Reference Emission Level & Emission Factors:
Policy and Modeling Tools for Developing Reference Emission Level

Retno Gumilang Dewi
Center for Research on Energy Policy
INSTITUT TEKNOLOGI BANDUNG
Outline

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  – Coverage

• Developing REL

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  – Supporting National Policies for Developing REL
  – Policies that Affect REL
  – Modeling Tools

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I. Background

• Cancun Agreements: Elements on MRV for non-Annex I Parties are considered under agenda item 3.2.2 “nationally appropriate mitigation actions by developing country Parties” of AWG-LCA;

• MRV within the context of mitigation assessment requires credible Reference Emission Level (REL); It is felt more important as Indonesia has announced ‘non-binding commitment’ for GHG mitigation action to avoid 26% (and further 41%) GHG emissions in 2020;

• REL is important as a basis to measure the success of mitigation actions;

• Developing REL is complex issues, establishing REL involves many factors (parameters/variables, data availability and reliability, national/regional policies, etc.) and actors (national, sub-national, sectors, etc.).
II. REL Understanding

• GUIDANCE FOR DEVELOPING REL (REFERENCE EMISSION LEVEL)

The SB 28 decision: describes Reference Emissions Levels (REL) as follows: “Means to establish reference emission levels, based on historical data, taking into account, inter alia, trends, starting dates and the length of the reference period, availability and reliability of historical data, and other specific national circumstances.”

• Developing (non-Annex 1) countries have to interpret this guidance according to their national circumstances

• parameters/variables,
• data availability and reliability,
• national/regional policies, etc. and
• national, sub-national, sectors, etc
2.1 REL Definitions and Use

- Future projection of emission level under the absence of mitigation actions
- Used as reference for measuring emission avoidance resulted from mitigation actions

**Annex I**

Historical

Non-Annex I

avoidance

Expected result from mitigation

MTon CO2-eq

1990 2000 2012 2020
2.2. Coverage

- Present discussion of REL mostly related to REDD
- REL is supposed to cover all aspects related to GHG emission activities/sectors

To be used to measure the success of mitigation actions

One of MRV components
III. Developing REL

3.1 Components needed for Developing REL

• Relevant Base Year

• Reliable Historical Activity Data

• Appropriate Emission factors

• Appropriate Model/projection tools (as much as possible represent future development) ➔ affect activity data ➔ affect emission trend

• Appropriate Methodology (emission estimates)

• Key Sources Category of GHG emissions
3.2 Factors Determine A Good REL

• National Circumstances
• Supported National/Sub-national Policies/Regulations
• Availability of Data for Projection (driver of development)
• Relevancy with sector development plan
### IV. Indonesian Case

#### 4.1 Important Sectors:

<table>
<thead>
<tr>
<th>Sector</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>Growth, % per yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>280,938</td>
<td>306,774</td>
<td>327,911</td>
<td>333,950</td>
<td>372,123</td>
<td>369,800</td>
<td>5.7</td>
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<tr>
<td>Industry</td>
<td>42,814</td>
<td>49,810</td>
<td>43,716</td>
<td>46,118</td>
<td>47,971</td>
<td>48,733</td>
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<tr>
<td>Agriculture</td>
<td>75,420</td>
<td>77,501</td>
<td>77,030</td>
<td>79,829</td>
<td>77,863</td>
<td>80,179</td>
<td>1.1</td>
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<tr>
<td>Waste</td>
<td>157,328</td>
<td>160,818</td>
<td>162,800</td>
<td>164,074</td>
<td>165,799</td>
<td>166,831</td>
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</tr>
<tr>
<td>LUCF</td>
<td>649,254</td>
<td>560,546</td>
<td>1,287,495</td>
<td>345,489</td>
<td>617,423</td>
<td>674,828*</td>
<td>Fluctuated</td>
</tr>
<tr>
<td>Peat Fire¹</td>
<td>172,000</td>
<td>194,000</td>
<td>678,000</td>
<td>246,000</td>
<td>440,000</td>
<td>451,000</td>
<td>Fluctuated</td>
</tr>
<tr>
<td>Total with LUCF</td>
<td>1,377,753</td>
<td>1,349,449</td>
<td>2,576,952</td>
<td>1,215,460</td>
<td>1,721,179</td>
<td>1,991,371</td>
<td>Fluctuated</td>
</tr>
<tr>
<td>Total w/o LUCF</td>
<td>556,499</td>
<td>594,903</td>
<td>611,457</td>
<td>623,971</td>
<td>663,756</td>
<td>665,544</td>
<td>3.2</td>
</tr>
</tbody>
</table>

* Ton CO2-eq
4.2 National vs Sub-National (Province and/or City/Regency)

