

What Place for Renewables in the INDCs?

Updated Version, March 12th, 2016

by Dr. Benjamin Stephan, Stefan Schurig and Anna Leidreiter



For further information, visit www.worldfuturecouncil.org or contact info@worldfuturecouncil.org

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Executive Summary

- 108 countries mention in their INDCs that they are planning to increase or strengthen renewables
- 75 countries quantify the share of renewables they are targeting to have in their energy or electricity mix or provide information on the amount of renewable energy they are planning on installing
- Eight countries are planning on fully decarbonizing their power generation, achieving 100% renewables
- The largest increase in installed renewable capacity comes from China and India: China plans to install more than 104 GW of wind and 72 GW of solar by 2020. India plans to install more than 36 GW of wind and 96 GW of solar by 2022
- 7 countries mention “clean” coal as part of their mitigation strategy in their INDC
- 9 countries are planning to increase nuclear energy as part of their mitigation strategy. The largest increase is planned by India, who wants to put an additional 55 GW online by 2032 – about 8 times the currently installed capacity.

1. Introduction

COP 21 In Paris most likely marks a turning point in international climate policy making: UNFCCC parties for the first time adopted a legally binding agreement that is universal and provides a mechanism that has the potential to build global mitigation efforts that help us to avert dangerous climate change. Intended Nationally Determined Contributions (INDCs) are a crucial element of the Paris Agreement. They are the foundation on which the success of global mitigation efforts will be built. Scientific assessments concluded that current INDCs are an important contribution, but still fall short of reaching the long-term goal adopted with the Paris Agreement of “Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels...” by the end of the century (UNFCCC 2015a: Article 2). The available assessments vary in their results – depending on the underlying models the assessments deployed (Levin and Fransen 2015). Even the evaluation by Climate Action Tracker – the most optimistic assessment – on the basis of 156 INDCs submitted by December 7th, 2015 only sees the world on track for 2.7°C of warming by the end of the century (CAT 2015). Hence it is clear, that current INDCs can only be a first step and that a substantial ratcheting up has to take place.

This research brief looks into the role of renewable energy in the INDCs and the contributions they are envisioned to make to emissions reduction efforts. The basis of this paper is an assessment of 158 INDCs. 142 INDCs mention renewable energy, 108 name the increase of renewable energy as one of their mitigation action, of which 75 include quantified goals. These numbers have to be considered in relation to the 164 nations around the globe, which according to IRENA have renewable energy targets in place (IRENA 2015).

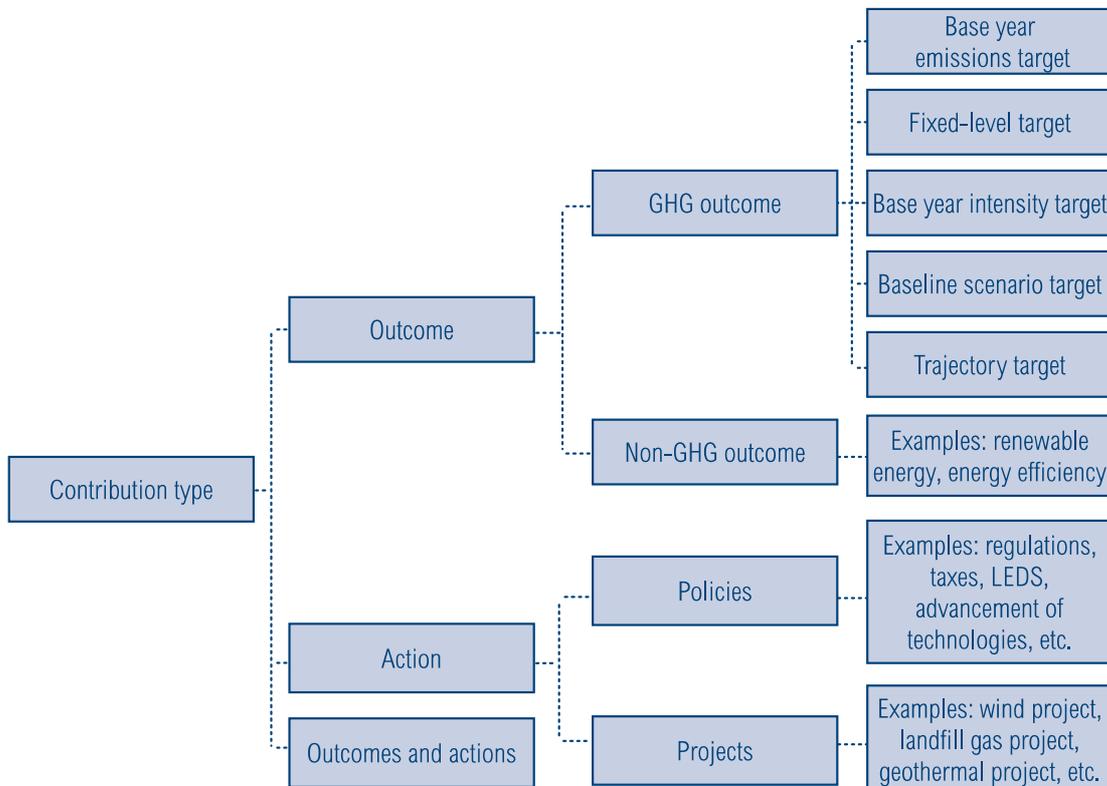
2. The INDC Process: The Way to and from Paris

