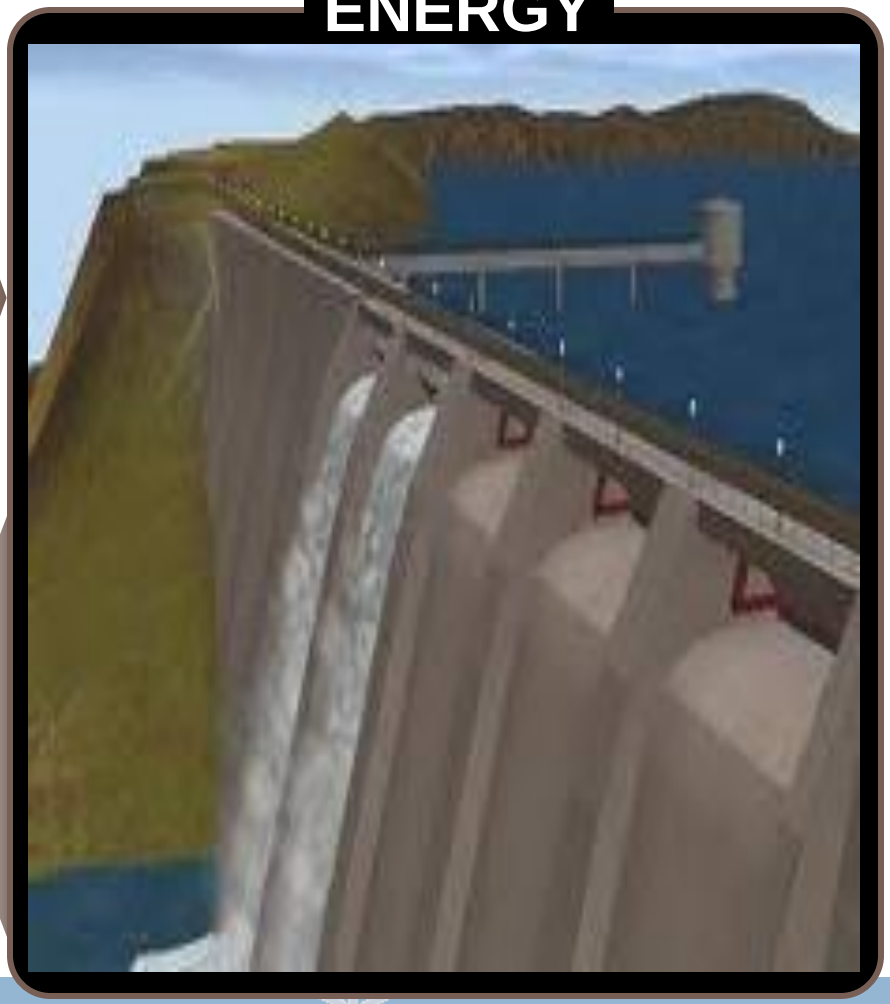


Nexus #4: Power generation requires large quantities of water

WATER

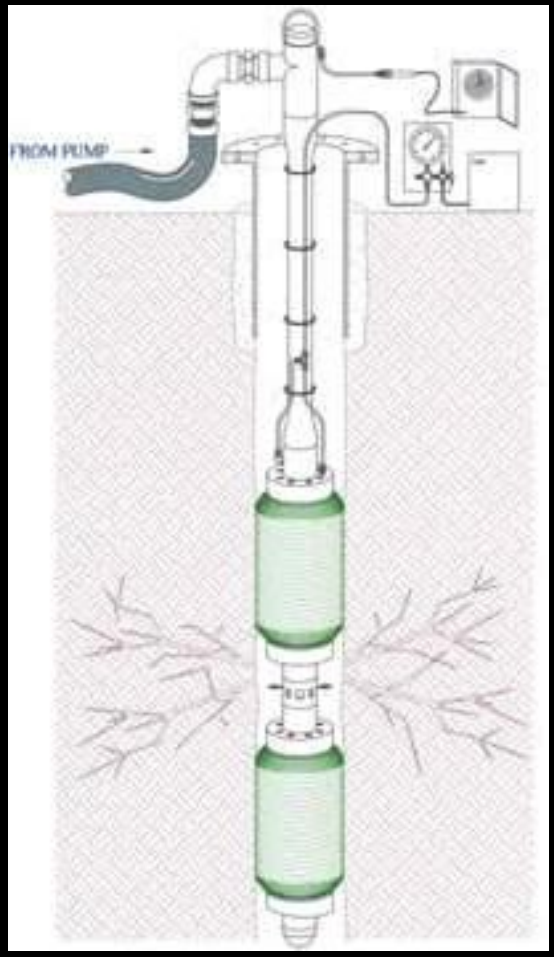
>50% of global industrial water consumption is used to generate power

