Assessing the achieved and missed benefits of a possible Intended Nationally Determined Contribution (INDC) for India

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For full methodology and project background, see: NewClimate (2015) Assessing the missed benefits of countries' national contributions. Accessed via newclimate.org/publications/

In 2010, the Indian Government submitted its voluntary international commitment to reduce the emissions intensity of its GDP by 20–25 % from 2005 levels by 2020 as part of the Copenhagen accord (Government of India, 2010). Given that India is still to submit its INDC, it was assumed for the purpose of this pre-analysis that the INDC could be an extension of India's previous 2020 pledge. Assuming a constant rate of annual emission intensity reductions, a possible INDC could be an emissions intensity reduction of 33-42% by 2030, compared to 2005. The least ambitious end of this range (reductions of 33%) is represented in the graphs as INDC A, and the most ambitious part of the range is represented as INDC B. In all cases, INDC A does not represent any additional benefits compared to the current policies scenario.

In comparison to a current policies trajectory, according to our illustrative method, the implementation of mitigation actions to meet the projected INDC B scenario would:

- Save at least USD 23 billion each year in reduced fossil fuel imports.
- Prevent in the order of 140,000 premature deaths each year from air pollution.
- Create 80,000 additional green jobs in domestic renewable energy.

If India was to increase the ambition of the projected INDC range to meet a trajectory towards 100% renewables by 2050 (in line with keeping global warming below 2°C and possibly even 1.5°C), it could achieve the following additional benefits:

- Save at least USD 174 billion annually in reduced fossil fuel imports additional to INDC reductions; a total saving of at least USD 197 billion compared to the current policies scenario.
- Prevent in the order of 1.2 million premature deaths each year from air pollution additional to the INDC, totalling 1.3 million deaths fewer annually than in the current policies scenario.
- Create approximately 600,000 jobs in the domestic renewable energy sector additional to the INDC scenario, totalling approximately 680,000 more jobs than in the current policies scenario.

Cost savings from fossil fuel imports

In 2009, India had the third largest energy demand in the world after China and the United States. The country's energy demand doubled from 319 Mtoe in 1990 to 669 Mtoe in 2009 (IEA, 2012). With India's economy growing, poverty levels decreasing and access to energy improving, growth of the country's energy demand is inevitable.

Coal in the power sector: Coal is the primary source of energy in India. Representing over 40% of India's energy mix in 2009, 56% of installed power capacity and nearly 70% of generated electricity in 2012, coal is a key cornerstone of India's energy supply (IEA, 2012). Figure 1 illustrates that India's projected most ambitious INDC would reduce coal demand in 2030 by an estimated 34 Mtoe, resulting in a cost saving of around USD 6 billion. A further 258 Mtoe reduction in coal consumption from the INDC level would be possible through a 100% renewable scenario, equivalent to further potential cost savings of USD 43 billion a year. This would be a total reduction of about 292 Mtoe of coal in 2030, corresponding to around USD 49 billion in cost savings, compared to current policies.

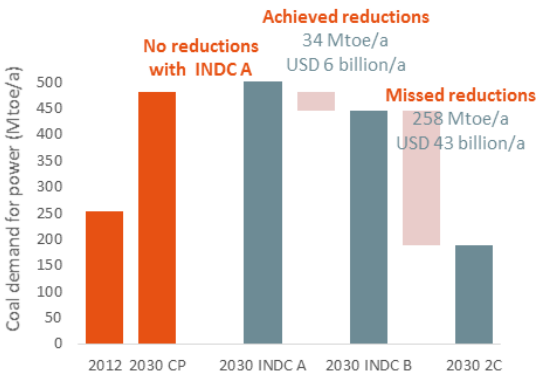

Figure 1: Coal demand from power sector

Oil in the transport sector: India's demand for oil has been increasing significantly over the last two decades. Oil accounted for 24% of India's Total Primary Energy Demand (TPED) in 2009, and in 2012, India was the world's fourth largest oil consumer and also the fourth largest importer (IEA, 2012). Figure 2 illustrates that India's most stringent part of the projected INDC range would reduce oil demand for transport in 2030 by an estimated 11Mtoe, resulting in a cost saving of around USD 11 billion in oil imports. A further 85 Mtoe reduction in oil consumption from the INDC level would be possible through a 100% renewable scenario with further savings of approximately USD 85 billion per year through oil imports for the transport sector. This would be a total saving of approximately 96 Mtoe of oil in 2030, and roughly USD 96 billion, compared to current policies.

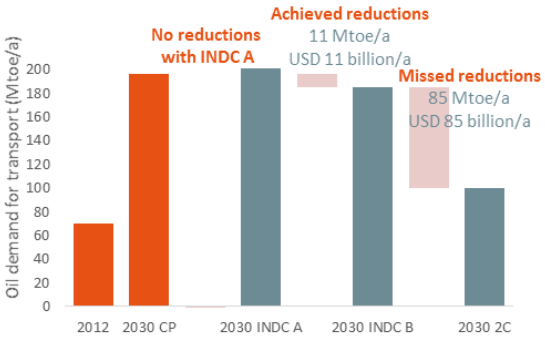

Figure 2: Oil demand from transport sector

Natural gas: India's gas demand was 65 billion m^3 (bcm) in 2011 and accounted for 7% of India's energy mix. The country's domestic hydrocarbon reserves are relatively small, which results in increasing dependence on imports and concerns over energy security (IEA, 2012). Demand for natural gas is expected to more than double between 2012 and 2030 in India's current policies scenario. As illustrated in Figure 3, India's most ambitious projected INDC would represent a reduction of 9Mtoe which translates into savings of about USD 6 billion annually. An additional 67 Mtoe reduction would be possible with a 100% renewable target with further savings of around USD 46 billion annually. This would mean a total reduction of 76 Mtoe of natural gas by 2030, corresponding to USD 52 billion, compared to the current policies.