2.1 Drafting INDCs: Requirements and Guidelines

During COP 19 in Warsaw UNFCCC parties launched the INDC process as a key contribution to reaching a climate deal during COP 21 in Paris. They decided in decision 1/CP19

“to invite all Parties to initiate or intensify domestic preparations for their intended nationally determined contributions, without prejudice to the legal nature of the contributions, in the context of adopting a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties towards achieving the objective of the Convention as set out in its Article 2 and to communicate them well in advance of the twenty-first session of the Conference of the Parties (by the first quarter of 2015 by those Parties ready to do so) in a manner that facilitates the clarity, transparency and understanding of the intended contributions, without prejudice to the legal nature of the contributions’.

Figure 1 – Types of Mitigation Options (Levin et al. 2015: 32)



The decision was reiterated one year later in Lima and guidelines as to what the INDCs should contain were specified in decision 1/CP20:

“[The Conference of Parties] Agrees that the information to be provided by Parties communicating their intended nationally determined contributions, in order to facilitate clarity, transparency and understanding, may include, as appropriate, inter alia, quantifiable information on the reference point (including, as appropriate, a base year), time frames and/or periods for implementation, scope and coverage, planning processes, assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals, and how the Party considers that its intended nationally determined contribution is fair and ambitious, in light of its national circumstances, and how it contributes towards achieving the objective of the Convention as set out in its Article 2;“

Generally speaking these COP decisions allow two different ways to organize an INDC: One option is to communicate intended outcomes such as GHG outcomes – meaning emissions reductions as absolute number, percentage compared to a base year or reduction of emission intensity for a country’s economy or parts of its economy – or non-GHG outcomes. The latter could be targets for energy efficiency or a target for the share in the share of renewables in the energy mix. It is up to the country as to how much detail it wants to provide on how this outcome is supposed to be achieved. The other option is to communicate a list of planned actions instead of outcomes, such as introducing a feed-in tariff or installing a certain amount of renewable energy (Levin et al. 2015: 4-5, 53, 58).

While being able to communicate both, outcomes or actions parties are being encouraged – as the COP decisions indicate – to communicated quantifiable outcomes as these make it easier to calculate reductions and determine the global emissions gap (Levin et al. 2015: 4).

2.2 The Way Ahead: The Role of INDCs in the Paris Agreement

INDCs played a helpful role going into COP 21 as they made clear what each party was willing to commit to and – through the assessments of the INDCs (CAT 2015, UNEP 2015, etc.) – gave a clear picture as to how big the gap to achieving the 2°C or 1,5°C goal still is. The INDCs, however, will be of even bigger importance post Paris: Through the Paris Agreement nationally determined contributions have become the central building blocks of global mitigation efforts. Through the INDCs and a review mechanism – “the ratchet” – built into the agreement, parties expect to achieve the necessary reductions to avert dangerous climate change (Oberghassel et al. 2016: 34). Starting with a global stocktake in 2018 and every 5 years thereafter, UNFCCC parties will have to revise and increase their nationally determined contributions (UNFCCC 2015a Articles 4 and 14). Through trusting, learning and profiting from each other parties are expected to scale up their mitigation efforts. If it works as envisioned, this process will build enough momentum to close the current gap.

