

M. Cames, R.O. Harthan (Öko-Institut), J. Füssler (INFRAS), M. Lazarus, C.M. Lee,
P. Erickson (SEI)

How Additional is the CDM?

23 May 2017



Methodological approach

Question: Does the CDM provide *real, measurable and additional* emission reductions?

- Systematic analysis of CDM rules for (i) **additionality determination**, (ii) determination of **baseline emissions** and (ii) other issues
- Analysis of application of rules in **major project types** based on random sample of project PDDs
- **Quantitative assessment** of impact on potential 2013-2020 CER supply

Approaches for additionality determination and baseline setting analysed

- Prior consideration
- Investment analysis
- First of its kind and common practice analysis
- Barrier analysis
- Crediting period and their renewal
- Additionality of PoAs
- Positive lists
- Standardized baselines
- Consideration of policies and regulations
- Suppressed demand

How additional are project types?

	CDM projects			Potential CER supply 2013 to 2020		
	Low	Medium	High	Low	Medium	High
	... likelihood of emission reductions being real, measurable, additional					
	No. of projects			Mt CO ₂ e		
HFC-23 abatement from HCFC-22 production						
Version <6		5			191	
Version >5			14			184
Adipic acid		4			257	
Nitric acid			97			175
Wind power	2.362			1.397		
Hydro power	2.010			1.669		
Biomass power		342			162	
Landfill gas		284			163	
Coal mine methane		83			170	
Waste heat recovery	277			222		
Fossil fuel switch	96			232		
Cook stoves	38			2		
Efficient lighting						
AMS II.C, AMS II.J	43			4		
AM0046, AM0113			0			0
Total	4.826	718	111	3.527	943	359

CDM eligibility of project types

Project type	Environmental integrity under current rules	Environmental integrity if rules were improved	Recommendations
HFC-23	Medium / High	High	Not eligible
Adipic acid	Medium	High	Eligible (with benchmark of 30 kg / t AA)
Nitric acid	High	High	Eligible
Wind power	Low	Low	Not eligible
Hydropower	Low	Low	Not eligible
Biomass power	Medium	Medium / High	Eligible (projects avoiding methane emissions)
Landfill gas	Medium	Medium / High	Eligible (subject to transition arrangements)
Coal mine methane	Medium	Medium / High	Eligible
Waste heat recovery	Low	Low	Not eligible
Fossil fuel switch	Low	Low	Not eligible
Efficient cook stoves	Low	Medium / High	Eligible
Efficient lighting	Low / High	Medium / High	Eligible

Recommendations

- Compendium of recommendations for improvement of CDM additionality and baseline setting rules
- Crediting has a limited role to play after 2020
- Limiting crediting to project types with high likelihood of delivering additional emission reductions
- Review methodologies systematically to reduce risk of over-crediting
- Limit purchase of CERs to vulnerable projects or new projects with high environmental integrity
- Transition to broader and more efficient climate policies
- Make sure PA gets sound framework for accounting ensuring environmental integrity -> transparency and review

Evaluation of project types 1

Project type	Additionality ¹⁾	Over-crediting ²⁾	Other issues	Overall environmental integrity ³⁾
HFC-23 (up to version 5)	<ul style="list-style-type: none"> Likely to be additional 	<ul style="list-style-type: none"> Risk of perverse incentives 	<ul style="list-style-type: none"> None 	Medium
HFC-23 (version 6)	<ul style="list-style-type: none"> Likely to be additional 	<ul style="list-style-type: none"> Risk of perverse incentives largely addressed Ambitious baseline could lead to under-crediting (net mitigation benefit) 	<ul style="list-style-type: none"> Low CER prices could jeopardize continued operation Emissions could be addressed through Montreal Protocol 	High
Adipic acid	<ul style="list-style-type: none"> Likely to be additional 	<ul style="list-style-type: none"> Most recent methodology could lead to slight under-crediting Leakage could lead to significant over-crediting in times of higher CER prices 	<ul style="list-style-type: none"> None 	Medium
Nitric acid	<ul style="list-style-type: none"> Likely to be additional 	<ul style="list-style-type: none"> Most recent methodologies lead to under-crediting Overall, little risks of overall over-crediting 	<ul style="list-style-type: none"> None 	High

