

# Incorporating GHG Emissions Into Environmental Impact Assessment Of Coal-Fired Power Plants

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IAIA Symposium on Climate Change

November 15,2010



# GHG emissions are a major environmental challenge for coal-fired power plants

- Quantity of CO<sub>2</sub> released per unit of energy produced by its combustion is the highest of all fossil fuels
- Coal plants are one of the most significant contributors to accumulation of GHG in the atmosphere
- GHG emissions cannot be significantly abated with current commercially available coal plant technologies
- Carbon lock-in risk

## BUT GHG emissions are generally not adequately addressed in traditional EIAs

- National legal or regulatory framework generally not developed, particularly in developing countries
- Only indirect links to physical impacts
- Quantification of GHG emissions in absolute value does not say much in terms of impacts
- Example: a 700-MW coal fired power plant emitting 4.9 MtCO<sub>2</sub> per year – is it a lot?
  - 0.01 % of total GHG emissions in the world in 2004
  - equivalent of annual emissions of 500,000 inhabitants of Latin America and Caribbean

# IDB's approach to address GHG emissions from coal plant in the EIA process

- Principles

- Priority to renewable energy, and, if a thermal solution is required, to less carbon intensive fossil fuels
- Use the best appropriate available technology to allow for high efficiency and lower GHG emissions intensity.

- Two stage process

- *Screening stage*: Minimum Performance Criteria
  - Minimum Thermal Efficiency (%)
  - Maximum Carbon Intensity (tCO<sub>2</sub>/MWh)
- *EIA stage*: comprehensive alternatives analysis including GHG emissions to justify the proposed fuel and technology

# Screening: IDB's minimum performance criteria for GHG emissions from coal plants

| Technology  | (PCC) Super-critical | (PCC) Ultra-super-critical | Circulating Fluidized Bed Combustion (CFBC) | Integrated Gasification Combined Cycle (IGCC) |
|---|----------------------|----------------------------|---|---|
| <b>Net Plant Higher Heat Value (HHV) Efficiency (%) (Bituminous coal)</b> | >38.3 <sup>(1)</sup> | >42.7 <sup>(1)</sup>       | >36.0 <sup>(2)</sup>                        | >38.2 <sup>(3)</sup>                          |
| <b>Net CO<sub>2</sub> Emissions Intensity (kg CO<sub>2</sub>/net MWh)</b> | <832 <sup>(4)</sup>  | <748 <sup>(4)</sup>        | <890 <sup>(4)</sup>                         | <832 <sup>(4)</sup>                           |

Sources: <sup>(1)</sup> US EPA, Environmental Footprints and Costs of Coal-Based Integrated Gasification Combined Cycle and Pulverized Coal Technologies, 2006; <sup>(2)</sup> International Energy Agency, Developments in fluidized bed combustion technology, 2006; <sup>(3)</sup> US DoE - Cost and Performance Comparison Baseline for Fossil Energy Power Plants, 2007; <sup>(4)</sup> Based on US EPA emissions factors for bituminous coal (93.47 kg CO<sub>2</sub>/MMBtu) and minimum net plant efficiency.

