CLIMATE ACTION TRACKER

Mexico

History: 2017 2016 2015 2014 2013 2011

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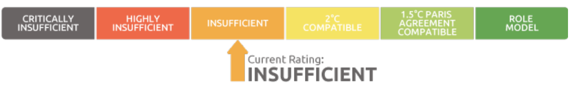
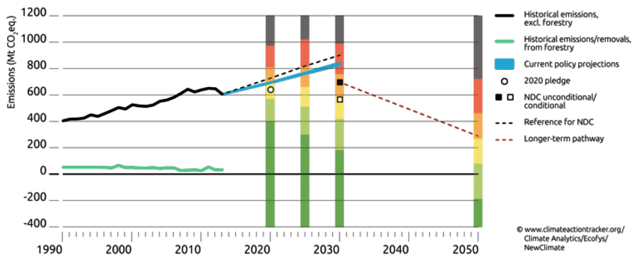
Rating



Basic Intermediate



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Assessment

Mexico has pledged to reduce its greenhouse gas emissions by 22% below baseline in 2030, equivalent to a 9% increase in emissions above 2010 levels. While our analysis suggests that Mexico will not meet either its 2020 or 2030 emissions targets, and will need to implement additional policies to do so, it is also clear that Mexico is taking promising steps in this direction, with renewable energy targets that, if implemented properly, could reduce emissions from the electricity sector by 35% in 2030 compared to business as usual.

Mexico's Nationally Determined Contribution (NDC), covers targets for both emissions of greenhouse gases (GHGs) and black carbon (BC). In its NDC, Mexico proposes to unconditionally reduce combined GHG and BC emissions by 25% below business as usual (BAU) in 2030. Mexico also proposes a 40% reduction of GHG and BC emissions by 2030, conditional on certain requirements for the global agreement and international support. The GHG component of these targets translates to a reduction goal of 22% below BAU unconditionally (equivalent to 72% above 1990 levels and 9% above 2010 levels excl. LULUCF), and 36% conditionally (equivalent to 40% above 1990 levels and 11% below 2010 levels excl. LULUCF) by 2030.

While the health and environmental benefits of reducing black carbon would be immediate and clear, the effects on global warming are complex and uncertain.

Based on these targets, we rate Mexico "Insufficient." This means that Mexico's unconditional NDC commitment is not consistent with holding warming to below 2°C, let alone limiting it to 1.5°C as required under the Paris Agreement, and is instead consistent with warming between 2°C and 3°C.

According to our analysis, Mexico will need to implement additional policies to reach its proposed NDC targets, but has begun taking steps in the right direction.

After COP21 in Paris in 2015, Mexico introduced a major new clean energy policy - its Energy Transition Law, which includes a clean energy target: 25% of electricity generation by 2018, 30% by 2021, and 35% by 2024. Our analysis reveals that the way in which this law is implemented, and the level of clean energy targeted beyond 2024, will be crucial to shaping Mexico's GHG emissions trajectory.

Critically, Mexico includes co-generation in its definition of clean energy. This is likely to be fuelled by natural gas, which is a fossil fuel, and still emits CO_2. National projections suggest that the cogeneration plants' share of the electricity mix could be as high as 6% by 2024 – up from 0% in 2014. If this goes ahead rather than using entirely zero emission sources, the share of renewables in the 2024 clean energy target could be reduced to 29%.

Looking ahead to 2030, Mexico's latest electricity projections show a sharp increase in nuclear generation in the late 2020s, accounting for 9% of generation in 2030, up from 4% in 2016. This is in addition to a projected 28% of generation from renewable sources in 2030. According to Mexico's Energy Secretary, building this additional nuclear capacity would require several billion dollars in investment, and the next federal government will need to make this decision after 2018 (Valencia Juliao, 2017). Our analysis shows that if Mexico were to turn to gas-based cogeneration instead of building additional nuclear capacity, emissions would be 13 $MtCO_2$ higher in 2030. Investing in additional renewable capacity, however, would lead to the same emissions reductions as nuclear.

Together with the renewable energy support policies that have recently been put in place, opting for zero emission sources instead of co-generation would be important, but needs to be followed up by further policies for Mexico to reach its NDC target. For example, Mexico's 2nd Special Programme on Climate Change will end in 2018, and so far Mexico has not announced plans to renew it.

Mexico's progress in policy planning and institution building over recent years has been remarkable, including the April 2012 adoption of the General Law on Climate Change (LGCC in Spanish), one of the world's first climate laws—and the first in a developing country. Under this law, Mexico aims to reduce its emissions by 50% from 2000 levels by 2050. The NDC proposal is consistent with this objective, as is Mexico's Mid-Century Strategy, which it submitted to the UNFCCC in November 2016.