¹⁾ High/medium/low likelihood of projects being additional under current rules;

²⁾ High/medium/low likelihood of avoiding over-crediting under current rules;

³⁾ High/medium/low likelihood of emission reductions being additional and not over-credited under current

Evaluation of project types 2

Project type	Additionality ¹⁾	Over-crediting ²⁾	Other issues	Overall environmental integrity ³⁾
Wind power	<ul style="list-style-type: none"> • CER revenue has only limited impact on profitability • Investment costs decreased significantly in last years • In some cases competitive with fossil generation • Support schemes • Widespread in many countries 	<ul style="list-style-type: none"> • Methodological assumptions may lead to both over- and under-crediting 	<ul style="list-style-type: none"> • None 	Low
Hydro power	<ul style="list-style-type: none"> • Common practice in many countries • CERs have only moderate impact on profitability • Competitive with fossil generation in many cases 	<ul style="list-style-type: none"> • Methodological assumptions may lead to both over- and under-crediting; over the lifetime of the project likely under-crediting 	<ul style="list-style-type: none"> • Methane emissions from reservoirs may be important and may not be fully reflected by CDM methodologies 	Low
Biomass power	<ul style="list-style-type: none"> • Significant impact of CER revenues on profitability for projects claiming methane avoidance • Competitive with fossil generation in many cases • Support schemes 	<ul style="list-style-type: none"> • Demonstration of biomass decay/abundance of biomass is key • Risk of exaggerated claims of anaerobic decay 	<ul style="list-style-type: none"> • None 	Medium

¹⁾ High/medium/low likelihood of projects being additional under current rules;

²⁾ High/medium/low likelihood of avoiding over-crediting under current rules;

³⁾ High/medium/low likelihood of emission reductions being additional and not over-credited under current

Evaluation of project types 3

Project type	Additionality ¹⁾	Over-crediting ²⁾	Other issues	Overall environmental integrity ³⁾
Landfill gas	<ul style="list-style-type: none"> Likely to be additional 	<ul style="list-style-type: none"> Default assumptions for the rate of methane captured historically have the potential to overestimate emission reductions Default soil oxidation rates may underestimate emission reductions for uncovered landfills in humid sub-tropical and tropical regions Perverse incentives for project developers to increase methane generation 	<ul style="list-style-type: none"> Perverse incentives for policy makers not to pursue less GHG intensive waste treatment methods 	Medium
Coal mine methane	<ul style="list-style-type: none"> Likely to be additional 	<ul style="list-style-type: none"> Potential concerns regarding increased mining 	<ul style="list-style-type: none"> Potential perverse incentives to dilute methane in order to avoid that abatement is required by regulations 	Medium

¹⁾ High/medium/low likelihood of projects being additional under current rules;

²⁾ High/medium/low likelihood of avoiding over-crediting under current rules;

³⁾ High/medium/low likelihood of emission reductions being additional and not over-credited under current

Evaluation of project types 4

Project type	Additionality ¹⁾	Over-crediting ²⁾	Other issues	Overall environmental integrity ³⁾
Waste heat recovery	<ul style="list-style-type: none"> • CER revenues small compared to fossil fuel cost savings • Future fuel cost savings uncertain • Widespread in many countries 	<ul style="list-style-type: none"> • Brownfield: risks for inflated baselines • Greenfield: modelling uncertain • Plant operation under the project different to baseline 	<ul style="list-style-type: none"> • None 	Low
Fossil fuel switch	<ul style="list-style-type: none"> • Use of barrier analysis allowed for small-scale projects not appropriate • Investment analysis insufficient as choice of fuel depends not only on prices • CER revenues have a small impact 	<ul style="list-style-type: none"> • Default values for upstream emissions not appropriate 	<ul style="list-style-type: none"> • None 	Low

