Greenhouse gas market mechanisms as financing instruments for upscaling energy efficiency in the building sector

UN ESCWA Expert Group Meeting “Means to Upscale Energy Efficiency projects in the Building Sector”
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Axel Michaelowa, Perspectives Climate Change
michaelowa@perspectives.cc
Topics

- The immense potential for greenhouse gas reductions through buildings efficiency
- The CDM and buildings efficiency-related projects
- The benchmark baseline methodology for new buildings
- A nationally appropriate mitigation action (NAMA) for the Mexican housing sector
- Conclusion
Building sector: complex system

Source: WBCSD (2007)
Building efficiency: the sleeping giant

Mitigation potential by 2030

Project-based mechanisms

- Quantification of the emission reduction (baseline scenario minus project emissions):

![Graph showing GHG emissions over time](image)
The CDM project cycle

1. Project idea
2. Check of availability of applicable methodologies
3. PDD Development (incl. baseline scenario, additionality discussion, and monitoring plan)
4. Approval by host- and investor country
5. Validation: Selection of a Validator; Dialogue and Follow up until submission to CDM EB
6. Registration by CDM EB
7. Monitoring
   - Selection of a verifier
   - Detailed monitoring plan
   - Support with »Initial Verification«
8. Marketing of CERs
9. CER Issuance

CDM Project Cycle
Buildings efficiency under the mechanisms

- Eligible types of buildings efficiency activities?
  - Easier to go for subcomponents: lighting, air conditioners…

- How will the baseline be calculated?
  - Are approved methodologies and data available?

- Is replication of a single project possible?
  - Programme of Activities under CDM

- Revenue to be earned through the sale of emission credits?
  - Credit price levels

- Can policies generate revenues under a mechanism?
  - Supported and credited NAMAs
Buildings efficiency under the mechanisms

- **Single projects**: usually *small-scale CDM projects*
  - limited emission reduction $1,000 < 15,000$ tCO$_2$e per year
  - Methodologies AMS-II.E, II.Q, III.AE are available (<50 proj.)

- **Opportunities to scale up the emission reduction**
  - Bundling of *several small-scale projects*
    - Bundle up to $15,000$ tCO$_2$e per year
  - **Large scale methodology AM 0091**

- **CDM Programme of Activities (PoA)**
  - Unlimited number of activities of *same type* for up to 28 years

- Nationally Appropriate Mitigation Action (NAMA)
  - Mitigation policy for *whole sector* or sub-sector
  - Can be supported or credited NAMA
Case study

- **Hotel Sonar Bangla Sheraton and Towers**
  - Improved diesel boiler: 2.2 GWh p.a.
  - Demand-side management/renewables: 2.1 GWh p.a.
    - Improved air conditioners
    - Variable speed motors
    - Improved water pumping
    - Solar water heaters
  - $2.1 \text{ GWh} \times 1103 \text{ t CO}_2/\text{GWh} = 2316$ credits per year
  - Diesel savings: 671 credits per year
Development of credit price

Data source: Bluenext
Benchmarking on emission performance (tCO$_2$/m$^2$)
- Performance comparison with buildings in “similar” circumstances

Bundle all measures and conservatively “aggregate” causality
- Implementation of a combination of technologies addressing
  - Electricity consumption
  - Fuel consumption
  - Chilled water consumption
  - Refrigeration
- Wider flexibility in technology choice
- Monitoring at a building level (not at an equipment level)

Benchmarking for baseline and additionality
Masdar City, Abu Dhabi

- First carbon neutral city
- 40,000 inhabitants
- Completion in 2025
Key elements of AM 0091

- Developed by Perspectives for Masdar
  - submitted to UNFCCC in March 2010
  - approved by CDM EB in June 2011 as AM 0091
    “Energy efficiency technologies and fuel switching in new buildings”

- Starting point: Baseline approach 48c
  - Single benchmark: the average emissions of top 20% performer buildings in similar circumstances built and occupied in the last 5 years
  - Emissions per gross floor area (GFA) (kgCO$_2$/m$^2$)
CDM benchmark methodology for building efficiency

