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# Can Concerns with CDM Coal Power Projects be Addressed through Revisions to the ACM0013 Methodology?

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A few weeks ago, we released a paper that examined several concerns with awarding offset credits (CERs) to coal power projects under the Clean Development Mechanism.[1] The paper found that systematic flaws in the ACM0013 CDM methodology and its application lead to significant over-estimation of emission reductions, and outlined reasons why such CERs may not be real, measurable, and additional. Subsequently, the CDM Methodologies Panel released its own in-depth review of ACM0013,[2] coming to many of the same conclusions while using different analytical methods. Both assessments found that over half of the CERs issued to coal plants are likely to be the result of systematic overestimation. In response, the CDM Executive Board, at its 65th meeting, agreed to put ACM0013 on hold, and requested the Meth Panel to provide a draft revised methodology to address its concerns. This note briefly assesses the ability of potential revisions to address key concerns with ACM0013 in particular and with CDM coal power projects in general.

As summarized in Annex I, we have reviewed key concerns with CDM coal power projects, listed potential remedies for each concern, and commented on whether these remedies are likely to prove feasible and adequate.[3]

We find that the available revisions we are aware of can only partially address the key concerns, but other concerns elude straightforward fixes. In general, we find no easy solution to the following three broad and fundamental challenges to ensuring that coal power CERs are real, measurable, and additional:

- **Low signal-to-noise ratio:** Most coal power projects involve relatively small increases in plant efficiency due to improvements in boiler technology (e.g. from 38% efficient subcritical to 39% efficient supercritical steam conditions).[4] At the same time, non-project-related factors such as coal quality, cooling technology, ambient conditions and pollution controls ("noise") can affect

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[1] Lazarus, M., and C. Chandler (2011). *Coal Power in the CDM: Issues and Options*. SEI Working Paper No. 2011-02. Stockholm Environment Institute, Seattle, WA, US. http://www.sei-international.org/publications?pid=1974.

[2] CDM Methodologies Panel (2011). "Information Note: Report on the analysis of issues concerning the methodology ACM0013." Fifty-third Meeting Report, Annex 13. United Nations Framework Convention on Climate Change, Bonn, Germany. Available at http://cdm.unfccc.int/Panels/meth/meeting/11/053/mp53_an13.pdf.

[3] Since a draft revised methodology has yet to be released, we identified potential revisions to ACM0013 from the Meth Panel's recent information note as well as from our prior work.

[4] These gross plant HHV efficiency values are from Gupta, P. (2008), "Supercritical Technology in NTPC India - A Brief Overview". National Thermal Power Corporation Ltd., India. Presented at the Cleaner Coal Workshop on Solutions to Asia's Growing Energy and Environmental Challenges, Ha Long City, Vietnam, August 19-21, 2008. Available at http://www.egcfe.ewg.apec.org/publications/proceedings/CleanerCoal/HaLong_2008/Day%202%20Session%203A%20-%20Pankaj%20Gupta%20Supercritical%20Technology%20in%20.pdf.

plant efficiency to a greater extent than the boiler efficiency improvement ("signal") that ACM0013 seeks to credit. The signal-to-noise ratio is further weakened by significant uncertainties in power plant efficiency data, which could be as large as or greater than boiler efficiency improvements. As noted in the Annex I table, site-specific feasibility studies and greater data verification by Designated Operational Entities (DOEs) could help to reduce this "noise", but not only are these untested approaches, they do not control for other factors in the "top 15%" performance baseline, which is fundamental to ACM0013. (Note that this weakness could also lead to unintended outcomes contrary to the objectives of the CDM, as noted below). Without more comprehensive measures to improve the quality of plant efficiency data and control for other environmental factors, especially in the top 15% performance baseline, it will remain difficult to ensure that coal power CERs are real and measurable.

