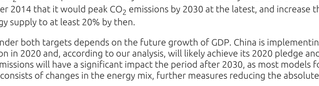
CLIMATE ACTION TRACKER

China

Page last updated: 8th December 2014

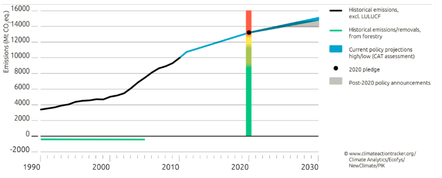
Rating



Assessment

China pledged in 2009 to reduce CO_2 emissions per unit of GDP by 40-45% on 2005 levels by 2020 and a share of non-fossil energy of 15%. Further, it announced in November 2014 that it would peak CO_2 emissions by 2030 at the latest, and increase the share of non-fossil energy carriers of the total primary energy supply to at least 20% by then.

The absolute level of emissions under both targets depends on the future growth of GDP. China is implementing significant policies, most recently a cap on coal consumption in 2020 and, according to our analysis, will likely achieve its 2020 pledge and its 2030 plans. The announcement that it will peak emissions will have a significant impact the period after 2030, as most models foresee increasing emissions for decades after that. As the target consists of changes in the energy mix, further measures reducing the absolute energy use could decrease emissions even further.



Pledge and post-2020 contribution

China's 2020 pledge consists of three elements:

- Overall reduction of CO_2 emissions per unit of GDP by 40-45% by 2020 compared to the 2005 level;
- Increase the share of non-fossil fuels in primary energy consumption to around 15% by 2020;
- Increase forest coverage by 40 million hectares and forest stock volume by 1.3 billion cubic meters by 2020 from the 2005 levels.

We used information from China's second national communication to quantify this pledge. China presents emissions scenarios for business as usual (excluding all policies implemented after 2005), for current policies, and for enhanced policies. Since the enhanced policies scenario leads to a 45% reduction of CO_2 emission intensity, we interpret it as the "pledge scenario." In that scenario, combustion-related CO_2 emissions are 9.9 $GtCO_2e$ in 2020 (The People's Republic of China, 2012). Including non-energy emissions, this translates to an emissions level of 13.2 $GtCO_2e$ according to our assessment (excl. LULUCF).

Convention	
Copenhagen pledge	
	Intensity: -40% to -45%
	Non-fossil share: 15%
	Forest cover: +40 million ha
	Forest stock: +1.3 billion m^3
Reference for pledge	various
Post-2020 commitment	
	Peak CO_2 emissions in 2030 or earlier
	Non-fossil share: 20% in 2030
Conditions	none
Long term goal(s)	none

The 2020 pledge has large uncertainties associated with its quantification. In general, the resulting emissions level of the intensity pledge depends critically on future GDP growth. The non-energy related emissions are highly uncertain and not covered by the pledge. In previous years, the CAT estimated higher emissions from cement and thus had a higher estimate for the pledge (see description of assumptions at the bottom of this page).

For its post 2020 contribution, China announced in November 2014 that it aims at peaking CO_2 emissions in 2030 or earlier and at achieving a share of 20% non-fossil energy in the total primary energy supply (Xinhua News Agency, 2014). Looking only at the non-fossil target, the CAT estimates an absolute emission level of 14.8 $GtCO_2e$ in 2030. At 20%, the share of non-fossil energy is at the lower end of our assessment of current policies.

To reflect the effect of peaking emissions, we show a range of two options: the upper end results from peaking emissions in 2030. We made the simple assumption that the emissions growth rate from 2020 to 2030 decreases each year so that the emissions trend is flat in 2030. We find this does not reduce emissions further than the 14.8 $GtCO_2e$ in 2030 that result from the 20% non-fossil target. Another alternative scenario could be a peak of emissions in 2025 (a linear decrease of the emissions growth to zero between 2020 and 2025) and stabilisation at that level. Under these assumptions, China's announcement would reach absolute emission levels of 13.8 $GtCO_2e$ in 2030.

