FACT SHEET

Wastewater and nutrient management for *#ClimateAction*

To solve the climate crisis we must take wastewater and nutrient management seriously – instead of contributing to pollution the recovered energy, water and nutrients can be used to help solve environmental and climate challenges.

See the video: Wastewater and nutrient management for #ClimateAction
Read the report: Wastewater: from problem to solution

What you need to know

Today wastewater treatment processes contribute as much to global greenhouse gas (GHG) emissions as the global aviation industry. Whilst the full scale of GHG emissions from wastewater is still not fully assessed it is projected that they will increase considerably in the coming years, if efforts to halve the proportion of untreated wastewater (SDG 6.3) rely on conventional, linear wastewater treatment solutions.

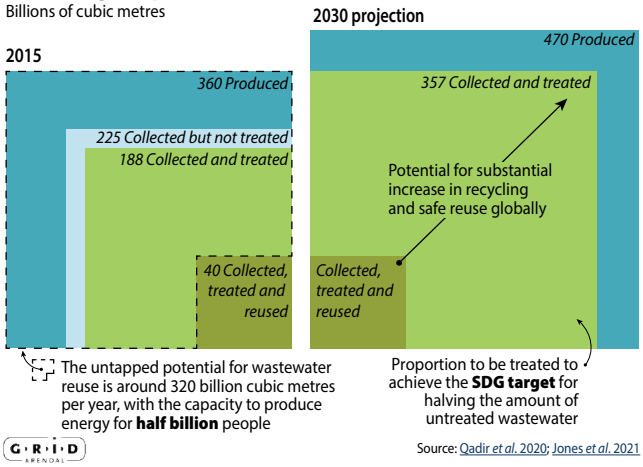
Globally we produce 5 x more wastewater than water passing over the Niagara Falls every year. This volume is increasing and pollution from unmanaged wastewater is still one of the most pressing global challenges. Excess nutrients flow into the environment undermining ecosystems, threatening human health and exacerbating climate change.

Rather than seeing wastewater as an ever-growing and costly problem, it should be looked to as a solution. It is a source for recovering valuable resources – not only recycled water but also energy and nutrients.

Wastewater has the potential to provide electricity for around half a billion people each year. In addition, recovering nutrients such as nitrogen, phosphorus and potassium could offset 13% of the global fertilizer demand in agriculture.

This potential is not being realised. Only 11% of treated wastewater is currently being reused.

Unlocking the potential of wastewater



Source: Qadir *et al.* 2020; Jones *et al.* 2021

Where is Wastewater in the climate agenda?

The issue of wastewater is still invisible in the climate agenda and yet it is an issue that risks undermining progress towards climate commitments. Wastewater must be actively and urgently brought into the development of climate solutions.

Dig deep enough and the elements are there. The critical role of water in delivering climate solutions was acknowledged in the Sharm el-Sheikh Implementation Plan resulting from COP27, reiterating the sentiment of the UN 2023 Water conference.

Sustainable wastewater management that recovers vital resources can contribute to climate mitigation as well as adaptation and resilience, with the co-benefits of tackling the two other threads of the triple planetary crises: biodiversity loss and pollution.

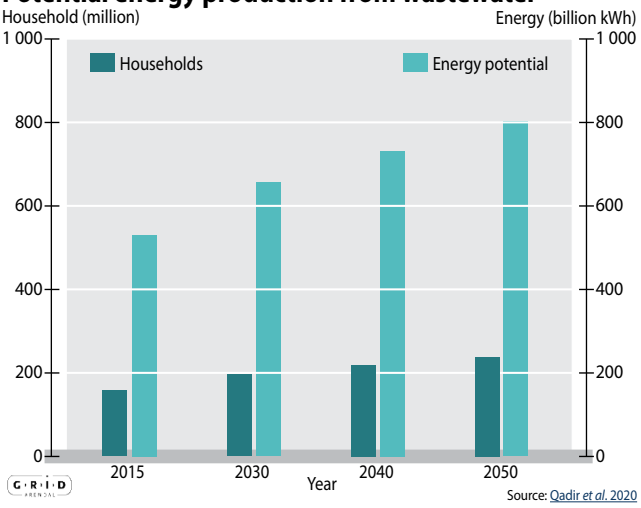
Energy recovery potential from wastewater

Conventional wastewater treatment processes are energy intensive and are estimated to account for 3% of global electricity consumption. Yet there is about five times more energy contained in wastewater than is needed to treat it. This energy is in the form of heat and from the chemical breakdown of the organic matter.

As an example, methane and carbon dioxide can be captured from the wastewater to produce biogas, contribution to lowering emissions and climate mitigation. Solid fuel briquettes can be made from faecal sludge and have shown the potential to replace traditional cooking energy sources.

Energy from wastewater can help to contribute to green energy requirements and climate mitigation. This alternative, reliable and accessible energy source has been projected to supply half a billion people per year. Costs and emissions of the transmission and distribution of energy are also reduced by providing a localised supply.

Potential energy production from wastewater



Source: Qadir *et al.* 2020

Explore: Large-scale centralized wastewater treatment as an energy source in Hamburg, Germany

Nutrient recovery potential from wastewater

Nutrients such as nitrogen, phosphorous, potassium and organic carbon are important fertilizers and soil improvers for crop production. All of these can be recovered from wastewater. The production and use of synthetic nitrogen fertilizer alone is estimated to account for 5% of GHG emissions.

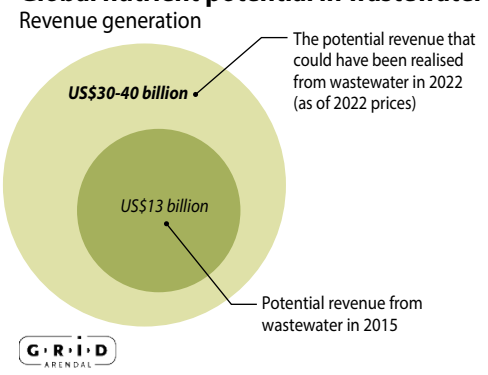
Returning nutrients recovered from wastewater to croplands could reduce demand on synthetic fertilizers, offsetting around 13% of the global fertilizer demand in agriculture.

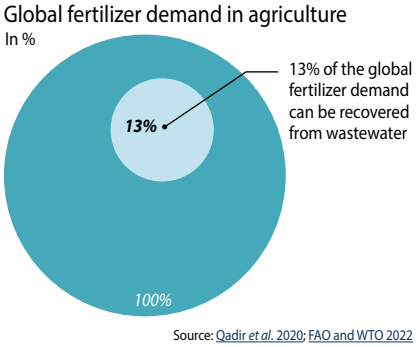
This would have a potential value of between US$30-40 billion as of 2022 prices, with additional benefits to increase accessibility of fertilizer in low-income regions and prevent them being lost to the environment, reducing pollution pressure on marine and freshwater ecosystem integrity, reducing biodiversity loss.

Nutrient recovery limits the emissions of powerful GHGs such as methane and nitrous oxide from the organic breakdown that occurs during wastewater treatment. Methane and nitrous oxide have respectively 30 times and 300 times more warming potential than carbon dioxide over a 100-year period.

Explore: Nutrient recovery from sustainable sanitation solutions in rural Burkina Faso

Global nutrient potential in wastewater





Source: Qadir *et al.* 2020; FAO and WTO 2022

89%

of treated wastewater is being discharged without any resource recovery

We are squandering the potential for recovering clean energy, water and nutrients that could contribute to climate change mitigation, adaptation and resilience.