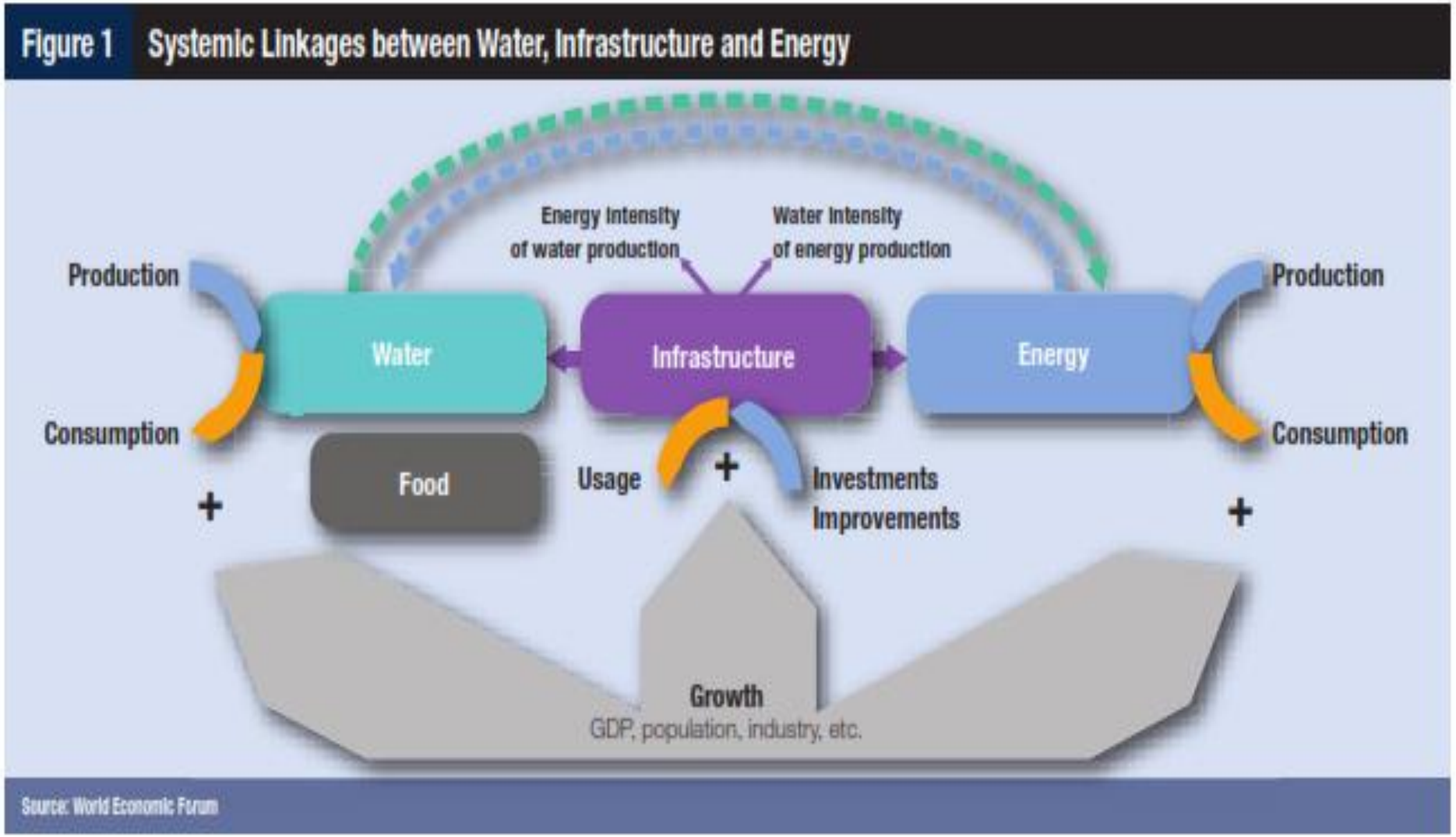
ENERGY

Nexus #5: Energy exploration & production generates large quantities of wastewater

