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

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

In February 2015, Switzerland became the first country to officially submit its INDC for the international climate agreement to be finalized in Paris at the end of this year. Switzerland's INDC includes the target to reduce greenhouse gas emissions by 50% by 2030 compared to 1990 levels (Swiss Confederation, 2015). Following the submission, a press release of the Federal Office of Environment (FOEN, 2015) indicated that at least 30% of this reduction would be achieved within Switzerland itself, whilst the rest may be attained through offsets and projects carried out abroad. Therefore, the analysis portrays two INDC scenarios: one with domestic emission reductions of 30% (INDC A), and the second where the whole target (50%) is achieved domestically (INDC B). Our analysis finds that domestic emission reductions of 30% compared to 1990 levels would create an insignificant volume of benefits compared to a current policies (CP) scenario in 2030 based on the *With Existing Measures* (WEM) scenario of the 6th National Communication (Swiss Confederation, 2013). The WEM scenario already projects a reduction of approximately 29% of the national emissions by 2030. In comparison to the CP scenario in 2030, according to our illustrative method, full implementation of the 50% emissions reduction target domestically, without the use of offsets in Switzerland (INDC B) would:

- Save up to USD 2.2 billion each year in reduced fossil fuel imports.
- Prevent in the order of up to 250 premature deaths each year from air pollution.
- Create 3,600 additional green jobs in domestic renewable energy.

If Switzerland was to increase the ambition of the INDC further to meet a trajectory towards 100% renewables for all energy by 2050 (in line with keeping global warming below 2°C and possibly even 1.5°C), it could achieve the following additional benefits in 2030:

- Save at least USD 1.75 billion annually in reduced fossil fuel imports additional to INDC reductions; a total saving of around USD 3.95 billion compared to the current policies scenario.
- Prevent in the order of 250 premature deaths each year from air pollution additional to the INDC, totalling up to 500 fewer deaths annually than in the current policies scenario.
- Create approximately 2,300 jobs in the domestic renewable energy sector alone additional to the INDC scenario, totalling approximately 5,900 more jobs than in the current policies scenario.

## Cost savings from fossil fuel imports

In 2010, Switzerland's total primary energy supply (TPES) was 26.2 Mtoe, reflecting an increase of 0.5% per year over the last decade. In the same year fossil fuels accounted for 53% of the TPES. Switzerland currently ranks third lowest among IEA countries in the level of fossil fuels in the energy mix: the country has a significant share of oil in TPES (39% in 2010), but very low shares of natural gas and less than 1% of TPES is accounted for by coal consumption (IEA, 2012). Switzerland does not produce any fossil fuels, therefore it is dependent on fossil fuels availability from other countries for its energy security (IEA, 2012).

**Oil for heating:** Unlike other European countries, oil still supplied 54% of energy for space heating in 2010 (IEA, 2012). In recent years, the government has introduced several policies to stimulate a move away from oil-based heating; heating oil consumption is gradually diminishing, dropping by 11% from 2005 to 2010 (IEA, 2012). Replacing oil heating with renewable energy sources would generate considerable reductions in $CO_2$ emissions, and would substantially improve Switzerland's energy security, whilst reducing the dependency of this essential service on the volatile international oil market. Under current policies, oil consumption for heating is set to decrease by approximately 62% between 2010 and 2030 (Prognos AG, 2012). With the use of offsets, the INDC is not expected to make significant advances on this reduction. Under a 100% renewable in 2050 trajectory, oil demand for heating could be reduced by 77% between 2010 and 2030 (Prognos AG, 2012), with approximate savings of USD 0.3 billion.

**Oil in the transport sector:** The transport sector accounted for 36% of final oil consumption in 2010. In 2010, oil was the major fuel for transport, supplying 95% of the sector's energy demand (Prognos AG, 2012). Both the oil consumption and supply have been relatively stable over the last decade (IEA, 2012). Figure 1 illustrates that Switzerland's INDC without the use of offsets could reduce oil demand for transport in 2030 by up to 2.3 Mtoe, resulting in a cost saving of around USD 1.7 billion in oil imports. A further 1.4 Mtoe reduction in oil consumption from the INDC level would be possible through a 100% renewable energy in 2050 scenario with further savings of approximately USD 1.1 billion per year through oil imports for the transport sector. This would be a total saving of around 3.7 Mtoe in 2030, and USD 2.8 billion, compared to current policies.

