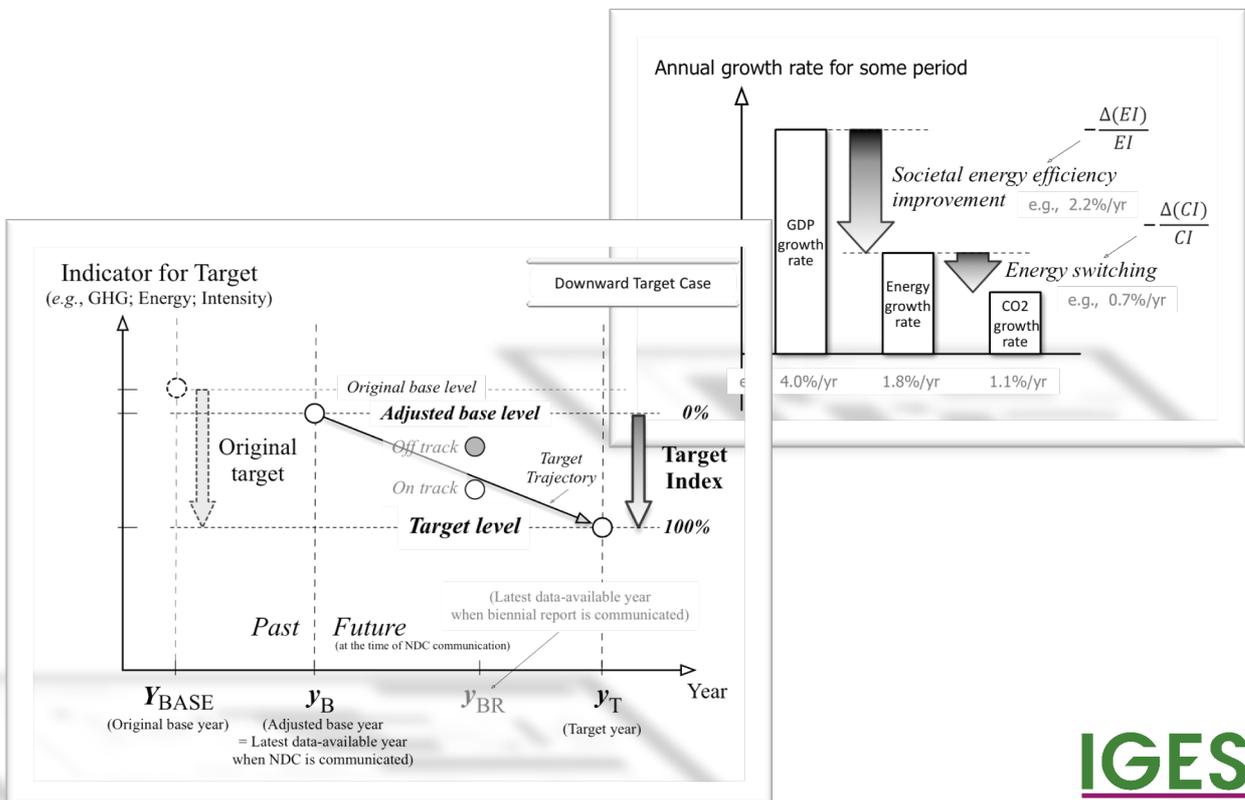


A Proposal for a Simple Methodology to Enhance Transparency and Comparability of NDC Targets and Their Progress Reporting under the Paris Agreement

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Executive Summary

The NDC Guidance on the “formulation and communication of the NDC mitigation target(s)” (5-year cycle) and the Transparency Framework Guidelines dealing with the “reporting and review related to tracking progress of the NDC mitigation target” (2-year cycle) are essential in the detailed rule design of the Paris Agreement, scheduled for adoption at COP24.

This paper proposes an approach to the design of the contents of these reporting processes, addressing the issues of greenhouse gas measurement, reporting and verification (GHG MRV).

The paper proposes the use of quantification methods to enhance transparency and comparability to attain the following objectives:

- I. To be a descriptive element of the communication of the NDC (5-year cycle) and the national report (2-year cycle) of each country, which are mandatory under the Paris Agreement;
- II. To be the basis of the international review and compliance facilitation processes; and
- III. To enable a country’s policymakers to conduct self-analysis and gain an accurate understanding of the situation to facilitate planning and implementing domestic policies.

The contents are as follows:

- (A) A simple method to evaluate the progress of achieving NDC mitigation target(s);
- (B) Necessary information for well-defined NDC target(s) and clear communication;
- (C) Method to analyse the status of progress towards achieving NDC targets; and
- (D) Method to describe the status of progress in the biennial reporting on NDC mitigation target(s).

The reporting process itself is also intended to be an exercise for capacity building.

Regarding (A), this paper proposes a method to compare progress between countries, using a 0% baseline for the latest year the NDC was submitted and 100% for each indicator’s target level.

Regarding (B), the paper proposes to break down the NDC mitigation target into various components. Then, the necessary information is to be well-defined, with items added such as those for the plan-do-check-act (PDCA) cycle elements, so as to facilitate domestic measures.

(C) proposes the method of factor analysis, which can be used as a tool to understand the NDC mitigation targets correctly from past trends, using a simple formula.

(D) proposes additional necessary report items in the progress report of the 2-year cycle, including the sharing of lessons learned.

The items proposed here do not all necessarily need to be obligatory. However, the exercise of preparing the NDC and following the proposed procedures to the extent possible will enable the officials in charge to understand their country’s progress and facilitate consideration of appropriate countermeasures.

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1. Background and Objectives of the Proposal

1.1. Background

Efforts to tackle the climate change issue after 2020 will be implemented globally based on the Paris Agreement and its detailed rules under the United Nations Framework Convention on Climate Change (UNFCCC). The Paris Agreement was adopted in 2015, came into force in 2016, and now is in the process of considering what kind of rules will be effective, moving towards adoption of a package of detailed rules scheduled for COP24 at the end of 2018.

The heart of the Paris Agreement is the Nationally Determined Contributions (NDCs) scheme. Every country shall formulate its NDC and communicate its progress every five years, aiming to achieve its objectives, especially the mitigation target as its core element (Paris Agreement, Article 4). The Paris Agreement aims to limit the rise of global mean surface temperature to well below 2 °C¹ above pre-industrial (in other words, normal) levels by taking stock of the implementation of the Agreement to assess progress ensuring that the earth's "heart" gets progressively healthier every five years.

The NDC has a major role in terms of both global and country ambitions.

In its global role, the sum of the NDC mitigation targets by each country is checked under the Global Stocktake process every five years from 2023, and an assessment will be made of whether or not the planet as a whole is on target to achieve the 2 °C temperature goal (PA, Article 14).² It is important to understand what is meant by "the quantitative additional GHG reduction needed to meet the temperature goal and the necessity to do so", which can be "shared", and whether it can be used to strengthen the NDC mitigation targets of each country. The Global Stocktake process can be interpreted as part of the PDCA-cycle process of climate initiatives in terms of both checking global progress plus a process to correct the trajectory, but it should be noted that the NDC is a "target" and/or an "ambition", but does not mean "achieved" reductions.

The Global Stocktake process is linked to implementation of domestic measures in each country via the "NDC formulation and communication" process, in principle.

The reporting and review process of each country's "progress and achievement towards its NDC

¹ An analogy to the body's temperature is easy to understand in order to imagine the index of average temperature rise of the Earth's surface. The 2 °C rise can be compared to a person whose base body temperature rises 2 °C (e.g., a person's temperature rises from a normal 36 °C to 38 °C). Although it is possible to live even at 38 °C, the burden on the human body would be greater.

² This prelude is the Talanoa Dialogue to be completed at COP 24 at the end of 2018. Since the total current NDCs fall far short of achieving the 2 °C goal, the Talanoa Dialogue is the first effort to consider how to go beyond the unique circumstances of each country to the global common goal.

mitigation target(s)”—in conjunction with the Global Stocktake—is known as the “Transparency Framework” which is on a 2-year cycle (PA, Article 13). If this “performance evaluation” process³ and the relevant GHG mitigation actions are not carried out effectively, and even if the strengthening of the NDC targets is ahead of schedule, the effectiveness of the Paris Agreement framework will be lost.

Additionally, the Paris Agreement outlines another supportive process to facilitate each country’s compliance (PA, Article 15). According to the Paris Agreement, the decision by each country as to what kind of NDC target is set and what kind of countermeasures are to be taken towards achievement is voluntary, but NDC formulation and its communication (5-year cycle) as well as its regular reporting for tracking progress (2-year cycle) are mandatory.

Current transparency arrangements under the UNFCCC, which are related to transparency and completeness, are mainly addressed to external observers outside of each country. The reporting and review processes are not aimed at fostering domestic understanding or strengthening implementation measures.

Generally, it was anticipated that publicizing information to a certain extent would generate some kind of pressure to induce countries to take effective measures to achieve the target. However, many countries—especially developing countries—do not always think this way. Moreover, they do not have sufficient capacity to design and implement effective measures due to lack of knowledge or because of institutional barriers.

For the Transparency Framework of the Paris Agreement to be effective in helping to achieve the NDC of each country, “formulating the NDC mitigation target and reporting progress” and its “progress status review” should be designed to aim at, and contribute to, the following:

- Proper recognition of the situation; and
- Effective promotion of real actions.

The concept of comparability, to further promote transparency, should be enhanced. It should include not only comparability between countries, but also comparison with past trends as well as the NDC target of the country. “Comparable information” should not be used to criticise a country with poor performance, but to help the country to design and implement more effective measures by analysing such information, based on the spirit of the Paris Agreement.