WATER

ENERGY

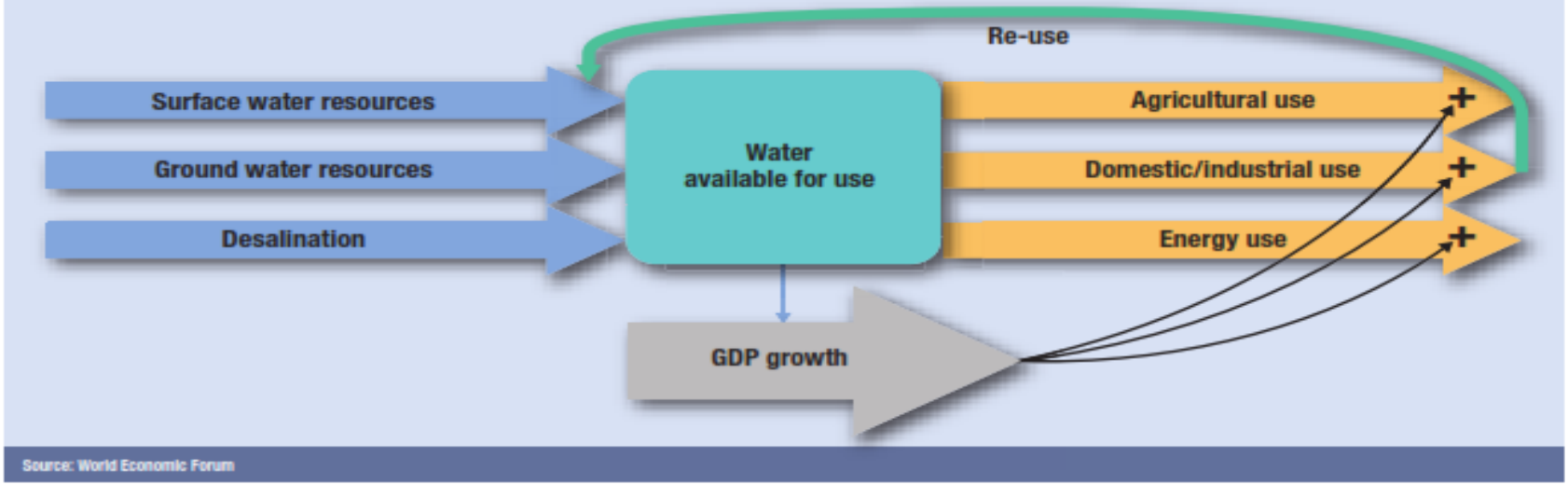




Source: World Economic Fourm, Marrakish 2010

Water Scarcity; Risk Descriotion and Impact

Figure 2 Key Input, Output and Influencing Factors in Water Availability



Direct impacts of water scarcity

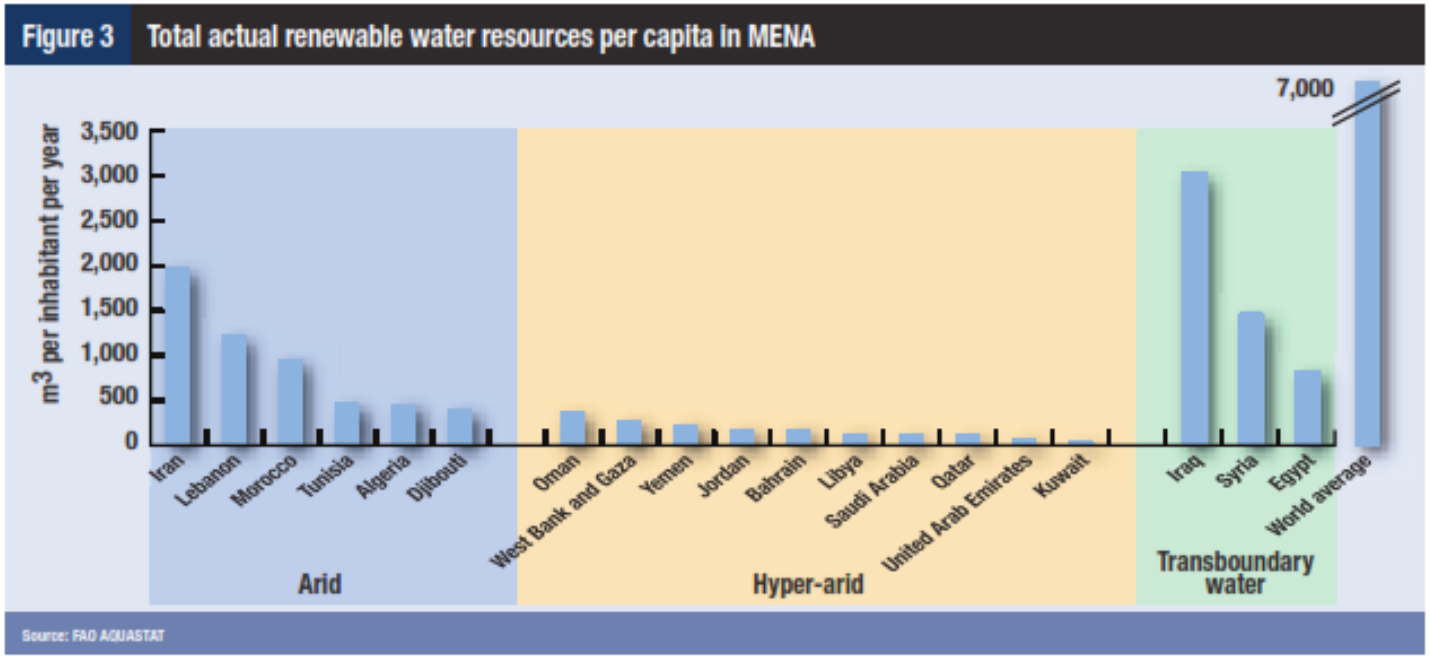
- Increasing cost of water
- Lower quality of life and negative health outcomes
- Depressed agricultural yields and shortages of food
- Constraints on water-dependent industrial and energy activities
- Environmental damage

Indirect impacts of water scarcity

- Domestic social tensions over water distribution
- Geopolitical tensions over access to trans-border water resources
- Economic and environmental costs of maintaining water supply
- Decreasing energy security through energy needs for maintaining water supply

Major Trends and Uncertainities

- Current State: A Highly Water-Deprived Region
- Agriculture and Food Production Drive Water Risks and Vice Versa
- Energy Drives Water Risks and Vice Versa
- Increaseing Infrastucture Requirements