The calculations are based on certain assumptions on the GDP growth rate (from the IEA World Energy Outlook 2014). As with the 2020 pledge, the announced 2030 plan is not decoupled from economic growth. Different GDP development could influence the level of emissions in 2030 and the year of peaking. If we assume that carbon intensity of energy is determined by the non-fossil target and develops linearly between 2020 and 2030, the only way to compensate for GDP growth higher than currently projected is through further improvements of energy efficiency (decreasing energy use per unit of GDP), if the same level of remaining emissions and the peaking time should were to be reached.

It is interesting to note that, in our calculations, the share of non-fossils determines the absolute level of emissions resulting from the pledge in 2030. Other parameters, such as total energy use, are kept as under the CAT current policy projections. The orientation towards a less emission intense economy however could likely also spur additional energy efficiency measures, which are not yet considered as implemented policies today. This could decrease the level of the emissions further or move the peaking to an earlier date.

Current policy projections

With currently implemented policies, China will reach an emissions level of 13.2 $GtCO_2e$ in 2020 and 14.8 – 15.1 $GtCO_2e$ in 2030. This means, that according to our assessment, China will meet its 2020 pledge. However, it is substantially above current emission levels. Compared to previous CAT analyses, it is somewhat lower due to a change in assumptions on non-energy related emissions.

China has a range of implemented policies in most sectors. Most significant is its commitment to a strong increase of renewable and low carbon energy. Since the Medium and Long Term Development Plan for Renewable Energy from 2007, China has increased its renewable energy capacity plans multiple times.

In its latest update of the 12th Five Year Plan, China decided to aim for a target of 700 GW of renewable energy capacity in 2020. This target is confirmed by the National Action Plan on Climate Change released in September 2014, which defines a number of actions and targets for 2020 (The People's Republic of China, 2014).

Bloomberg New Energy Finance expects an increase of RE capacity of 809 GW between 2010 and 2030 (Bloomberg New Energy Finance, 2013), which would add up to more than 1100 GW in 2030. While the emissions per kWh electricity produced in China was roughly stable from 1990 to 2004 and is still above world average, the country has turned towards a trend of decarbonisation of their energy supply in the past years (IEA 2014b).

The National Action Plan on Climate Change mentions in the context of the "reasonable control of the total coal consumption" the target to increase the share of gas of total primary energy supply to 10% in 2020. The Energy Development Strategy Action Plan (2014 – 2020) further defines the "reasonable control of the total coal consumption" as limiting coal to a maximum of 4.2 billion tonnes of coal by 2020. Both actions go beyond the WEO 2014 projections and are included with significant emissions reductions in the CAT assessment of the current policies projections. The cap on coal specifically has an important impact on emissions post 2020 if we assume it is kept at that level afterwards, and we expect this policy to be one of the main drivers on a pathway towards peaking emissions in China by 2030.

Policies to reduce energy consumption support the energy intensity targets in the Five Year Plan. In the industrial sector, the TOP 1000 enterprises programme has proven effective in the past and has been extended to 10 000 installations. There is also an increasing number of efficiency standards for appliances, buildings and cars. In 2013, China published the Air Pollution Control Action Plan (Government of China, 2013), which besides other measures, bans construction of new coal-fired power plants in various coastal provinces in order to decrease air pollution there. The effect on emissions will likely be small, as the regions with major extension plans for coal-fired power plants are not touched by the regulation (Ailun Yang and Ryna Yiyun, 2013). Eventually, the impact on emissions will be dependent on the energy source used to replace the planned plants affected by the regulation.

Date of pledge: January 2010

Assumptions

2020 Pledge

As China only makes available two inventory years which do not have the same scope and are thus not directly comparable, we use a combination of international data sources for energy related emissions (IEA, 2014b) and non-energy emissions (EDGAR 4.2 (EC/JRC/PBL, 2011), CDIAC (Boden, 2013)), and inventory data for LULUCF to determine historic emissions until 2010. For the projections, we used the enhanced policy scenario from the second National Communication until 2020, which leads to 45% improvement of emission intensity for energy related emissions. After 2020 we use growth rates of the World Energy Outlook 2014 (IEA2014). We add projections from US EPA (2012) for non-CO_2 emissions. For CO_2 process emissions, we use growth rates from the non-OECD region from the IEA's Energy Technology Perspectives report (IEA, 2014c).

