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Energy, Water, Climate Change – Building Bridges between Europe and MENA and between Generations 2012

Sustainable Proposal for Energy & Waste Water Treatment for the "Republic of Electric Generators"

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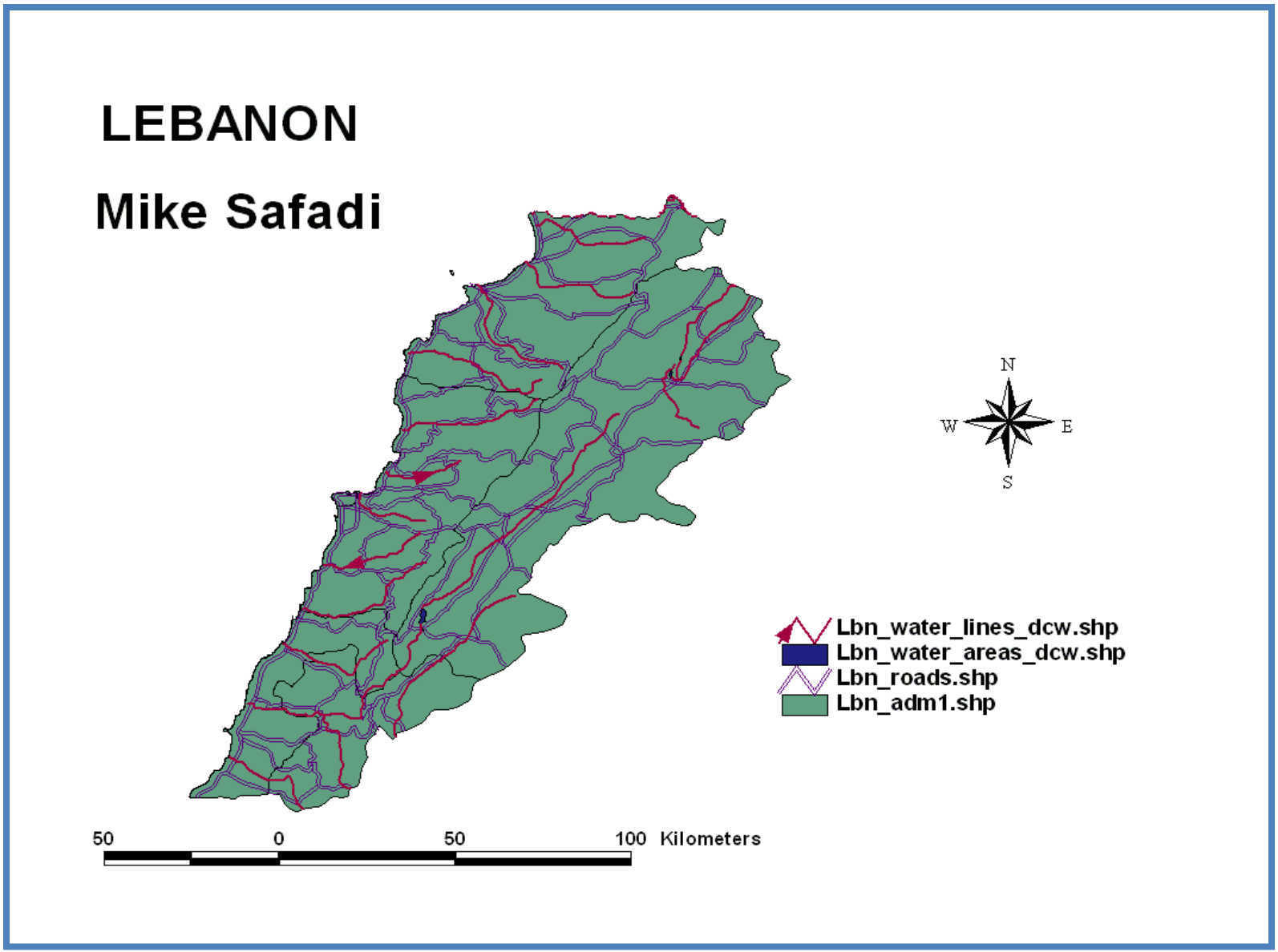
Outline- IWRM Thesis Proposal 2012

