

How China will reduce its carbon impact

May 17 2018



Credit: Leiden University

Ron Yuang, Ph.D. candidate from the Institute of Environmental Sciences investigated the impact of the renewable energy, expansion on China's carbon emission. On 17 May, she will defend her thesis. China is investing heavily in the development of low-carbon electricity sources, like nuclear, hydro-, wind and solar power.

"China has started a 35 year plan to develop low-carbon electricity. This plan especially focusses on wind and solar energy. It is a very important policy implication for China. This is why I wanted to focus on this issue," tells Yuan. For her research, she used a multi-regional input-output model as core methodology. This method focuses on economic relationships and allows to take inter-regional linkages and spillovers into

account.

First, Yuan created a general overview of China's total carbon [emission](#) by establishing the emissions of the different economic sectors. By treating each sector as a subsystem, she assessed the carbon linkages of each sector with the rest of the economy. It turned out that the power sector holds important future opportunities for curbing the rapid growth of carbon emission. "The electricity sector is upstream of the supply chain. It provides power to the other sectors, like the construction or the equipment manufacturing sector," explains Yuan. "Via inter-sectoral linkages these other sectors have a spillover effect on the emissions of the electricity sector."

Next, she analysed the impact of the development of low-carbon electricity on the [carbon emissions](#) that are embodied in the exports of China. This included all 30 provinces of China during the period from 2002-2014. The results showed that in 2014, the development of low-carbon electricity reduced the carbon emissions embodied in exports by 259 megaton. This is an percentage of almost 20 percent.

In the final part of the thesis, Yuan studied the impact of the expansion in low-carbon electricity. Although low-carbon electricity ensures substantial less carbon emission in the use phase, the infrastructure tends to require more materials than the old coal power plants. Therefore, Yuan made an estimation of the carbon 'overhead' from the low-carbon electricity infrastructure expansion during China's transition. The results indeed show an increase in net carbon emissions caused by the expansion of low-carbon electricity infrastructure. But, Yuan says: 'the increase in emission caused by the investment in infrastructure is still lower than the emission reduction that is the result of this energy structure change.'

To make predictions for the future, Yuan combined historical regional data (2002-2012) with predictions from well-known scenarios from

national and international bodies. This enabled her to project the trends of carbon impacts from low-carbon electricity investments up to 2040. The results show that under all scenarios the annual carbon impact of the investments will never exceed 4% of China's total carbon emission during 2015-2040. During 2035-2040 she expects a large reduction in carbon [impact](#) of low-carbon emission investment. "Evidently, scaling up deployment of low-[carbon](#) electricity will eventually contribute towards a more sustainable [electricity](#) sector," Yuan and her colleagues conclude.

Provided by Leiden University

Citation: How China will reduce its carbon impact (2018, May 17) retrieved 19 April 2024 from <https://phys.org/news/2018-05-china-carbon-impact.html>

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