International Energy Agency

The Water-Energy Nexus in Energy Transitions

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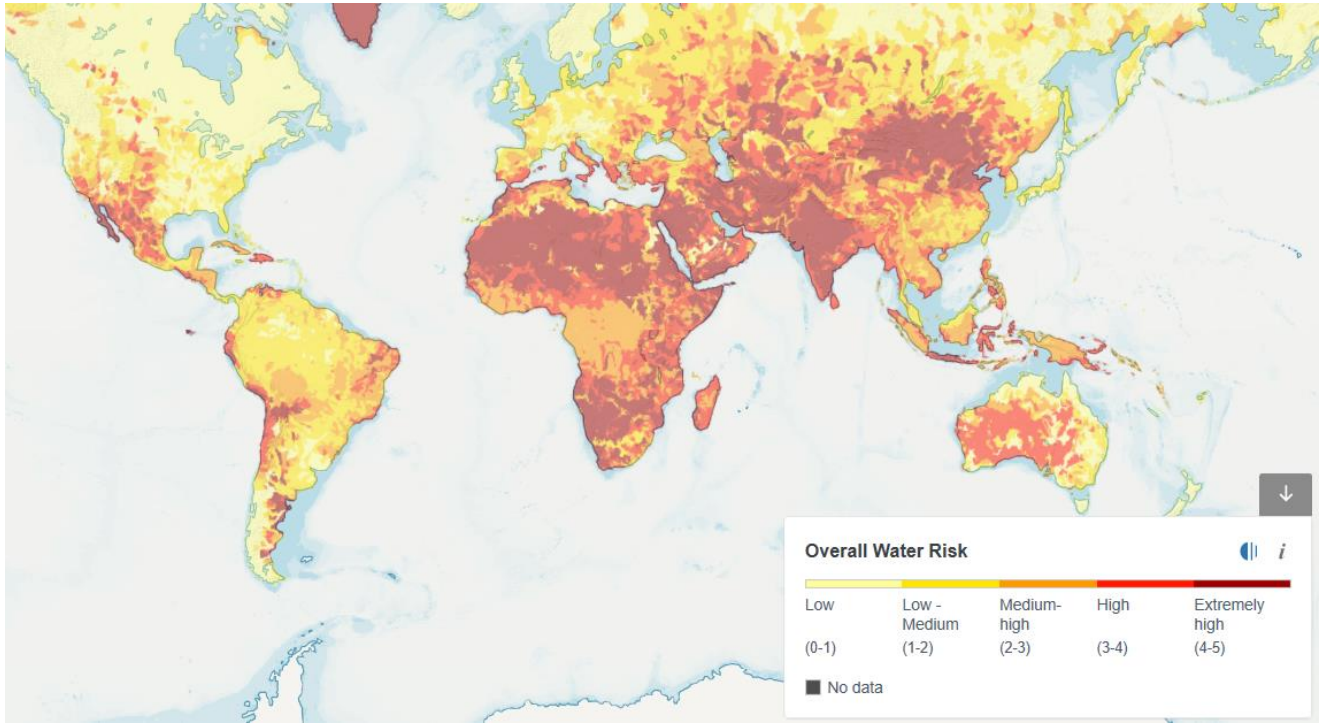
Breakout Session I: Water-Energy Nexus in the Energy Transition: Unveiling the Challenges