Pledges and targets

Paris Agreement targets

On 21 September 2016, Mexico ratified the Paris Agreement and its Intended Nationally Determined Contribution (INDC) became its Nationally Determined Contribution (NDC). It aims to unconditionally reduce GHG emissions in 2030 by 22% below its BAU baseline.

Under a number of conditions (a global agreement addressing international carbon pricing, carbon border adjustments, technical cooperation, access to low cost financial resources and technology transfer), Mexico would increase the greenhouse gas reductions target to 36%.

Positive elements of Mexico's NDC include the specification that it includes economy-wide emissions reduction goals and the specification of an unconditional and a conditional reduction. The NDC is based around a comprehensive accounting of all sources and gases, including land use change and forestry. A significant issue is the baseline (BAU) emissions projections, which are rather uncertain, and Mexico could consider setting its targets with respect to a fixed base year.

The submission also includes reductions of black carbon (BC) (51%/70% reduction below BAU of 124 $MtCO_2e$ of BC in 2030 unconditionally/conditionally). While the health and environmental benefits of such reductions would be immediate and clear, the effects on global warming are complex and uncertain. Most measures that reduce black carbon simultaneously reduce greenhouse gas emissions, meaning that black carbon reductions are typically not additional to greenhouse gas reductions (e.g. reducing black carbon from burning diesel by burning less diesel will also reduce CO_2 emissions). See box below on black carbon.

GHG and black-carbon reductions together would reflect reductions of 25%/40% in total, according to the NDC document, but we note that the actual reduction would be closer to the impact of GHG reductions alone of 22/36%.

Mexico includes values for the baseline in its submission, both for greenhouse gases, for black carbon and the total, reported using Global Warming Potentials (GWPs) from the IPCC 5th Assessment Report (AR5). Based on this baseline, the absolute values of the unconditional/conditional target for greenhouse gas reductions would be 727 $MtCO_2e$/ 591 $MtCO_2e$ excl. LULUCF (759 $MtCO_2e$/ 623 $MtCO_2e$ incl. LULUCF) in 2030. The reported baseline is higher than what we estimate as the current trend with implemented policies. The resulting target for 2030 is lower than the current emissions trend—its fulfilment therefore requires additional policies.

Copenhagen pledge	
2020 target	**30% below BAU by 2020 incl. LULUCF [58% above 1990 by 2020 excl. LULUCF[1]]**
Conditions	**financial and technological support**
Paris Agreement target	
Ratified	**Yes**
Unconditional target for 2030	**22% GHG, 51% black carbon, total 25% below baselines provided in NDC document by 2030 [72% above 1990 by 2030 excl. LULUCF[2]]**
Conditional target for 2030	**36% GHG, 70% black carbon, total 40% below baselines provided in NDC document by 2030 [40% above 1990 by 2030 excl. LULUCF]**
Conditions	**global agreement, financial and technology support**
Coverage	**economy-wide, including LULUCF**
Emission peak target	**2025/2026**
Long term goal(s)	
Long-term goal(s)	**50% below 2000 by 2050 [29% below 1990 by 2050 excl. LULUCF]**

Along with the 2030 target, Mexico mentions in its NDC "a net emissions peak starting from 2026," which we interpret as starting a decline of emissions in 2026, and therefore an emissions peak in 2025. The level of this peak is unclear. Mexico also does not clarify how the (conditional) 2020 pledge relates to its post-2020 contribution.

Black Carbon and the NDC

Mexico's NDC targets include a target to reduce black carbon emissions, which has substantial co-benefits for human health. From the climate perspective, however, there is no established scientific method to compare the climate benefits of black-carbon reductions to those of CO_2 and other greenhouse gases. In its most recent Fifth Assessment Report (AR5), the IPCC has not provided calculations of Global Warming Potential for black carbon comparable to those provided for greenhouse gases, merely noting the inherent difficulties in doing so and limiting itself to just displaying estimates from the pre-AR5 literature.

While the NDC does specify a metric to compare with CO_2 (GWP of 900), this is based on a single literature source (pre-dating IPCC AR5), which itself notes the very large uncertainties (around 100%). Even more importantly, the authors of this paper emphasise that this estimate does not take into account the current *cooling* effects of other air pollutants emitted by the same sources. Emissions of these would also be reduced by measures to reduce black carbon, so the net effect of reductions in emissions of black carbon and co-emitted species together would be smaller, or, depending on the emission source, even be negative.