The process of negotiating the rules of the Paris Agreement is being carried out in parallel on several items, but the above issues are particularly related to:

- (1) “Further Guidance on NDC—Information to facilitate clarity, transparency and understanding of NDCs” (APA Agenda item 3 (b)), and
- (2) “Modalities, Procedures and Guidelines of the Enhanced Transparency Framework for action” (APA Agenda item 5).

This paper discusses and proposes options for these items.

³ In an earlier paper, the author proposed that the objectives of the rules of the Transparency Framework should not be only about performance evaluation, but they should also encourage new and strengthened domestic policies and other measures (Matsuo, 2017).

1.2. Objectives of the paper

In the international framework to address climate change, the proper quantification of effects through measurement, reporting and verification (MRV) processes has become very important. It includes Articles 5, 7 and 8, and market mechanisms (Article 6: JI; Article 12: CDM; and Article 17: IET) of the Kyoto Protocol, as well as Nationally Appropriate Mitigation Actions (NAMAs) introduced by the Bali Action Plan (2007) under the UNFCCC. As for the NDC mitigation targets, the MRV aspect is also crucial as quantitative assessment will be needed to assess the effects of measures and to track progress on achieving the targets.

Historically, under the UNFCCC, the process of refining each country's GHG inventory has been promoted from an early stage as part of the MRV process. The Kyoto Protocol's compliance system for industrialised countries (KP, Articles 5, 7, 8) for their targets was strictly evaluated based on this experience, and compliance assessment was conducted for each country.

On the other hand, one feature of the Paris Agreement is that a larger degree of freedom and flexibility is allowed for setting the NDC mitigation targets under the Agreement.

This paper, makes a proposal concerning the international rules for a country's NDC mitigation target formulation and communication as well as on reporting the state of progress under the Transparency Framework, especially focusing on its aspect as part of the MRV system including a methodological assessment tool.

This proposal emphasizes the importance of the target's user friendliness, so that it is:

Easy to assess progress and easy to understand.

This feature not only has the merits of transparency and objectivity of the review internationally, but it also means that domestic decision-makers can properly understand the situation of their country.

It is also essential that:

The mitigation target(s) of each country should be well-defined.

This means that:

Once a target has been committed to by a country, its compliance will not be ambiguous and it should be able to be assessed exactly thereafter.

Although this will not be an obstacle for developed countries that have experience with the Kyoto Protocol compliance system, it will be challenging for developing countries with a weak GHG inventory system.

Here, it is assumed that the GHG inventory⁴ is given (assuming it will be developed independently). This proposal also aims to minimise the ambiguity⁵ of the “definition of the NDC mitigation target” and “its progress evaluation”. Quantitative evaluation is assumed to be both self-evaluation and third-party evaluation.

For the mitigation aspect of the NDCs, the following quantification methods and reporting elements are proposed with four categories (A to D below) for the proposal targeting (1) the NDC Guidance (APA agenda item 3 (b)) and (2) Transparency Framework Guidelines (APA agenda item 5):

- (A) A simple method to track the progress of the NDC mitigation target(s) (for Transparency Framework Guidelines, partially related to the NDC Guidance for its preparation);
- (B) Necessary information to formulate well-defined NDC target(s) and communication elements (for NDC Guidance);
- (C) An analysing tool to assess the progress toward the CO₂ emissions part of the NDC target (for NDC Guidance and Transparency Framework Guidelines); and
- (D) Reporting elements for the progress toward the NDC mitigation target(s) (for Transparency Framework Guidelines).

These quantification methods/tools can increase the level of transparency and comparability for:

- I. Descriptive elements of the communication of the NDC (every 5 years) and biennial national reports of each country, which are mandatory under the Paris Agreement; and
- II. The basis of the international review and compliance facilitation process.

In addition, the proposal recognises that:

- III. A country should self-analyse and understand its own situation properly so that decision-makers can develop domestic plans, and implement policies and measures.

This latter aspect is a more important objective. This was taken into account when designing the proposal for the rules.

Especially from the perspective of self-analysis, comparability of the past to current performance with the NDC mitigation target in the country is more important than the comparability among countries.

Also, in order to enable government officials in developing countries to calculate and analyse by themselves, the approach is designed to be simple and easy to understand.

It should be noted that the items described here are not necessarily mandatory elements. However, by

⁴ The limitation of the GHG inventory system is that it does not include useful information for implementing countermeasures and that it cannot facilitate elaboration of the underlying statistics (e.g., energy statistics), which are more important from the viewpoint of SDGs than the GHG inventory. These points are not discussed here.

⁵ This does not mean requesting “unnecessary stringency” through GHG MRV. Unnecessary means “it is meaningful only in the context of GHG”. On the other hand, we consider that MRV aiming at promoting countermeasures is required. In order to promote countermeasures, it is effective to properly monitor and grasp Key Performance Indicators (KPIs) of countermeasures and to use the PDCA-cycle. The GHG MRV should be positioned as a part of the self-analysis.

preparing the items in the template, and following them as requested to the extent possible, they are designed so that persons in charge can easily gain a proper understanding, thereby facilitating implementation of countermeasures.

To date, there has not yet been a proposal based on this kind of viewpoint (other than a paper by the author (Matsuo, 2017)). On the other hand, this approach has already demonstrated its effectiveness in Japanese reporting systems under the Energy Conservation Law (Energy Conservation Center, 2017 and older; METI 2017) and the reporting system under the Nippon Keidanren (Japan Business Federation) Voluntary Action Plan (Commitment to a Low Carbon Society) (Japan Business Federation, 2018 and older; METI 2015, 2018).

2. Simple Method of Evaluating Progress towards the NDC Target

Each country is obliged to report the progress towards its NDC mitigation target(s) every two years. This aspect should be considered at the stage of the NDC target formulation because it should be in a form that allows for good understanding of the progress and simple reporting. This paper emphasises the following two points:

- There are various types of targets (see Figure 2), but it is desirable to be able to evaluate these on a “common scale” (from the viewpoint of comparability among countries); and
- A country can see, at a glance, the status of the progress towards achievement of its target (i.e. from the point of view of comparability among countries).

2.1. Progress status expressed as a percentage

In the case of a quantitative target, it is necessary to reach the target level from the level of the latest year specified in the NDC, whether the target is for GHG emissions, for energy consumption, for key performance indicators (KPIs) of some policy or measure (e.g., renewable energy introduction amount), for some intensity, or even if it is against the deviation from a business as usual (BaU) scenario.

Therefore, this paper proposes a “**Target Index**”, such that:

0% is assumed for the level in the adjusted base year (see next sub-section)
and 100% for the target level of the indicator of the target.

Then progress is evaluated based on whether the level achieved in a certain year
(latest year specified in the report) is above or below the line (**Target Trajectory**)
linearly interpolated between these two points.

(see Figure 1 and next sub-section for the adjusted base year definition).

This method can be applied to both declining and increasing targets using the same scale. If there are multiple targets, progress can be evaluated by applying the method to each one.

When plotting the indicator for the target on the vertical axis and time on the horizontal axis, a straight line between the two points of

(adjusted base year, its actual value)⁶ and (target year, target value)

can be drawn as the “Target Trajectory”.

⁶ As shown in the next subsection, the latest year specified in the NDC means the adjusted base year.

If the performance level of the indicator of a certain year is below the Target Trajectory, it is considered to be “on-track”, while if the level is above the trajectory, the performance is considered off-track (for declining targets, and vice versa for increasing targets) as shown in Figure 1.