- National Action Plan on GHG Mitigation (RAN GRK)
- Regional Action Plan on GHG Mitigation (RAD GRK)

Presidential Regulation No. 61/2011: RAN GRK/RAD GRK
4.3 Supporting National Policies for Developing REL

- Presidential Regulation No. 61/2011: RAN GRK/RAD GRK
- Ratification of UNFCCC Act No. 6/1994: Indonesia is not Annex-1 country, as a Party to the convention, Indonesia has to submit report regarding GHG inventory, mitigation action plan, and other activities related to climate change → reported in NATCOM
4.4 Policies that Affect REL

ENERGY SECTOR

a. Green energy policy (2004): green consideration in developing energy system (max renewable, efficient, clean technology).
b. Permen ESDM No.32/2008: mandatory of biofuel utilization
   Biofuel (2009): industry & power generation 2.5%, transport 1%
   Biofuel (2010): industry 5%, power 1%, transportation (2.5 -3%)
c. Energy Law No. 30/2007
d. Inpres No. 1/2006 and No.10/2006: The Development of Biofuel
e. Inpres No. 10/2005: Energy efficiency and Regulation of Energy
f. Permen ESDM 0031/2005: guideline for implementing EE
g. Blue Print PEN 2005-2025
Energy elasticity target < 1 in 2025 (in 2005 = 1.84, other countries 1.0 → more energy is needed to increase a unit of Indonesian GDP)

- Targeted share of different sources of energy in 2025:
  - to reduce oil from 54.78% (in 2005) to less than 20%
  - to increase natural gas from 22.2% (in 2005) to 30%
  - to increase coal from 16.77% (in 2005) to more than 33%
  - to increase geothermal from 2.48% (in 2005) to > 5%
  - to increase other new-renewable energy (biomass, nuclear, hydro, solar, and wind) becomes more than 5%
  - to develop biofuel at least 5%
  - to develop liquefied coal least 2% (18 MMBOE in 2020).

- Supply mix is formulated base on least cost & resource availability

- Shift of new-renewable from 4.5% (2003) to 17% (2025) is positive to climate change mitigations, but coal share increases from 14% (2003) to 33% (2025) will negative to climate change mitigations
WASTE SECTOR

- Municipal Solid Management Law No. 18/2008.
- According to the Law, open dumping practices will be prohibited in the year 2013.
- It is expected that the Law will encourage the development of a more managed waste handling system (i.e., a sanitary landfill equipped with gas flaring or utilization systems).
- The GOI expects that after 2020, around 80% of the domestic liquid waste will be handled by sewerage systems.
Projection of Net CO₂ Emission under BAU and Mitigation Scenarios and Sectors Contribution in Reducing the Emission
4.5 Modeling Tools

- Development Model for Estimating activity Data
- Methodology to Estimate GHG Emissions Level

Sectoral: Energy, IPPU, AFOLU, and Waste
Sub-Sector Energy: Industry, Transport, Residential, etc)

IPCC Guidelines and Locally Developed Parameters

REL
GHG Emission Projection and Mitigation

GHG Emission Level = Activity Data (AD) x EF

Provide by sector

GHG Emission Projection: AD (projection) x EF

Sectoral Projection → provide by sector

ENERGY SECTOR

Projection scenario of long term estimation for energy demand – supply

Scenario of long term energy demand – supply is developed by “energy model simulation”
The image depicts a flowchart representing the flow of energy and materials in an economy. The chart illustrates the relationship between population, GDP, and various energy sectors including the residential, transport, production, and power sectors.

- **Population** leads to **GDP** through **Passenger Transport Demand**.
- **GDP** influences the **Transport Sector**.
- **Transport Sector** interacts with the **Residential Sector** and **Arus Barang**.
- **Arus Barang** connects to **Production Sector (Industry & Commercial)**.
- **Production Sector** supplies energy demand to **Power Plant**.
- **Power Plant** provides electricity supply to the economy.
- **Supply** from fossil fuels like oil, coal, gas, and biofuel.
- **Renewable Energy** is another source of supply.
5. Closing Remarks

• Indonesia is very active in dealing with GHG emissions mitigations (target, actions plan, etc.), particularly since the announcement of non-binding commitment in GHG emission avoidance target.

• MRV of the achievement of mitigation efforts requires relevant REL.

• Issues that have to be dealt with REL development include complexity of reconciliation and integration of REL at national, sub-national and sectoral level.

• Issues related with mitigation initiatives/actions: domestic budget (RAN/RAD on Climate change), supported NAMAs, measurements of mitigation results (MRV), etc.

• MRV has to be dealt with many issues: inventory, REL, results of mitigations, international supports, BUR (biennial update report), ICA (international consultation and analysis).

• Required independent MRV institutions ??
Thank You

gelandewi@yahoo.com
geland@che.itb.ac.id