A world of water scarcity

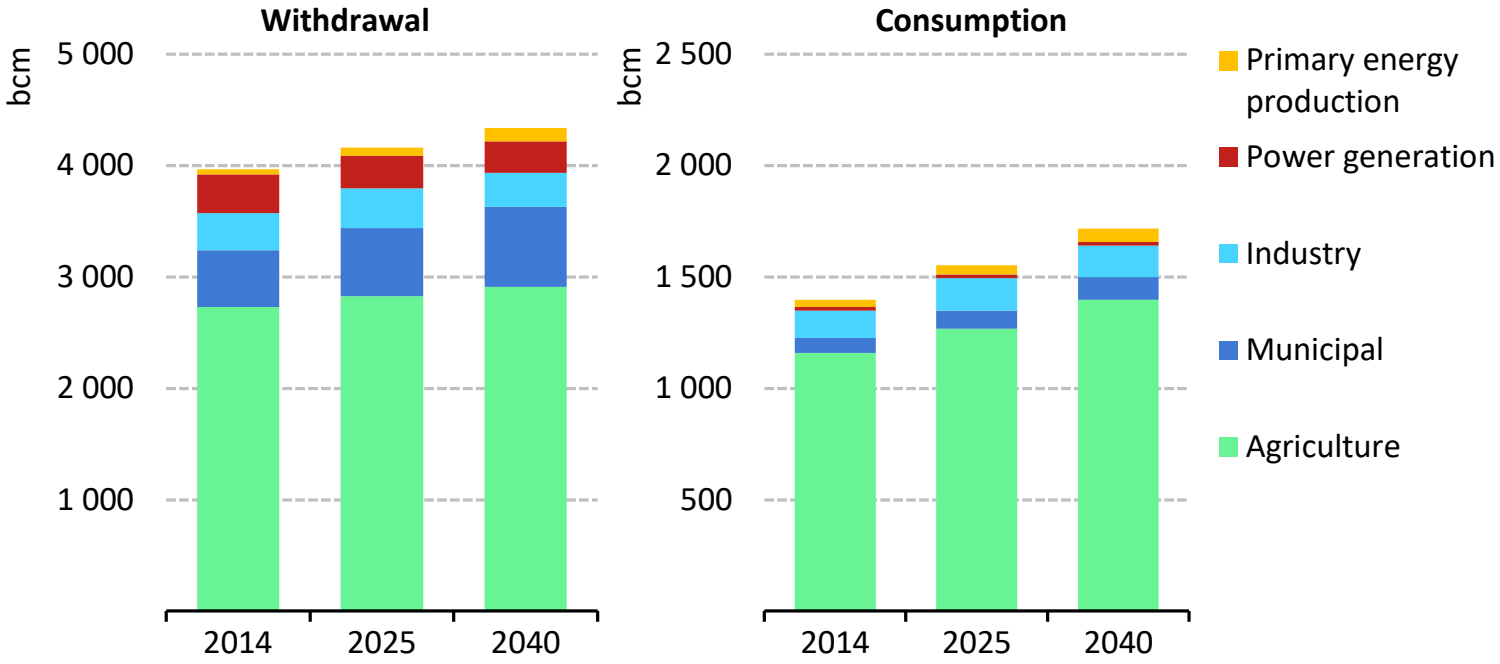
Level of Water Stress by Region (WRI Aqueduct Database)



Over 60% of the world's population experiences water shortages at least once per year and 2 billion people currently do not have safe drinking water