- **Ineffectiveness of additionality assessment in the context of multi-billion-dollar coal power projects:** The common practice test cannot perform as an important credibility check when nearly all supercritical (India) and ultra-supercritical (China) coal power projects are seeking CDM approval; the result is tautological – since nearly all apply, all are deemed additional. This would not be a problem if the underlying additionality analyses, based largely on investment analyses, were otherwise convincing. However, investment analyses tend to find small differences in the cost of electricity between the proposed projects and their less efficient alternatives, and do not necessarily stand up to robust sensitivity analysis. At the same time, the likely value of CDM finance (CERs) is several orders of magnitude lower than the scale of coal plant investments, and also pales in comparison with the variation in coal prices witnessed in recent years. (Note that one possible, but partial remedy would be to require the demonstration of a significant difference in the cost of electricity between the project and baseline alternative.) In addition, given that ongoing coal price increases provide a strong incentive to build supercritical or ultra-supercritical coal plants, and Indian and Chinese government policies foster or require supercritical or ultra-supercritical coal designs, it is very difficult to make a credible claim that these projects are truly additional.
- **The contradiction of using climate finance in support of long-lived emissions-intensive infrastructure that could undermine the ability to meet 2°C climate stabilization objectives:** The ACM0013 pipeline of 45 coal power projects offers at most only small percentage improvements in efficiency. At the same time, these investments will "lock in" over 400 million $tCO_2$ in annual emissions over several decades, and accordingly may undermine achievement of the ultimate objective of limiting dangerous climate change. Other mechanisms, such as sectoral crediting and emissions trading, can encourage increased coal plant efficiency without providing direct financial support to the construction of new coal plants.

All CDM methodologies face some degree of error and uncertainty; indeed, many recognize these concerns and utilize simplifications such as conservative assumptions or discount factors to compensate. However, the combination of the three challenges noted above is unique to coal power projects and ACM0013, and is likely to defy easy resolution through methodology revision. It remains unclear to us how a revised ACM0013 methodology could lead to verifiable emission reductions in a feasible, robust and conservative manner consistent with the goals of the CDM and climate stabilization.

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# ANNEX 1

## Table 1: Key concerns with CDM coal power projects, potential remedies, and evaluation of their feasibility and adequacy

| Issue | Explanation/Example | Potential remedy | Adequacy/feasibility of remedy |
|---|---|---|---|
| Inconsistency and bias in Option 1 (most likely technology) baselines leads to underestimation of baseline plant efficiency | Option 1 baselines reflect characteristics of existing rather than new technologies, leading to lower plant efficiencies and higher emission baseline rates.<br>In India, technologies currently available in the market suggest emissions improvements on the order of 2-4% when moving from subcritical to supercritical technologies, but coal power project PDDs claim an average of 11%.<br>Subcritical technology is identified as the "most likely" alternative in all Indian and 8 of 13 Chinese projects, although both countries have transitioned away from this technology.<br>Poorly documented and inconsistent assumptions (see MP report). | Use of feasibility studies to determine Option 1 plant efficiency at optimum load for project site. | Could be effective, but as yet, an untested and potentially costly approach.<br>Requires engineering expertise for DOEs to effectively validate.<br>Does not address systematic mis-specification of baseline technology (e.g. large, subcritical units in China where none are currently built) as found in PDDs. |
| Use of outdated historical data in the Option 2 baseline leads to underestimation of baseline emission rate | The gap between commissioning dates of project activity and of peer group plants is typically 5-10 years. This gap means improvements in plant efficiencies are ignored, e.g. rapid shift away from subcritical technology in India and China.<br>Even using historical data for all vintage plants, the MP found that the top 15% plant efficiencies are higher than the value used in project PDDs for Chinese projects. | Procedures to estimate autonomous efficiency improvements during period. | Efficiency improvements are not continuous over time; e.g. transition to supercritical in China occurred in a few years' time. |
| | | Use of ex post data to calculate baseline at the time of offset issuance. | More accurate but creates investor uncertainty. |
| | | | Neither remedy addresses the signal-to-noise problem (other non-efficiency factors). |
| Low signal-to-noise ratio: site-specific factors (noise) can have as great an impact on unit efficiency as the choice of boiler technology (signal), but are not accounted for | Coal unit efficiency is influenced by factors such as cooling technology, pollution abatement equipment, coal quality, and ambient conditions. Together, these variables can affect relative unit efficiency by 7% or more. ACM0013 does not account for these factors, and is intended to attribute CERs only to direct improvements in boiler/plant efficiency. | Use of feasibility studies to determine Option 1 plant efficiency at optimum load for project site. | As noted above, feasibility study approach would to address this concern only for Option 1. Option 2 baselines would remain subject to this concern. |

