The role of water in the low-carbon transition

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Written on behalf of 643 investors with US$67 trillion in assets

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Water is Climate

Integrating water into climate policy is key to achieving long-term, sustainable economic growth.

There is nothing for policymakers to lose - and a great deal for them to gain - from fully integrating water into climate policy and facilitating an integrated approach to both issues by the private sector.

Water – like land or energy – is one of the natural resource 'building blocks' of sustainable development and bears both risks and opportunities:

GHG emissions

A stable water supply is required for reducing GHG emissions and avoiding dangerous climate change. Improved water stewardship may result in opportunities to further decrease emissions[1];

Access to energy

The World Bank's Thirsty Energy Initiative finds that "current energy planning and production is often made without taking into account existing and future water constraints"[2], risking the sector's ability to deliver on low-carbon energy needs set out in NDCS;

Economic growth

The World Bank reports that water security, exacerbated by climate change, could cost some of the world's regions up to 6% of GDP by 2050[3]. They also report that better water resource management and policy could improve the growth rates of some regions by up to 6%.

1. As reported by 25% of companies disclosing to CDP's water questionnaire in 2015
2. World Bank 2016, "High and Dry: Climate Change, Water and the Economy", http://www.worldbank.org/en/topic/water/publication/high-and-dry-climate-change-water-and-the-economy
3. Ibid

The role of water in moving the world to a low-carbon future

The Paris Agreement and the associated NDCs have set the world on a course of rapid decarbonisation and adaptation to changes in the world's climate but water is needed to achieve them. Meanwhile, global demand for water may outstrip supply by a margin of 40% by 2030[4].

> **Climate change will exacerbate many of the issues related to water management and any adaptation strategy must include a consideration of water related issues... Many of the current and proposed regulations to reduce carbon emissions will have the effect to increase power and water consumption.**
>
> **Endesa**

Water availability has the potential to either enhance or derail national climate change adaption and mitigation plans as part of planning for sustainable development.

Climate NDCs plan for a large-scale shift and expansion of energy generation capacity using technologies that often require a stable supply of good quality water. A UNFCCC platform survey of 129 NDCs indicated that improved water security was fundamental to the success of almost all of them[5].

Other constituencies that may make a claim on the same water supplies include citizens, agriculture (including food and biofuels), natural ecosystems, and alternative industrial uses. Future water policy must address prioritisation between these potential users.

Given the risks and opportunities, a holistic approach to water management at national level is needed to ensure that all actors can take effective action to support NDCs and implement the Paris goals.

The low-carbon industrial transformation requires water

Climate change mitigation requires investment in long-term infrastructure that will have an operational lifetime spanning many decades, and water requirements for energy generation will increase by 11.2% by 2050[6] if current consumption modes remain unchanged. Companies are acutely aware that water availability will be vital to the success of corporate decarbonisation efforts. They also recognize that efforts to conserve water can have a positive impact on GHG emission reductions.

- CDP investment analysis[7] of 12 of the largest and highest-emitting global cement companies found that across the companies, more than 50% of facilities are currently located in areas of water stress;
- Water availability challenges in one basin where **BASF** operate is forcing them to increase the amount of recycled water used. The need for water recycling is challenging the company's 2020 energy goal (to increase energy efficiency by 25% relative to 2002);
- **Endesa** reports that many current activities carried out to reduce GHG emissions require large amounts of water, increasing the company's dependence on and thus exposure to water-related risks. For example, Carbon Capture and Storage Technology (CCS) would allow the company to generate electricity from coal with nearly zero emissions, but would increase power plant's water needs and dependencies.

4. World Resources Group 2009, "Charting our Water Future", http://www.mckinsey.com/~/media/mckinsey/dotcom/client_service/sustainability/pdfs/charting%20our%20water%20future/charting_our_water_future_full_report_.ashx

5. Review of the integration of water within the Intended Determined Contributions (INDCs) for COP21, File: http://www.iwa-network.org/downloads/1448965142-2015%2011%2029_Review%20of%20Water%20integration%20in%20INDC_VF.pdf

6. "Managing Water under Uncertainty and Risk", United Nations World Water Assessment Programme 2012, http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/WWAP_WWDR4%20Facts%20and%20Figures.pdf

7. CDP 2016, "Visible Cracks", https://www.cdp.net/Docs/investor/2016/cement-report-exec-summary-2016.pdf

Technology focus:
Carbon Capture and Storage

Carbon Capture and Storage (CCS) offers a potential technical solution for reducing GHGs to business sectors that are dependent on fossil fuels. Scaling up use of CCS technology globally is an assumption for RCP 2.6, the most commonly used IPCC scenario for reducing GHG emissions via policy and technological means.

However, CCS is highly water-intensive and studies suggest that its scaled-up application could lead to the energy sector's demand for water exceeding the available supply. While CCS could cut the GHG emissions of pulverized-coal-fired power plants by 80 to 90 percent, it could lead to a doubling in water consumption[8].

To give a more specific example, in the United States scaling up CCS could increase the water consumption of the electricity sector by 80% by 2030, or about 7,500 megaliters per day, according to research by the US Department of Energy's National Energy Technology Laboratory[9].