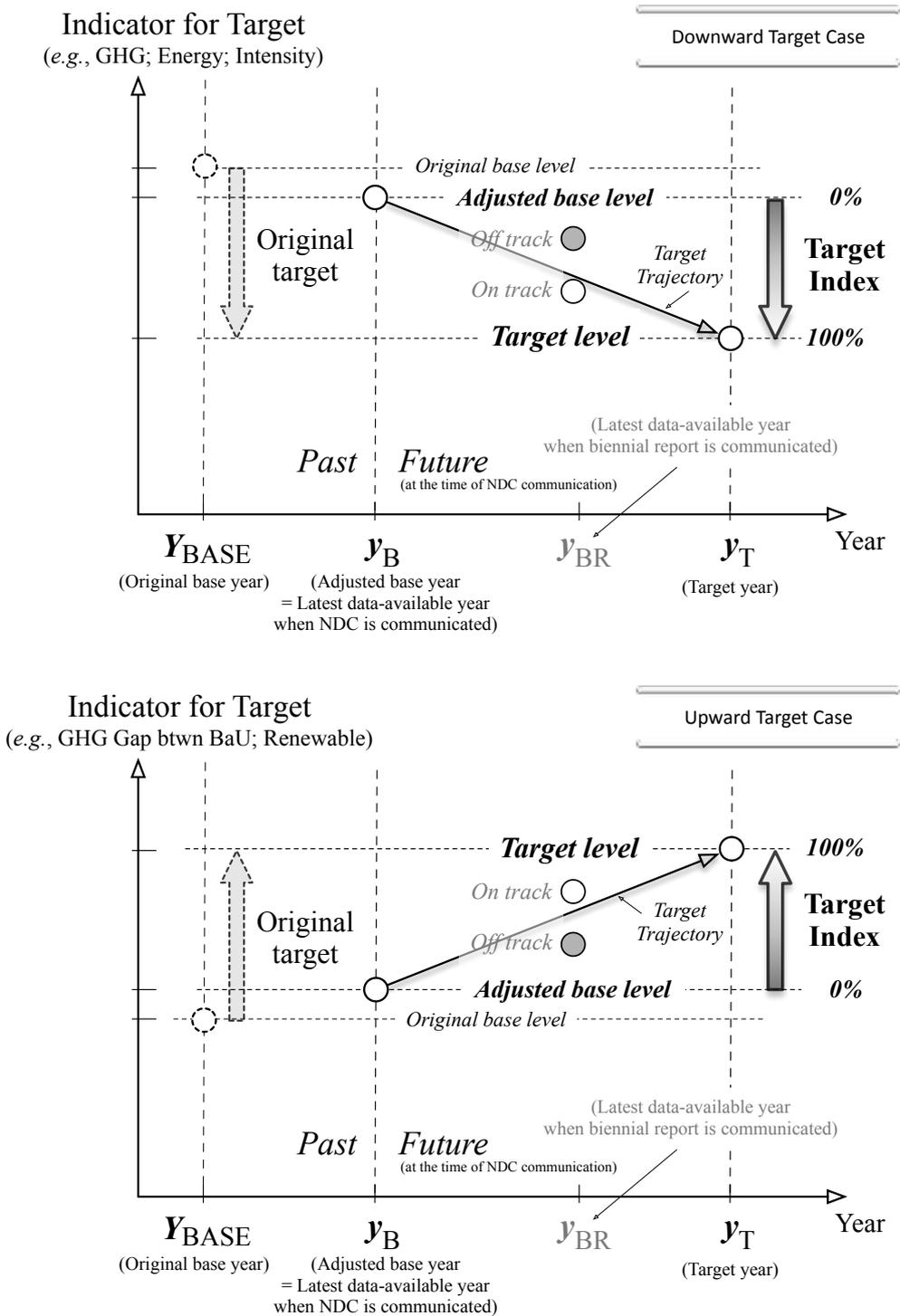


Figure 1: Image of NDC mitigation target and progress toward its achievement

It is noted that the “Target Index” could range from below zero (i.e., worse than the adjusted base year) to over-100% (i.e., over achievement of the target). It is also noted that the assessment of on-track or off-track should be judged whether the level of a certain year is below or above the “Target Trajectory” for declining targets (or vice versa for increasing targets) and NOT whether the Target Index is 100% for the years prior to the target year.

In the course of progress evaluation in the middle of the period up to the target year, since there is fluctuation depending on the year, the value of each single year has little significant meaning. Therefore, it is more appropriate to assess the progress over a period of several years (whether it is above or below the Target Trajectory). This method enables more accurate evaluation of progress (as the “check” part of the PDCA cycle).

2.2. Base year adjustment

If the base year of the NDC target (Y_{BASE} in Figure 1) is different from the latest year of data availability at the time the NDC was communicated (y_B in Figure 1), the Guidance should request the country to:

adjust the reference (base) level and target level by adjusting the base year to y_B
--

and specify the adjusted values, in parallel.

Selection of the base year may involve historical or political considerations depending on the country. However, here it is not proposed to require a change in the original base year selection; it is simply proposed for technical reasons to have a common base year.

The merits of using this adjustment method are:

- Enhanced comparability by choosing the same base year as the origin;
- Enhanced transparency by clarifying the next steps to be taken after submitting the NDC; and
- Clarification of the target that the country should aim for (not dependent on the past situation).

3. Necessary Information to Make the NDC Target Well-Defined and Facilitate Communication

3.1. Categorisation of current NDC mitigation targets

Currently, 169 Parties have submitted their first NDC1 (192 countries⁷ have submitted INDCs, but some have not submitted their NDC1).

The current mitigation targets of NDC1 of the countries are categorised into various types with the following components and combinations thereof:

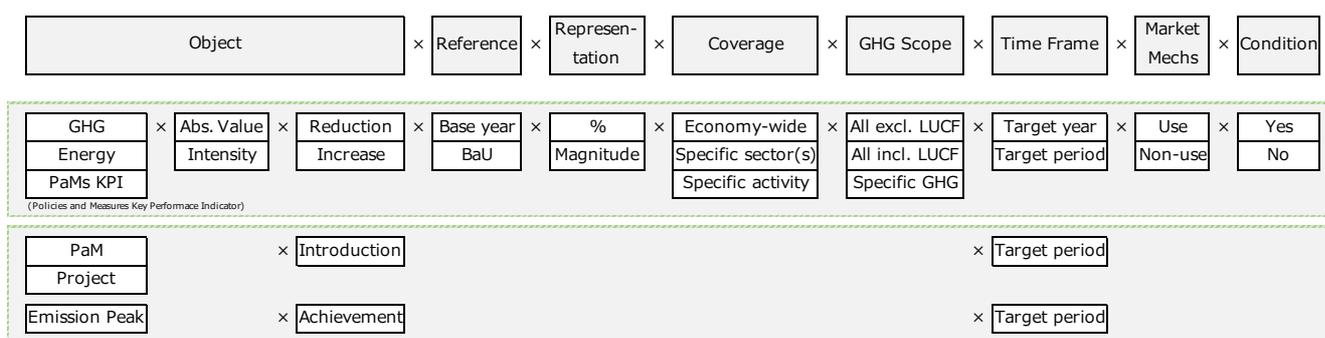


Figure 2: Types and components of current NDC mitigation targets

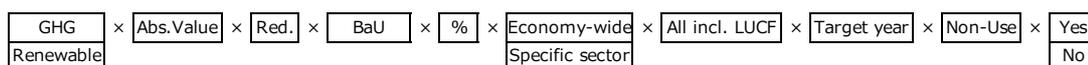
PaMs KPI is a type of target where specific policies and measures are taken, and the performance target is set to some kind of Key Performance Indicator (KPI), such as renewable energy introduction amount, energy saving standard level, energy saving equipment introduction amount, forest cover area, etc.

In the case of developed countries, the following economy-wide absolute emission reduction target and some similar target types are communicated in most cases:



In the case of developing countries, diverse types of (co-existing) targets (where two tiers show that several different targets co-exist) can be seen. Many countries selected the type of target set in “the gap between the ‘as-is’ scenario, often called the BaU or Baseline” as an overall target. However, there are not many NDCs that clearly explain how BaU or Baseline is defined.

⁷ 165 INDCs in 164 countries + EU (28 countries) were submitted. For NDCs, 168 countries + the EU have submitted 141 NDCs 1 (where the EU itself and the 28 EU member countries have submitted the same INDC/NDC as a Member State) (as of April 18, 2018). Many countries converted the INDC to the NDC1 with little amendment.



Under the Paris Agreement, developing countries are encouraged over time to move towards an economy-wide target. On the other hand, at present, many LDCs and SIDS have listed NDCs to implement specific policies, measures and projects without specifying quantified targets.

Each country is also encouraged to raise its level of ambition, so in the near future, there will no longer be any NDC mitigation targets that only declare the introduction of specific policies, measures and projects; rather, all countries will need to develop some quantitative targets.

This paper does not cover the target type⁸ of simply implementing specific policy measures and projects without targets, but those that have some quantitative targets (i.e. quantitative target setting on some KPI of specific policies and measures) are included.

3.2. Requirements and considerations on rules for NDC communication

Items to be specified in the NDC

In the Paris Agreement (Article 4) and COP21 Decision requests the Ad-hoc Working Group on the Paris Agreement to develop a Guidance on features of NDCs to be communicated by countries (see Annex 1). This paper proposes that the Guidance should be developed based on the following points:

- Information contained in the communication of the NDC should aim for transparency, accuracy, completeness, and comparability, with the aim of being understood correctly;
- Quantitative information may include a reference point (base year, etc.), time frame, sector scope and GHG coverage, planning process, conditions and methodological approach;
- Each country needs to ensure methodological consistency with respect to baselines etc. at both the NDC communication and implementation stage; and
- The NDC should include all GHG emissions and absorption by default, and it should indicate the reasons if certain parts are not included.

The NDC Guidance, to be adopted at COP24, should specify the accompanying explanatory information that should be included in the NDC, such as “quantitative and/or methodological information” which is mainly described as an “explanation of each component that constitutes the NDC mitigation target” as shown in Figure 2 (specific proposals are discussed in the next section).

To ensure this is achieved, it is necessary to look at how to represent the following quantitative and non-quantitative information in an international set of rules (i.e., as guidance), while respecting the sovereignty of each country.

⁸ It is possible that this type of target could be included as an effective one in the NDC Guidance (with other types). In this case, it is easy to judge if the target is achieved, since it is possible to provide a binary judgement of “yes or no” after the fact.

- Baseline (or BaU) scenario setting methodology for future outlooks (if applicable);
- Well-defined (i.e., without being arbitrary) description of the NDC mitigation target itself;
- Appropriate self-analysis and method to explain how the Party plans to achieve its NDC mitigation target, and its application;
- Method to maintain comparability (versus own country's past trend, as well as other countries);
- Key performance indicators (KPIs) and indicators that can be benchmarks (various intensities, etc.) and the related assessment method;
- Procedures to adjust course, including any indicators which may trigger policy changes;
- *Ex post* evaluation of the previous 5-year period performance (and from the previous biennial national report); and
- Relationship between the intermediate and final targets within the timeframe.⁹

Although not aimed directly at the NDC target, each country should strive to formulate and communicate its own long-term (mid-century) low-GHG emission development strategy in addition to the NDC (PA Article 4, Para. 19). Generally, NDCs tend to be relatively short-term (5 to 15 years), so in the course of formulating this long-term low-carbon development strategy, it is desirable to consider policies that require a long-term (at least several decades) perspective and reflect this (e.g., preparation of renewable-dominant energy system) in the NDC. Related strategies could include power plant development, technology development, public transport policy and urban planning.

Items to be specified for NDC progress in the biennial national report under the Transparency Framework

The central element of the Transparency Framework is the report and review of “progress on achieving the NDC mitigation target(s)” every two years, and the rules are to be compiled in the form of guidelines¹⁰. As stated in COP Decision 1/CP.21, para. 31, this should be based on a report consistent with the contents of the communication of the NDC itself every five years.