| Issue | Explanation/Example | Potential remedy | Adequacy/feasibility of remedy |
|---|---|---|---|
| Poor quality and availability of historical power plant performance data creates potential bias and added uncertainty, and further decreases signal-to-noise ratio | Uncertainty and annual variation in coal unit emissions data can, in some circumstances, be quite high, reducing confidence in standardized baseline values and reported emission reductions.<br>Required data for Option 2 are not made available in China. In India, data are incomplete and are inconsistently used. | DOE validation of emissions data | Central records can be reviewed for consistency with PDD values, but it remains unclear how fuel consumption could be validated at the power plant level.<br>Does not address lack of data availability and potentially poor estimation methods. |
| Limitations in the investment and sensitivity analyses compromise additionality assessment | Small differences in the levelized cost of electricity between the proposed project and alternative render the investment analysis highly sensitive to inputs such as construction costs, fuel costs, or load factors, creating potential for minor variations in these parameters to alter the determination of additionality. Sensitivity analyses fail to properly consider a reasonable variation in critical assumptions (e.g., fuel prices), nor independent variation of key parameters (all comparisons use the same percentage change for both the project and alternatives). | Require significant difference (e.g. >10%) between project and baseline in levelized cost of electricity for large, new greenfield projects.[5] | Could be effective at reducing number of projects with questionable additionality. Requires agreement on an appropriate threshold difference, which may be difficult. |
| | | Improved specifications for sensitivity analysis and more careful validation of assumptions. | Enabling and ensuring careful DOE scrutiny of additionality assessment is an ongoing challenge. |
| Additionality: Transition to higher-efficiency coal generation already underway due to rising coal prices and government policies | In both India and China, a number of non-CDM reasons have encouraged a shift away from subcritical technology. This transition has been largely driven by growing pressures on coal supplies, increasing reliance on imported coal, and growing exposure to rising international coal prices, and has been fostered by government policies mandating use of more efficient technologies (e.g., supercritical technology required in India's Ultra Mega Power Projects (UMPPs) and prioritizing grid access for efficient plants (e.g., in China's 2007 energy-saving approach to power dispatching). | Further clarification of E+/E- rules with respect to tariff and other power sector policies.<br>Revisions to common practice test (below). | E+/E- issues are a fundamentally challenging aspect of the CDM, which renders clear rules elusive. |

[5] See presentation on "How to further improve the assessment of additionality", 64th Meeting of the CDM Executive Board, 24-26 October 2011. Available at http://unfccc4.meta-fusion.com/kongresse/111024_cdm64/pdf/4.3_Lex_Additionality_greenfield.pdf.

| Issue | Explanation/Example | Potential remedy | Adequacy/feasibility of remedy |
|---|---|---|---|
| Additionality: Common practice test is not effective in coal plant context | Common practice analysis is intended as a credibility check to determine whether the proposed project type (e.g. technology or practice) has already diffused in the relevant sector and region. However, the common practice test excludes from consideration any project that is registered or applying for CDM approval. Nearly all supercritical and ultra-supercritical units in India and China, respectively, are excluded on this basis, and, therefore none are considered common practice. While this exclusion makes sense for project types where there are clearly decisive cost or technical barriers, that is not the case here, and a result the common practice analysis does not function as an important credibility check. | Revise the common practice test to enable distinction among situations where exclusion of CDM projects from consideration is warranted (decisive cost or technical barriers), and where it is not (lack of decisive barrier, where a technology shift is already and clearly underway). | Could be effective, but requires EB to reconsider common practice guidelines. |
| Use of CDM finance for major additions of new, long-lived coal plants may be inconsistent with the UNFCCC's 2°C objective | Coal plants represent major, long-lived investments using the highest-emitting electricity resource. Using much-needed climate finance to support construction of these plants, even if it leads to slight increase in the efficiency of some coal plants, may undermine the overall objective of limiting dangerous climate change. This focus on incremental change and lock-in of emissions are particularly troubling as "the door to 2°C is closing".[6] The coal projects in the CDM pipeline offer, at best, marginal improvements in emission rates, while locking in over 400 million $tCO_2$ in annual emissions – as much as the annual $CO_2$ emissions of countries such as France, Spain and South Africa. | Exclude coal power projects from the CDM | Effective, but requires agreement among Parties. |
| | | Use of other market mechanisms such as sectoral crediting or emissions trading to encourage improved coal plant efficiencies | As long as sectoral benchmarks are set below coal plant emission rates, there will be no net finance for new coal plant construction. |
| Unintended outcomes contrary to the objectives of the CDM | The addition of sulfur and particulate emission controls to mitigate local pollution impacts, for example, can have the effect of reducing net unit efficiency. As a result, ACM0013 may inadvertently penalize projects that minimize local air pollution impacts, if plants included in the standardized baseline calculation have not implemented similar controls. Conversely, it could reward projects that do not take steps to mitigate local air pollution impacts if plants in the Option 2 baseline have generally implemented pollution controls. This perverse outcome would run contrary to the sustainability objectives of the CDM. | Use site-specific feasibility assessment as suggested above. | Would help address concerns, but only for Option 1 baselines |

[6] International Energy Agency (2011), *World Energy Outlook 2011*. Paris, France. http://www.worldenergyoutlook.org.