- Lebanon Geography
- War & Post War Period
- State of Energy in Lebanon
- Electricity in Lebanon
- Environmental Problems (Fuel)
- Sustainable Hydro-Power (Sustainable Approach)
- Lebanese Waste Water Problems
- Environmental Impacts of Waste Water
- Combining Hydro-Power to support Waste Water Treatment
- Benefits
- Constraints
- Recommendations

Geography

- Location: Middle East, bordering the Mediterranean Sea, between Israel and Syria
- Surface Area: 10452km2
- Population: 4 Millions
- Climate: Mediterranean; mild to cool, wet winters with hot, dry summers; Lebanon mountains experience heavy winter snows
- Precipitation: Ranges from coastal to mountains, between 800-above 1500mm. (Snow precipitation cover Lebanon starting from 800m a.s.l to 3088m a.s.l)

Lebanon: “The Palace of Water in Middle East”



War and Post-War Period (1975-1990)

- A lot of damage has been done on hydraulic infrastructure
- A lot of illegalities occurred in underground water
- Destruction of the Lebanese Electric Infrastructure
- After the 1990, rehabilitation took place of the Lebanese Public Sector
- Lebanon until 2012: Does not have State Electricity 24hrs.
- In 2000 a Water Master Plan was launched (Water Sector Reform)
- 10-year Water Master Plan: Building of 17 dams, which will allow Lebanon to store 878 Mm3 (Only 2-3 dams exist)

