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/

India submitted its INDC to the UNFCCC in October 2015. Related to the energy sector, the INDC includes a target to reduce emissions intensity by 33% to 35% by 2030, compared to 2005 levels, and to increase the share of non-fossil fuel electricity generation capacity to 40% by 2030. The emissions intensity target alone is understood to result in an emissions target that is weaker than the current policies trajectory (CAT, 2015). However, the 40% non-fossil fuel electricity generation capacity target will make a marginal impact to decrease energy related emissions. In comparison to a current policies trajectory, according to our illustrative method, achieving the renewable energy capacity target of the INDC would:

- Save at least USD 2.5 billion each year in reduced fossil fuel imports.
- Prevent in the order of 28,000 premature deaths each year from air pollution.
- Create 50,000 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 benefits in 2030, in addition to those achieved by the INDC:

- Save at least USD 195 billion annually in reduced fossil fuel imports.
- Prevent in the order of 1.3 million premature deaths each year from air.
- Create approximately 625,000 jobs in the domestic renewable energy sector.

Cost savings from fossil fuel imports

In 2012, India had the third largest energy demand in the world after China and the United States. The country's energy demand more than doubled from 317 Mtoe in 1990 to 788 Mtoe in 2012 (IEA, 2014b). 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 45% of India's total energy demand in 2012 and 81% of generated power in 2012 (IEA, 2014b), coal is a key cornerstone of India's energy supply. In 2012, India produced approximately 85% of its coal demand domestically (IEA, 2014a). However, since coal production is not projected to increase at a rate comparable to increased demand, India is forecast to become one of the world's most import dependent countries, with imports of coal in excess of 300 Mtoe in 2030 (McKinsey & Company, 2014). Therefore, the projected reductions in coal demand under the scenarios presented in Figure 1 will result in cost savings. Figure 1 illustrates that India's INDC would reduce coal demand only very marginally in 2030, by an estimated 7 Mtoe, resulting in a cost saving of around USD 1 billion. A further 295 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 50 billion a year. This would be a total reduction of just over 300 Mtoe of coal in 2030, corresponding to around USD 51 billion in cost savings, compared to current policies.

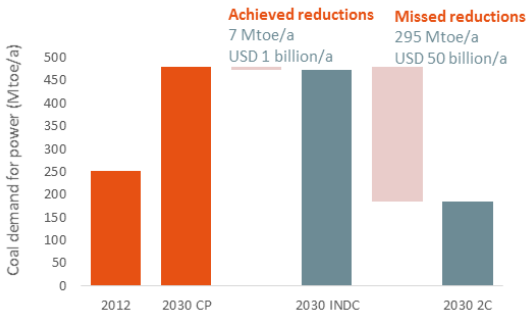

Figure 1: Coal demand from power sector

Oil in the transport sector: India's demand for oil has been increasing significantly over the last two decades. Oil accounted for 22% of India's total primary energy demand in 2012, making India the world's 4th largest oil consumer and also the 4th largest importer (IEA, 2014b). Figure 2 illustrates that India's INDC would represent no reductions from oil consumption in transport in 2030 compared to current policies, since the only component of the INDC understood to be additional to current policies is the non-fossil fuel electricity generation target, which does not directly affect the transport sector. Through a 100% renewable scenario, a reduction of 95 Mtoe in oil consumption would be possible with savings of about USD 95 billion per year coming from reduction in oil imports for the transport sector.

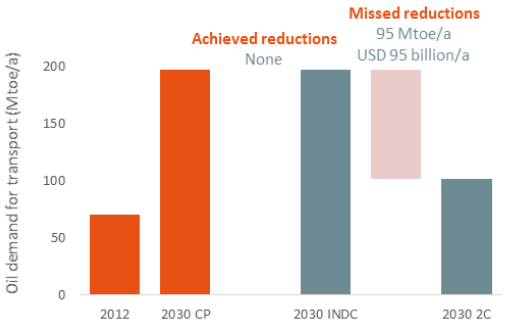

Figure 2: Oil demand from transport sector

Natural gas: India's gas demand was 49 Mtoe in 2011 and accounted for 6% of India's energy mix (IEA, 2014b). 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 5, India's INDC would represent a reduction of 2 Mtoe which translates into savings of about USD 1.5 billion annually. An additional 75 Mtoe reduction would be possible with a 100% renewable target with further savings of around USD 50 billion annually. This would mean a total reduction of 77 Mtoe of natural gas by 2030, corresponding to USD 52 billion, compared to the current policies.

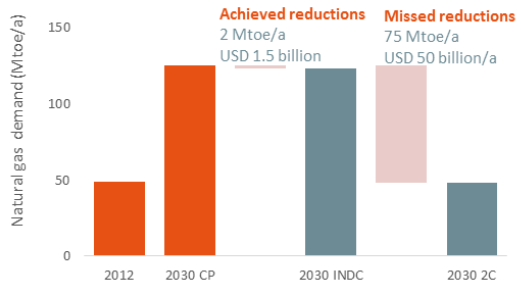

Figure 3: Reduced natural gas demand

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 INDC scenario, approximately 28,000 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 1.3 million additional premature deaths every year.

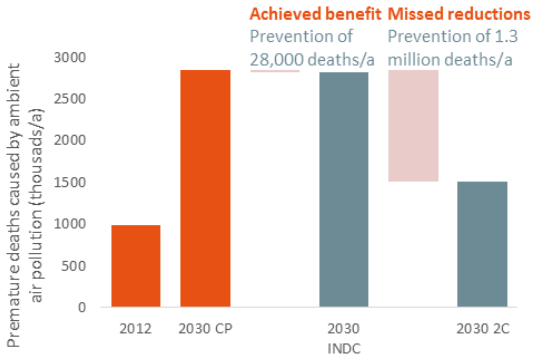

Figure 4: Premature adult deaths prevented

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 3. India's INDC would create 50,000 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 625,000 additional jobs created compared to the INDC scenario, or a total of 675,000 new jobs compared to current policies.

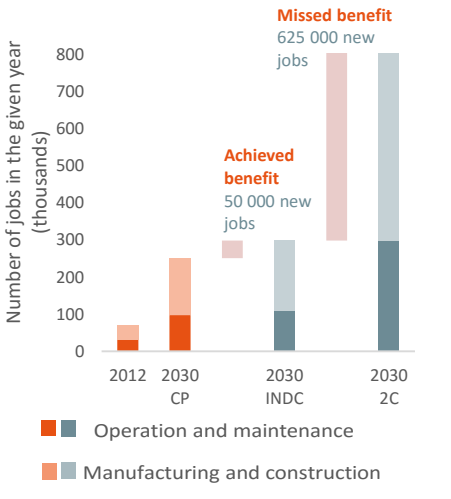

Figure 5: Job creation from renewables

Supplementary information

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

Assumptions for India:

INDC scenarios: Energy sector emissions under the INDC scenarios are based on Climate Action Tracker analysis of current policies and the impact of the INDC's 40% non-fossil fuel electricity generation capacity target (CAT, 2015). It is assumed that the additional renewable energy capacity, compared to the current policies scenario, is based on new wind and solar installations, rather than additional nuclear capacity.

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 projected for the country in the Climate Action Tracker analysis (CAT, 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.

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, 2014b).

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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NITI Aayog. (2015). *Report on Energy Efficiency and Energy Mix in the Indian Energy System (2030)*. Retrieved from http://niti.gov.in/mgov_file/Energy_Efficiency.pdf

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