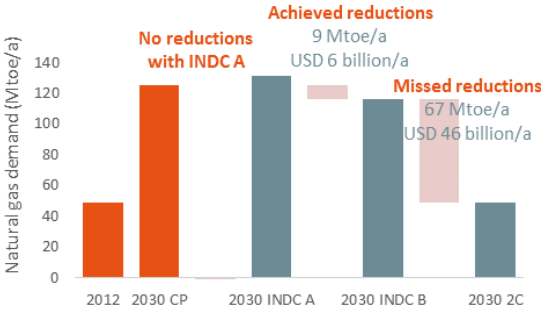

Figure 3: Job creation from renewables

Premature deaths from outdoor air pollution

A 2014 WHO survey found that Delhi, the Indian capital, was the most polluted city in the world, with an annual average Particulate Matter 2.5 concentration of 153 ug/m^3. Figure 4 shows that under current policies, the number of premature deaths will roughly triple between 2012 and 2030. Under the projected INDC B scenario, approximately 140,000 premature deaths could be prevented each year by 2030, compared to the current policies scenario. Strengthening this commitment to be in line with a 100% renewable trajectory could prevent around 1.2 million additional premature deaths every year, or a total of approximately 1.3 million compared to current policies.

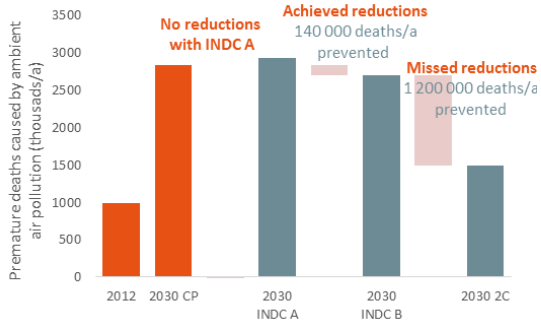

Figure 4: Premature adult deaths prevented

Creation of green jobs in domestic renewable energy

Under current policies, employment opportunities in the renewable energy sector are projected to almost triple up to 2030, as shown in Figure 5. India's projected most ambitious INDC would create 80,000 additional full time jobs by 2030, compared to current policies. However, if the country were to strengthen the projected INDC to meet a 100% renewable scenario, the impact on job creation would be significant, with approximately 600,000 additional jobs created compared to the INDC scenario, or a total of 680,000 new jobs compared to current policies.

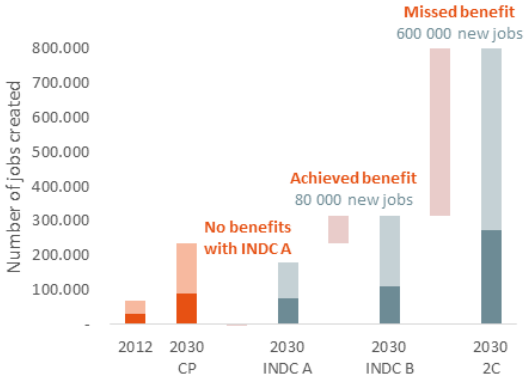

Figure 5: Reduced natural gas demand

Supplementary information

See NewClimate (2015) *for full methodology and cross country assumptions.*

Assumptions for India:

INDC scenarios: Given that India has not yet made a public announcement of what its INDC would look like, and for the purpose of this pre-analysis, we used a projection of India's 2020 pledge to reduce the emissions intensity of GDP by 20-25% by 2020, compared to 2005. Assuming a constant rate of annual emissions intensity reductions, the possible INDC could be for emissions intensity reductions of 33-42% by 2030, compared to 2005.

Background Particulate Matter 2.5: Due to data limitations on the origin of PM 2.5, and based upon observable trends and country factors, it is assumed that the background concentration of PM 2.5 for India would be slightly less than that estimated for China, and so a value of 8 ug/m-3 was assigned. The estimated background concentration could range between 6 and 10 ug/m-3, without having a significant impact on the rounded results.

Share of renewable technologies under a 2°C scenario in 2050: It is assumed that the respective share of each renewable energy technology for total renewable energy generation in 2050 will be the same as the projections made by the National Institution for Transforming India (NITI Aayog, 2015). However, we assume a maximum technical potential for hydropower of 149 GW, after which the share of other renewable energy technologies will increase proportionally to make up for lack of additional hydropower capacity.

Electricity generation projections (TWh): Projections for electricity generation in India were based on a national study on energy efficiency and energy mix (NITI Aayog, 2015). The contribution of renewable energies for projected electricity generation was only given as a whole, therefore the share for each renewable was calculated based on the projected energy mix (GW) given by the same report.

Fossil fuel import prices: Based on the regional prices of the World Energy Outlook (IEA 2014).

It is assumed that the capacity load factor for renewable energy technologies in various years will be the same as those indicated for India in the World Energy Outlook projections (IEA, 2014).

Under the 100% renewable scenario, we assume that this scenario would be adopted by all countries worldwide, allowing India to use technology that is developed elsewhere. The 100% renewable scenario could be difficult to be achieved by a single country in isolation.

References and data sources

See NewClimate (2015) *for cross country references and data sources.*

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