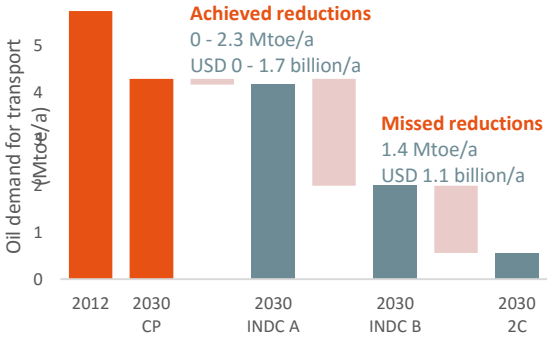


Figure 1: Oil demand from transport sector

**Natural gas:** In 2010, natural gas accounted for 11% of the country's TPES. Yet, natural gas supply has been increasing steadily and it has been the fastest growing energy source over the past decade (IEA, 2012). Under the INDC scenario without offsets, Switzerland could save up to USD 500 million per year by 2030 through reducing gas imports by up to 1 Mtoe, as illustrated in Figure 2. If the country was to strengthen the INDC further to meet a 100% renewable trajectory, natural gas consumption could be reduced by an additional 0.7 Mtoe in 2030, corresponding to further potential cost savings of approximately USD 350 million per year. This would be a total saving of about 1.7 Mtoe in 2030, and USD 850 million, compared to current policies.

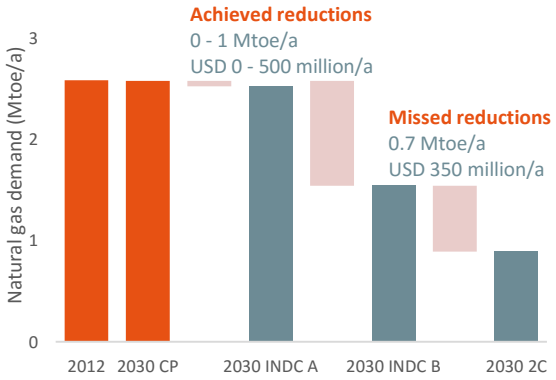


Figure 2: Reduced natural gas demand

## Premature deaths from outdoor air pollution

A number of PM2.5 measurement sites in the Swiss Plateau have shown PM2.5 levels between 10 and 20 µg/m³ in the last decade (FOEN, 2013). Figure 3 shows that under current policies, the number of premature deaths will already have be reduced by roughly one third by 2030. Moreover, under the INDC scenarios, up to 250 premature additional 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 250 additional premature deaths every year, or a total of approximately 500 compared to current policies.

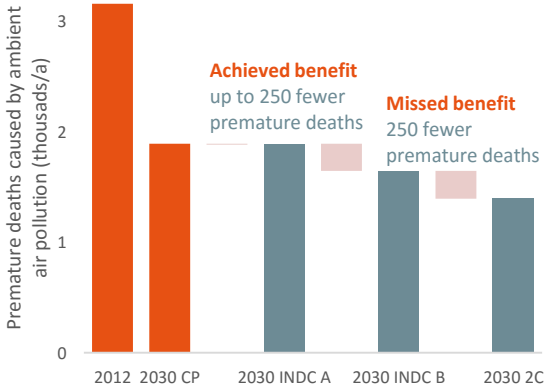


Figure 3: Premature adult deaths prevented

## Creation of green jobs in domestic renewable energy

*Full time equivalent jobs in manufacturing, construction, operation and maintenance for domestic installations of wind, solar, hydro, biomass and geothermal electricity.*

Renewable sources supplied over 60% of electricity production in 2014. Hydro accounted for the greatest share of this supply with 58% of total electricity production, whilst non-conventional renewables made up the remaining share (BFE, 2014). It is notable that the share of solar has increased from just 0.1% in 2010 to 1.25% in 2014 (BFE, 2014). Under current policies, an increase in the share of renewable energies to 66% of electricity generation is projected up to 2030 (Prognos AG, 2012), which significantly increases the employment opportunities in this sector, as shown in Figure 4. Through the INDC without offsets, Switzerland could create 3,600 additional full time jobs by 2030, compared to current policies. If the INDC were strengthened to meet a 100% renewable scenario, approximately 2,300 additional jobs would be created, compared to the INDC scenario, or a total of 5,900 new jobs compared to current policies.