The energy sector needs to contend with competing uses of water

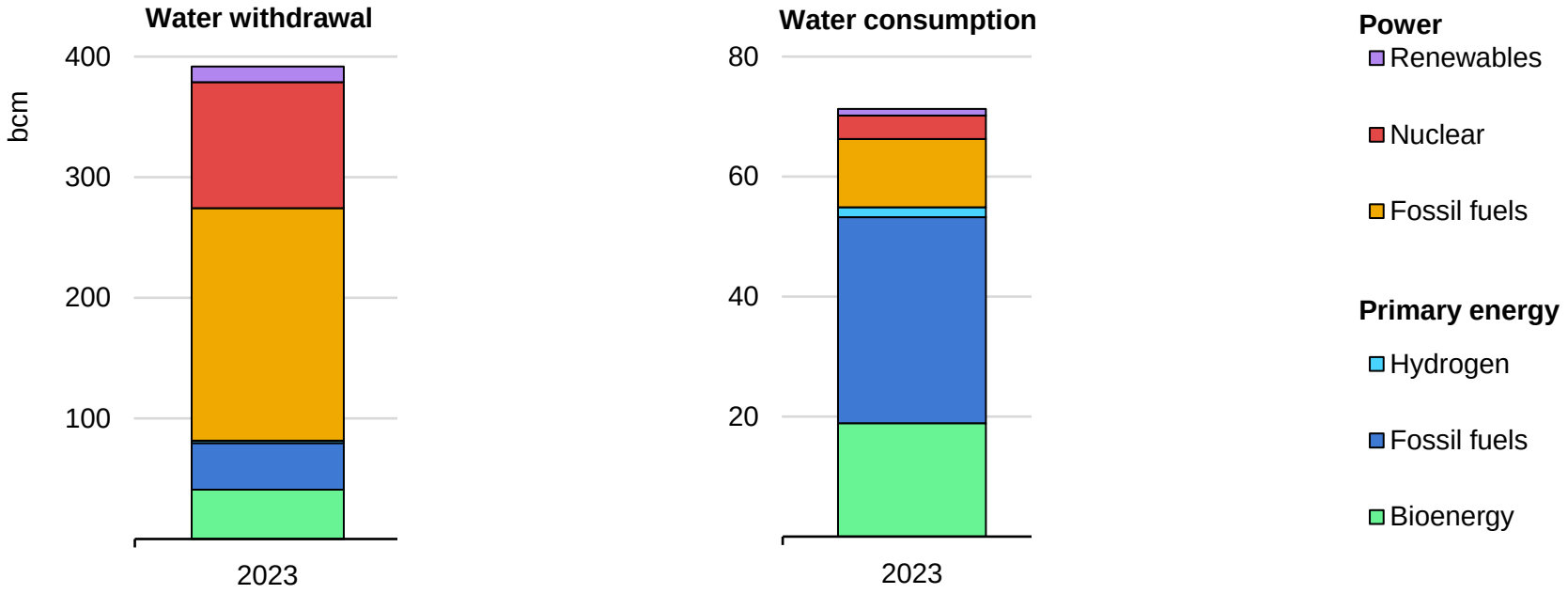
Global water withdrawal and consumption by sector



Primary energy production and power generation account for roughly 10% of total worldwide water withdrawals and less than 5% of total water consumption

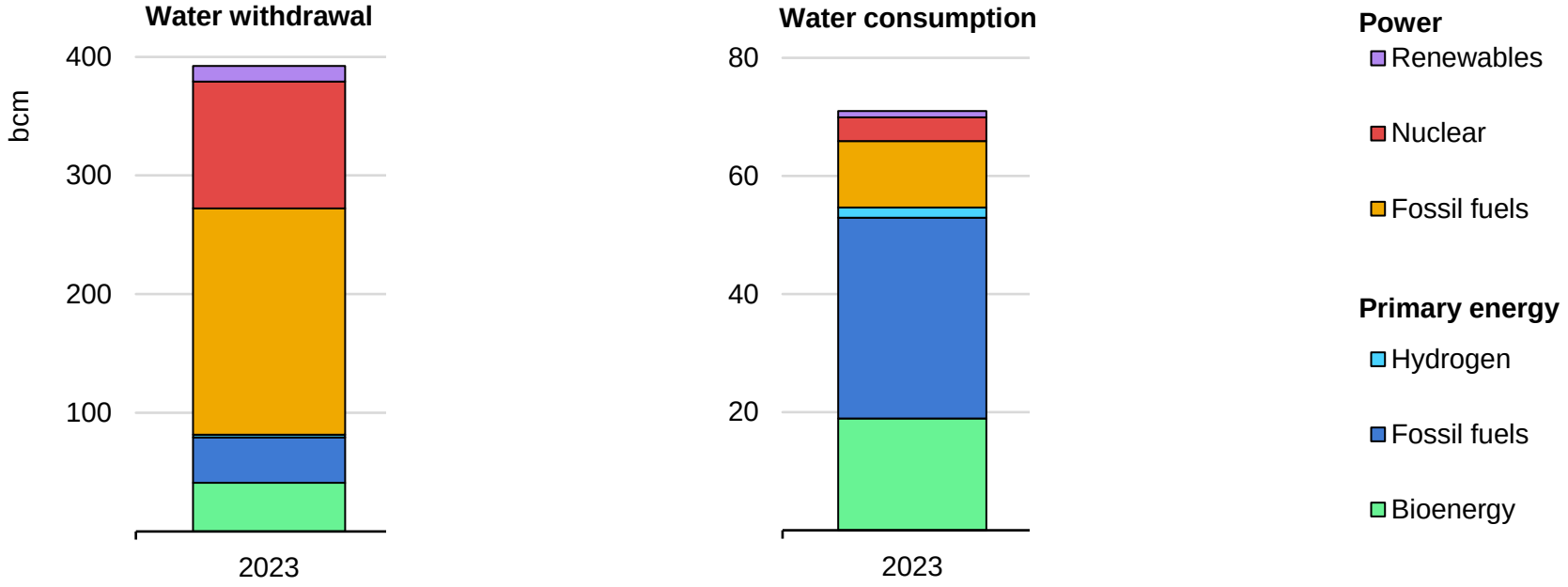
What is behind the energy's water footprint?

