# Article 6

Metrics and  Conversion

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# Nationally Determined Contributions

- Flexibility of Paris Agreement- inclusiveness and challenges
- Bottom up approach and countries specify targets as they see fit within their development context
- Diversity of NDCs and diversity of mitigation options- GHG, renewable energy, actions
- NDCs in GHG and non-GHG metrics
- Transferability- conversions
- Accounting issues of counting different metrics
- Environmental integrity

# Article 6.2 Transfers: Quantification of Metrics

1) Can ITMOs be transferred in non-GHG metrics- amounts of renewable energy or area of land/forest conserved?

   - Logical option given many countries have NDC targets expressed in non-GHG metrics.

2) Notwithstanding metrics used to quantify ITMOs, can international accounting be applied in non-GHG metrics including corresponding adjustments?

3) If ITMOs are quantified in GHG metrics, what GWP values to use to convert to non-$CO_2$ gases into $CO_2$ equivalent?

# Multiple metrics

- Most flexible and allows more countries to participate in trading by making it easier to reconcile ITMOs with their NDC targets.
- Countries be allowed to choose which metric(s) to use – could also be same metrics as their NDC, but not necessarily
- ITMOs may be traded in any metrics as long as corresponding adjustments (conversion) are done
- Acquiring country may or may not use the ITMOs and may be no more than a merchant trade
- International guidance on conversions to be developed based on existing practice

# Multiple metrics

- Many countries have have NDC with  targets in GHG and other metrics

  - Many  countries have economy wide GHG reduction target along with a separate target for renewable energy generation
  - Quantifying ITMOs using a single metric would make it difficult to reconcile with country's NDC targets (GHG & MWh)
  - Risks of double counting-  *transferring country accounts for kWh  but not for GHG reductions, seller and buyer reductions  (they either export in NDC metric when they issue or sell, or they have to convert to the NDC metric in order to make a CA)*
  - Avoid double *counting- ITMOs be transferred using multiple metrics corresponding to all of the transferring countries  relevant NDC targets or stipulate transferring country may only quantify ITMOs using non-GHG metrics if it does not have a GHG target (discourages adoption of GHG ?).*

# Buffer Registry/Netting Account

# Multiple metrics- illustration

- *Person A  transfers CHF  5000  to Person B from his Euro account, the bank will convert 5000 CHF into Euros, debit that amount from Person's Euro account, and Person B's account receives CHF 5000*

- *Alternatively, Person A needs to transfer Euros  5000 to Person C, the bank will debit Person A's account for Euros 5000 . Person C receives  Euros 5000 Euros in his/her Euro account, or if they only have ( it is their choice what account they have) a Swiss Franc account, the receiving bank will convert the Euros into CHF*

# GHG Metrics

- Mitigation outcomes may be converted when traded beyond borders to GHG metrics before transfer- *the CA must be done in GHG and the NDC is not in GHG. You can CA in the NDC metric, and can then covert in GHG for transfer*
- *But will be based on what the acquiring party wants including a non GHG metric ITMO*
- Does it improve transparency?- *(different GWP values, was CDM free of issues even with CO2e mitigation outcomes/accounting)*

# International accounting

- Option 1- solely using GHG metrics with requirement
  - of only to the acquiring country or to
  - both transferring and acquiring country

- Option 2- using multiple metrics
  - individual metrics decided by transferring and acquiring countries or
  - all relevant metrics used in NDC targets of transferring countries or both transferring and acquiring countries.
  - be able to transfer in whatever metric parties want except that the CA for the exporting country must be done in the metric of its NDC (export in anything you want as long as CA is done)

# Accounting in GHG metrics

- Mitigation outcome in a non-GHG metric 1kWh converted to 400 kg $CO_2$ reductions
  - Acquiring country converts ITMO to 400 kg $CO_2$ reduction and adjust towards its NDC (corresponding adjustment) if its NDC is in CO2e
  - Transferring country adds 1 kWh from its NDC of renewable electricity generation and if it has a GHG target, add 400 kg $CO_2$ to the total account for transfer using both GHG and non-GHG metrics for transferring countries that have both GHG and non-GHG targets
  - Requirement for only GHG metric accounting would also require using the same GWP values
  - Exporting country needs to do more or NDC more ambitious

# Accounting in multiple metrics

- Mitigation outcomes using multiple metrics with countries making conversions as needed depending on metrics in respective NDCs

  - Transferring country transfers mitigation outcome of 1 hectare of avoided deforestation to acquiring country. Transferring country subtracts this hectare from its avoided deforestation to track progress towards its NDC in terms of land area conserved (hectares). Acquiring party with a GHG target applies adjustment of 1000 kg $CO_2e$ towards its NDC accounting.

  - Transferring country transfers 1kWh of renewable electricity to acquiring country in accordance with grid emission factor of acquiring country for adjustment.

# Global Warming Potential (GWP) Values

Which options for deciding which GWP values to be used when quantifying ITMOs and for accounting related to NDCs?