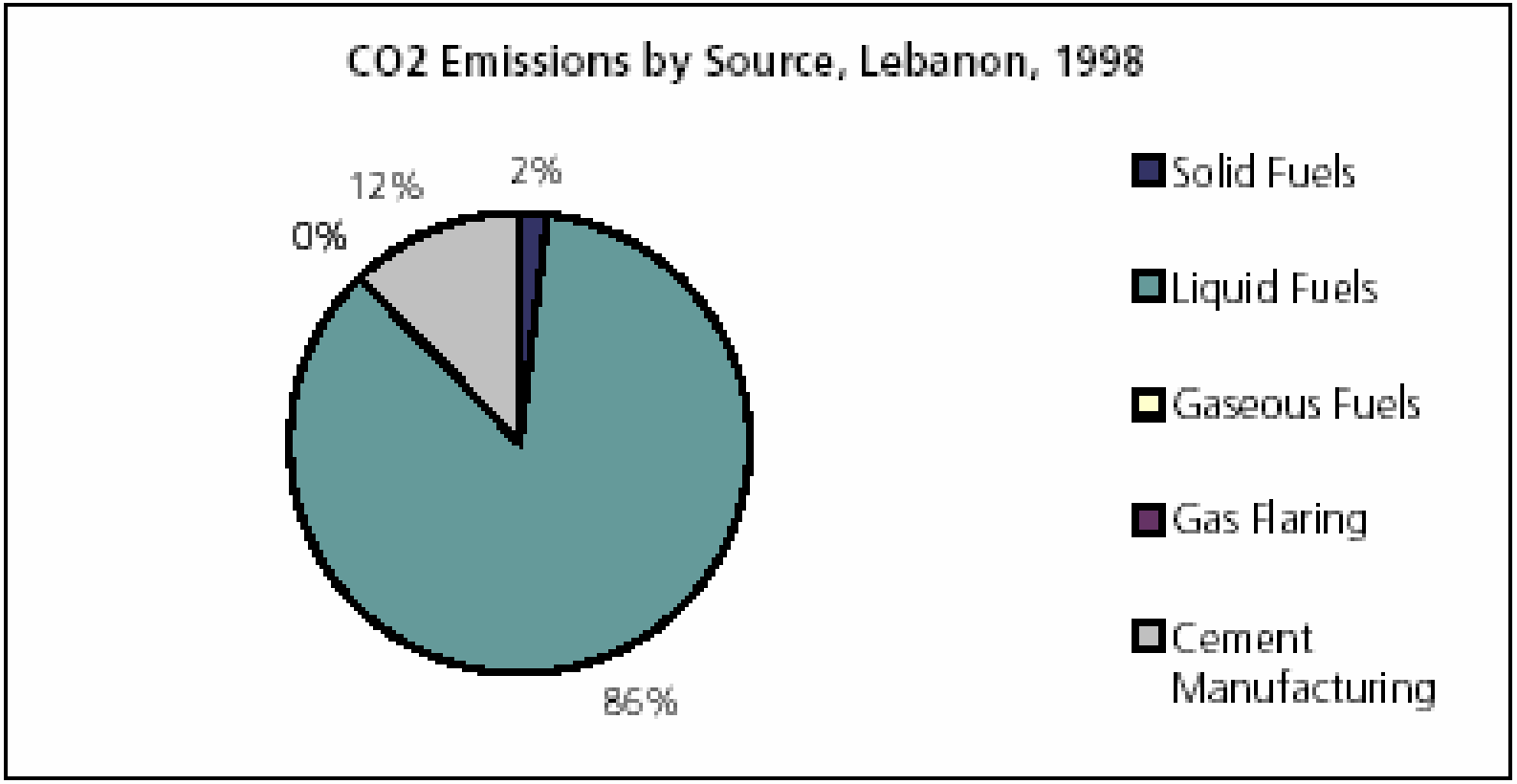
State of Energy in Lebanon

- Lebanon has no known fossil fuel resources
- All energy needs are met with imports of petroleum products
- The power sector accounts for about 50% of the fuel imports
- Lebanon is an energy intensive country, more than other neighboring Southern Mediterranean countries

Electricity Sector

- Since 1990, after the end of the Lebanese civil war, the generation of electricity started to grow with a high rate
- The 87-90% of the electricity is produced with oil products, mainly gas/diesel and residual fuel oil.
- The remaining 13 % is produced with hydro.
- Lebanon's electricity sector is dominated by the state-owned Electricité du Liban (EDL)
- Lebanon: A mafia Republic of Private Electrical Generators, that works when State Electricity is off.

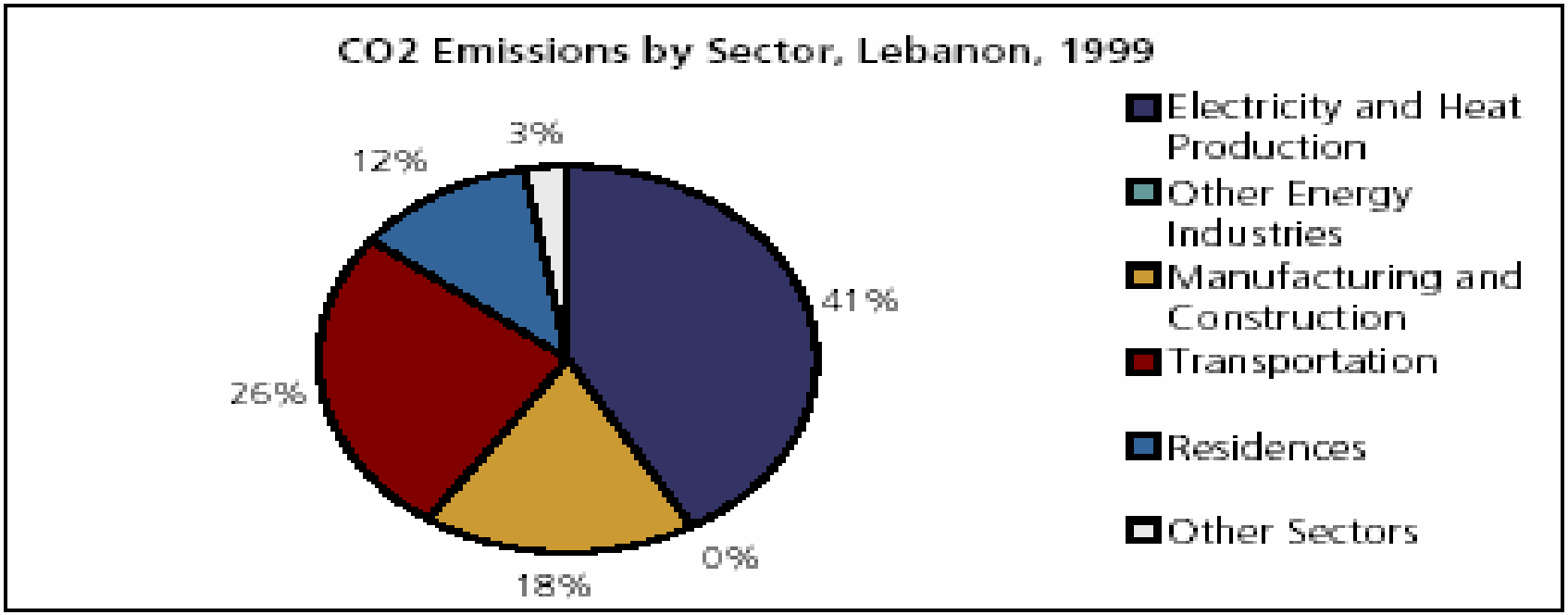
Environmental Damage



(Source: ALMEE: Lebanese Association for Energy Saving & for Environment

Environmental Damage

- Electricity and heat production are the largest contributor of CO2 (approximately 41%), *followed by the transport (approximately 26 %), manufacturing (18%) and residential (12%) sectors. (ALMEE Association)*



