



Center for
Clean Air Policy

The Mexico Case Study

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Sectoral Study Workshop

Washington, DC, 21 September 2009

Outline of the Presentation

- General Analytical Methodology
- Setting Sectoral Goals for Mexico's Cement Sector
- Non-Cost Mitigation Barriers in Mexico
 - » Energy Pricing
 - » Fuel Supplies
 - » Other
- Conclusions
- A Key Question

Methodology for Setting Sectoral Goals

- Perform analysis to estimate the:
 - » BAU emissions through 2025, based upon expected growth in production and projected changes in production capacity, energy intensity, electricity intensity, fuel mix, industry practices
 - » Emissions reduction options and implementation costs
 - » Maximum deployment of mitigation options, both individually and as packages of options
 - » **Barriers** to implementing promising mitigation options
- Propose unilateral and no-lose sectoral goals
 - » **Emissions intensity goals to allow for growth of the industry**
- Recommend policy pathways for achievement

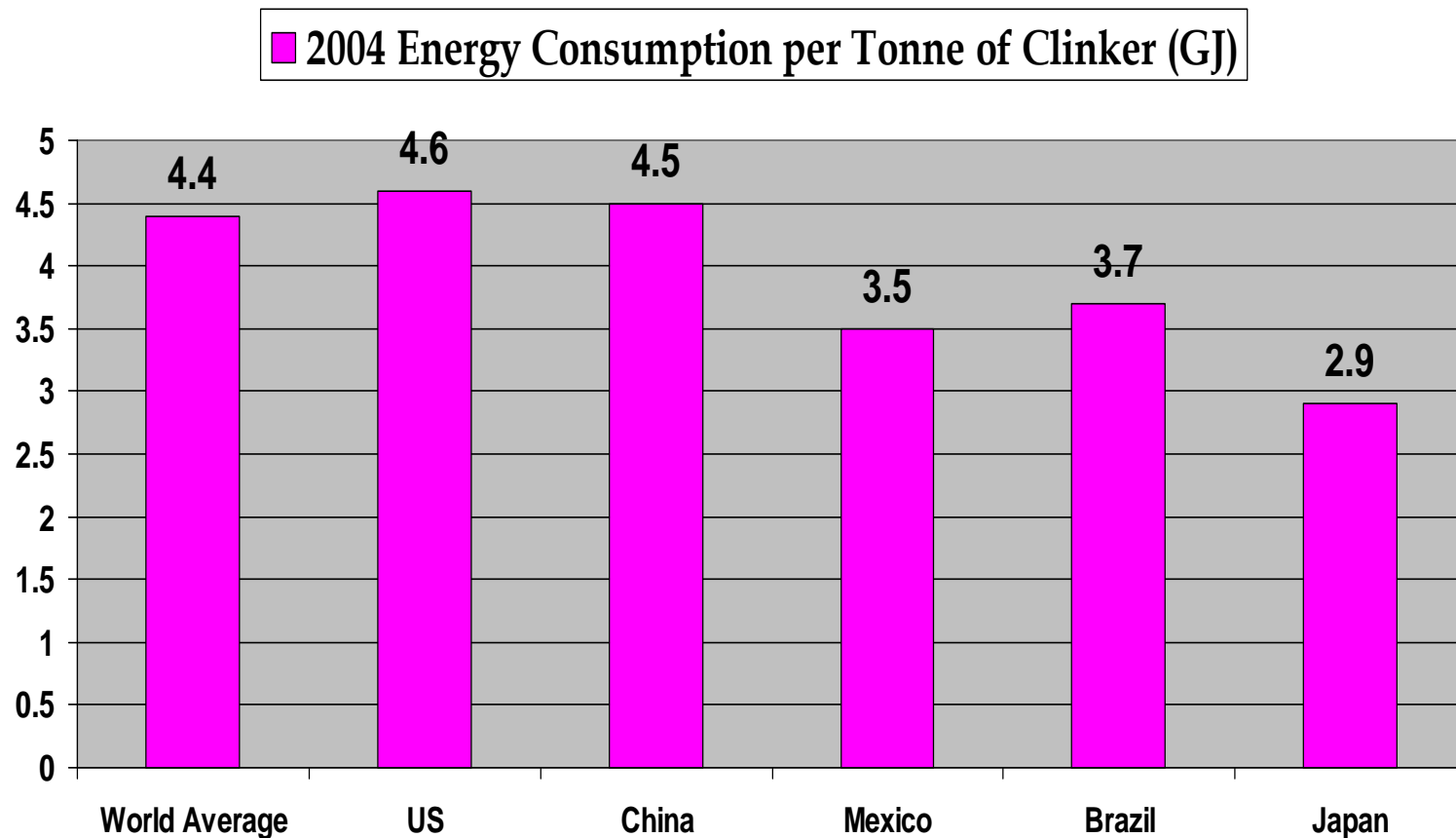
DISCLAIMER!

