The Impact of Environment, Water Resources and Land Protection on the Development of Syrian Energy Supply Strategy

Sustainable Development Goals Addressed

Organization, Institution or Company

Energy Planning Group, Nuclear Engineering Department, Atomic Energy Commission of the Syrian Arab Republic and International Atomic Energy Agency (IAEA)

Location of project site, Country

Syrian Arab Republic

Brief narrative description of objective/project/activity/initiative

The Syrian Arab Republic faces a number of challenges related to energy, water, land and climate. The country receives relatively little rainfall, particularly in the arid south-east region, and current water consumption is unsustainable. The impacts of climate change are expected to exacerbate the existing water deficit, owing to increasing temperatures and declining precipitation. Increasing agricultural and industrial demand for water (including in the power sector) will place additional stress on water resources. At the same time, achieving development goals will likely necessitate a substantial expansion of electricity generation, requiring additional water for cooling power plants, and potentially generating additional greenhouse gas emissions. Addressing water needs may also require the increased deployment of energy intensive desalination, further increasing energy needs.

The IAEA provided support to national experts from the Syrian Arab Republic to build capacity in integrated energy and water planning using the Agency's CLEW (Climate, Land, Energy and Water) framework. The team of national experts developed projections of energy and water demand using tools developed by the IAEA — specifically the Model for Assessment of Energy Demand (MAED) and the Model for Analysis of Water Demand (MAWD) — based on population growth and density, economic development, mobility requirements, industrial and agricultural growth, and other factors. The study also took into account IPCC estimates of climate change impacts on the Syrian environment, where increased temperatures and declining precipitation is expected to result in higher electricity demand (e.g. for space cooling, water pumping and desalination) and lower water availability. The researchers then applied the technologically detailed energy planning model MESSAGE to explore alternative strategies for a sustainable climate–energy–water future, including the potential impact of carbon and water pricing, a desalination quota, and technology options including carbon capture and storage (CCS).

Economic, environmental and climate benefits, challenges and lessons learned

The analysis projected that water consumption for power generation could climb from 55 billion cubic meters in 2010 to around 440 billion cubic meters in 2050 with rapid economic growth and an increasing role for water-intensive fossil power plants. The deployment of fossil power plants equipped with CCS carbon capture is likely to further increase water requirements, counterbalancing the benefits from lower carbon dioxide emissions. On the other hand, the introduction of water pricing can help to limit the increase in water demand, albeit at the expense of higher electricity costs.

The findings illustrate some of the significant trade-offs between energy affordability, water consumption and climate change. Despite the challenges this creates for sustainable development, it is also important to keep these findings in perspective, given that the amount of cooling water used in the power generation sector is far below municipal and agricultural demands. For instance, the study also estimated the impact of switching to new short-rotation crops and increasing water supply efficiency in the industrial, service and residential sectors. These measures were estimated to result in water savings four times larger in 2050 than the entire water consumption for power generation.

This further illustrates the value of applying integrated, multi-resource and multi-sector planning approaches to identify and weigh alternative policy interventions.

Additional information: website addresses and contacts

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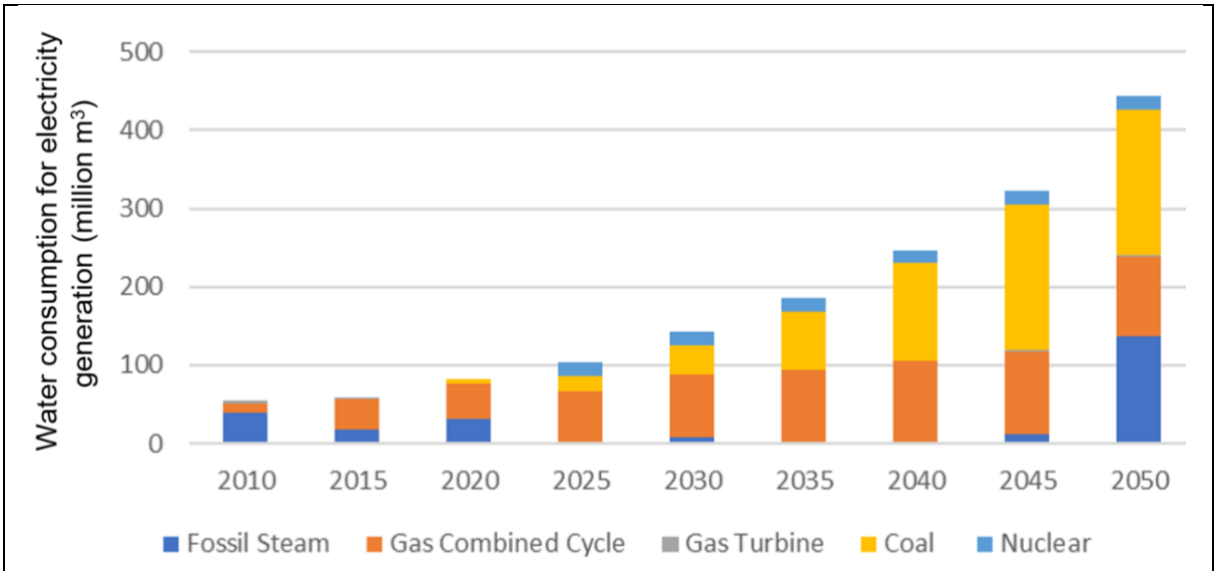
IAEA (2018). IAEA Methodologies and Models for Sustainable Energy Planning, IAEA Brief, Vienna, Austria, https://www.iaea.org/sites/default/files/19/02/iaea-methodologies-and-models-for-sustainable-energy-planning.pdf

See also, https://www.iaea.org/topics/energy-planning/capacity-building



Water consumption for power generation under reference scenario, Syrian Arab Republic. Note, 'Fossil Steam' refers to steam cycle generation using fuel oil.