Cumulative frequency of building specific emissions (tCO2/m2)

Top 20% performers
Differentiating the benchmark

- Differentiation according to building categories
  - **Residential**: single-family, multi-family
  - **Commercial**: office, hotel, warehouse, mercantile...
  - **Institutional**: education, public assembly, health care..
  - **Mixed-use**: more than one function above

  ➢ One benchmark per building category, differentiated by low rise and high rise (> 3 storeys)
  - Heating / cooling degree days within range of ±20%
  - Building size within range of ±50%
  - Within the same socio-economic category
    - At least three categories
The CDM buildings methodology, the Middle East, and the future

- The MENA region would be **THE ideal region** for application of the methodology
  - Large-scale urbanization with **whole cities** built by a single developer
  - Good availability of data

- The methodology could be also applied in the context of **NAMAs**
  - Monitoring of buildings efficiency NAMA

- Perspectives would be happy to **collaborate with MENA governments/institutions/companies** to apply the methodology!
Mexican housing challenges

Housing stock in millions

Source: CONAVI, 2010
## Mexican housing NAMA

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Sub-sector</strong></td>
<td>New residential houses (maximum 4 storeys and 8 units)</td>
</tr>
<tr>
<td><strong>Measures and activities with direct impact on GHG emission reduction</strong></td>
<td>Substantial up-scale of “Green mortgage” and “Ésta es tu casa” schemes through <strong>increased subsidies</strong> and more <strong>ambitious efficiency standards</strong>.</td>
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</table>
| **Measures and activities with indirect impact on GHG emission reduction** | Supportive actions for transformation of the “Green Mortgage” and "Ésta es tu casa" programmes into a **holistic urban planning process** including **building codes**  
  • Building code pilot in 1 federal state  
  • Promotion and enforcement of building codes across federal states over time  
  • Capacity building  
  • Extension of urban planning criteria and inclusion in the framework |
| **NAMA implementation and operation costs**                   | **Full costs** of substantial up-scaling of actions until 2020                                                                                                                                              |
| **NAMA type**                                                 | **Supported** NAMA (with the possibility of NAMA crediting for parts of the actions)                                                                                                                                 |
Marginal cost of NAMA elements

- Mitigation cost
- Credit price

- AC, refrigerators
- Supported NAMAs
- Credited NAMAs
- Supported NAMAs

PV

Mitigation volume
Emission paths under different scenarios

- Current practice = 57.6 MtCO$_2$
- 12% = 50.9 MtCO$_2$
- 41% = 33.8 MtCO$_2$
- 18% = 47.2 MtCO$_2$
- 19% = 46.5 MtCO$_2$
- 28% = 41.4 MtCO$_2$
- 41% = 33.8 MtCO$_2$

Annual emissions in million tCO$_2$/a

- BAU Current Green Mortgage (37% coverage 2020)
- Scenario 1 (100% coverage 2020)
- Scenario 2 (100% coverage 2015)
- Scenario 3 (technology scale up)
- Scenario 4 (scenarios 1 and 3 combined)
- Current practice cumulative
Key Actors involved in shaping the NAMA

Host Country Government & Public and Private Institutions

Developed Country Government (= intl. Donor)

Foreign and domestic consultants

Communication

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Communication
NAMA lessons from Mexico

- A good NAMA is long term and has a broad scope
- Avoid smallish “project-based” NAMA
- Integrate all relevant actors from the very beginning
- Assign clear roles and have strong moderator
- Host country ownership is a must
- Build NAMA upon existing activities as far as possible
- Ensure donor conditions do not choke off the NAMA
- Ensure relevant and sustainable donor contributions
- Take consultancy competition into account
Summary: Buildings under the market mechanisms

- To date, activity has been limited
  - Only some efficient lighting projects, very few whole building projects
- Methodologies for baseline setting/monitoring do exist
  - Data availability is challenging
- Current emission credit prices are very low
  - Upswing depends on overall global climate policy
  - Voluntary market is no real alternative
- New market mechanisms might open new doors
  - NAMA crediting?
Thank you!

Perspectives GmbH

Axel Michaelowa
michaelowa@perspectives.cc