- Source: ALMEE: Lebanese Association for Energy Saving & for Environment

Environmental Impacts from Electricity (FUEL)

- Increase in CO_2 and CO in the atmosphere…
- Causing many diseases (mainly Cancer)

Zouk Electric Fuel Plant,Lebanon

From Electric Generators Republic to Sustainable Hydro-Power

- Flowing water creates energy that can be captured and turned into electricity
- The most common type of hydroelectric power plant uses a dam on a river to store water in a reservoir.

Sustainable Approach

- Lebanon has the ability in terms of water resources to generate his own electricity, without fuel (Hydro-Power)
- In order to do so, investment in dams need to take place
- Since the Arabs (Gulf countries) are investing millions of Dollars for desalination plants due to water scarcity
- Solution is: Let them invest in Lebanon, build dams throughout Lebanon, and through pipes from Lebanon to their countries (UAE, KSA, Qatar…), benefit from the water (through water agreements, negotiation…)

Lebanese Waste Water

- Because of Civil War Period, Waste Water was dumped directly into the Mediterranean Sea.
- To date, little information is available in terms of wastewater management.

Waste water disposal in Lebanon:

Number of Sea outfalls amount to 77 (2012)

2nd Big Issue: Lebanese Waste Water

- Sewage and waste are dumped daily into Lebanon's largest river, the Litani → ending up into the Mediterranean Sea
- Litani River used by farmers to water their field and orchards.
- The practice is now threatening to become an environmental disaster harming the country's agricultural sector.
- Due to government neglect, the river, has become the outlet for a network of sewers and waste water pouring in from the villages, towns, and factories along its banks. (Al-Akhbar 2011)