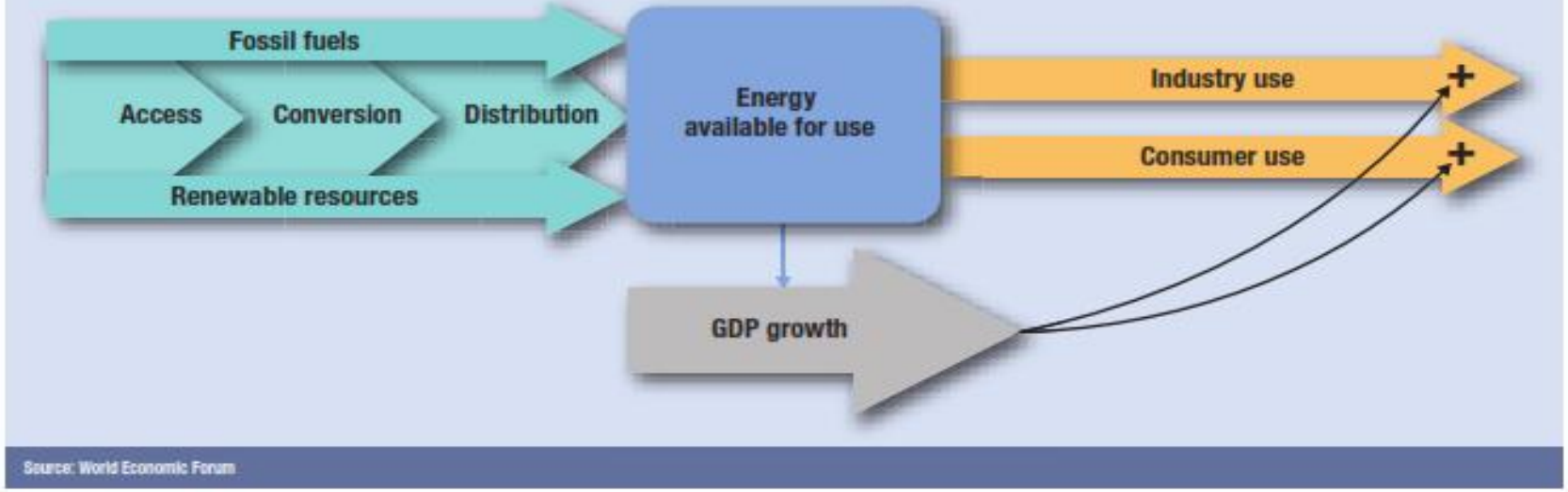


Levers and Trade-Offs

- Managing Water Demand by Increasing Efficincy of Uses
- Manging Water Demand Through the Food Supply Chain "Virtual Water"
- Manging Sustainable Water Supply based on IWRM
- Fostering cooperation on Supply and Demand management
- Fostering Regional Cooperation to Meet Curruent and Future Water Demand
- Linking Infrastructure Investments to Water and Energy Risks

Energy Security; Risk Description and Impact

Figure 4 Key Input, Output and Influencing Factors in Energy Security



Source: World Economic Forum

Direct impacts of lacking energy security

- Failures in critical services because of a lack of electricity
- Economic cost of ensuring supply
- Economic loss from energy-constrained industry
- Lower quality of life

Indirect impacts of lacking energy security

- Environmental cost of ensuring supply
- Geopolitical tensions over energy resources
- Social tensions
- Water scarcity (particularly for countries relying on desalination)

Major Trends and Uncertinities

- Current State: A Region Characterized by High Energy Intensity *(60% more energy-intense that OECD)*
- Dempgaphic and Growth Patterns Drive Energy Risks
- Infrastucture Requirment

Levers & Trade-Offs

- Increasing Efficiency and Manging Demand
- Manging the Supply Side of Energy Security Through Alternative Sources
- Fostering Regional Cooperation for the Supply and Demand Management

Applied R & D

on Water and Energy Needed

OPPORTUNITY → ACTION → OUTCOMES

- Water issues
- Water & Energy Issues
- Energy Issues
- Benefit to Region
- Education & Training
- Future outlook

Scope of Work:

Water issues such as:

- Studies on the availability and cost of fresh water from alternative source
- Conservation of water and the strategic storage of water.
- Water efficiency and public information programs.
- Water demand management approaches and impediments
- More efficient and enviromentally friendly technology for desalination
- Use of treated industrial and municipal water for crop irrigation.
- Seawater pollution in associated with the dumping of brine water
- Seawater pollution associated with the congestion of tankers with oil leaks and their dumping of dirty ballast water prior to filling with oil.
- Exploitation of non-traditional sources of water.

Is Importing Water Viable?