Global water use in the energy sector in 2023 and in 2030 in the Stated Policies Scenario (STEPS)



Clean energy can help to ease the water crisis

Global water use in the energy sector in 2023 and in 2030 in the Net Zero Emissions by 2050 Scenario (NZE)

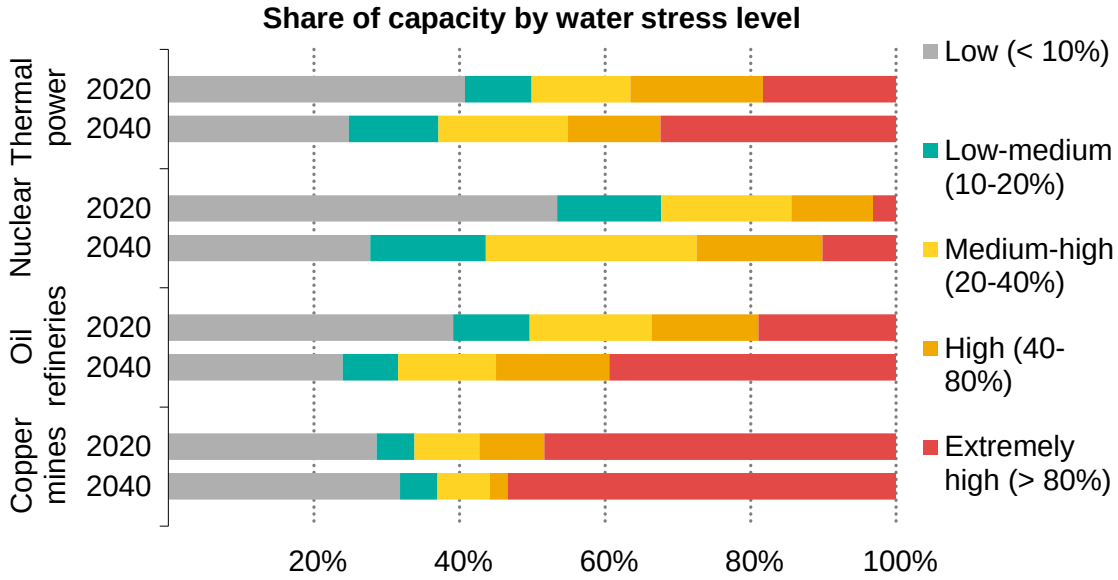


Energy and water stewardship are critical for global prosperity

- Energy and water resources are foundational to economic development, food production, environmental sustainability and human well-being
- Many of the climate impacts will be felt through water, with implications for energy security
- Energy planning should take current and future water availability into consideration when considering the choice of sites and technologies
- Collaboration with the water sector can help energy transitions: biogas can be produced from wastewater and desalination can be a source of flexibility to balance variable renewables
- Many of the clean technologies being deployed to provide electricity can also be used to provide access to water