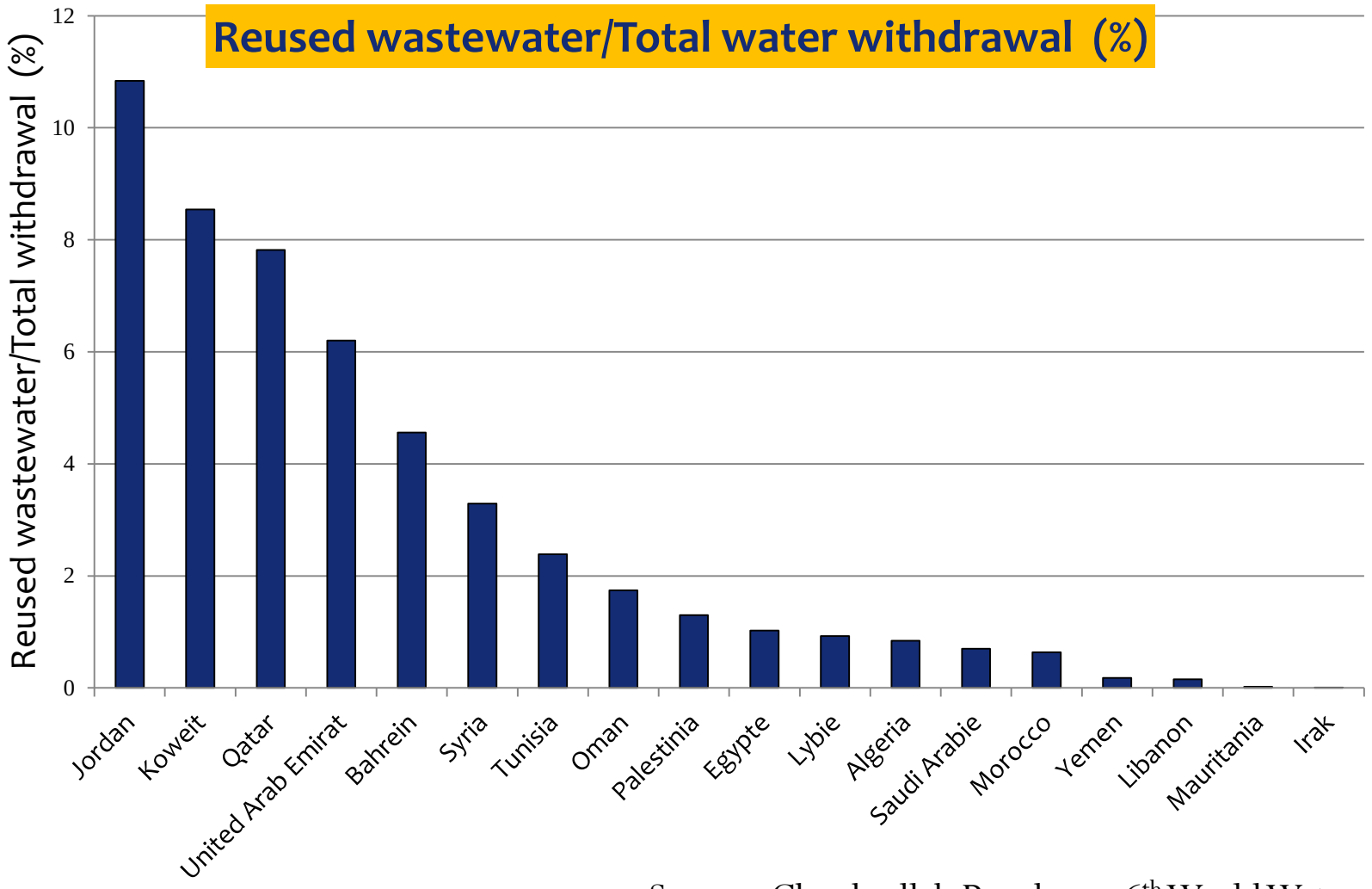
Environmental Impacts of WasteWater

- Impacts on Mediterranean Sea
- Impacts on Fish & Marine Life
- Impacts on Tourism
- Economic Loss
- Associated Diseases & Pests

(Lebanese CNRS)