1) Allowing different sets of GWPs to be used
2) Use a singe set of GWPs for quantifying ITMOs and setting/tracking progress

An issue in conversions if different countries use different GWP

# Current status of  negotiations

- **“Internationally transferred mitigation outcomes (“ITMOs”)”** are [to]:
- (i) [Be] [real] [verified] [additional] [and permanent] [and has a system to [ensure][address] permanence, including addressing reversals]*{based on text from 8 December SBSTA text, paragraph 28(h)(iv)*;
- (ii) [[Be] in the form of anthropogenic emissions by sources [and removals [by sinks]] [avoidance]] *{text from 8 December SBSTA text, start of paragraph 1(a)(ii)}*, including mitigation co-benefits resulting from adaptation actions and/or economic diversification plans, or the means to achieve them;
- (iii) [[Be] measured in metric tons of carbon dioxide equivalent (tCO2eq) in accordance with the methodologies and common metrics assessed by the IPCC and adopted by the CMA [and/or in other metrics determined by participating Parties [consistent with the (nationally determined contributions (NDCs) of the participating Parties]];]…”

# Case Study: Renewable Energy/Electricity

- A good test case with precedence
- Connected grids but different metrics
- Connected grids and same metrics
- Unconnected grids and different metrics
- Unconnected grids but same metrics
- What is renewable energy?- Clean coal,  solar, wind, hydro, energy efficiencies…
- Carbon content of electricity?

# Transboundary CDM-India and Bhutan

- Interconnected electricity grid
- Export of hydroelectricity from Bhutan to India- 7 billion units
- Dagachhu Hydropower Project approved November 6, 2013
- Conversion from MwH to CO2e- Indian grid emission factor
- Estimating the grid emission factor- *Central Electricity Authority database for plants in Eastern India and Bhutan Annual Power Data Book for plants in Bhutan*

# DNAs

- No published delineation of DNAs of host countries regarding project electricity system but both DNAs have issued  a Letter of Approval to the project authority
- Transnational electricity system defined in umbrella agreement between India and Bhutan on July 28, 2006- *develop projects under CDM and use a common carbon emission baseline*

# Grid emission factor- $CO_2$Baseline Database for Indian Power Plants 2018

Weighted average emission factor, simple operating margin (OM), build mar- gin (BM) and combined margin (CM) of the Indian Grid for FY 2016-17 (adjusted for cross-border electricity transfers), in t CO2/MWh

| Average | OM | BM | CM |
|---|---|---|---|
| 0.82 | 0.96 | 0.87 | 0.92 |

- Average is the average emission of all stations in the grid, weighted by net generation
- OM is the average emission from all stations excluding the low cost/must run sources
- BM is the average emission of the 20% (by net generation) most recent capacity addition in the grid
- CM is a weighted average of the OM and BM (here weighted 50: 50)

# Adjustment for Cross-Border Electricity Transfers

- The weighted average emission factors and operating margins of the Indian Grid were adjusted for cross-border electricity imports and exports, in line with the Grid Tool:
  - The relevant amounts of electricity imported and exported are listed in the database worksheet “Transfers”
  - The $CO_2$ emissions associated with these imports were quantified based on the simple operating margin of the exporting grid

# Determination of transmission constraints

- Incentive for grid integration and ensuring claimed ERs are real and verifiable
- Constraint criterion 1: In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of more than 5 % between the systems during 60 % or more of the hours of the year.
- Constraint criterion 2: The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year.

# Determination of transmission constraints

- Where the application of these criteria does not result in a clear grid boundary, use a regional grid definition in the case of large countries with layered dispatch systems (e.g. provincial / regional /national).
- A provincial grid definition may indeed in many cases be too narrow given significant electricity trade among provinces that might be affected, directly or indirectly, by a CDM project activity. In other countries, the national (or other largest) grid definition should be used by default.

# Determination of transmission constraints

- In its 28th meeting in December 2006, the CDM Executive Board clarified that the word “regional”, in the context of “regional electricity system” used in ACM0002 can also be interpreted as extending across several countries.
- The Board further clarified that trans-national electricity systems are eligible under ACM0002 as well as clarified that the grid emission factor in this context shall be estimated for the “regional electricity system”. (EB28, paragraph 14)

# Baseline emissions data

- Based on the data for a particular fiscal year
- Calculations are based on generation, fuel consumption and fuel quality data obtained from the power stations
- Typical standard data were used only for a few stations where information was not available from the station.
- Cross-border electricity transfers were also taken into account for calculating the $CO_2$ emission baseline

# Grid emission factor

Weighted average emission factor, simple operating margin (OM), build mar- gin (BM) and combined margin (CM) of the Indian Grid for FY 2016-17 (adjusted for cross-border electricity transfers), in t CO2/MWh

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# ACM0002- Summary of Methodology

- A consolidated CDM methodology for grid-connected power generation from renewable energy sources
- Covers grid-connected renewable power generation project activities that includes among others construction and operation of a greenfield power plant
- The methodology requires the calculation of the baseline emission factor following the combined margin (CM) approach consisting of a weighted average of:
  - Operating margin (OM);
  - Build margin (BM).

# Article 6.2 Voluntary co-operation

- Allowing transfer of mitigation outcome between countries

  - Should lead to eligibility to participate in the markets for emission reductions, removals, avoidance and promotion of sustainable development while being real, verified and permanent
  - Be in any metric decided by the Parties that take part in the transfer
  - Any mitigation outcome, including avoidance, becomes an ITMO when transferred between two parties in metrics that the Parties agree to
  - Conversion required only if mitigation options crosses national borders
  - With special consideration to LDCs for additionality to facilitate the economic diversification and ultimately structural transformation