3. Renewable Targets in the INDCs

3.1 Methodology of the Analysis

Of the 161 INDCs available on the UNFCCC website on March 12th, 2016, 158 have been included in the analysis. Three are only available in Arabic and had to be excluded. The others have been searched with the following keywords to find the relevant passages in the INDCs: *renewable, solar, wind, natural gas, clean coal, nuclear* and *energy* in the respective languages (English, French, Spanish). Energy efficiency measures or targets have not been considered in the analysis. Furthermore the results (see Annex I) are not disaggregated into conditional and unconditional contributions.

3.2 Type of Renewable Targets

Of the 158 INDCs analyzed, 75 provide quantified renewable targets. Another 33 state that they want to increase renewables as part of their mitigation efforts but don't provide quantified targets. Iceland and Albania state that they do not have any additional renewable targets as the renewables share in their electricity and heat (only Iceland) mix is already at nearly 100%. In 32 additional INDCs renewables are mentioned – e.g. describing wind or solar potential – but it is not clear whether their share is supposed to be increased.

With regard to quantified targets INDCs differ in what type of information they provide. They either provide the share of renewables in the energy mix (22), the share of renewables in the electricity mix (25), the share of renewables in electric generation capacity (10), renewable energy penetration (3), the share of renewables during peak electricity demand (1), annual electricity supply in GW/h (1), additionally installed electric generation capacity in GW (6) or total installed electric generation capacity in GW (7). What further complicates comparison is the fact that not all of these INDCs provide this information for renewables in general, but sometimes focus targets on single energy types, e.g. wind or solar energy. In addition there is a large difference in the detail of information that is provided: While some countries only provide information on the share of renewables or total installed renewable capacity other countries break this down into different energy types (wind, solar, hydro, biomass) and some even provide lists of envisioned projects (number and locations of new windparks, etc.). The latter are primarily developing countries such as Niger, Haiti or San Tome and Principe whose energy demand and absolute amount of renewable energy produced is relatively low. The INDCs that mention an increase in renewable energy but do not provide quantified targets are similarly diverse. Some of them give detailed descriptions what they are planning

– without quantifying those – while others simply mention that they are planning to strengthen renewables.

3.3 Level of Ambition

From a brief desktop research solely based on the information provided in the INDCs, it is difficult to make an accurate judgment of the level of ambition countries have with their renewable goals. To make accurate assessments, it would be necessary to have information on the current share of renewables/installed renewable capacity, projected energy consumption development and the type of financing that is envisioned in addition to the renewable targets. Few INDCs include all of this information and additional research was not possible.

3.3.1 100% renewable

8 countries – Cabo Verde (2025), Cook Islands (2020), Costa Rica (2030), Fiji (2030), Papua New Guinea (2030), Samoa (2017), Tuvalu (2025) and Vanuatu (2030) are planning to fully decarbonize their electricity system and achieve 100% renewable electricity. Even though Samo, Cabo Verde, Cook Islands and Tuvalu are merely small island states with relatively low energy consumption, the increase in the share of renewables is significant: On Samoa it would mean quadrupling the renewable energy share, Cabo Verde needs to triple its and the Cook Islands and Tuvalu would double theirs. In addition Ethiopia plans on becoming carbon neutral until 2030, but does not give details on the planned development of its energy sector. Furthermore, Ecuador and Uruguay state in their INDCs that they are aiming to achieve a share of 90% respectively 95% in their electricity mix by 2017. For Uruguay this is only a small increase of 2% from a renewables share of currently 93% in its power sector. Ecuador did not provide any information on its current share of renewables.