Finally, reductions in black carbon are generally not additional to reductions in CO_2 emissions, because large fractions of black-carbon emissions stem from the same emission sources as CO_2. Emission reduction policies therefore reduce CO_2 and black carbon simultaneously, and this is already included in calculations of the emissions reductions in greenhouse gases required to hold warming below 2°C globally, like the "emissions gap" and "fair share" reductions (see next section on Fair Share).

2020 pledge

The 2020 pledge would require a much earlier peaking, as its emissions level is already below today's level. We therefore assume that the unconditional post-2020 contribution is independent of the 2020 target. The conditional target would be roughly in line with a linear development between today, 2020 and 2050. Given this situation it appears that Mexico needs to clarify the status of its 2020 pledge.

In its submission under the Copenhagen Accord, Mexico "aims at reducing its GHG emissions up to 30% with respect to the business-as-usual (BAU) scenario by 2020 (equivalent to 58% above 1990 levels excl. LULUCF), subject to the provision of adequate financial and technological support from developed countries as part of a global agreement." Former President Felipe Calderón announced this target during the Copenhagen Conference of the Parties to the United Framework Convention on Climate Change (COP) in 2009. Currently implemented policies are not projected to meet the 2020 target.

Long-term goal

Mexico submitted its "Climate Change Mid-Century Strategy" to the UNFCCC in November, 2016, in accordance with the Paris Agreement (Government of Mexico, 2016). As mentioned in the NDC, Mexico pledges to reduce its greenhouse gas emissions to 50% below 2000 levels in 2050.

Fair share

We rate Mexico's mitigation targets "Insufficient." The "Insufficient" rating indicates that Mexico's climate commitment in 2030 is not consistent with holding warming to below 2°C, let alone limiting it to 1.5°C as required under the Paris Agreement, and is instead consistent with warming between 2°C and 3°C. If all countries were to follow Mexico's approach, warming would reach over 2°C and up to 3°C. This means Mexico's climate commitment is at the least stringent end of what would be a fair share of global effort, and is not consistent with the Paris Agreement's 1.5?C limit, unless other countries make much deeper reductions and comparably greater effort.

The CAT ratings are based on climate commitments in (I)NDCs. If the CAT were to rate Mexico's projected emissions levels in 2030 under current policies, we would rate Mexico "Highly Insufficient," indicating that Mexico's current policies in 2030 are not consistent with holding warming to below 2°C, let alone limiting it to 1.5°C as required under the Paris Agreement, and are instead consistent with warming between 3°C and 4°C: if all countries were to follow Mexico's approach, warming could reach over 3°C and up to 4°C. This means Mexico's current policies are not in line with any interpretation of a "fair" approach to the former 2°C goal, let alone the Paris Agreement's 1.5°C limit.

For further information about the risks and impacts associated with the temperature levels of each of the categories click here.

For Mexico, the individual effort sharing categories spread over large ranges of emissions allowances, and there are no effort sharing categories that stand out and require specifically stringent or lenient reductions for Mexico. This reflects the fact that Mexico's per capita emissions and wealth are close to the global average.

Current policy projections

According to our assessment, Mexico's current policies will lead to emissions of 693 $MtCO_2e$ excl. LULUCF in 2020. In 2030, the emissions level is projected to be between 829 and 842 $MtCO_2e$ in 2030, excl. LULUCF. This scenario suggests that Mexico will not meet either its 2020 or 2030 emissions targets, and will need to implement additional policies to do so. Our current policy projections are now slightly lower than in previous assessments (about 6% in 2030 for the upper end of the range). This is due to a data update and a methodology change, not the addition of new policies. Two factors contribute to this: first, the historical GHG inventory reported in Mexico's Biennial Update Report is lower than previously reported values in the 5th national communication (9% in 2010). Second, the BAU scenario from the NDC, which we now use as a starting point for our current policy projections, is also lower than the previously used projections from the 5th National Communication.

Historically, Mexico's emissions have been increasing since 1990. GHG emissions have increasingly shifted away from agriculture and LULUCF towards energy-related emissions. While in 1990 agricultural and LULUCF emissions represented almost 27% of Mexico's GHG emissions, by 2012 their share had declined to 15%. Over the same time period, energy-related emissions increased substantially—by more than 60%.

The basis for climate policy in Mexico is its 'General Law on Climate Change', which translates the overarching targets into strategies and plans, and provides the institutional framework for implementation. The law does not include concrete political instruments, rendering it impossible to quantify its direct effects..