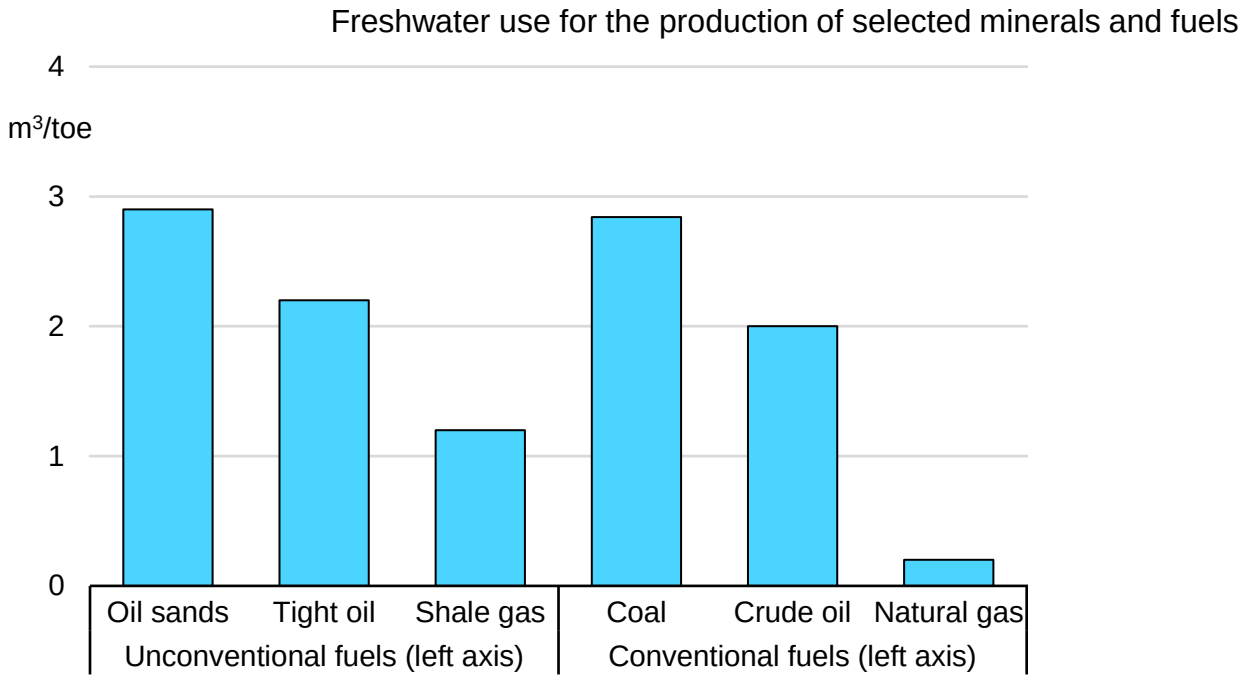
A changing climate will bring increased risks

Water stress exposure of freshwater-cooled thermal and nuclear power plants, refineries and copper mines



Around a third of oil refineries are located in high water stress areas

Zooming in on the extractives sector



Energy choices can support sustainable water management

- Clean electrification through technologies such as wind and solar PV generally brings a lower water footprint as it doesn’t require as much water for cooling processes

- Water use can be cut by controlling losses (e.g. minimising wet areas, gains in efficiency) or using alternative technologies (e.g. dry cooling, dry tailings)

- Operations can also use water that has lower quality, such as water from mine dewatering and surface runoff, as well as recycled process water, produced water or desalinated seawater

- Companies can minimize water contamination (e.g. by managing runoff or using treatment technologies) and prevent it from reaching waterbodies (e.g. through drainage systems)

- They can also remove contaminants present in effluents through simple measures (e.g. pH correction) or advanced technologies, such as membrane filtration or photochemical oxidation