In the Paris Agreement (Article 13) and the COP21 decision (see Annex 2), the points that should be considered regarding the contents of the reporting under the Transparency Framework for action (2-year cycle) are as follows:

- In the NDC progress part of the reporting Guidelines for the Transparency Framework for Action, importance is attached to transparency, accuracy, completeness, consistency, comparability, etc. consistent with the NDC formulation and communication.

⁹ For example, in NDC2 that should be communicated in 2025, the year 2035 may be designated as the target year, but at the same time, there is also the possibility that 2030—the target within the time frame of NDC1—may be required to be described as an intermediate target year. In such case, the quantitative description element of the intermediate target is the same as the final target.

¹⁰ Generally, guidelines are regarded as a more enforceable document than guidance. Although the contents of the NDCs are voluntary, its communication is mandatory. In the Transparency Framework of the Paris Agreement, separate (but relevant) Guidelines are developed both in terms of reporting and review. In terms of operation, it is assumed that guidance and templates will be prepared under that (as in the current transparency arrangement).

- In particular, it is necessary to ensure the consistency of the methodology used in the NDC communication and the methodology used in the NDC progress report.

As concepts to be realised within these Guidelines, consistency and comparability are particularly important.

3.3. Criteria for Describing the NDC Mitigation Targets

It is mandatory to formulate and communicate NDC mitigation targets under the Paris Agreement, but the level and contents are voluntarily set by each country, resulting in the NDC system being less effective in reducing GHG emissions worldwide. We aim to secure greater effectiveness by properly designing and operating the reporting system (of the targets themselves and any progress made) and further reviewing it (the NDC targets are reviewed at the global level for aggregation, while their progress is reviewed at the country level).

One theme of this paper is how to express the NDC mitigation targets for an effective and workable NDC system at the country level.

To be well-defined

As mentioned above, five criteria—transparency, accuracy, completeness, consistency, comparability—are already defined.¹¹ This paper proposes that the targets should include the following items in order to meet these five criteria:

The NDC mitigation target should be “well-defined” without being arbitrary

If the target is not clearly defined¹² it will be difficult internationally as well as nationally to assess whether the target has been met, or whether a country is on track to meet the target. This also leaves a kind of escape route, and doubts may be expressed on the seriousness of the intention to achieve the committed target. Also, because evaluation would become difficult quantitatively, this goes against the spirit of MRV.

The NDC mitigation targets will be revised at least every five years. For example, NDC1's 2030 target will be outdated by the time it is evaluated, so there may well be no significant meaning to the evaluation of achievement. However, performance evaluation in the form of a past target is important for the following reasons:

- It follows the transition and achievements of the NDC mitigation targets and clarifies historical efforts;

¹¹ Among these criteria, the rule on “completeness” could be loosened somewhat. Given the state of submission of national communications and biennial update reports by developing countries, a good start would be “to report first, even if it is not complete”. This is also consistent with the underlying spirits of the Transparency Framework to be facilitative and flexible according to the capabilities of developing countries.

¹² A case where the percent reduction from BaU is set as the NDC mitigation target, even though the BaU scenario is not properly defined, for example. A considerable number of NDCs by developing countries fall under this category currently.

- By comparing the base year level, the past target level, the latest target level and the current situation, it is very useful for the future,
- Additionally, it is very important when conducting the NDC progress assessment every two years, “that the target to be headed is defined without being arbitrary” when a country implements its PDCA cyclic process for measures.

To add some theoretical considerations:

A well-defined NDC mitigation target means the following:

The values of the various parameters constituting the mathematical expression of the NDC mitigation target “represented by a mathematical formula” are decided without being arbitrary after the target year.

One of the criteria to be emphasised is consistency and this can be realised by using a common methodology at both the “*ex ante* = NDC formulation” stage and “*ex post* = NDC implementation” stage similar to the approach of CDM. The value of each input parameter does not need to be common in advance and afterwards, and the difference arises that the parameter is an estimated value in advance, and an actual value *ex post*. Of course, there is a difference there, which is important information for the PDCA process in order to make stepwise improvements.

Another criterion is comparability as shown below, but in either case, it means that the various parameters mentioned above are quantified and can be compared:

- Comparability among countries; and
- Comparability between one country's past trends and future direction.

One more issue is how to assess the results of the comparison so that real improvements are made.

To include elements of the PDCA-cycle

The core of the NDC is the mitigation target, but in addition, the NDC includes an explanation of the plans and institutional arrangements showing how it is planned to achieve it. This inclusion makes it possible to objectively conduct a self-assessment of any progress made and consider how to improve it. At the later reporting stage, based on these explanations in the NDC, a country can describe how it has changed in the biennial national report under the Transparency Framework, then analyse the results of its self-analysis and describe what kind of changes were made.

For that purpose, it is desirable that the following information should be included in the NDC:

- Institutional framework for implementation
 - Which ministries/departments have developed the plan? Which ministries and agencies implement relevant actions? Which department is responsible for checking?
 - How does each responsible agency make decisions, carry out coordination and what is its line of responsibility?
- Planning and implementation process [P]
 - What is the Party's concrete plan or blueprint to achieve the target?

- What are the key policies, measures and actions? Also, to what extent do they contribute to achieving the target?
- Among the key policies, measures and actions, what are the prospects for expansion of existing ones? What is planned to be implemented in the near future? What else?
- Implementing means [D]
 - Who are the actors and implementers of key policies, measures and actions?
 - What are the results so far? What is the monitoring and reporting system for KPIs? How is the aspect of GHG MRV integrated?
- Check [C]
 - How is the achievement rate of KPIs of key policies, measures and actions checked?
 - Is there a system to grasp the factors of success or failure? Is the system actually used?
- Adjustment [A]
 - How have the key policies, measures and actions been adjusted? Or will these be adjusted in the future?
 - Are the government's adjustment systems and processes prepared for the entire NDC mitigation target? What will trigger these changes?

In this way, the guidelines/templates should be made to take account of the PDCA cycle thereby strengthening their effectiveness.

This will also be a good opportunity to reaffirm and check the content of each country's plan, even at the implementation stage.

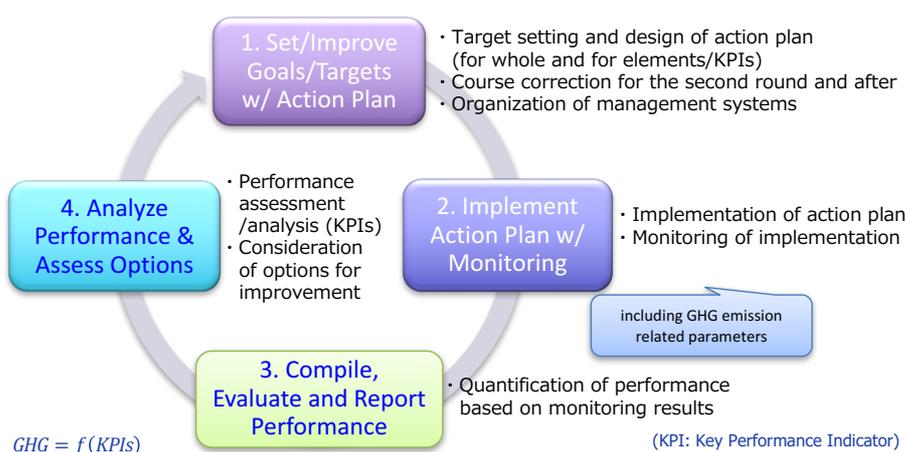


Figure 3: PDCA-cycle and GHG MRV integration

Note that these elements will not be an additional burden in the sense that they will be included again anyway in the biennial national report under the Transparency Framework (including the section on adjustments).

3.4. Proposal of Information Items related to the NDC mitigation target

In most cases, the NDC mitigation targets consist of several components as shown in Figure 2. The type of target chosen is a voluntary matter for each country, but we would like to consider the methodological requirement for it to be well-defined, then add the non-methodological elements of the previous pages and list the information that should be included in the NDC.

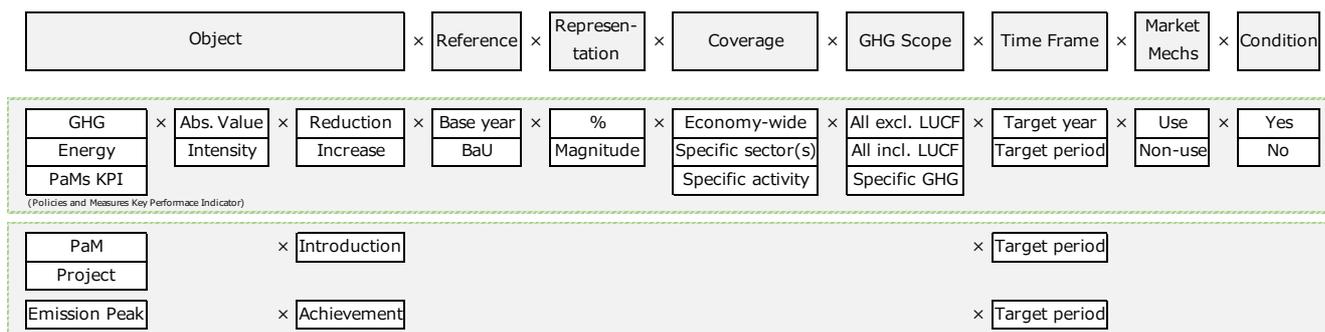


Figure 2: Types and elements of current NDC mitigation target (re-posted)

In Figure 2, if the base year is different from the “the latest year of data availability at the time of NDC commutation”, proposals from the previous section should be followed, adjusting the base and target value and setting the latest year above as the adjusted base year (to be shown together). Below, the base and target values are regarded as those of the adjusted ones.