The National Strategy on Climate Change (NSCC), published in June 2013, implements one of the requirements of the General Law. The NSCC is designed towards a long-term strategic development, but only provides very general guidance. How this will be translated into concrete action remains to be seen.

The 2nd Special Programme on Climate Change (PECC 2014–2018), published in 2014, includes the most relevant mitigation measures to 2018. The programme summarises 23 quantified mitigation-relevant measures that lead to a reduction in emissions by 83 $MtCO_2e$ in 2018 compared to the baseline presented in the same document. The PECC will end in 2018, and so far Mexico has not announced plans to renew it.

In 2014, Mexico implemented a carbon tax that is set at approximately at US$3.5/$tCO_2e$ differentiated by fuel type (SEMARNAT, 2014). This tax is expected to generate an annual revenue of about US$1 billion. However, its impact on GHG emission reduction is unclear and, given its low rate, a substantial emission reduction is unlikely.

In late 2016, Mexico began a simulation of an Emissions Trading Scheme that is planned to formally start in the second half of 2018. Between 400 and 700 companies are expected to participate in the market (Santiago & Rodríguez, 2017).

Energy Supply

The Energy transition law (Camara de diputados del H. congreso de la union, 2015), published in December 2015, includes clean energy targets for Mexico for the year 2018 (25% of generation), 2021 (30%) and 2024 (35%). Clean energy according to Mexican law includes renewable energy sources, nuclear power, CCS as well as efficient co-generation (Secretaria de Energia, 2014a).

The inclusion of the latter technology is particularly noteworthy as co-generation plants are mostly gas based and thus emit CO_2. While this technology currently does not play a role in Mexico, the latest Energy Outlook published by the Mexican government (SENER, 2016) suggests that the share of co-generation might grow to 4% of total generation in 2030. This implies that the share of zero-emission power plants might be lower than what the Clean Energy Target indicates. For instance, for 2024 the projections foresee a share of 6% of co-generation in the electricity matrix, potentially lowering the share of zero emission power generation under the 2024 clean energy target to 29%.

In the same electricity projections, the Mexican government suggests that nuclear generation will grow to make up 9% of generation in 2030 (compared to 3.7% in 2016). There is currently only one nuclear plant operating in Mexico, the Central Nucleoelectrica Laguna Verde. The plant was constructed to house five reactors, but only two are operating.

The Mexican government has commissioned preparatory technical studies to install two further reactors, which could be built at the Laguna Verde plant. However, the Sub-secretary of Energy indicated that each additional reactor would require over a billion dollars of investment, and that the next federal government (elected in 2018) will need to make the investment decision (Valencia Juliao, 2017). Should Mexico choose not to invest in additional nuclear capacity, but rather increase generation from gas-based cogeneration, its emissions in 2030 would be 13 $MtCO_2$ higher. However, Mexico could invest in additional renewable capacity instead, achieving the same emissions reductions as with nuclear.

Mexico intends to use a combination of clean energy certificates (Secretaria de Energia, 2014b) and a recently introduced tender scheme to help reach its clean energy target. The clean energy certificate scheme will include targets for companies above a certain size and the tender scheme aims to supply low cost renewable energy. However, both instruments are too young to judge whether they will be effective in achieving their stated aims.

Preliminary results are promising, showing that the tender might be especially effective in increasing the share of renewables, especially solar and wind, as a large number of projects were awarded in both the first and second rounds (SENER, 2016). However, similar processes in other countries have shown that the award in a tender process does not necessarily lead to the implementation of projects and, moving forward, it remains unclear whether these tenders will be sufficient to reach the target.

Projects awarded in the first tender round should be operational by March, 2018. As of March, 2017, none of these projects had been constructed, but representatives at two companies awarded projects, Engie and Iberdrola, confirmed their projects were in the permitting process and did not foresee delays in construction (Meana, 2017). In June, 2017, the Asociación Mexicana de Energía Solar (Asolmex), which was awarded 28 solar projects in the first and second tenders, commented that 35% of the capacity awarded in these rounds was in the late stages of development or under construction (El Norte, 2017).

Through the North American Climate, Clean Energy, and Environment Partnership Action Plan, Mexican President Enrique Peña Nieto, alongside Canadian Prime Minister Justin Trudeau, and former US president Barack Obama, announced a goal to achieve 50% clean power generation by 2025 in North America (The White House, 2016). If Mexico reaches a 50% share of renewables in 2025, it is likely to overachieve its 35% target in 2024, and come closer to meeting its NDC target. The plan also intends to support cross-border transmission projects and improve energy efficiency. After the administration change in the US, it is not clear to what extent this plan will be implemented by the three countries.