Post 2020 contribution

The estimate of the post-2020 contribution reflects China's announcement to peak emissions no later than 2030 and aim at a share on non-fossil fuels of 20% in 2030. We consider three options to quantify emission trajectories: the share of non-fossil fuels, peak emissions in 2030 and peak emissions in 2025. For the non-fossil target, we start from the current policy scenario of the WEO2014 and add the effect of recently-adopted policies including the cap on coal and the target for gas of at least 10% and a share of 20% non-fossil fuels (excl. biomass).

To illustrate potential peaking scenarios, we assume the growth rate of emissions linearly approaches zero in the respective years. Assuming that the minimum non-fossil share and the latest possible peaking (in 2030) are consistent, we adapt the starting growth rate in 2020 so that the absolute total emission level matches the calculated level resulting from the non-fossil fuel target.

Current policy projections

For projections of energy-related CO_2 emissions, we use projections from the World Energy Outlook 2014. We adjust the renewable energy capacity based on the Bloomberg New Energy Finance report (Bloomberg New Energy Finance, 2013), and the share of gas and the cap on coal according to the National Action Plan on Climate Change (The People's Republic of China, 2014). For non-CO_2 emissions, we use growth rates from US EPA's anthropogenic GHG emissions projections applied to the historic data, and use growth rates from the IEA's Energy Technology Perspectives report (IEA, 2010) for CO_2 process emissions. Later ETPs do not provide country level data.

We further reduce emissions based on calculations on the impact of the increased renewable energy targets, the target of 10% gas and the coal cap. After implementing the renewable energy and the gas target, the consumption of coal is already slightly below the cap in 2020. For 2030, the cap goes significantly further.

To quantify this, we consider two options. The first is to maintain the total primary energy fix as in the current policy scenario of the WEO2014 (we assume that the targets are met by shifting from coal towards gas and renewables). The second option is to allow for some flexibility in the total primary energy demand and assume that the coal cap is reached through increasing efficiency additionally to the already expected development of renewable energy and gas.

When shifting away from coal, it is likely that older combustion facilities are shut down first. This changes the efficiency of the combustion of the primary energy and thus the emission factor. To reflect this, we use an average of the WEO2014 current policy scenario and the new policy scenario for the calculations.

Sources

Bloomberg New Energy Finance (2013). The future of China's power sector. From centralised and coal powered to distributed and renewable? (14 October, 2013).

Boden, T.A., G. Marland, and R.J. Andres (2013). Global, Regional, and National Fossil-Fuel CO2 Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. doi 10.3334/CDIAC/00001_V2013

European Commission, Joint Research Centre (JRC)/Netherlands Environmental Assessment Agency (PBL) (2011). Emission Database for Global Atmospheric Research (EDGAR), release version 4.0. http://edgar.jrc.ec.europa.eu

IEA (2014). World Energy Outlook 2014. International Energy Agency. Paris.

IEA (2014b). Energy Balances. International Energy Agency, Paris

IEA (2010). Energy Technology Perspectives. International Energy Agency. Paris

The People's Republic of China (2014a). National Action Plan on Climate Change (2014 – 2020).

The People's Republic of China (2014b). Energy Development Strategy Action Plan (2014 – 2020).

The People's Republic of China (2012). Second National Communication on Climate Change of The People's Republic of China. (14 November, 2012).

The People's Republic of China (2011). China's 12th Five Year Plan (Twelfth Five-Year Guideline, 2011–2015)

The People's Republic of China (2010). China's pledge to the Copenhagen Accord. Compiled in: Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, UNFCCC (2011)

The People's Republic of China (2009). Government announcement.

US EPA (2012). Global Mitigation of Non-CO_2 Greenhouse Gases, Washington, D.C., USA.

Xinhua News Agency (2014). Chinese carbon emissions to peak in 2030.

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