The necessary information for each of the above components to express the NDC mitigation target in a well-defined manner is as follows:

Table 1: Proposal for necessary information to be included in a NDC mitigation target (Methodological items A)

Item	Proposed Required Information	Explanation
Object of the Target	<p>It should be specified what the Party wants to target (i.e., definition of the indicator for the target).</p> <p>The physical unit should be clarified for both absolute level target and intensity target.</p> <p>It is also necessary to explicitly indicate whether it is a type of target aiming for reduction or increase.</p>	<p>Recognising the difference in definitions (e.g., difference between primary energy supply and consumption).</p> <p>Should be expressed using statistics.</p> <p>Necessary to recognise the difference between the concept of flow and stock (e.g., annual introduction amount (flow) vs. operating amount (stock))</p>

Reference and its Quantitative Representation	<p><u>Base year case:</u> Calendar year or fiscal year should be specified.</p> <p>If the original base year is not “the latest data-available year at the time of NDC communication”, adjustment is required. Then the adjusted base and target level should be specified in parallel.</p> <p><u>BaU (or Baseline) scenario case:</u></p> <ul style="list-style-type: none"> • BaU scenario concept [Relationship with existing development plan, GDP growth rate assumption, energy mix assumption, various assumptions that affect GHG emissions]. • Whether the quantitative values up to the target year (or target period) are decided beforehand. In the case that it is not fixed, the mathematical formula of how to calculate the value <i>ex post</i> should be provided. • Reference value of every year until the target year (if it is decided beforehand, its quantitative value, or estimated value if it is decided posteriorly). <p>In both cases, the table of values and graphs of the followings should be specified:</p> <ul style="list-style-type: none"> • (Absolute amount; Percentage), • (Absolute amount of reduction or growth; Percentage of reduction or growth) 	<p>Example of BaU scenario:</p> <p>The BaU scenario was extended to the target year based on the current 5-year development plan. GDP is the same annual rate as planned 5%/yr (2020–2030). Energy mix shall be maintained for 2018 years.</p> <p>For the value of the BaU scenario, there are cases where the value is fixed in advance, OR the way of thinking (calculation method) is fixed but the value will be determined afterwards.</p> <p>In the latter case, GHG emissions are calculated from GDP growth rate, for example.</p> <p>In both cases, however, it is necessary to specify the annual value (estimated value for the latter case). This is necessary when evaluating progress.</p> <p>If the country’s target will shift to the absolute emission reduction target in the future, it is desirable that the value of BaU be decided beforehand.</p>
Coverage	<p>There should be specific description on whether coverage of the target is economy-wide, for specific sector(s), or for specific activity(ies).</p>	<p>Where additional conditions such as geographical coverage are included, it should also be specified.</p> <p>The coverage related to LULUCF sector is handled in the GHG scope.</p>
GHG Scope	<p>When targeting or removing some specific GHGs, the scope must be designated.</p>	<p>There may be cases where two types of targets are set, i.e.,</p>

	The LULUCF sector is treated here. Also, it needs a description of whether the LULUCF sector is currently in net emissions or sink.	inclusion of LULUCF sector or not.
Time Frame	Target year (single year) or target period (multiple years) should be designated. If multiple target years ⁹ are specified, all other elements in each should be specified.	In the Guidelines, it is desirable to specify a common target year or target period for all Parties.
Relationship between Final and Intermediate Targets	In cases where there is an intermediate target and final target, their relationship should be specified.	See footnote 9.
Use of Market Mechanism	It should be designated whether to use domestic and/or international emission reduction credits and/or allowances generated by some market mechanism to achieve targets. If so, the name of the market mechanism needs and conditions (if any) to be specified.	On the other hand, from the viewpoint of avoiding double counting, in order to achieve the target by use of domestic credits, it is necessary to add the amount to the actual amount of domestic emissions to assess whether the target is met. ¹³
Conditions	When setting a condition on a target, the condition is defined so as not to be arbitrary. Particularly in the case of support from developed countries, quantitative description as well as the type of support could meet the conditions should be described. It also	When formulating a conditional target, the “difference” from the case without the condition was taken into consideration, and the contribution should have been estimated in some way.

¹³ Emission allowances or emission reduction credits generated in the country can be used outside the country (i.e., the amount can be regarded as a reduction in another country). So, by setting the rule not to count the amount of reductions from the beginning, it can prevent the risk of double counting. If used domestically, not overseas, specifying “use the market mechanism” can allow the country to use such a reduction in the target accounting by balancing, so there is no problem. If there is no possibility of being used outside of the country from the beginning, the country can only specify emissions credits from abroad and whether to use emission reduction credits.

In the case of the EU emissions trading scheme (ETS) participating countries, there should be no problem with this treatment. On the other hand, considering the EU ETS covered region-wide sectors (not national-scale sectors) in the EU's climate policy, a different treatment without overlap could be possible, such that:

EU ETS covered sector as a whole is regarded like a Party to the Paris Agreement in addition to each EU Member State which covers only non-ETS sector of the country.

This may be consistent that the EU itself is a Party to the UNFCCC and the Paris Agreement in parallel with its Member States. However, the treatment may depend on a higher decision on the treatment of EU and its Member States related to the NDC (which is common for all EU Member States).

	describes how to handle cases where partial filling is done.	This should be stated as objectively as possible. Specific description is better. ¹⁴
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Note that when multiple targets are included in one NDC (in the case of multiple target years and in the case of multiple targets), the description of the necessary information is required for each target.

In addition, the following information should also be added to NDC's necessary information in order to grasp the current situation and check the progress:

Table 2: Necessary information to be included in NDC mitigation targets (Methodological items B)

Item	Required Information	Explanation
Status of the Latest Year	With regard to adjusted base year (the latest data-available year used in NDC communication), the following data and information should be specified: <ul style="list-style-type: none"> Value of each target and its background information. 	Based on this, the progress situation will be assessed.
Graph	Regarding each target, including a trend record from the past (if possible before 1990 (prior to 1973 is preferable for developed countries), if there is no data, 2000 onward trend is chosen), a graph continuously up to the target year should be drawn. The latest year to the (intermediate, if any) target year, should be connected with a straight line, by default. If it is not a target relating to GHG emissions, a graph of economy-wide GHG emissions is also added (from the past to the target year above). There needs to be a description of the interpretation of graphs for milestone years and for the periods categorised by them, (consistent with the results of factor analysis below).	In the case of deviation target from BaU, there are cases where it is not linear. In the case of targets for indicators different from GHG emissions (e.g., some intensity), it is easier to grasp the relationship by also including a graph of GHG emissions. The vertical axis should be taken as starting from zero (to avoid misunderstanding).
Factor Analysis	In accordance with the above graph, factor analysis (focus on energy-related CO ₂) continuously connected from past trends to	See explanation in Section 4.

¹⁴ Once the effectiveness of a specific support is estimated, it can be the basis for discussion with donors as well. On the other hand, if it is only a conceptual one, the possibility to obtain actual support is low.

	the target year should be undertaken, (if BaU is applied to describe in the definition of the target, the BaU scenario should be analysed as well). Relevant self-analysis should also be carried out on the degree of difficulty to attain the target.	Analysis by connecting the past to the future can ensure that country officials in charge can deepen their understanding of the current situation and target.
Post evaluation from previous 5-year period and the latest biennial reporting	<i>Ex post</i> evaluation analysis of the results of the latest cycles regarding the 5-year cycle and the 2-year cycle should be described. This could be linked to the above-mentioned factor analysis.	Post-evaluation analysis focusing on the most recent cycles. In particular, if it did not come up as expected, consider and analyse the reasons and describe relevant countermeasures.
Scenario Analysis	If possible, formulate the “Current Measures Scenario (CMS)” and “Planned Measures Scenario (PMS)” and compare with the target. In addition to the explanation and interpretation of each scenario, consider and describe the implications of the comparison analysis on the potential to achieve the target.	This part is relevant to the scenario analysis in “projection part” of the reports under current transparency arrangement.
Additional Information	In addition, any additional key information should be specified. Key information can be referenced in taking countermeasures toward achieving NDC mitigation target(s).	“Useful” information is important when taking countermeasures in that country. Considering what information is important for each target is a valuable exercise.

In addition to the methodology, the information to be described in NDC includes the following:

Table 3: Necessary information to be included in an NDC mitigation target (Non-methodological items)

Item	Required Information	Explanation
Institutional Framework	Regarding the NDC mitigation target and associated action plans, the following information is required: <ul style="list-style-type: none"> Ministries/Departments to formulate the NDC mitigation goal and the action plan, 	Climate change measures have cross-cutting nature. Organise in the form of illustrating coordination, implementation, role sharing,

	<ul style="list-style-type: none"> • Ministries/Departments to implement the mitigation measures toward the target, • Department for checking progress, • Ministries/Departments that make decisions on the target, • Method of inter-ministry coordination, • Responsibilities, roles of each ministry and agency. 	decision-making, etc., across ministries and agencies.
Planning and Implementation Process	<p>Information on the “Plan” part of PDCA-cycle:</p> <ul style="list-style-type: none"> • Description of how to draw up a blueprint to achieve the target, • List of key measures (i.e., having large emission reductions) and estimation of their effect (and breakdown), • Brief explanation of each key measure, • Current status of key countermeasures [in progress (+ expansion expected); or implementation is almost decided but not yet implemented; or implementation is uncertain at the present time]. <p>If necessary, supplementary explanatory materials can be attached (the same applies to the following).</p>	<p>It is required to explain as clearly as possible without confining it to a black box without understanding the true meaning.</p> <p>Conversely, if this cannot be explained, the effectiveness of measures to achieve the NDC target is doubtful.</p> <p>It is also important to recognise what the key countermeasures are.</p> <p>This information will also be included in the biennial reporting in updated form (along with progress situation).</p>
Means of Implementation	<p>Information on the “Do” part of PDCA-cycle:</p> <ul style="list-style-type: none"> • Implementing entities of key measures (policies, measures, programs, actions, etc.), • Track record of key countermeasures, • KPIs and their monitoring and reporting system. 	<p>More explanation of key measures.</p> <p>Recognition of what are the KPIs, and whether those are monitored is important. If no monitoring takes place, it is encouraged to do so.</p>
Check	<p>Information on the “Check” part of PDCA-cycle:</p>	<p>Especially when it is not applied, it is desirable to introduce this process as a trigger.</p>