- Analysis and results presented here are those of CCAP alone. They are preliminary and meant to illustrate the proof-of-concept of sectoral approaches. None of the information or proposals have been officially endorsed by the Mexican government or by Mexican industry.

Setting Sectoral Goals for Mexico's Cement Sector

Mexico's Cement Sector — Energy Efficiency

Mexico's cement sector is one of the most energy efficient in the world



Source: IEA. 2008. Worldwide Trends in Energy Use and Efficiency

Analysis of Mitigation Options

	Emissions Reduction Potentials	Emissions	Redux	Redux
No.	2020 Scenario	MtCO2	MtCO2	%
0	Baseline (BAU)	41.63	0.00	0.0%
1	EE = 3 GJ/t clinker	39.54	2.09	5.0%
2	Blending = 72.3%	37.87	3.76	9.0%
3	Electricity 100% offset	38.15	3.48	8.4%
4	Alt fuels (tires) = 30%	41.05	0.58	1.4%
5	Alt fuels (MSW) = 30%	39.17	2.46	5.9%
6	Alt fuels (sludge) = 30%	36.97	4.66	11.2%
7	Elec. Intensity = 80 KWh/t cement	40.52	1.11	2.7%

Promising Cement Sector Mitigation Options

- Cement blending (3.8 MtCO₂ in 2020)
 - » Barriers include NOMs, market, cost (supply of blending materials?)
- Use of alternative fuels – sludge or MSW (2.5 – 4.7 MtCO₂ in 2020)
 - » Cost-effective? Full implementation cost depends upon choice of alternative fuel and relative prices of alternative fuel vs. petcoke
 - » Primary barriers are legal/regulatory + fuel processing costs
- Replacement of fossil-fuel based electricity generated by CFE with electricity produced by RE (3.5 MtCO₂ in 2020)
 - » Expanded cement sector boundary
 - » May require international assistance in the form of loans
 - » Depends upon how power sector is included in mitigation efforts

Mexico's Cement Sector — Initial Proposal for Sectoral Goals

- **Unilateral: reduce emissions intensity by 5% from BAU in 2020 (2.1 MtCO₂)**
 - » based upon partial deployment of blending option
- **No-lose: reduce emissions intensity by 11% from BAU in 2020 (4.3 MtCO₂)**
 - » reduces intensity to about current EU average
 - » based upon significant deployment of the blending and alternative fuels options
 - » international assistance would be required in the form of loans or partial finance for up-front capital costs of measures
- May want to make goals more stringent if RE option is included in cement sector boundary

Non-Cost Mitigation Barriers in Mexico

Mitigation Barriers – Energy Pricing

- Cement Sector RE
 - » CFE must buy electricity at lowest cost
- PEMEX Co-generation
 - » potentially very cost-effective
 - » at least 3100 MW potential
 - » only 300-500 MW needed for self supply
 - » no guaranteed market for excess generation (and CFE currently has excess capacity)
 - » price paid by CFE would be low

Mitigation Barriers – Energy Pricing

- Iron and Steel Sector

- » Energy costs high because fuel purchased at spot prices (contracting used in U.S.)
- » Electricity prices much higher for industry than for residential customers in Mexico (opposite of U.S.)