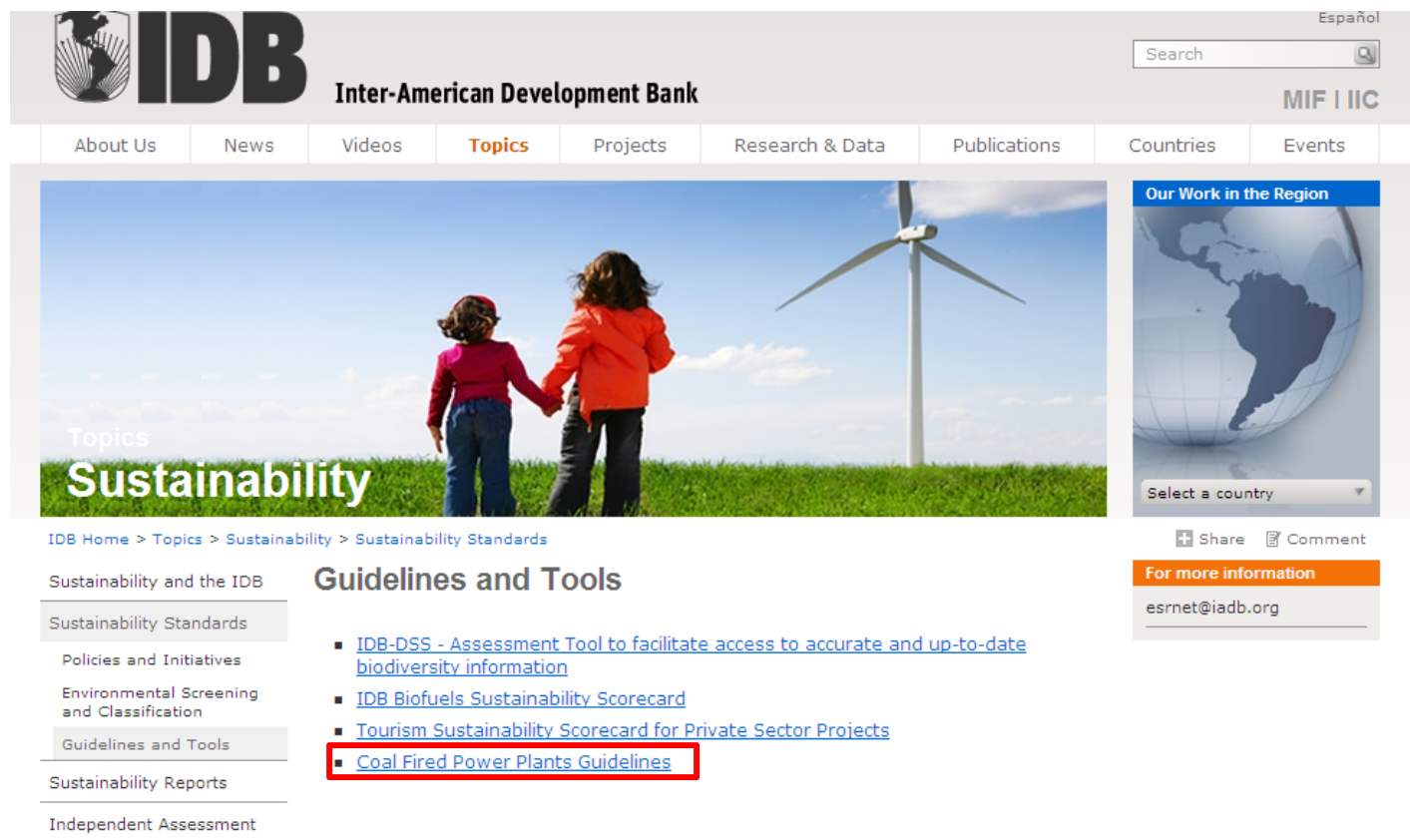
## EIA – Analysis of Alternatives

- Multi-criteria analysis, including:
  - (i) source of fuel and whether the coal is indigenous or needs to be imported;
  - (ii) capital and operational costs;
  - (iii) overall efficiency of the technology;
  - (iv) level of GHG emissions per MWh;
  - (v) size of the grid in relation to the selection of units size
- Could also include a costs-benefits analysis with climate change externalities (e.g. shadow-carbon pricing)
- Documents and demonstrates the use of best appropriate available technology to maximize efficiency and minimize carbon intensity

## Next steps

- Extend the approach to other GHG intensive industries
  - Cement Manufacturing Climate Change Guidelines finalized
  - Climate change Guidelines on other fossil fuel power plants currently under preparation
- Get further practical experience in incorporating GHG emissions in the EIA's analysis of alternatives and refine the criteria accordingly
- Explore ways to take into account climate change externalities into costs – benefits analysis
- Explore ways to incorporate carbon offsets in the analysis
- Revise the guidelines periodically to take into account new technological developments (e.g. carbon capture and storage) as they become commercially available

# Further information: IDB's Sustainability Portal: [www.iadb.org/en/topics/sustainability](http://www.iadb.org/en/topics/sustainability)



The screenshot shows the IDB Sustainability Portal. At the top left is the IDB logo and the text "Inter-American Development Bank". To the right is a search bar and the text "Español" and "MIF | IIC". Below the logo is a navigation menu with items: "About Us", "News", "Videos", "Topics" (highlighted), "Projects", "Research & Data", "Publications", "Countries", and "Events". The main content area features a large image of two children holding hands in a field with a wind turbine in the background. Below the image is the text "Topics Sustainability". To the right of the image is a section titled "Our Work in the Region" with a globe and a "Select a country" dropdown menu. Below the image is a breadcrumb trail: "IDB Home > Topics > Sustainability > Sustainability Standards". The main heading is "Guidelines and Tools". Below this heading is a list of links: "IDB-DSS - Assessment Tool to facilitate access to accurate and up-to-date biodiversity information", "IDB Biofuels Sustainability Scorecard", "Tourism Sustainability Scorecard for Private Sector Projects", and "Coal Fired Power Plants Guidelines" (highlighted with a red box). On the left side, there is a sidebar with a "Sustainability and the IDB" section containing links for "Sustainability Standards", "Policies and Initiatives", "Environmental Screening and Classification", "Guidelines and Tools", "Sustainability Reports", and "Independent Assessment". On the right side, there is a "Share" and "Comment" button, and a "For more information" section with the email "esrnet@iadb.org".

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## Guidelines and Tools

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