	<ul style="list-style-type: none"> • System for checking the achievement rate of KPIs of key policies, measures and actions, • System for grasping factors of success and failure, • Implementation status. 	Donors of developed countries should also actively support them.
Adjustment	<p>Information on the “Act” or “Adjustment” part of PDCA-cycle:</p> <ul style="list-style-type: none"> • Description of the trajectory adjustment process for key measures. If there is no such schedule and assumption, the planned schedule should be specified. 	With respect to individual key countermeasures, it is contemplated that it will be procedurally guaranteed to analyse and adjust them, rather than leaving them as they are.
Viewpoint of GHG MRV	<p>The above is not necessarily seen from the perspective of GHG emissions.</p> <p>In addition, an explanation of what kind of procedure is taking place from the aspect of GHG MRV is encouraged.</p>	<p>GHG MRV should be implemented in embedded form in the PDCA process by KPIs (as an ancillary process) for the main purpose of the measures.</p> <p>GHG reduction is calculated by a mathematical formula with several parameters. The formula should be designed so that parameters are the KPIs of the measure.</p> <p>The project evaluation process itself can be used for the V (verification) part of the GHG MRV.</p>
PDCA as a whole country	<p>Description of the PDCA process of the whole NDC mitigation target and action plan of the country.</p> <p>In particular, it should explain the method and system of trajectory adjustment and the explanation of possible triggering events.</p>	<p>It is desirable that a systematic PDCA process is included.</p> <p>If not, this exercise is expected to make the country aware of preparing such intuitional arrangements.</p>
New Noteworthy Matters	Explanation of what should be noted regarding any changes from the previous biennial reporting	If any.

4. A Method to Analyse and Understand Progress to Achieve NDC Targets

4.1. Proposed requirements for a trend analysis method common to each country

Progress on achieving the NDC mitigation target needs to be reported biennially. This paper argues that the NDC mitigation target:

Should be utilised as part of a domestic PDCA-cycle driven by the Paris Agreement process.

In the previous section, this paper proposed reporting items for the mitigation part of the NDC and necessary information from the perspective of PDCA.

In this section, rather than the domestic PDCA-cycles for various countermeasures, we focus on economy-wide CO₂ emissions and introduce “factor analysis” as a simple but strong tool to grasp the whole picture in the “check” process of the PDCA-cycle.

This paper proposes that “self-analysis” should be added to the NDC communication and biennial progress report (see previous section and next section). The analytical method should have the following characteristics:

- Suitable to analyse the essence of the NDC mitigation target;
- Focus on the most important “core” part of GHG emission trends;
- Minimal difficulty, simple, and easy to calculate;
- A common technical tool applicable to each country (comparability);
- Enables consistent and continuous analysis from past trends to future targets; and
- Not subject to limitations due to insufficient availability of statistical information.

In order to satisfy these criteria, this paper proposes to incorporate the following items in the analysis:

Factor analysis applying the Kaya-identity to energy-related CO₂ emissions.

The reason why this paper proposes to restrict the analysis to energy-related CO₂, rather than all GHGs, is that in most countries (even in countries where energy-related CO₂ is not the largest GHG), the increase/decrease in energy-related CO₂ dominates the increase/decrease of all GHGs (it corresponds to the “core” in the second criterion above).

4.2. Simple theoretical basis of the Kaya identity and related factor analysis

It is ‘natural’ to consider that changes in energy-related CO₂ emissions can be broken down into changes in the following three factors:

- (a) Scale of economic output;
- (b) Amount of energy use needed for economic output (representing a kind of societal efficiency);
and
- (c) Amount of CO₂ emitted when energy is used (representing the energy mix).

The mathematical expression can be written as follows (known as the Kaya Identity):

$$CO_2 = GDP \cdot \frac{Energy}{GDP} \cdot \frac{CO_2}{Energy} = GDP \cdot EI \cdot CI$$

The three terms on the right side, $GDP, EI (= Energy/GDP), CI (= CO_2/Energy)$ ¹⁵ correspond to the three factors (a)–(c) above, respectively.

What is important is the change in each of these factors, rather than the magnitude. Therefore, by considering the change in the terms of the above-mentioned Kaya Identity specified as Δ (basically the annual change), the following formula can be obtained:

$$\frac{\Delta(CO_2)}{CO_2} = \frac{\Delta(GDP)}{GDP} + \frac{\Delta(EI)}{EI} + \frac{\Delta(CI)}{CI}$$

Each term is a “rate of change”, measured by “percent”. That is, the “rate of change” of CO₂ is broken down as the “summation” (not product) of each factor.

The above formula can be expressed in words as:

$$\begin{aligned} (\text{CO}_2 \text{ growth rate}) &= (\text{GDP growth rate}) \\ &\quad - (\text{societal energy efficiency improvement rate}) \\ &\quad - (\text{rate of decarbonization of the energy mix}). \end{aligned}$$

Here, we understand the meaning of each index as:

- Declining rate of EI : “societal energy efficiency improvement rate against economy output”
- Declining rate of CI : “rate of change of energy mix to less carbon economy against energy use”

In other words, the growth of energy-related CO₂ emissions is simply divided into three factors: a factor that increases as the economy grows; a factor that decreases by improving energy efficiency of economy; and a factor that decreases as the energy sources shift to lower carbon intensity.

Also, there is a simple and easy-to-understand relationship between the rate of change of each factor (energy intensity EI , and carbon intensity CI) and the rate of change of GDP, energy use and CO₂ as shown in Figure 4:

- (The rate of change of EI) is
(the rate of change of energy use) *minus* (the rate of change of GDP); and
- (The rate of change of CI) is
(the rate of change of CO₂ emissions) *minus* (the rate of change of energy use).

¹⁵ EI, CI refer to “energy intensity” (against economy) and “carbon intensity” (against energy), respectively.

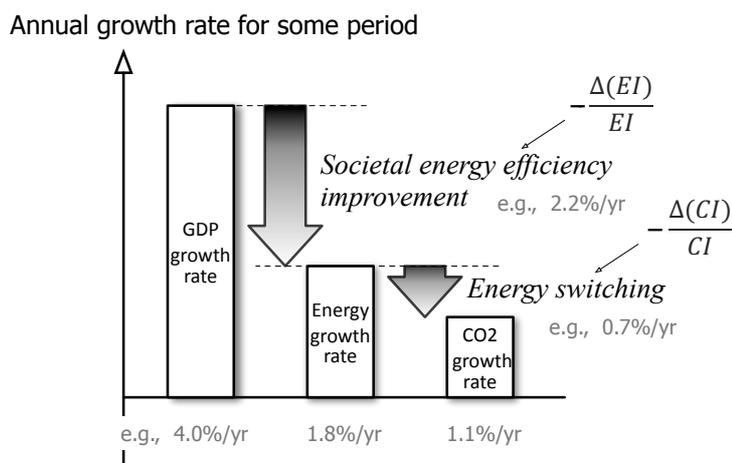


Figure 4: Image of a factor analysis of energy related- CO_2 for some period

It should be noted that the form of “energy” used here depends on the purpose of the analysis, whether to use the primary energy on the supply side or the final energy on the demand side. This proposal argues that it is better to use the “final energy consumption” as the default.

The reason is that future use of renewable energy in the power sector is expected to expand greatly, thereby switching the power supply source from thermal power generation to renewable energy generation. It is straightforward to understand that this shift should be considered as the “decarbonization of energy mix” only (not energy efficiency improvement).¹⁶

4.3. Considerations of the analysis

One of the advantages of this factor analysis method is that it can be applied not only to past trends but also to future estimation in the same way.

The following steps can be applied:

1. Draw a graph of emissions etc. during the time frame intended (e.g., 1965–now).
2. Divide it into several characteristic periods sandwiched between milestone-event years (e.g., oil crisis, oil price stagnation, Lehman shock, natural disasters, etc.).
3. In each section, analyse the factors to understand what the driving forces were for that period.
4. Then, analyze causes for these driving forces.
5. The same factor analysis should be conducted for an extended timeframe to include the period

¹⁶ This is due to the basic rules of energy statistics. In the case of thermal power generation, the electricity amount is usually only around 1/3 of the energy amount of the fuel. On the other hand, in the case of renewable power generation, the generated electric energy itself is the energy amount. Therefore, if we adopt the approach to count based on the “primary energy supply” side, a large part of the energy conversion of simple “thermal power generation → renewable energy generation” will be counted as “energy efficiency improvement”. On the other hand, if counting based on the “final energy consumption” side, since the sources of electricity generation are compared with the same amount of electricity, they are counted as “energy shift to decarbonization” only and match with appropriate recognition.

from now (latest year) to the target year with respect to the target value of CO₂ (and that of BaU scenario).

6. Compare these results with a factor analysis of past trends and analyse whether there is a period with the same performance in the past, or how much performance improvement is necessary in comparison with a certain period in the past. This will make it possible to have an accurate (quantitative) image of the degree of difficulty of achieving the target in light of past experiences.