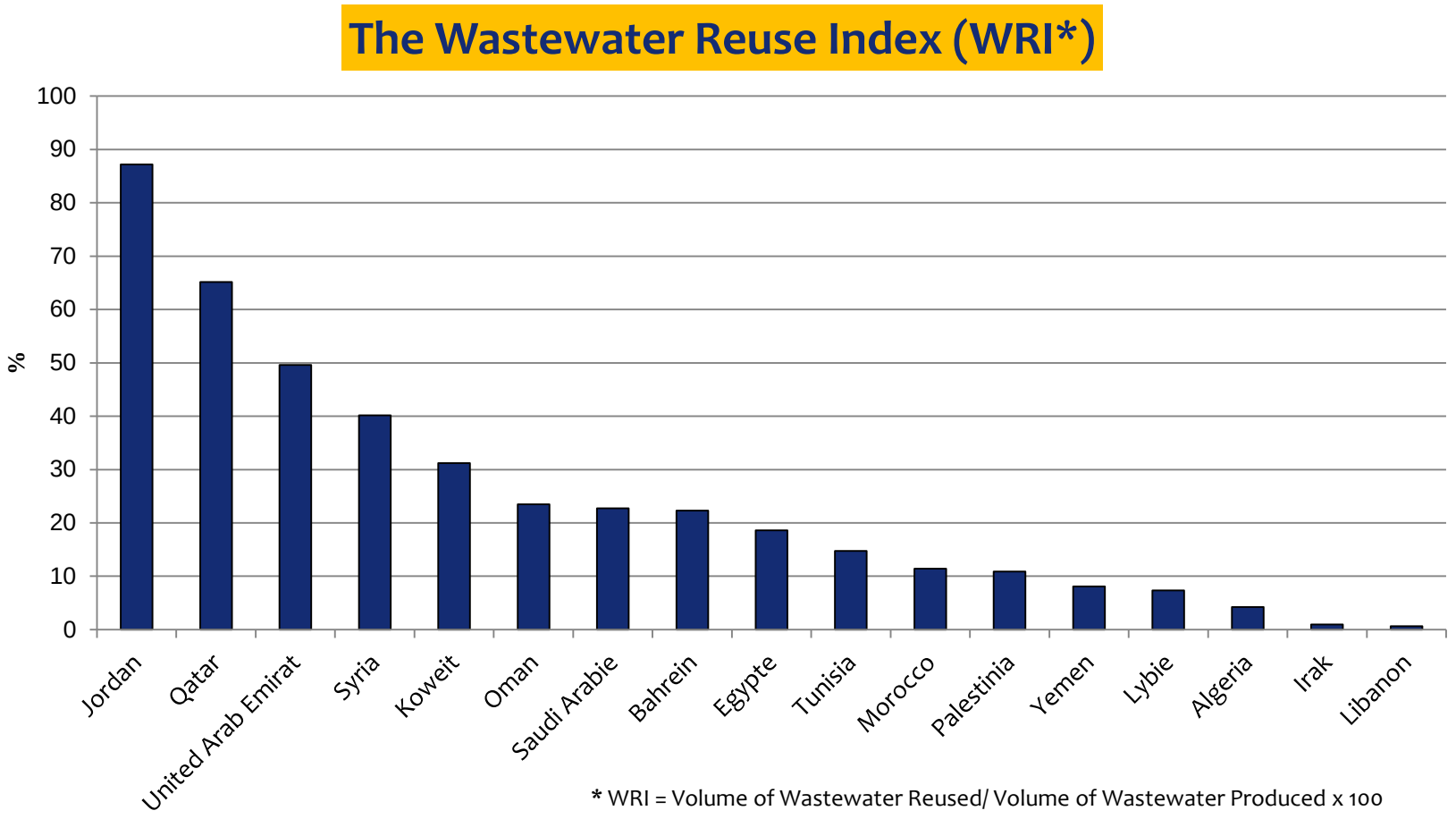
Adapted from CDR/LACECO, 2000

Re-used Waste Water



Source: Choukrallah Roudwan, 6th World Water Forum, France, 2012

Waste Water Reuse Index



Source: Choukrallah Roudwan, 6th World Water Forum, France, 2012

Combining Hydro-Power to generate Waste Water Treatment Plants

- Since Lebanon is the "Water Palace" in this arid and semi arid region → more focus should be on building dams
- Generating our own electricity
- Being dependent politically and economically
- Reducing Fuel costs and environmental damage
- Investing in Waste Water Treatment Plants since they require 24 hours electricity, and currently Lebanese State is unable to give 24hours electricity.
- Thus, by generating electricity from water (rivers, dams…), this 24 hours electricity, will be used to generate the Waste Water Treatment Plants

Combining Hydro-Power to generate Waste Water Treatment Plants

- Waste Water Treatment plants costs around 20M USD and up
- Establish a database, not yet existing, on the wastewater quality in Lebanon
- In this way, we are solving the problem of electricity and of waste water management that is still a big issue in the 21th century.

Benefits of such combination

- Less pollution in the Mediterranean Sea
- Positive economic externalities on Tourism, and on Fish and Marine Life
- Less Diseases & Cancer…
- Less economic costs for buying fuel and waiting political decisions
- Less costs for 2nd bill for electrical generators
- If Government is unable: solution is a combination of PPP (Private-Public Partnership) and B.O.T (Build-Operate-Transfer).
- Waste Water Re-Use can be used for Irrigation in the Agriculture Sector and for Landscape in cities.
- Saving Water Resources and maybe a possibility to export it to the scarce water countries (Dubai, Qatar, Kuwait…)

Constraints

- Bad Water & Energy Governance (No Accountability, No Integrity)
- Unclear policies on wastewater re-use
- Old Water Laws and Regulations dating back to 1920 (Ottoman Empire & French Mandate)
- Limited Private Sector role
- Economic Debt (50-60 Billion USD)
- Mafia Electrical Generators
- Political Instability in Lebanon & in the Region
- High Corruption

Recommendations

- Such proposal, can help Lebanon in matter of Energy & Water to be sufficient and independent
- To Have a Good Governance in the Public Sector
- Strengthening the Private-Public Partnership
- Involvement of 3rd parties (Civil societies, NGO's)
- International Cooperation & International Community Support
- Arab Gulf Countries have the ability to invest in Lebanon for Dams, reducing their costs of desalination…and through water agreements they will benefit from the fresh water through pipes
- Public & Environmental Awareness in schools, universities, media regarding Waste Water Management & Treatment
- Apply the principles of Integrated Water Resources Management

Thank you!!