3.3.2 The big fish – India, China and Brazil

The INDCs of China and India contain the by far largest increase in installed renewable capacity. China plans to increase the share of renewable energy in its energy mix from 11.2% in 2014 to 20% in 2030. To do this, China plans on more than doubling its installed capacity in wind power from 95.81 GW in 2014 to 200 GW in 2020. Furthermore it plans to have a capacity of 100 GW of solar power installed by 2020. This means installing an additional capacity of 72 GW – about 2,5 times the capacity China installed in the previous decade. Furthermore China is planning to cover more of its thermal energy needs renewably: By 2020 thermal energy totaling 50 million tons of coal equivalent is supposed to come from renewable sources (geothermal, biomass, etc.).

India is also planning to increase its renewable generation capacity massively. It is planning to install 100 GW of solar capacity by 2022 – an additional capacity of 96 GW compared to current levels. The targeted increase of wind power is only 36 GW bringing India's wind capacity to a total of 60 GW in 2022. In addition India is planning on more than doubling its biomass based production capacity increasing it from 4.4 GW to 10 GW by 2022.

Brazil's is starting from a higher share of 75% renewables in the electricity and 40% in the energy mix. The share of renewables in the energy mix is supposed to be increased by 5% to 45% by 2030. To achieve this, it plans on "increasing the share of renewables (other than hydropower) in the power supply to at least 23% by 2030, including by raising the share of wind, biomass and solar."

To put these numbers into context: By the end of 2014 Germany had an installed generation capacity of 38 GW of wind and 38,5 GW of solar power (BWE 2015, Fraunhofer ISE 2015). The share of renewables was 13,7% in the energy mix and 25,8% in the electricity mix – with a 8.6% share for wind and a 5.8% share for solar (AEE 2015, UBA 2015).

3.4 Dirty Energy: The Role of Nuclear, "Clean" Coal and Natural Gas

Apart from renewable energy some of the INDCs also list an increase in nuclear energy, "clean" coal or natural gas as mitigation contribution:

- **Natural Gas:** 22 INDCs mention an increase in Natural Gas usage as part of their mitigation effort. These countries are: Afghanistan, Algeria, Benin, China, Congo, Ghana, Iran, Israel, Jordan, Lebanon, Niger, Nigeria, Macedonia, Morocco, Mozambique, Rwanda, Saudi Arabia, Senegal, Sudan, Tanzania, Venezuela and Yemen.
- **"Clean" Coal:** In their INDCs, 7 countries name "clean" coal technologies part of their mitigation contributions. These countries are Bangladesh, China, Ghana, India, Macedonia, Mongolia and South Africa.
- **Nuclear Power:** 9 countries are planning to rely on an increase in nuclear power to achieve part of the envisaged emissions reductions. These countries are China, Iran, Israel, Jordan, Niger, India, Argentina, Turkey and the United Arab Emirates. India plans by far the largest increase in nuclear energy, trying to achieve 63 GW in installed capacity by 2032 – roughly 8 times the currently installed capacity or an increase of more than 55 GW.

3.5 The Absent

Looking at the list of 48 countries that have not included renewable targets in their INDCs or didn't even mention renewables, one has to keep in mind that most of these countries have renewable energy targets. According to IRENA 164 countries have a renewable energy target (IRENA 2015). The most prominent examples that did not include renewable targets into their INDCs are the European Union and the United States. Yet, the EU has decided in its Climate and Energy package to increase its renewable share in the energy mix to at least 27% by 2030. And US President Obama had announced a 20 % goal for renewable energy in the electricity mix – excluding large hydro – in July 2015. The 20% goal implicates about “triple the percentage of energy currently produced from non-hydro renewables“ (Sheppard 2015).

3.6 Policy Details: The Role of Feed-in-Tariffs

A number of INDCs also mention policy measures with which the renewable targets are supposed to be achieved – carbon taxes, emissions trading, renewable quotas, feed-in tariffs, etc. This paper cannot go into detail, but limits itself to give a brief overview on the situation of feed-in tariffs. Seven countries state in their INDCs that they are planning or considering implementing a feed-in tariff to promote renewables and achieve their renewable target. Apart from Laos, these are only African countries namely Gambia, Ghana, Mozambique, Namibia, and Rwanda.