¹⁾ High/medium/low likelihood of projects being additional under current rules;

²⁾ High/medium/low likelihood of avoiding over-crediting under current rules;

³⁾ High/medium/low likelihood of emission reductions being additional and not over-credited under current

Evaluation of project types 5

Project type	Additionality ¹⁾	Over-crediting ²⁾	Other issues	Overall environmental integrity ³⁾
Efficient cook stoves	<ul style="list-style-type: none"> • CER revenues are insufficient to fully cover project costs • Additionality questionable in urban areas 	<ul style="list-style-type: none"> • Fraction of NRB likely to be overestimated • Water boiling test not appropriate • Emission intensity factors of fossil fuel likely underestimate emissions relative to wood-fuel used in the baseline • Emissions factors used for suppressed demand are unrealistic • Unrealistic assumptions for charcoal use • Over-crediting if traditional stoves continue to be used 	<ul style="list-style-type: none"> • Inconsistent accounting: CDM credits in the same region both reduction and increase of biomass use 	Low

¹⁾ High/medium/low likelihood of projects being additional under current rules;

²⁾ High/medium/low likelihood of avoiding over-crediting under current rules;

³⁾ High/medium/low likelihood of emission reductions being additional and not over-credited under current

Evaluation of project types 6

Project type	Additionality ¹⁾	Over-crediting ²⁾	Other issues	Overall environmental integrity ³⁾
Efficient lighting (AMS II.C AMS II.J)	<ul style="list-style-type: none"> Shift to EE lighting well underway and/or mandates in most common PoA countries, and PoAs allowed to use SSC additionality 'loophole' 	<ul style="list-style-type: none"> Unlikely 	<ul style="list-style-type: none"> None 	Low
Efficient lighting (AM0113, AM0046)	<ul style="list-style-type: none"> Likely to be additional 	<ul style="list-style-type: none"> Unlikely 	<ul style="list-style-type: none"> None 	High

¹⁾ High/medium/low likelihood of projects being additional under current rules;

²⁾ High/medium/low likelihood of avoiding over-crediting under current rules;

³⁾ High/medium/low likelihood of emission reductions being additional and not over-credited under current

Impact of CER revenues on the profitability of different project types

Type	Source	Projects with available IRR information	Average IRR without CER revenues	Average IRR with CER revenues	Average IRR difference
Biomass energy	UNEP-DTU	271	5.5%	13.6%	8.1%
	IGES	216	5.2%	12.9%	7.7%
Coal bed/mine methane	UNEP-DTU	70	2.1%	29.5%	27.5%
	IGES	75	2.2%	30.5%	28.3%
EE own generation	UNEP-DTU	205	8.8%	15.5%	6.7%
	IGES	202	8.3%	14.7%	6.4%
EE supply side	UNEP-DTU	36	7.1%	14.6%	7.5%
	IGES	23	6.3%	13.2%	6.9%
Fossil fuel switch	UNEP-DTU	47	7.2%	10.4%	3.1%
	IGES	39	7.0%	10.4%	3.4%
Hydro	UNEP-DTU	1,753	7.7%	11.0%	3.3%
	IGES	1,635	8.0%	11.6%	3.6%
Landfill gas	UNEP-DTU	183	2.5%	18.0%	15.6%
	IGES	165	2.8%	16.6%	13.8%
Methane avoidance	UNEP-DTU	203	3.8%	21.1%	17.3%
	IGES	204	3.9%	20.8%	16.9%
Solar	UNEP-DTU	154	6.5%	7.9%	1.4%
	IGES	122	5.8%	7.0%	1.2%
Wind	UNEP-DTU	2,162	7.1%	9.7%	2.6%
	IGES	1,804	6.6%	9.4%	2.8%