This could be the basis to understand the effects of current policies and measures, and to consider the quantitative image of requirements of strengthened measures in the near future.

A key advantage of this method is that data are generally easily available, even for developing countries with limited statistical capacity. Required statistical data are limited to annual GDP, final energy consumption, and energy-related CO₂ emissions. A spreadsheet can be used to calculate the average change rate (annual rate) in each period. Thus, the level of difficulty of this analysis is low. Of course, in order to properly analyse the deeper reasons of the characteristics of each period, further information including other statistical data (e.g., statistics of petroleum product prices) would be needed.

4.4. Meaning of the analysis

This method of analysing NDC mitigation targets can be used to understand the possible level of difficulty in achieving them etc. in light of past experiences.

It is also a very effective tool for understanding and judging the implications of the targets and BaU scenarios developed by others (often provided as the modeling calculation in a black box).

The European Environment Agency conducts GHG emissions trend analysis of EU countries using this factor analysis method (although this analysis is on the primary energy supply side) (EEA, 2017).

The Government of Japan also analyses factors by disassembling them further by sector when new annual energy consumption and CO₂ emissions statistical data are announced.

In addition, voluntary target setting and action plans by industry, called the Commitment to a Low Carbon Society coordinated by Nippon Keidanren (Japan Business Federation), requires each industry sector association to publish its annual report with a template to include the factor analysis.¹⁷ This practice has continued for several years (Japan Business Federation, 2018 and older; METI 2015, 2018).

Performing such analysis on its own will provide a base on which those in charge of reporting can pursue questions, reach a correct understanding and make more appropriate decisions in the future. In other words, it will be a very effective self-capacity development exercise.

In fact, the NDC formulation and communication, as well as preparation and reporting biennially on its progress, will be burdensome for each Party. International systems and rules should be designed so that they will be useful for the country itself, not merely for international transparency.

¹⁷ The way of thinking is not much different from that of a country. The difference lies in the fact that the “amount of activity (or output)” driving emissions is not GDP but the activity level indicator considered to be the most suitable for the industry sector.

5. Information Items related to the Reporting of Progress to Achieve NDC Targets

In the third section, this paper proposed items and necessary information that should be included in the report of the mitigation part of the NDC.

In this section, it is proposed that the information on progress of the NDC mitigation target(s) that each country must report every two years should include the following contents.

Much of the information is the [same](#) as the items and the necessary information described in the NDC mitigation part (thereby ensuring consistency of the NDC between formulation and the implementation stages). The differences or additional items are highlighted in [red](#).

Table 4: Information to be included in the biennial report for progress toward the NDC target

Item	Required Information	Explanation
Object of the Target	Identical to NDC mitigation section 3.	No additional explanation.
Reference and Its Quantitative Representation	<p><u>Base year case:</u> Identical to NDC mitigation section 3.</p> <p><u>BaU (or Baseline) scenario case:</u> Identical to NDC mitigation section 3.</p> <p>In addition, for parts where values are already fixed, specify them clearly.</p> <p>Specify if pre-estimated values are modified based on new information.</p>	No additional explanation.
Coverage	Identical to NDC mitigation section 3.	No additional explanation.
GHG Scope	Identical to NDC mitigation section 3.	No additional explanation.
Time Frame	Identical to NDC mitigation section 3.	No additional explanation.
Relationship between Final and Intermediate Targets	Identical to NDC mitigation section 3.	No additional explanation.

Use of Market Mechanism	Identical to NDC mitigation section 3.	No additional explanation.
Conditions	Identical to NDC mitigation section 3. In addition, indicate if there is a specific change regarding the presence of the condition.	No additional explanation.
Status of the Latest Year	In addition to the adjusted base year “the latest data-available year at NDC communication”, annual information up to the latest year at the time of reporting of bi-yearly reports should be specified.	No additional explanation.
Percentage Representing the Degree of Progress Towards Achieving the Target	The Target Index is defined to show the progress toward meeting the target (i.e., 0% for the adjusted base year level, and 100% for the target level) as situated in upper or lower side of the line (Target Trajectory) It is also shown in the graph below to make it easy to understand.	It is possible to see progress at a glance (the Target Trajectory is above or below a straight line). However, there are annual fluctuations in the progress, so it is better to look at the trend over several years rather than focus only on the value of one year.
Graph	Identical to NDC mitigation section 3. In addition, the gap should be made clear between the assumption at the time of NDC reporting (straight line to the target value) and the record of the latest year at the time of reporting.	When the indicator of the target is different from GHG, a graph of GHG emissions should also be included.
Factor Analysis	Identical to NDC mitigation section 3. In addition, the data should be updated, and there should be an explanation of how it has changed from previous analysis.	No additional explanation.
Post evaluation from the latest biennial report	Identical to NDC mitigation section 3.	No additional explanation.
Scenario Analysis	Identical to NDC mitigation section 3. In addition, the scenarios should be updated based on the latest information.	This practice is intended to be a self-analysis aiming at achieving the target.

Additional Information	Identical to NDC mitigation section 3. Describe any additional information, if any.	No additional explanation.
Institutional Framework	Identical to NDC mitigation section 3. In the case of any drastic reorganisation of ministries and agencies, roles before and after the change should be explained together to understand correctly which roles were transferred.	No additional explanation.
Planning and Implementation Process	Identical to NDC mitigation section 3. Special notes such as changes in progress should be shown, if any.	No additional explanation.
Means of Implementation	Identical to NDC mitigation section 3. Special notes such as changes in progress should be shown, if any.	No additional explanation.
Check	Identical to NDC mitigation section 3. Special notes such as the gap between KPIs values at the <i>ex ante</i> and <i>ex post</i> stages of monitoring should be shown.	No additional explanation.
Adjustment	Identical to NDC mitigation section 3. Special notes such as changes in progress, esp., how the adjustment process was done, should be shown.	No additional explanation.
Viewpoint of GHG MRV	Identical to NDC mitigation section 3. Special notes such as changes in progress should be shown, if any.	No additional explanation.
PDCA as a whole Country	Identical to NDC mitigation section 3. Special notes such as changes in progress, esp., how the adjustment process was done, should be shown.	No additional explanation.
New Noteworthy Matters	Identical to the NDC mitigation section 3.	No additional explanation.
Analysis and Sharing	Describe lessons learned and experiences worth sharing with other countries.	It is very effective to analyse what lessons we can share.

Experience and Lessons	Because this is intended to be applied to other countries, self-analysis should be undertaken regarding the conditions that resulted in success or failure. This could be useful to minimise the future risk of failure.	This is also intended for South-South cooperation among countries in similar situations. Supplementary support by developed country donors will also be effective and appreciated.
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Much of this information overlaps with the contents of the NDC and the previous biennial national report. Therefore, from the second time onward, it is only necessary to describe the updated parts thereby reducing the burden.

It is a useful exercise to recognise and document how and why the NDC was updated, as well as the result. Support for developing countries from donors would be desirable, including the GEF's Capacity Building Initiative for Transparency (CBIT).

6. Messages for the Upcoming International Negotiation Process

Although the NDC introduced in the Paris Agreement is a new effort, it builds on the previous effort to develop INDCs, which 192 countries have already prepared and communicated. In that sense, the previous effort can be considered successful in that each country gained valuable experience. In addition, regarding the Transparency Framework, there are 24-years of experience¹⁸ dating from the time of the submission of the first national communications. Therefore, the question is how can we formulate desirable operational rules by making use of the experience and lessons learned so far?

This paper proposes contents for the rules while fully acknowledging that the relevant international rules are designed so that the “formulation and communication of NDC target(s)” as well as “reporting of its progress” and associated “review” processes themselves are useful for:

- Accurate recognition of the situation of the past, current and the target; and
- Effective promotion of the implementation of countermeasures.

By designing these reporting systems as exercises for important capacity development and providing a simple recipe for effective, concrete implementation, this proposal intends to make it possible for a country to prepare a menu of what is really necessary for effective communication.

Of course, some countries may perceive these objectives to be challenging. Some countries may be concerned that this proposal creates too many additional burdens. In addition, some countries maybe concerned about possible interference with their sovereignty.

The proposal in this paper is not necessarily advocating a mandatory requirement. Developing countries find it difficult to achieve completeness in many cases. However, by preparing the items in the templates, and by going through the steps shown here, officials in a country are likely to gain greater capacity, resulting in measures with higher effectiveness. We acknowledge that there may be other methods better suited to particular countries, so this proposal is intended to encourage any modifications or applications suitable for specific countries.

It is important to be aware and prepare a PDCA cycle of processes for each action. Therefore, this proposal is intended to improve performance rather than become an additional burden. It means that the original (non-GHG) objective of the action can be achieved to a greater extent.

In short, the detailed rules of the international institution under the Paris Agreement should be designed to trigger and drive domestic changes.

¹⁸ The author of this paper has been involved in in-depth reviews of all rounds from the first national report review. This paper is based on experience of more than 20 years.