4. Effect of the INDCs

It is just as difficult to determine the effect of the renewable targets in the INDC on the global development of renewable energy as it is difficult to determine the effect of INDCs on global warming. From a renewables perspective, part of the problem is the absence of a requirement to include renewable targets and implementation strategies into the INDCs – and a standardized way as to how this was supposed to be done. The currency of the UNFCCC is emissions reductions in CO₂e and one can understand the motivation of the UNFCCC and its parties to make it as easy as possible to compile an INDC in order to have a high rate of submissions. Yet, higher reporting requirements including the need to describe how emissions reduction are supposed to be achieved would have provided greater transparency. And they might have triggered more detailed discussion processes in the respective countries as to what

renewable targets exactly should look like and how they should be achieved. In this light 108 countries including renewable targets, of which 75 are quantified is a considerable number. There are calculations as to how INDCs with their renewable targets and other measures will effect the development of the global energy sector. The International Energy Agency has analyzed 125 INDCs that had been submitted by mid-October 2015. Based on this assessment – which took into account unconditional pledges only and already implemented domestic policy – they concluded that “Growth in energy sector GHG emissions slows dramatically, if INDCs are implemented fully.” (IEA 2015: 5). Yet, they do not come to a halt, as by 2030 global energy-related emissions are still expected to grow around 0.5% per year (IEA 2015: 5). There will be a large increase in renewables in the power sector. But as global electricity demand is expected to grow by 40%, global CO₂ emissions from power generation will not fall but „remain broadly flat through to 2030“ (IEA 2015: 5).

Considering these forecasts, it is clear that also the renewable targets in the INDCs fall short of the long-term goals set out in the Paris Agreement. To be able to limit global warming “to well below 2 °C ... and to pursue efforts to limit the temperature increase to 1.5 °C” (UNFCCC 2015a: Article 2) the agreement calls for achieving “a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century” (UNFCCC 2015a: Article 4). This according to current research translates into decarbonization – the complete phase out of fossil fuels in the energy sectors (electricity, heating/cooling and transportation) – by mid century (UNEP 2015: 6). Decarbonization, however, will not be reached without additional efforts going beyond the renewable targets in the current INDCs.

5. Summary

Given the missing requirements to report on renewable energy development in the INDCs a considerable number of INDCs include renewable energy targets – 47% of INDCs include quantified targets. One has to take into account though, that more than these countries have a renewable energy target, but did not include them (IRENA 2015). Similarly more could be planning on increasing nuclear, “clean” coal or natural gas but not mention this in the INDCs. It was difficult to accurately determine the level of ambitions, given the limited data the INDCs contained. But it is clear that they vary considerably, in many instances leaving room for improvement and thus far falling short of transforming the energy system quickly enough to decarbonize it by mid-century (UNEP 2015; IEA 2015). The renewable generation capacity

China and India are planning to bring online is impressive. Yet, similarly India's massive nuclear target is worrisome – though it has to be seen whether this rapid increase is realistic, given the time nuclear power plants take to be built.

Just looking at the renewable targets – not considering their economic situation – there seems to be room for improvement in a number of developing countries. As many of them have yet relatively low energy consumption rates, there might be chance to initiate early on a profound transformation of the electricity sector. International cooperation and finance could play an important role in helping to scale up these targets. Projects like the Africa Renewable Energy Initiative (AREI) financed by the G7 and aiming to bring 10 GW of additional renewable generation capacity online by 2020 and possibly 300 GW by 2030, are promising ventures that might just do that.

The INDCs in their current form are an important first step, but yet fall way short of putting us on track to avert dangerous climate change. The Paris Agreement has put into place important institutional building blocks. If implemented in a swift and ambitious manner, there is a likely chance of limiting global warming below 2°C by the end of the century. To do so UNFCCC parties have to make sure that renewables play a bigger role in the INDCs during the upcoming review and stocktaking process. It would be beneficial if this process puts parties' renewable targets under scrutiny and offers assistance to parties in need to implementing and developing them. Many more initiatives like AREI are needed to implement the necessary transformation in the global energy sector.

6. Literature

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