This extremely high demand would compete with the needs of other users including citizens, farmers and the local ecosystem. Politically difficult trade-offs would be required, and given the strength of other claims on water resources it is not clear that it would be possible to fully scale up CCS.

Transforming the global energy mix

A shift in energy generation is key in reducing emissions. Luckily, the scale-up of renewable energy generation and use is largely good news for water resource availability.

"Energy efficiency, wind and solar photo voltaic contribute to a low-carbon energy future without intensifying water demands significantly," reported the IEA[10]. They go on to report however, that several low-carbon energy technologies – nuclear power, power plants fitted with CCS equipment and certain types of concentrating solar power – can be highly water-intensive.

Especially in regard to hydroelectric generation, water availability is key and a lack of a stable water supply can have a significant impact on countries where hydroelectricity constitutes a significant proporation of the energy mix. For example, recent droughts in Brazil have had presented challenges for companies reporting to CDP.

- French utilities giant **ENGIE** disclosed a reduction in revenue resulting from the ongoing drought in Brazil; in 2014, the financial impact of "unfavourable hydrology" was reported to cost the organization approximately US$223 million, almost 3% of operating income in 2014.
- **Unilever** reported that for their operations in the south east of Brazil, hydropower accounts for over 70% of its electricity supplied, and are anticipating energy restrictions being enforced if poor rains continue.
- Portuguese utility **EDP** told investors that the effects of drought on its hydropower dependent Brazilian operations could amount to a reduction of US$ 167 – 223 million on earnings in 2015.

Another area where renewable energy poses great demands on water supply is biofuel crops. Future water needs for biofuels will depend largely on whether feedstock crops come from irrigated or rain-fed lands and the extent to which advanced biofuels – whose feedstock crops tend to be less water-intensive – penetrate markets[11]. Climate policymakers must consider these issues if they are to develop successful national climate mitigation policies.

> **Lockheed Martin understands the synergies between water usage and energy efficiency and carbon emissions. For example, as a result of a chiller replacement at our Gaithersburg, Maryland facility, we reduced 800 metric tons of carbon emissions per year, the site's water usage was reduced 8 percent annually and the site experienced a $77,000 annual savings in electrical costs.**
>
> **Lockheed Martin**

8. World Resources Group, January 2015, Opportunities to reduce water use and greenhouse gas emission in the Chinese power sector, http://www.wri.org/sites/default/files/ghg-chinese-power-sector-issuebrief_1.pdf

9. National Energy Technology Laboratory research cited in "The Water Cost of Carbon Capture", http://spectrum.ieee.org/energy/environment/the-water-cost-of-carbon-capture

10. IEA 2012, "Water for Energy: Is energy becoming a thirstier resource?", http://www.worldenergyoutlook.org/media/weowebsite/2012/WEO_2012_Water_Excerpt.pdf

11. Ibid

Industrial synergies can help meet climate and water goals

There is more good news: companies are already reporting that sound water management can reduce emissions and enhance the low-carbon transition.

Analysis of CDP's 2015 data found that more than a quarter of companies identified opportunities to reduce GHG emissions through improved water governance. If given proper attention and consideration, water security can be transformed from a limiting factor into an enhancing one that galvanises energy efficiency.

- **L'Oreal** reported that the implementation of solutions company wide to reduce the quantity of hot water needed for cleaning led to an annual 13% reduction in water consumption and an annual reduction of 692 tCO2;
- **Mitsubishi** planted more than 1 million trees both domestically in Japan and globally in order to improve local water availability whilst also contributing to the establishment of natural carbon sinks;
- **Mars** reports working with farmers in the Mississippi Delta to use alternate wetting and drying (AWD), an irrigation technique that reduces both water use and GHG emissions with little or no impact on yields.

Conclusion and recommendations

Sound and effective water governance is essential for driving dynamic, low carbon economic growth. Climate policy that integrates water issues hence provides great opportunities for sustainable development.

Climate NDCs and the Sustainable Development Goals both acknowledge the role in water stewardship that governments and private sector actors must play in order to achieve a sustainable, low-carbon future.

However, this awareness is still incomplete. Not all of the institutions and actors responsible for implementing NDCs have fully taken water availability issues into account. And not all companies are following the sector leaders in their approach to integrating water and energy/climate goals to minimise trade-offs and maximise synergies.

Integrating water practice and considerations into the mitigation strategies of NDCs will allow governments and businesses to benefit. Companies must consider the role of water in the planning and implementation of GHG emissions reductions activities, and these activities will in turn influence the ability of governments to create effective climate and water policies.

CDP recommends that governments and policymakers:

1. **Ensure that effective regulation of water use and sound water governance is considered to be part of the climate policy process and constitutes part of the national implementation plan for each NDC;**

2. **Ensure the private sector considers both water and climate resilience in GHG emission reduction plans; business should be encouraged and expected to identify and implement GHG mitigation and adaptation opportunities related to improved water management;**

3. **Require annual reporting of action by business, for example via the Business Alliance for Climate and Water; recognising the value of transparency in driving corporate action and investment, and helping policymakers to track national progress against NDCs and SDGs.**

The availability of abundant, clean water for all is fundamental to achieving sustainable development, including the avoidance of dangerous climate change. If given proper attention and consideration, water security can be transformed from a limiting factor into an opportunity to drive energy efficiency and clean power generation.

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