Abbreviations:

APA:	Ad-Hoc Working Group on the Paris Agreement
BaU:	Business-as-Usual
CBIT:	Capacity Building Initiative for Transparency
CDM:	Clean Development Mechanism
CMA:	Conference of the Parties serving as the meeting of the Parties to the Paris Agreement
COP <i>n</i> :	<i>n</i> -th session of the Conference of the Parties (to the UNFCCC)
(EU) ETS:	(EU) Emissions Trading Scheme
GEF:	Global Environmental Facility
GHG:	Greenhouse Gas
IET:	International Emissions Trading
INDC:	Intended Nationally Determined Contribution
IPCC:	Intergovernmental Panel on Climate Change
JI:	Joint Implementation
KP:	Kyoto Protocol (to the United Nations Framework Convention on Climate Change)
KPI:	Key Performance Indicator
LDCs:	Least Developed Countries
LULUCF:	Land-Use, Land-Use Change and Forestry
MPG:	Modalities, Procedures and Guidelines (of the Transparency Framework)
MRV:	Measurement, Reporting and Verification
NAMA:	Nationally Appropriate Mitigation Action
NDC <i>n</i> :	<i>n</i> -th Nationally Determined Contribution
PA:	Paris Agreement (under the United Nations Framework Convention on Climate Change)
PaMs:	Policies and Measures
PDCA:	Plan-Do-Check-Act (or Adjust)
SDGs:	Sustainable Development Goals
SIDS:	Small-Island Developing States
UNFCCC:	United Nations Framework Convention on Climate Change

Annex: Paris Agreement and COP 21 Decision related to the NDC and Its Progress

Annex 1. Items to be described in the NDC

The Paris Agreement (Article 4) and the COP21 decision specify the following regarding the content of the communication of the NDC (underline and abbreviation use by the author):

- In communicating their NDCs, all Parties shall provide the information necessary for clarity, transparency and understanding in accordance with decision 1/CP.21 and any relevant decisions of the CMA. (PA Article 4, Para. 8)
- In accounting for anthropogenic emissions and removals corresponding to their NDCs, Parties shall promote environmental integrity, transparency, accuracy, completeness, comparability and consistency, and ensure the avoidance of double counting, in accordance with guidance adopted by the CMA. (PA Article 4, Para. 13)
- (The COP) *Requests* the APA to develop further guidance on features of the NDCs for consideration and adoption by the CMA 1; (Decision 1/CP.21, para. 26)
- (The COP) *Agrees* that the information to be provided by Parties communicating their NDCs, 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 GHG emissions and, as appropriate, removals, and how the Party considers that its NDC is fair and ambitious, in the light of its national circumstances, and how it contributes towards achieving the objective of the Convention as set out in its Article 2; (Decision 1/CP.21, para. 27)
- (The COP) *Requests* the APA to develop further guidance for the information to be provided by Parties in order to facilitate clarity, transparency and understanding of NDCs for consideration and adoption by the CMA 1; (Decision 1/CP.21, para. 28)
- (The COP) *Requests* the APA to elaborate, drawing from approaches established under the Convention and its related legal instruments as appropriate, guidance for accounting for Parties' NDCs, as referred to in Article 4, paragraph 13, of the Agreement, for consideration and adoption by the CMA 1, which ensures that: (Decision 1/CP.21, para. 31)
 - (a) Parties account for anthropogenic emissions and removals in accordance with common methodologies and metrics assessed by the IPCC and adopted by the CMA;
 - (b) Parties ensure methodological consistency, including on baselines, between the communication and implementation of NDCs;

- (c) Parties strive to include all categories of anthropogenic emissions or removals in their NDCs and, once a source, sink or activity is included, continue to include it;
- (d) Parties shall provide an explanation of why any categories of anthropogenic emissions or removals are excluded;
- All Parties should strive to formulate and communicate long-term low greenhouse gas emission development strategies, mindful of Article 2 taking into account their common but differentiated responsibilities and respective capabilities, in the light of different national circumstances. (PA Article 4, Para. 19)
- (The COP) *Invites* Parties to communicate, by 2020, to the secretariat mid-century, long-term low GHG emission development strategies in accordance with Article 4, paragraph 19, of the Agreement, and *requests* the secretariat to publish on the UNFCCC website Parties' low greenhouse gas emission development strategies as communicated; (Decision 1/CP.21, para. 36)

The last two points on the long-term strategy are not targeting the NDC directly, but could have impacts on the NDC.

Annex 2. Items to be described in the biennial report on the progress of the NDC under the Transparency Framework

The central theme of the Transparency Framework is the report and review of the “NDC progress status”. This, of course, must be based on the report content and consistent method of the NDC itself, as noted in Decision 1/CP.21, para. 31 on the previous page.

The Paris Agreement (Article 13) and the COP21 decision specify the followings on the content of the biennial reporting in the Transparency Framework for action:

- The purpose of the framework for transparency of action is to provide a clear understanding of climate change action in the light of the objective of the Convention as set out in its Article 2, including clarity and tracking of progress towards achieving Parties' individual NDCs under Article 4, and Parties' adaptation actions under Article 7, including good practices, priorities, needs and gaps, to inform the global stocktake under Article 14. (PA Article 13, Para. 5)
- Each Party shall regularly provide the following information: (PA Article 13, Para. 7)
 - (b) Information necessary to track progress made in implementing and achieving its nationally determined contribution under Article 4.
- The CMA 1 shall, building on experience from the arrangements related to transparency under the Convention, and elaborating on the provisions in this Article, adopt common modalities, procedures and guidelines, as appropriate, for the transparency of action and support. (PA Article 13, Para. 13)
- (The COP) *Also requests* the APA in developing the recommendations for the modalities, procedures and guidelines referred to in paragraph 91 above to take into account, inter alia: (Decision 1/CP.21, para. 92)
 - (a) The importance of facilitating improved reporting and transparency over time;

- (b) The need to provide flexibility to those developing country Parties that need it in the light of their capacities;
 - (c) The need to promote transparency, accuracy, completeness, consistency, and comparability; ...
- (The COP) *Requests* the APA, when developing modalities, procedures and guidelines referred to in paragraph 92 above, to consider, inter alia: (Decision 1/CP.21, para. 95)
 - (a) The types of flexibility available to those developing countries that need it on the basis of their capacities;
 - (b) The consistency between the methodology communicated in the NDC and the methodology for reporting on progress made towards achieving individual Parties' respective NDC; ...

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Relevant UNFCCC and Related Supporting Web-sites

Paris Agreement, 1.CP/21	<ul style="list-style-type: none"> – Outline and essence of the Paris Agreement: http://unfccc.int/paris_agreement/items/9485.php – Decision 1/CP.21 including the Paris Agreement and relevant COP Decisions: http://unfccc.int/resource/docs/2015/cop21/eng/10a01.pdf
National Reports and Review/ Assessment (Current Arrangements)	<ul style="list-style-type: none"> – Overview of the current National Reports and relevant review/assessment process: http://unfccc.int/national_reports/items/1408.php – National Communications and Biennial Reports by Annex I Parties: http://unfccc.int/national_reports/national_communications_and_biennial_reports/items/10267.php – International consultation and analysis for non-Annex I Parties: http://unfccc.int/national_reports/non-annex_i_parties/ica/items/8621.php – The International Assessment and Review Process for Annex I Parties: http://unfccc.int/focus/mitigation/the_multilateral_assessment_process_under_the_iar/items/7549.php – Reporting on national implementation and MRV for NAMA: http://unfccc.int/focus/mitigation/items/7173.php – MRV handbook for NAMA for developing countries: http://unfccc.int/files/national_reports/annex_i_natcom/application/pdf/non-annex_i_mrv_handbook.pdf
Transparency Framework	<ul style="list-style-type: none"> – Information on APA agenda item 5 (Transparency Framework): http://unfccc.int/meetings/ad_hoc_working_groups/items/10163.php – Informal Note by the Co-Facilitators: http://unfccc.int/files/meetings/bonn_may_2017/in-session/application/pdf/apa2017_i5_informal_note_by_the_co-facilitators_.pdf
Training of Experts (Current Arrangements)	<ul style="list-style-type: none"> – Training Programmes for the Review of Information submitted by Annex I Parties: http://unfccc.int/national_reports/expert_training/training_programmes_for_experts/items/2763.php – Training for the technical analysis of BURs submitted by non-Annex I Parties: http://unfccc.int/national_reports/expert_training/training_for_the_technical_analysis_of_burs/items/9279.php
Guidelines (Current Arrangements)	<ul style="list-style-type: none"> – Guidelines for the preparation of National Communications: http://unfccc.int/resource/docs/cop8/07a02.pdf – Guidelines for BR and BUR, and Modalities and procedures for IAR and ICA: http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf – Composition, modalities and procedures of the team of technical experts under ICA:

	https://unfccc.int/files/meetings/warsaw_nov_2013/decisions/application/pdf/cop19_tte_ica.pdf
NDCs	<ul style="list-style-type: none"> – Outline of the NDC: http://unfccc.int/focus/items/10240.php – NDC Registry: http://unfccc.int/focus/ndc_registry/items/9433.php http://www4.unfccc.int/ndcregistry/Pages/Home.aspx – Information on APA agenda item3 (NDC) http://unfccc.int/bodies/apa/items/10128.php
INDCs	<ul style="list-style-type: none"> – INDC portal: http://unfccc.int/focus/indc_portal/items/8766.php http://www4.unfccc.int/submissions/indc/Submission%20Pages/submissions.aspx
APA Report	<ul style="list-style-type: none"> – https://unfccc.int/sites/default/files/resource/docs/2017/apa/eng/04.pdf (FCCC/APA/2017/4)
APA Submission Portal	<ul style="list-style-type: none"> – Submissions by Parties or groups of Parties on the APA (Ad-hoc Group on the Paris Agreement) agenda items are compiled here: http://www4.unfccc.int/submissions/SitePages/sessions.aspx?showOnlyCurrentCalls=1&populateData=1&expectedsubmissionfrom=Parties&focalBodies=APA
Tasks arising from 1/CP.21	<ul style="list-style-type: none"> – Tasks arising from 1/CP.21 with the relevant bodies and timelines: http://unfccc.int/files/bodies/cop/application/pdf/overview_1cp21_tasks.pdf – Negotiation progress tracker as of Oct. 12, 2017 (ver. 12): http://unfccc.int/files/paris_agreement/application/pdf/pa_progress_tracker_200617.pdf

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https://pub.iges.or.jp/pub/NDC-tracking-progress-method_ENG

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