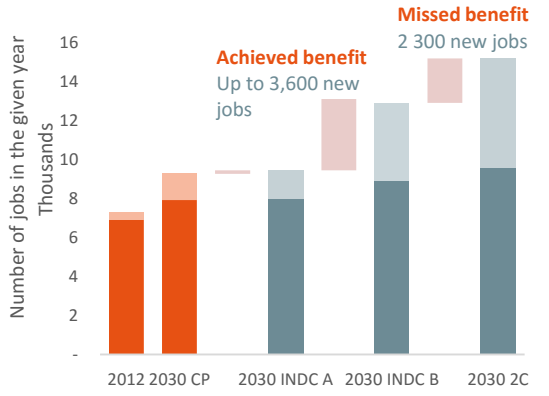


Figure 4: Job creation from renewables

# Supplementary information

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

**Assumptions for Switzerland:**

Current Policies Scenario: Based on the "With Existing Measures" (WEM) scenario described in the 6th National Communication (Swiss Confederation, 2013).

INDC scenarios: The calculations were based on the INDC submission to the UNFCCC, which indicates a reduction in its greenhouse gas emissions by 50 percent by 2030 compared to 1990 levels. We include two INDC scenarios: one in which it is assumed that domestic emission reductions are 30% and the remaining 20% is achieved through offsets (INDC A), and the second which assumes the full 50% is achieved domestically (INDC B). The rate of emission reductions in the energy sector relative to economy wide reductions is assumed to follow the trend as per current policy projections in the National Communication (Swiss Confederation, 2013): we assume emission reductions from the energy sector of 28.6% and 47.6% for economy-wide emission reductions of 30% and 50%, respectively.

Background Particulate Matter 2.5: The background concentration of PM 2.5 for Switzerland is assumed to be 0.93 ug/m-3 as indicated for the European continent in Anenberg et al. (2010).

Electricity demand projections and share of renewable technologies under a 100% renewable scenario in 2050: Projections are taken from the *Energy Perspectives up to 2050* report (Prognos AG, 2012). 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 in the New Policies Variant E scenario.

Renewable installations under a 100% renewable trajectory and under the INDC scenario: Under the 100% renewable trajectory it is projected that renewable sources will supply 100% of electricity in 2050, and that the total capacity of renewable energy sources will increase in a linear fashion from the condition in 2012 to the requirements in 2050. Under the INDC scenarios, it is assumed that the rate of installation of new capacity for each technology is proportional to the rate of energy related emission reductions, relative to the emission reductions under the 100% renewable scenario.

Fossil fuel import prices: Based on the prices in the 6th National Communication (Swiss Confederation, 2013).

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

# References and data sources

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


Anenberg, S. C., Horowitz, L. W., Tong, D. Q., & West, J. J. (2010). An Estimate of the Global Burden of Anthropogenic Ozone and Fine Particulate Matter on Premature Human Mortality Using Atmospheric Modeling. *Environmental Health Perspectives*, *118*(9), 1189–1195. http://doi.org/10.1289/ehp.0901220

BFE. (2014). Schweizerische Statistik Der Erneuerbaren Energien Ausgabe 2010, 33–. Retrieved from http://www.bfe.admin.ch/php/modules/publikationen/stream.php?extlang=de&name=de_721331960.pdf

FOEN. (2013). *PM10 and PM2.5 ambient concentrations in Switzerland. Modelling results for 2005, 2010 and 2020*. Bern. Retrieved from www.bafu.admin.ch/uw-1304-e

FOEN. (2015). Switzerland targets 50% reduction in greenhouse gas emissions by 2030. Retrieved from http://www.bafu.admin.ch/klima/03449/12696/index.html?lang=en&msg-id=56394

Höhne, N., Day, T., Fekete, H., & Gonzales, S. (2015). *Assessing the missed benefits of countries' national contributions*. NewClimate Institute, Köln. Retrieved from http://newclimate.org/2015/03/27/indc-cobenefits/

IEA. (2012). *Energy Policies of IEA Countries. Switzerland 2012 Review*.

IEA. (2014). *World Energy Outlook*. Paris, France.

Prognos AG. (2012). *Die Energieperspektiven für die Schweiz bis 2050*.

Swiss Confederation. (2013). *Switzerland ' s Sixth National Communication and First Biennial Report under the UNFCCC Third National Communication under the Kyoto Protocol to the UNFCCC*. Retrieved from http://www.bafu.admin.ch/climatereporting/00551/13139/index.html?lang=en

Swiss Confederation. (2015). *Switzerland Switzerland's Iintended Nationally Determined Contribution (INDC) and clarifying information*. Retrieved from http://www4.unfccc.int/submissions/INDC/Published Documents/Switzerland/1/15 02 27_INDC Contribution of Switzerland.pdf