- Electricity Sector

- » Fuel pricing and subsidies causes mitigation options that are cost-effective under world prices for fuel oil and NG to be positive cost under the price outlook used by CFE

MAC Table in 2020 with COPAR and World Fuel Prices

Reference Tech Option / New Tech Option	World	COPAR	CO2 Mt
	EUR2007/ CO2 Mt	EUR2007/ CO2 Mt	
Existing Conventional Thermal / Repowering Conventional Fuel Oil Thermal to NGCC	-119.1	2.9	3.7
Existing Conventional Thermal / Wind (Class 7, 5 units)	-44	13.9	8.9
Existing Conventional Thermal / Wind (Class 6, 5 units)	-35.8	22.1	0.4
Coal (2 Units) / Geothermal (MX)	-16.2	-16.2	5.1
Existing Coal / Biomass Co firing - Pulverized Coal Plants	-2.5	-2.5	3.5
Coal (2 Units) / Biomass Conventional	2.1	2.1	0.9
Coal (2 Units) / Landfill Gas	14.5	14.5	2.6
Existing Coal / Repowering Coal to NGCC	15.6	16	3.8
Coal (2 Units) / Solar-Thermal (US)	40	40	1.0
Coal (2 Units) / Hydroelectric - Zimapán	73.1	73.1	1.3
Existing Conventional Thermal / Solar-PV (US)	350.6	408.5	0.0

Mitigation Barriers – Fuel Supplies

- PEMEX fuel oil supply:
 - » Most promising electricity sector mitigation option is repowering of inefficient fuel oil plants to NGCC (beyond BAU conversions) – where would fuel oil go?
 - » Disadvantageous to sell fuel oil in Gulf market
 - Requires transportation costs (and emissions)
 - Depresses price of Maya crude → reduces PEMEX income → lowers Mexican revenues from PEMEX
 - » Could ship to Asia but transport costs incurred
 - » Need to have PEMEX further process fuel oil to other products or find other domestic uses¹⁴

Mitigation Barriers – Other

- PEMEX
 - » Oil refineries are not very energy efficient
 - » PEMEX lacks budgetary authority
 - » EE not a budgetary priority
 - PEMEX taxes provide 60% of government revenues
 - Oil reserves decreasing so exploration is priority
 - » Management capacity
 - » Restrictions on joint ventures
 - » Co-generation opportunity also inhibited
- Energy security
 - » SENER (Energy Ministry) restricts percentage of power generation from NG

Conclusions and Key Outstanding Questions

Conclusions I

- Situation in Mexico is similar to that in U.S.
 - » Can't just assume cost-effective measures are easy to implement
 - » Politics of GHG regulation is just as difficult
 - » Primary industry concern is competitiveness
- Mexico's recent policy reforms address many of the barriers discussed here
 - » Energy reform gives PEMEX greater budgetary flexibility, broadens scope of cooperative ventures
 - » Electricity reform promotes RE and efficient co-generation and includes provisions for new electricity and fuel pricing regulations (including CFE purchase of co-generated power from PEMEX)
 - » Energy Transition Fund (3 years, 3 billion pesos/yr)

Conclusions II

- Sectors are not independent entities → trans-sector cap-and-trade makes sense
 - » E.g., potential solution to fuel oil dilemma
 - PEMEX processes fuel oil to petcoke (PEMEX's emissions rise)
 - Cement industry uses petcoke (cement sector's emissions rise)
 - Power sector switches from fuel oil to NGCC (electricity sector's emissions decrease)
 - **Overall result is emissions decline, but impacts differ across sectors**
 - » Domestic implementation can be designed to be more equitable

Key Question

- Is there an opportunity here to link U.S., Mexican and Canadian cap-and-trade systems to “level the playing field”?
 - » Would recent reforms in public sectors in Mexico be enough to make allowances fungible?
 - » Could only private sectors be linked under a separate cap-and-trade program?

Thank you!

For more information:

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