Assessing the achieved and missed benefits of Japan's Intended Nationally Determined Contribution (INDC)

NewClimate Institute

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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 June 2015, Japan published a draft version of its INDC for public consultation. The INDC includes a **target of 26% aggregate emissions reductions below 2013 levels by 2030** (Government of Japan, 2015). This includes a 25% reduction on energy related CO_2 emissions below 2013, and an increase in the share of renewables for power to between 22% and 24%. In comparison to a current policies trajectory in 2030, according to our illustrative method, the full implementation of Japan's INDC would:

- Save at least USD 8 billion each year in reduced fossil fuel imports.
- Prevent in the order of 1,500 premature deaths each year from air pollution.
- Create no additional green jobs in domestic renewable energy

If Japan strengthened its INDC to meet a trajectory towards 100% renewables by 2050 (and thus in line with keeping global warming below 2°C and possibly even 1.5°C), it could, according to our illustrative method, achieve the following benefits:

- Save at least USD 25 billion each year in reduced fossil fuel imports additional to the INDC reductions, in total USD 33 billion from the current policies scenario.
- Prevent in the order of 15,000 premature deaths each year from air pollution additional to the INDC improvement, in total 16,500 deaths fewer than in the current policies scenario.
- Create approximately 67,000 jobs in the domestic renewable energy sector additional to the current policies and INDC scenarios.

Cost savings from fossil fuel imports

Japan is a major importer of fossil fuels. In 2011, domestic production accounted for 0.4% of crude oil and 3.1% of natural gas supply, whilst domestic coal production ceased in 2002 (Government of Japan, 2013). Furthermore, since the East Japan earthquake in 2011, fossil fuel demand is significantly increasing to compensate for the reduction of nuclear supply.

Coal in the power sector: Coal accounted for 32.8% of power generation in 2012, up from 14.4% in 1990 (IEA, 2014). Figure 1 shows that Japan's INDC would reduce coal demand in 2030 by an estimated 11 Mtoe, resulting in a cost saving of around USD 2 billion. However, the INDC plan envisages a significant restart of nuclear power generation, and the proportion of coal-fired power will increase significantly if this is not realised. A further 34 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 6 billion a year. This would be a total saving in of 45 Mtoe in 2030, or USD 8 billion, compared to current policies.

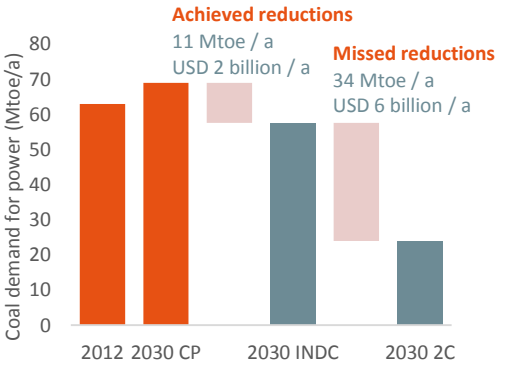

Figure 1: Reduced coal demand from power sector

Oil in the transport sector: Oil accounted for 46.5% of total primary energy demand in 2012, and 97% of energy consumption for transport (IEA, 2014). Figure 2 shows that Japan's INDC will reduce oil demand for transport in 2030 by an

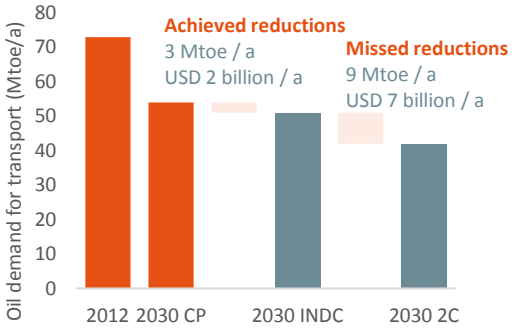

Figure 2: Reduced oil demand from transport sector

estimated 3 Mtoe, resulting in a cost saving of around USD 2 billion in oil imports. A further 9 Mtoe reduction in oil consumption from the INDC level would be possible through a 100% renewable scenario with further savings of approximately USD 7 billion per year through oil imports for the transport sector. This would be a total saving of 12 Mtoe of oil in 2030, or USD 9 billion, compared to current policies.

Natural gas: Japan is increasingly relying on natural gas. Although it accounted for just 10% of total primary energy supply in 1990, it is now forecast under current policies to account for 21.9% by 2030. Figure 3 shows that under the scenario implied by the INDC, Japan will save USD 4 billion per year by 2030 through reducing gas imports by 6 Mtoe. If Japan were to strengthen the INDC further to meet a 100% renewable trajectory, natural gas consumption could be reduced further by an additional 18 Mtoe of natural gas in 2030, equating to further potential cost savings of approximately USD 12 billion per year. This would be a total saving of 24 Mtoe of oil in 2030, or USD 16 billion, compared to current policies.

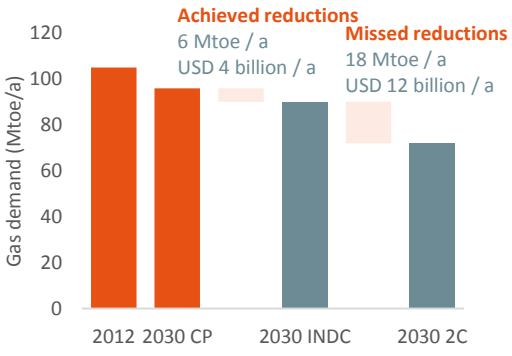

Figure 3: Reduced natural gas demand

Premature deaths from outdoor air pollution

In response to the UN Environmental Assembly's call for action against the rising burden or ambient air pollution is Asia, Japan's Ministry of Environment launched a plan with UNEP in July 2014 to tackle air pollution in the region. This is reflected in the already significant reduction of ambient air pollution projected for 2030 in the current policies scenario compared to 2012, resulting in a reduction of approximately 25,000 premature deaths per year according to our illustrative methodology, as shown in Figure 4. A further reduction of around 1,500 deaths annually is achieved with the INDC in 2030, whereas strengthening this commitment to be in line with a 100% renewable trajectory could prevent around 15,000 additional premature deaths every year.

