

Emissions from energy use in the water sector are poorly understood

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Greater understanding is needed of greenhouse gas (GHG) emissions from energy use in the water sector if it is to meet sustainability goals, according to researchers at the University of East Anglia (UEA).

In a study published online today in *Nature Climate Change*, Prof Declan Conway and Sabrina Rothausen argue that greater focus on the [energy requirements](#) of the water sector will be a crucial part of the policy response to the huge challenges it faces in the coming decades.

Transparency in the water industry's [energy use](#) is also likely to be important for it to meet carbon-reduction commitments while responding to other measures of sustainability, such as the need for stricter quality standards and increasing demand.

To date, much attention has been given to the need for sustainable water resource management, but far less to the growing energy use and associated [emissions](#) from the water sector, for example through processes involved in water treatment and distribution and domestic heating of water.

"Pressures on [water management](#) include stricter water-quality standards, increasing demand for water and the need to adapt to climate change, while reducing emissions of GHGs," said Prof Conway, professor of water resources and climate change.

"The processes of abstraction, transport and treatment of fresh water and wastewater all demand energy. Adapting water management to meet

increasing demand, regulatory standards and the effects of climate change will in many cases require greater energy use."

He added: "Energy use in the water sector is growing, yet its importance is under-recognized, and gaps remain in our knowledge. In this study we define the need to integrate energy use further into water resource management and identify opportunities for the water sector to understand and describe more effectively its role in GHG emissions, through regulatory and behavioural responses, to meet future challenges."

Some recent studies have highlighted the importance of GHG emissions from energy use in the water sector. They show that water-related energy use in the US accounts for nearly 5% of total GHG emissions, and the proportion is even higher in the UK, although there it is mostly associated with end uses of water, such as heating. In countries with very high freshwater withdrawals, most of the water is used for irrigation and the energy used in its extraction and transport is often considerable. Estimates for India suggest that emissions from lifting water for irrigation could be as much as 6% of total national emissions.

Climate change represents a huge challenge to the sustainable management of water resources. In recent decades, developments in industrial, agricultural and domestic water use, and in water-quality regulation, have greatly intensified the treatment and transport of water. Moreover, rising demand for food and bio-fuels, and their international trade, threaten to drive expansion of irrigated cropland and cropping intensity and hence greater use of water for agriculture. These activities generally require high energy consumption and have contributed to increases in energy use in the water sector in many parts of the world.

The 'perfect storm' scenario of sustaining increases in food production given [climate change](#) impacts and the need to reduce GHG emissions,

together with increasing competition for water, provides a strong rationale for better integration of water and energy use.

There is also a need to achieve better connections between mitigation and adaptation. Consideration of alternative water supply systems, treatment technologies or water allocation may have a tendency to overlook the carbon cost; some measures regarded as sustainable water management, such as desalination, are very energy intensive. This is particularly the case in the absence of regulatory pressure, as is currently the case in most countries.

In [Greenhouse-gas](#) emissions from energy use in the water sector, Prof Conway and Ms Rothausen, of the School of International Development, quantify energy use in the water sector and detail the extent of current knowledge on emissions from the water sector and agricultural water use. Their review shows that energy use and GHG emissions in the sector are under-recognized, in part because of differences in the scope of water-sector boundaries, data availability, methodological approaches and whether results are expressed as energy use or GHG emissions.

Ms Rothausen explained: "Although end use often has the highest energy use of all water-sector elements, it has not traditionally been seen as a direct part of the water sector and is often unaccounted for in water management and policy.

"What evidence there is shows that energy use in the water sector is considerable and growing. This growth is likely to continue, sometimes as an unintended policy outcome, with greater pressure to use and maintain quality of water resources. Despite some recent progress, we need to better understand and profile the role of the water sector as a GHG emitter. A co-ordinated view of the water sector will promote more comprehensive assessments of energy use, while standardized

methodologies will enable comparisons between assessments of different technologies and processes, and between regions or countries."

More information: Greenhouse-gas emissions from energy use in the water sector is published online on June 26 in *Nature Climate Change*, DOI: [10.1038/nclimate1147](https://doi.org/10.1038/nclimate1147)

Provided by University of East Anglia

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