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Researchers call for joint carbon and water cap-and-trade market

A joint water and carbon cap-and-trade system could lead to a more sustainable future, a recent study suggests. Such a system could account for the important links between energy, water and climate change, while at the same time, ensuring economic growth.

Energy, water and climate change are closely linked to each other. Modern economies rely on electricity and generating electricity requires water. In turn, sourcing, transporting and treating water needs energy. At the same time, electricity generation from fossil fuels contributes to climate change and climate change is likely to cause water shortages, which, in turn, will affect electricity production. Future water shortages could lead to energy-water conflicts, where power stations could be shut down to protect water supplies, affecting industry.

In the United States, electric power plants withdraw 3.3 billion gallons (12.5 billion litres) of water a day, with this figure predicted to increase by 50% by 2025. Although most of the water used by power stations is returned to the environment, it needs energy-intensive pre-treatment as it is hot and may be contaminated with heavy metals and suspended solids.

Based on the situation in the US, the researchers suggest that a water cap-and-trade system could run in parallel with a carbon cap-and-trade system, each with their own prices in the electricity markets to limit water use and carbon emissions and outline their proposals for how such a hypothetical system could be operated. Power generators would be required to purchase permits to emit a certain amount of carbon dioxide (as is currently the case with the European Union Emissions Trading Scheme¹ (EU ETS)) or use a certain amount of water each year; these strict limits on water use and carbon emissions could encourage power generators to invest in more renewable energy sources and water-conservation technologies.

Future electricity markets would potentially trade in carbon and water certificates. Similar to the carbon cap-and-trade market, the water cap-and-trade could have water certificates, where each certificate could be equivalent to 10,000 – 1000,000 gallons (37854-378541 litres), or another appropriate unit of water used. An administrator would auction water and carbon certificates to power generators. Power generators that use less than their yearly allocation can bank the extra allowances for future use or the allowances could be traded in the market. Proceeds from the cap-and-trade programme can be reinvested in the economy to meet local or regional sustainability goals. The researchers advise that caps on water use should reflect the need to balance economic development with sustainability standards.

In addition, the researchers proposed a large-scale multi-agent simulation model that can be used to explore how the cap-and-trade in carbon and water would work. The model considers the complex interactions and implications of cap-and-trade programme rules for all three markets (carbon, water and electricity) over multiple time scales, involving relevant decision makers, such as electric power companies, independent system operators, and permit auction administrators.

Players in the electricity market can use this model to put theory into practice by trying out different strategies designed to comply with regulations while meeting customer demands, by, for example, buying and selling permits, installing greener technologies or investing in more renewable energy sources.

1. See: http://ec.europa.eu/clima/policies/ets/index_en.htm

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