Assumptions

Historical emissions

Historic data is taken from Mexico's First Biennial Update Report (Government of Mexico, 2015a), as submitted to the UNFCCC. It uses Global Warming Potentials (GWPs) from the IPCC Second Assessment Report (SAR).

Pledge for 2020

The reference level projections for the 2020 pledge are from the technical annex to Mexico's National Climate Change Strategy from 2013 (Federal Government of Mexico, 2013). We used this baseline because it is included in Mexico's national law as a reference for the pledge. We first calculated the pledge including LULUCF emissions. We then deducted the current policy LULUCF emissions, based on the BAU scenario from the NDC document, from the pledge contribution including LULUCF.

NDC contribution

To calculate the absolute emissions level resulting from the NDC, we used the baseline provided in the NDC document. The document specifically states that emissions were calculated using Global Warming Potentials from the IPCC's 5th Assessment Report. The CAT uses GWPs from the Second Assessment Report as a common reference. We were not able to convert the emission levels, as the distribution of gases in the given baseline levels are unknown. Instead, we applied the growth rates from the NDC baseline scenario to the historic data (in SAR) starting after 2013. We then calculated the NDC contribution including LULUCF based on this harmonized baseline scenario. To exclude emissions from the LULUCF sector, we deducted the projected LULUCF emissions from the NDC baseline scenario.

Current policy projections

We took the BAU as reported in the documentation accompanying the NDC (Government of Mexico, 2015b) as a starting point for the current policy projections. We harmonized the BAU to historic data as described in the section above. The range for the current policies scenario is based on calculations around the Clean Energy Target as set in the Energy Transition Law and electricity generation projections from the Mexican government.

In previous analyses, we have quantified the impact of the PECC. The PECC was expected to achieve emissions reductions of about 83 $MtCO_2e$ in 2018 from a baseline of 1009 $MtCO_2e$ (in 2020, incl. LULUCF). The baseline scenario from the NDC, once harmonized to historic data, projects emissions of 760 $MtCO_2e$ in 2020, incl. LULUCF. The difference between the PECC and NDC baselines is nearly 250 $MtCO_2e$, and so we assume that the reductions from the PECC are achieved in the NDC baseline and do not quantify the impact of the PECC further.

We assess two scenarios for the implementation of the clean energy targets and electricity generation through 2030. A first scenario assumes that the clean energy targets will be reached according to the fuel mix provided in the energy forecast by SENER (SENER, 2016). This includes a large share of nuclear in 2030. In a second scenario, we assumed that generation from nuclear would remain constant to 2030 (as it is projected to through 2027), and that the additional electricity would be generated using efficient co-generation, which is likely to include natural gas, which still emits CO_2 Mexico includes efficient co-generation in its definition of clean energy, and has projected higher shares of co-generation in the past (SENER, 2015).

Black Carbon

We estimate that the net effect of black carbon emission reductions additional to those resulting as a co-benefit from reductions in CO_2 to be negligible. There is no established scientific method to compare the climate benefits of black-carbon reductions to those of CO_2 and other greenhouse gases. The IPCC has not provided such estimates even in its most recent Fifth Assessment Report. Although the NDC does specify a metric to compare with CO_2 (GWP of 900), this value is unsuitable to use in this policy context and the single literature source (Bond et al. 2013) to which the NDC refers to states:

- "… the summed climate forcing of all species for a source category emitting in a particular region (or season) may have a different magnitude than the global average, or even a different sign."
- "The 100-year global-warming-potential (GWP) value for black carbon is 900 (120 to 1800 range) with all forcing mechanisms included. The

large range derives from the uncertainties in the climate forcing for black carbon effects."
- "Co-emission effects … are not captured by BC metrics presented here…"
- "These and other differences raise questions about the appropriateness of using a single metric to compare black carbon and greenhouse gases."

The paper to which the NDC refers to (Bond et al. 2013) estimates that the combined global warming effect of black carbon and its co-emitted species is slightly negative and notes that the "reduction of aerosol concentrations by mitigating BC-rich source categories would be accompanied by small to no changes in short-term climate forcing."

Note: this is not generally the case for certain other air pollutants (e.g. reductions in sulphate aerosols would lead to warming), so that while measures to reduce black carbon do not generally help to combat climate change, these are highly welcomed as a climate-neutral measure to improve local air quality, thereby reducing health impacts.

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