- In the past 20 years, Turkey has examined the possibilities of exporting water through the peace pipe line; a project was proposed to supply Syria, Jordan, Palestine, Israel, and Arabia with water.
- The recent published Blue Peace; rethinking Middle East Water report, states that on the average Turkey can at least export 1-1.5 BCM from its national rivers (excluding Tigris and Euphrates) to the Jordan River Valley countries.

Scope of Work:

Water Energy issues such as:

- Optimal use of energy in desalination processes.
- Maximizing the efficiency of existing desalination plants and selection of the most promising and economically-feasible desalination technologies for future developments.
- Training and education in the principles of reservoir engineering and reservoir modeling of water, oil, and natural gas resources.
- Peace and security issues as these pertain to energy and water.
- Issues of sustainable governance of water resources

Scope of Work:

Energy issues:

- Smart electricity grid as well as the interconnection of national grids;
- Optimal use of the gas and interconnection of the national grids
- Better infrastructure design for energy conservation.
- Energy efficiency projects.
- Economic research pertaining to the global oil and gas market to improve demand forecasting and reduce the volatility in prices.
- Research to identify new market opportunities for crude oil, gas, liquefied gas, refined products, GTL and petrochemicals.
- Studies on alternative sources of energy, particularly solar energy,
- Comparative studies on the price development of different energy sources.

What is the Role of Private Sector?

- There is a need to undertake analysis to help convene and build coalitions to develop transformational policies, programs, projects and partnerships – aimed to create "proof points" that such a coordinated platform approach can work;
- The efforts needed should support the development of national and regional analysis on gaps between water supply and demand that lead to prioritized recommendations and sector strategies;
- Followed by building local public-private coalitions to identify potential reform projects, programs and policies that support the government's reform activities and;
- Partnerships that leverage expertise from the private sector (technology, expertise and advice) to assist the public sector in their water planning and management activities.

Scope of Work:

- The research work should be carried out in well-defined projects. Most of the projects should, at least initially, be directed by staff members from the region;
- Later, external projects, engaging visiting scholars and international working groups, as well as networks of scholars in its fields of expertise, starting in the region, and expanding internationally.
- Organize training courses for professionals in the region and abroad on various aspects of energy and water. Some of the courses will be policy oriented and others technically oriented.

A REGIONAL APPROACH TO WATER MANAGEMENT

- If the region is to remain stable and secure, it is necessary that resources be distributed across the region to enable access to all.
- Production technology is a catalyst in attempting to resolve the issues of dispute among the riparian parties. Peaceful settlement of water disputes is a preventive measure that would serve regional stability.
- Human resources have to be trained and equipped with the managerial skills and hardware needed for sophisticated management of national water resources

A REGIONAL APPROACH TO WATER MANAGEMENT

- Conducting public awareness campaigns and adopting systems for public participation.
- The productivity per unit water flow per unit of land should be increased to cope with the increasing population and with the limitation on water resources.
- Efficient water use therefore heavily hinges on the consumption of energy and the use of modern technology.

What about Establishing A Community of Water & Energy?

- The challenges outlined above highlight that the water and energy sectors are best addressed by an interdependent Water and Energy Community for the Human Environment.
- Establishment of a Community of Water and Energy among Turkey, Syria, Lebanon, Jordan, Iraq, and Palestine. In which these countries can set the stage for regional and trans-regional cooperation.
- Such a community is a reminder of the Community of Coal and Steal in postwar Europe that was created in 1955 and developed into the European Common Market, the European Commission and the European Union in few decades.
- Can the European cooperation sets an example for other regions to follow

Concluding Remarks

- The problem of the region water & Energy security is already serious and is growing more serious each year
- This impact strategic interests & stability
- Considerable effort must be expended to identify and characterize water resources, and design supply systems appropriate to local circumstances
- Water issues cannot be separated from energy issues
- Careful effort must be expended to identify appropriate energy options needed to meet water security needs
- A major analytical effort is needed to identify the steps needed to meet the Millennium Development Goals across The Region
- Achievement of these goals will still leave millions of people without water & energy security.

Thank You for your Attention