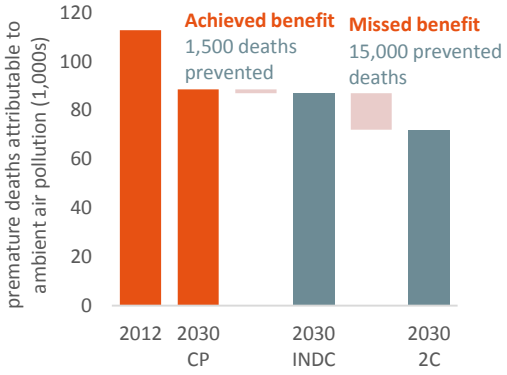

Figure 4: Premature adult deaths prevented

Creation of green jobs in domestic renewable energy

In 2012, Japan accounted for 5% of global PV manufacturers. Estimates from IRENA (IRENA, 2014) indicate that around 40,000 people are employed in the PV industry in Japan. Given that the illustrative method of this study accounts for only jobs for *domestic* renewable installations, and does not account for the export sector, this is in line with the results shown in Figure 5 which indicate around 45,000 full-time equivalent jobs across the entire renewables sector in 2012.

Under a current policies scenario, investments in renewable energy will generate approximately 70,000 additional jobs by 2030. Figure 5 shows that the INDC would have a negligent impact on job creation compared to current policies, since energy efficiency measures under the INDC would reduce the total electricity generation in 2030 and also the absolute amount generated from renewables (although the *share* of renewables increases marginally). However, if Japan were to strengthen the INDC to meet a 100% renewable scenario, the impact on job creation would be significant, with approximately 67,000 additional jobs created, compared to the INDC scenario.

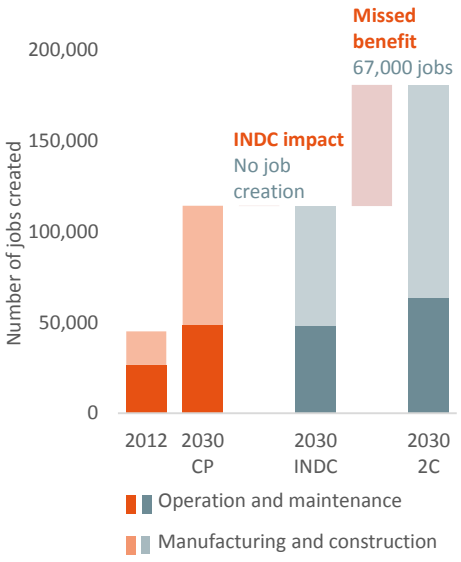

Figure 5: Job creation from renewables

Supplementary information

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

Assumptions for Japan:

INDC scenario: We used the draft INDC (Government of Japan, 2015) as a basis: energy related CO_2 emissions are 24% below 2005 in 2030. The share of coal-fired power is 26%, nuclear 20% to 22%, and renewables 22% to 24% in 2030. The current polices scenario based on the World Energy Outlook (IEA 2014), assumes significantly less nuclear power. The high nuclear share in 2030 as presented in the draft INDC is ambitious, given the current slow rate of nuclear power plant restart. In the case that nuclear cannot be restarted as planned in this document, the share of coal-fired power would significantly increase and the benefits that we calculate here would be less.

Calculation of renewable energy capacity under the INDC scenario: It is assumed that Japan reaches the upper end of the range (24%) of its anticipated target for 22% to 24% renewables under the anticipated INDC.

Share of renewables under current policies in 2030: Whilst the growth rate in renewable capacity under current policies was taken from the World Energy Outlook (IEA 2014), the split between specific renewable energy technologies was adjusted according to the respective shares envisaged under the INDC, which is considered a more likely reflection of a current policies trajectory.

Share of renewable technologies under a 2°C scenario in 2050: Based upon observable trends and forecasts, it is assumed that the total installed capacity of hydro in the energy system will not continue to increase at the same rate as other renewables. For this reason, it is assumed in the calculations that the 2050 energy mix will be based upon a plateau of the total installed capacity of hydro power shortly after its forecast value under the anticipated INDC scenario in 2030, whilst the remainder of the energy supply will be met by other renewable technologies, the respective shares of which will remain constant according to those projected under the INDC scenario for 2030.

Fossil fuel import prices: Based on the prices for fossil fuel imports for 2014 from (METI, 2015) and the regional growth rates of the prices from the World Energy Outlook (IEA 2014).

Background concentrations of air pollutants: Whilst reliable data could be sourced for the average ambient concentration of PM2.5 in Japan, data could not be found to show what proportion of this concentration was attributable to background sources which could not be reduced through domestic climate change mitigation measures. Instead, the average figure for this data across the EU, China and the US, was taken. This has only a minor effect on the rate at which more ambitious scenarios translate to a reduction in premature deaths.

It is assumed that the capacity load factor for solar PV in Japan is the same as used for the EU (reference scenario in the PRIMES model), due to the similarity of the EU and comparability of the results across regions / countries.

References and data sources

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

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